HP 1000

DS/1000-IV GENERATION AND INITIALIZATION MANUAL

For RTE-A and RTE-6/VM

HEWLETT PACKARD
11000 Wolfe Road, Cupertino, CA 95014

Part No. 91750-90013
E1292

Printed in U.S.A. DEC 1992
Second Edition

PRINTING HISTORY

New editions are complete revisions of the manual. Update packages, which are issued between editions, contain additional and replacement pages to be merged into the manual by the customer. The dates on the title page change only when a new edition or a new update is published. No information is incorporated into a reprinting unless it appears as a prior update; the edition does not change when an update is incorporated.

The software code printed alongside the date indicates the version level of the software product at the time the manual or update was issued. Many product updates and fixes do not require manual changes and, conversely, manual corrections may be done without accompanying product changes. Therefore, do not expect a one to one correspondence between product updates and manual updates.

First Edition	MAY 1990	Revision 5.2/5020
Second Edition	DEC 1992	Revision 6.0/6000

HP Computer Museum
www.hpmuseum.net

For research and education purposes only.

LIST OF EFFECTIVE PAGES

The List of Effective Pages gives the date of the most recent version of each page in the manual.

Effective Pages	Date
all	DEC 1992

PREFACE

AUDIENCE

This manual is intended for the Network Manager or anyone assigned the responsibilities of a Network Manager, which includes system planning as well as the initialization and generation of a DS/1000-IV network. Besides generating the initial network, this person also re-generates and re-configures as is necessary to maintain up-to-date software, and adds additional capability and/or equipment as the requirements of the application change.

ASSUMPTIONS

This manual assumes that the Network Manager or the person assigned those responsibilities is familiar with DS/1000-IV and its capabilities. This person should have read and understood the *DS/1000-IV User's Manual*. It is also assumed that you are familiar with the RTE-A or RTE-6/VM Operating System including File Manager, FMP routines, and RTE generation procedures. If HP 3000 computers are to exist in the network, then familiarity with the MPE Operating System is also required.

This manual may include some information on the DS/1000-IV Compatible Services that are part of the NS-ARPA/1000 product (91790A). This product contains Network Services (NS) and ARPA Services in addition to DS Services. The DS Services in NS-ARPA/1000 were provided for backward compatibility between NS-ARPA/1000 and DS/1000-IV nodes. The NS-ARPA/1000 and DS/1000-IV nodes can communicate through DS Services. This feature of NS-ARPA/1000 can help you migrate from DS/1000-IV to NS-ARPA/1000.

ORGANIZATION

Section 1	Installation Summary
Section 2	Planning the Network Configuration
Section 3	Planning the DS/1000-IV Node Configuration
Section 4	RTE-A System Generation
Section 5	RTE-6/VM System Generation
Section 6	Program Installation
Section 7	Network Initialization
Section 8	Additional Initialization Tasks
Appendix A	Example Answer Files
Appendix B	Glossary

CONVENTIONS USED IN THIS MANUAL

NOTATION	DESCRIPTION
nonitalics	Words in syntax statements that are not in italics must be entered exactly as shown. Punctuation characters other than brackets, braces and ellipses must also be entered exactly as shown. For example: `EXIT;`
italics	Words in syntax statements that are in italics denote a parameter that must be replaced by a user-supplied variable. For example: `CLOSE` *filename*
[ ]	An element inside brackets in a syntax statement is optional. Several elements stacked inside brackets means the user may select any one or none of these elements. For example: [A / B] User *may* select A or B or neither.
{ }	When several elements are stacked within braces in a syntax statement, the user must select one of those elements. For example: {A / B / C} User *must* select A or B or C.
. . .	A horizontal ellipsis in a syntax statement indicates that a previous element may be repeated. For example: [,*itemname*]. . . ; In addition, vertical and horizontal ellipses may be used in examples to indicate that portions of the example have been omitted.
	A shaded delimiter preceding a parameter in a syntax statement indicates that the delimiter *must* be supplied whenever (a) that parameter is included or (b) that parameter is omitted and any *other* parameter that follows is included. For example: *itema*[,*itemb*][,*itemc*] means that the following are allowed: *itema* *itema*,*itemb* *itema*,*itemb*,*itemc* *itema*,,*itemc*

Δ

When necessary for clarity, the symbol Δ may be used in a syntax statement to indicate a required blank or an exact number of blanks. For example:

```
SET[(modifier)]Δ(variable);
```

underlining

When necessary for clarity in an example, user input may be underlined. For example:

```
NEW NAME? ALPHA
```

In addition, brackets, braces or ellipses appearing in syntax or format statements that must be entered as shown will be underlined. For example:

```
LET var[[subscript]] = value
```

shading

Shading represents inverse video on the terminal's screen. In addition, it is used to emphasize key portions of an example.

The symbol ( ) may be used to indicate a key on the terminal's keyboard. For example, (RETURN) indicates the carriage return key.

(CONTROL)*char*

Control characters are indicated by (CONTROL) followed by the character. For example, (CONTROL)Y means the user presses the control key and the character Y simultaneously.

CONTENTS

CONTENTS (continued)

Section 4
RTE-A System Generation

Section 5
RTE-6/VM System Generation

Section 6
Installing DS/1000-IV Programs

Section 7
NETWORK INITIALIZATION

Section 8
ADDITIONAL INITIALIZATION TASKS

CONTENTS (continued)

DS/1000-IV INSTALLATION AND INITIALIZATION SUMMARY

SECTION 1

This section summarizes the tasks required to install and initialize DS/1000-IV. These tasks are divided into these groups and are documented in the rest of this manual:

- **Planning the network configuration** - Configuration includes network boundary definitions, and name and address assignments.

  Install and verify the necessary hardware (I/O cards, cables, computers) for network connectivity.

- **Planning the DS/1000-IV node configuration** - Copy the DS/1000-IV files from the product media to your system. The media is labeled with the RTE utility used to create the media. Refer to the *RTE Utilities Manual* for copying instructions.

  Determine the **internal resources** required for DS/1000-IV. This includes memory, system resources and software modules.

- **Generating the system** - Modify your RTE system generation answer file for your link(s) and DS/1000-IV.

- **Installing DS/1000-IV programs** - Set your working directory to /DS1000. Load the DS/1000-IV programs with LINK or use the supplied load file.

- **Initializing the node** - Run DINIT to create the DS/1000-IV initialization answer file. When running DINIT for the first time, you should create the initialization answer file first and not initialize the DS/1000-IV node. Then, you can check and alter the answer file if necessary. When you are satisfied with the initialization answer file, run DINIT again to initialize DS/1000-IV on your node.

  Modify the boot command file and system welcome file to prepare the system for DS/1000-IV. Modify or add such RTE commands as RP, AS, and RV.

  The initialization tasks for link subsystem(s) and DINIT can be executed from the welcome file. In which case, reboot your system to execute the revised boot and welcome files.

  Initialize the link subsystem (X.25, etc.).

- **Verify that DS/1000-IV is working at your node** - Once you have configured and initialized DS/1000-IV, verify that DS/1000-IV is working at your node. Also verify the appropriate services at each node in the network. Try using the following commands:

  - Use the DSINF NR (print nodal routing vector information) and VA (print DS/1000-IV resources being used) commands.
  - Use REMAT commands to a remote DS/1000-IV node.
  - Use RMOTE commands to a remote HP 3000 node.
  - Use DS File Transparency to copy or list files at another node.

NOTE

You must keep up-to-date copies of the system generation answer, installation, boot, welcome files, and DINIT answer files. Should you have problems with your system, HP will require these files.

PLANNING A NETWORK

SECTION 2

OVERVIEW

In the early design stages, there may be many alternative architectures which appear promising. You may wish to evaluate them to determine the one best suited to your needs, particularly if the project is a large one. You will need to consider the following questions:

- How many terminals are needed?
- What response time will the system provide?
- How much memory is needed?
- What line speeds should be used?
- Would leased lines or direct-dial lines be less expensive?
- What availability will the system have?
- How should the network be structured in order to optimize reliability and performance, yet minimize cost?
- If the requirements of the application change, what effect will a given increase in workload or a few additional terminals or nodes have on response time?

You will need to obtain technical information describing all hardware and software operating systems to be used. Hewlett-Packard provides manuals for all of its systems. Pay particular attention to those sections in each dealing with planning and system generation.

The next few subsections describe aspects of a network that require planning and careful consideration before the initial network is generated.

NETWORK TOPOLOGY

There are many different ways of connecting computers together in a distributed system network. This section discusses some of the basic types. You must consider the effect a given configuration will have on each node's performance, including the effects of the communication line speeds you plan to use. Consult your HP Sales Representative for this information.

String

The "string" topology (see Figure 2-1A) requires one less communication link than there are computers in the network, making it the least expensive in terms of data communications hardware. Each RTE node has the "store-and-forward" capability, so any RTE node can communicate with any other, even though all nodes are not directly connected. Since each node must receive then re-transmit each message destined for nodes other than itself, store-and-forward introduces a delay in each intervening node.

A failure in any node or communication link will prevent the nodes on either side from communicating. For example, in Figure 2-1A, a failure in the Node 3/4 communication link will prevent Nodes 1, 2 and 3 from communicating with Nodes 4, 5, 6 and 7.

Ring

The "ring" structure is basically the same as a "string", with the addition of one link between the end nodes (see Figure 2-1B). To send a message from one node to any other, at most only half the nodes need to become involved; consequently, the store-and-forward delay is less than in a "string". The "ring" structure is often used in data-sharing applications, in which databases stored in various nodes are accessible from all the other nodes.

This architecture is less vulnerable than the "string". If a failure occurs in any one node or link, a path exists by which the other nodes can still communicate, but the store-and-forward delay will then be the same as a "string".

NOTE

With the rerouting software generated into the system, a link failure will automatically cause routing tables to be updated to reflect a new route to the destination, if one exists. System generation is discussed in the "RTE-A System Generation" and "RTE-6/VM Generation" sections.

Legend of Figure 2-1:

A. String
B. Ring
C. Star
D. Hierarchical
E. Ring with alternate paths
F. Star with alternate paths
G. Hierarchical with alternate paths
H. Mixture

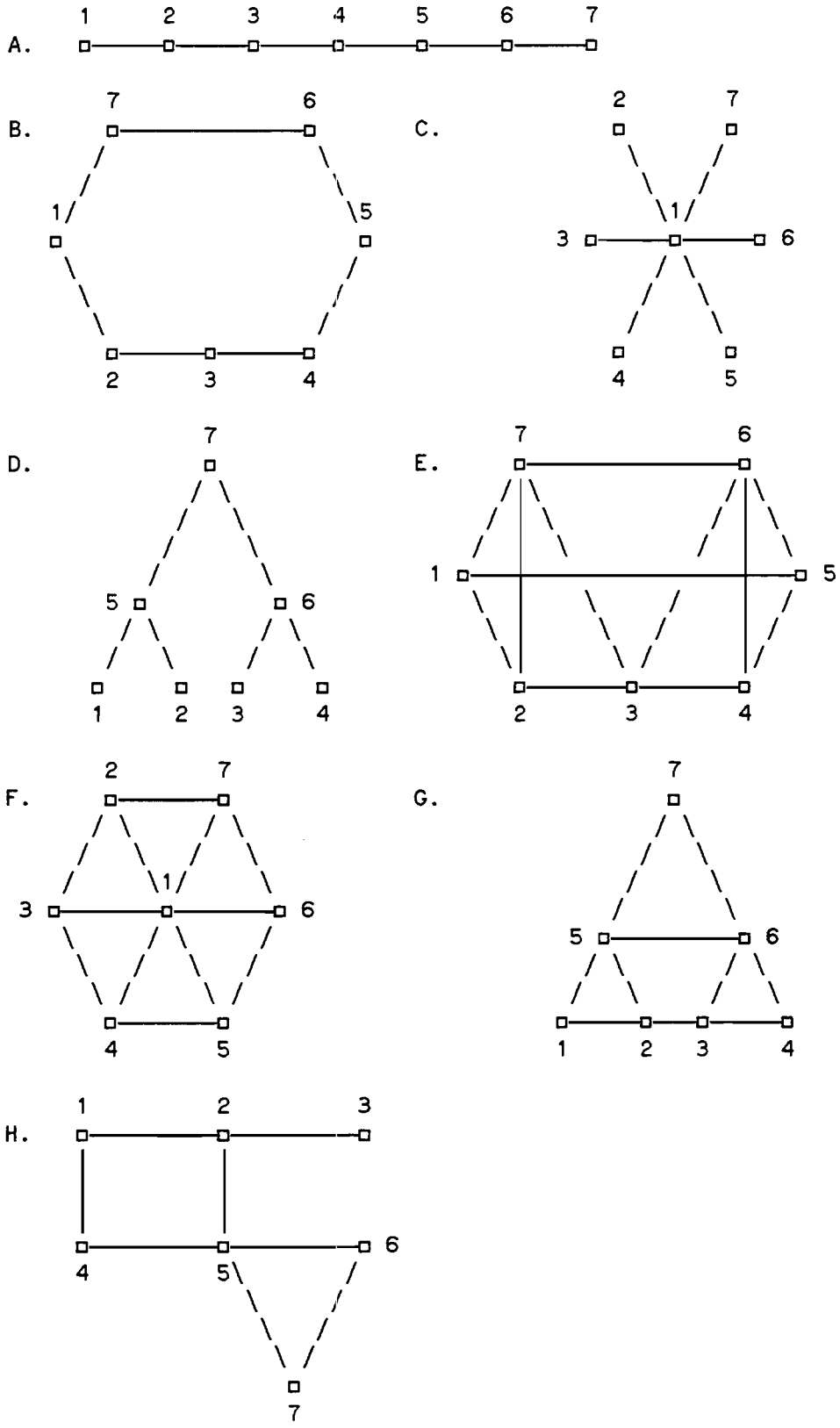


Figure 2-1. Network Topologies.

Star

The "star" (see Figure 2-1C) is often used for centralized data collection, supervisory control, or in applications where the outlying nodes contain computers with little storage capacity, relying on the central node for this purpose. It might also be used where a large database or control program exists in the central node that is accessed by the other nodes. These applications usually make little use of store-and-forward. However, the "star" can be valuable because any computer can communicate with any other with at most one store-and-forward delay.

This configuration is most vulnerable to a failure of the central node, which would prevent any network communications.

Hierarchical

The "hierarchical" structure (Figure 2-1D) is sometimes used with supervisory-control applications, where large databases exist at one node, possibly along with control programs, that are accessed by nodes lower in the hierarchy.

Commands and control setpoints may be computed at the highest level for specific interpretation by each of the lower nodes. The overall algorithm may be designed with the "intelligence" divided among nodes in such a way that a failure in any of the higher-level nodes will allow continued operation by the lower-level nodes, although perhaps in some degraded fashion.

It may also be used in distributed database applications. For example, in Figure 2-1D, data may be stored at nodes 5 and 6 for use by nodes 1 thru 4. This information-sharing application saves the cost of two discs.

A failure in the lower nodes will only affect the area it controls. This configuration is the one least vulnerable to failures, except for the alternate-path structures.

REDUNDANT LINKS OR ALTERNATE PATHS

Addition of redundant links or alternate paths can reduce the network's vulnerability to failures in any communication line or related equipment (modems, cables, interfaces, computers, discs, and so forth). Figures 2-1E thru G show the ring, star and hierarchical structures with the addition of redundant communication links. Notice that in each case, the network is far less vulnerable to failures. Some can even operate after more than one link or node failure.

With the automatic rerouting capabilities of DS/1000-IV, alternate or redundant links are easy to use. When the network initialization files are created for each node, all links including redundant links out of a node are described. A relative cost factor is assigned to each link to indicate which path is the preferred path to use.

With information about all links leaving the node, and added intelligence to select the best route, best path selection will occur automatically. When one link goes down for any reason, a calculation is made using the cost values assigned to various alternate links, and a new best path is determined and brought into service automatically.

The "Network Initialization" section will provide more information on setting up your cost values.

All the examples above have very regular, symmetric topologies. Of course, there are many other non-symmetric examples, such as in Figure 2-1H.

ADDRESSING

Any HP 1000 node can communicate with any other HP 1000 node if a direct or indirect path exists between them by means of communication links. If one or more HP 3000 nodes exist in the network, they can communicate only with their neighboring RTEs and vice-versa. Using the Remote I/O Mapping features of DS/1000-IV any node in the network may access the HP 3000 using the program RMOTE. Remote I/O mapping is explained in the *DS/1000-IV Theory of Operation and Troubleshooting Manual*, and RMOTE is explained in the *DS/1000-IV User's Manual.*

For example, in Figure 2-2, assume node 7 is an HP 3000. Only nodes 5 and 6 can communicate with node 7. Nodes 1, 2, 3 and 4 can put data in a file at nodes 5 or 6, and nodes 5 and 6 can pass the information to node 7. However, nodes 1, 2, 3 and 4 cannot place the information directly into a file at node 7.

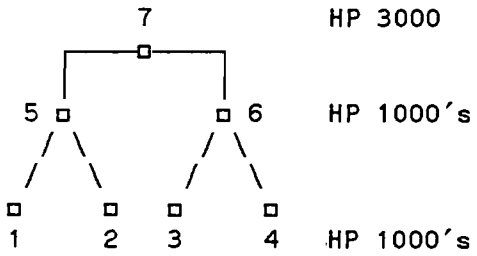


Figure 2-2. Complex Network.

Any HP 1000 node can communicate with any number of other HP 1000 nodes, provided enough memory exists to contain the network-routing information (the size and format of this table is shown in the *DS/1000-IV Theory of Operation and Troubleshooting Manual*). When RTE Session Monitor is present in any node in the network, each program is restricted to accessing 16 different nodes at any one time.

Each node has a particular path of communication to the other nodes. In some structures, there is only one choice. For example, in Figure 2-1A, node 1 can communicate with node 5 only by going through nodes 2, 3 and 4. In other structures the path is up to the Network Manager. In Figure 2-1B, node 1 can communicate with node 5 through nodes 7 and 6, or through nodes 2, 3 and 4. The paths can be changed either by using Automatic Rerouting as a result of link failures, or by using the DSMOD CN command discussed in the "Network Initialization" section later in this manual.

Each HP 1000 node has a unique "node number" associated with it. When a program wishes to communicate with another node in the network, it may address that node by the node address parameter value of the Program to Program (PTOP) call. A specific node may be addressed by using the node's number in the node address parameter of the PTOP call or the DS service command. You should assign globally unique node numbers when the interconnection of two or more networks is a possibility. This prevents network downtime that would be necessary to reconfigure network node identifiers.

A second way of addressing nodes is available if the two nodes are neighbors. A program can address a neighbor node by using the negative of the communication link logical unit number in the nodal address parameter. Using a negative LU number is the only way an HP 3000 node can be addressed.

The third way to address a node is by supplying a node number value of -1. This informs the system to direct the request to the local node, a useful feature when developing programs because communication links are not used, and both the master and slave programs exist in the same node.

RELIABILITY AND REDUNDANCY

Redundancy can greatly improve reliability; with sufficient redundancy, a distributed system can be designed which is almost never "down". The next section discusses ways in which a network can be structured to increase overall reliability, including calculations which can be used to evaluate the merits of a particular architecture against another. Hardware failures are discussed here. Software failures are much more difficult to control.

Although the chances that any piece of equipment will fail are small, no reasonably complicated system can ever be guaranteed 100% failure-free. The network depends on many individual modules, each with its own probability of failure. Overall availability depends upon the reliability of each of these units, and whether redundant units are available. If so, failures can be isolated at the module level by replacement, increasing system availability.

Many application systems have as a design requirement the ability to "fail-soft" in the event of hardware failures.

If redundancy exists, failures can be bypassed, and the fault traced to a replaceable part or module level while the applications software continues using the redundant links or nodes. Notice that the software need not necessarily be aware that the changeover has taken place. The procedure for bypassing a bad node or link is described in the troubleshooting section. It is important that considerable thought be given to the advantages of redundancy at the network planning stage, in order that the day-to-day operation be smooth and free of "surprises".

Some equipment requires periodic maintenance that cannot be done online. If a network has been designed to be redundant, these scheduled shutdowns can be handled smoothly, even in systems requiring around-the-clock operation.

So far, all this is intuitively apparent. However, a quantitative analysis can provide a valuable estimate of the system's overall availability, and, conversely, how often it is "down". Overall network availability is that portion of time during normal operating hours that the network is fully operational. Failures in any part of the network critical to its operation must be repairable quickly if the availability is to be kept high. The "Troubleshooting" section of the *DS/1000-IV Theory of Operation and Troubleshooting Manual* will help locate failures efficiently, but the highest availability can only be obtained when spare modules exist which can be quickly and automatically switched into the network in the event of a failure. System availability is defined to be equal to:

$$\frac{MTBF}{MTBF + MTTR}$$

where

MTBF = Mean Time Between Failure

MTTR = Mean Time To Repair

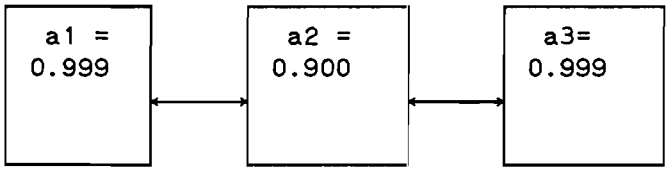
MTTR includes diagnosing the problem and replacing the failed part, module, or subsystem.

Availability is simply the probability that the system is operational at any single instant of time. It is highest when MTTR is low and MTBF is high. The designer can minimize MTTR by providing spare units which can be switched over online, and maximize MTBF by operating the equipment well within the manufacturer's environmental specs, particularly temperature, humidity and vibration. High temperature drastically accelerates semiconductor failure mechanisms; high humidity can corrode connections and provide conductive paths between traces on printed circuit boards. Vibration causes wear in PC board connectors.

In the examples below, various configurations and their availabilities are described. Arbitrary sybsystems are shown as boxes, which may represent any level of complexity, from an interface card to a computer system. For reliability calculations, the only concern is the availability of the subsystem, how it is connected to the other subsystems, and whether the overall system can operate even if it fails. Hypothetical availability figures are assigned to illustrate how overall availability is affected by changes in system configuration. These numbers bear absolutely no relationship to any real equipment.

Example One

In this example, three subsystems are connected in series, so that they must all be operational in order to be useful. Such a connection might be a simple modem link, with two modems and a telephone line. Sample availabilities for each module are shown as a1, a2, and a3.



Note: the sample availabilities do not represent the values for any particular piece of equipment.

The availability for any number of modules connected in series is simply the product of the availabilities of each:

$$a = a1 \times a2 \times a3 = 0.8982009$$

In other words, this subsystem would be available a little less than 90 percent of the time. Note that the overall availability of such a series-connected system is worse than the worst component (a2).

Example Two

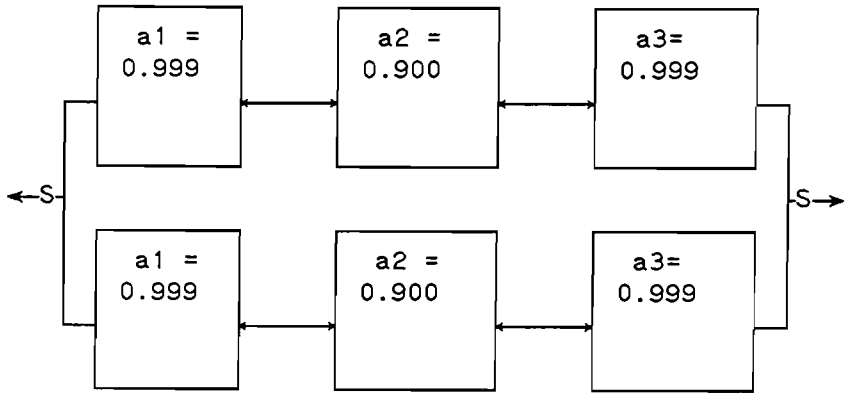
Suppose that by stocking spares (lowering MTTR) we can increase the availability of each to a1 = a3 = 0.9999, a2 = 0.99. Then:

$$a = a1 \times a2 \times a3 = 0.98980201$$

The cost is at least twice as high (if a spare is needed for every part), but the system would be unavailable only about 1.1% of the time, a tenfold improvement.

Example Three

Suppose two such modem links are used, each with spares:



Where the point marked S represents some apparatus for switching between either of the two subsystems. In the case where the boxes marked a1 and a3 represent RTE-to-RTE communication interfaces, S might be software to switch the logical unit numbers to the spare path represented by the lower boxes a1, a2, and a3.

Assume these are connected in such a way that, if either a1, a2 or a3 in either subsystem fails, then the other subsystem could be switched in. This form of parallel interconnection is referred to as "tandem". The availability of a pair of subsystems connected in parallel is:

$$a = 1 - (1 - a4) (1 - a5)$$

where a4 is the availability of one of the two tandem subsystems (a1 × a2 × a3), and a5 is the availability of the other.

This is simply the probability that both will not be out of service at the same time. In this example, the availablility of each of these two subsystems is the same as our second example, 0.98980201. Substituting this value for a4 and a5, yields 0.999896001. Such a system has nearly 100 times less downtime than the one in Example 2. It would be unavailable for approximately one hour a year, assuming 24-hour-a-day operation.

Example Four

The cost of a tandem system can be lowered if less expensive components are used, yet often the reliability required can still be maintained. Assume that availability is also lowered to that of the first example, but assume no spares. Its availability is:

```
a = 1 - ( 1 - 0.8982009) ( 1 - 0.8982009 ) = 0.989636943
```

This is about the same as Example 2. Since the same number of units are required, including spares, the cost may be the same or less than Example 2. This example illustrates the point that, if high availability is a major criterion, it is suggested that you include enough spares for links at each node, and generate each system to include them. Higher availability can be obtained if the spares to be connected can be switched into service online, since the MTTR in such a configuration is lower.

The point is a distributed system can be designed to provide higher availability than a single-computer system. If high availability is important, one or more complete systems can be connected together, and the software designed in such a way that very fast response time is offered when both systems are working, with somewhat slower response time if one system has failed.

You may wish to consider the advantages of including "soft-fail" features in the software design. For example, if the application requires that data be stored in disc files, the software could be designed to record all transactions at several of the nodes. If one node fails, all further transactions would be recorded at the remaining nodes. The procedure for bringing a node back online would include searching all other nodes for update transactions. This method would guarantee that as long as there was one node online, transactions could continue to be processed with the only loss of capability being the terminals attached to the failed system(s).

The network may be designed such that, if part of the network fails, reduced capability or slower response time occurs, but the most important capabilities are still available. This is called "functional availability".

In the above examples, it is assumed that failures occur independently; that is, one failure does not cause, and is unrelated to, another. At the system level, where modules are connected in only a few places, this is generally true (for example, an internal "short" in an integrated circuit in one computer does not cause a failure in another computer). This statistical independence is assumed in the calculations above (the probability of simultaneous occurrence of two independent events is the product of their probabilities). However, the designer should take care to avoid certain conditions which can cause massive, simultaneous failures. For example, if two nodes are in the same building, they should be connected to separate power circuits (otherwise a power failure will affect both). Operation should be well within the equipment's environmental specifications (temperature, humidity, vibration, and so forth); it is better to be on the cool, dry side of the operating range, if possible. Severe vibration can also cause massive failures; the limits are generally specified in the environmental specifications. Power line surges and momentary dropouts may cause erratic operation in several subsytem modules; check the manufacturer's documentation for limits. Static electricity discharge into the equipment can be controlled by conductive, grounded floor mats. If hardwire links are used, they should be protected from lightning; a "hit" may severely damage both sides. Communication cables should be run through cable troughs to protect them from damage.

PLANNING A DS/1000-IV NODE CONFIGURATION

SECTION 3

OVERVIEW

DS/1000-IV includes the following features:

- **Microprocessor based serial communication cards.** These are provided to off-load the communication interrupt and protocol processing from the HP 1000. These cards use the High Level Data Link Control (HDLC) protocol between HP 1000s and BISYNC for HP 1000-HP 3000 communication. Both links provide full modem support.

- **Single driver.** The DVA66 driver communicates with both the BISYNC card, for traffic to the HP 3000, and with the HDLC card, for traffic to other HP 1000s. DVA66 is the driver for RTE-6/VM; in RTE-A, the driver is ID*66.

- **Automatic or Dynamic Rerouting.** This is implemented to automatically switch message traffic around a failed network link or node and to find other communication paths for use in delivering messages to the destination node.

- **Message Accounting.** This is an end-to-end protocol that insures delivery of a message to the destination node before discarding the message in the source node.

- **Remote Session Monitor.** This allows DS/1000-IV programs to access group and private disc cartridges as well as system cartridges on other session nodes in the network. Session nodes are RTE-6/VM systems only. Remote Session also enforces the capability checking associated with the session established for the remote user. Remote access to LUs 2 and 3 is subject to the same restrictions as is the local session user.

- **Remote I/O Mapping.** This feature makes sharing resources transparent to many standard RTE programs. For example, a magnetic tape, usually LU 8, can be shared by several nodes in the network. This is done by mapping LU 8, on nodes where the device does not exist, to LU 8 on the node where the device does exist.

- **Network Utilities.** These enable the network manager to evaluate communication problems that arise.

- **Simple Initialization and Modification of DS.** There are two programs for initializing and modifying DS. DINIT handles DS initialization and DSMOD handles modifications to DS parameters after initialization.

This section describes the following resources needed by DS/1000-IV. You will need this information when planning your node configuration, generating and booting up your system, installing software programs, and initializing your node.

- Message Accounting
- Dynamic Message Rerouting
- Remote Session
- Remote I/O Mapping
- X.25
- Disc Space
- Interface Drivers
- DS/1000-IV Programs
- Libraries
- System resources
- Remote Database Access
- VPLUS/V Intrinsics
- APLDR vs LOAD and MEMRY
- FMGR Files
- Block Transfers
- Multiuser Environment

MESSAGE ACCOUNTING

Message accounting provides what is called an "End-to-End" protocol as opposed to a "Point-to-Point" protocol. A point-to-point protocol is only concerned with a successful transmission of the message from one interface to another over a transmission medium (wire, microwave, fiber optics). The Message Accounting "End-to-End" protocol ensures that a message sent by one node is successfully received by the destination node no matter which physical "Point-to-Point" paths are used.

With the advent of microprocessor based communication interfaces, which DS/1000-IV uses, and with onboard storage for a number of incoming and outgoing messages, more opportunities exists for messages to get lost. Power failure on the interface and not necessarily to the CPU leaves the link level software (the driver) with no knowledge of which messages have or have not been successfully transmitted by the card. Link failures resulting in rerouting may also cause duplicate messages to be received.

The Message Accounting (MA) software assigns a sequence number to each outgoing message and ensures that the message can be regenerated should a link failure occur before an acknowledge is received from the destination node. This acknowledge indication is simply included in any reply message going to the origin node and does not necessarily generate additional link traffic for the acknowledgement process. With this sequence number/acknowledge scheme duplicate messages can be detected and discarded as well.

So, what is Message Accounting? Simply an end-to-end protocol that insures your messages arrive at the destination node successfully, one time and one time only.

Do I Need Message Accounting?

Message Accounting is most useful in situations where duplicate messages or lost messages would produce undesirable results. In the case of a central database receiving updates from many satellite nodes, duplicate entries would typically produce confusing and inaccurate information to those viewing the database. For example, if the satellites are sending order entry information from sales offices around a large geographical area, an entry made more than once when a single entry was intended will no doubt constitute "undesirable results". If the order wasn't made at all because of link failure, equally undesirable results will occur. Message accounting solves these problems by ensuring the data is received by the software in the destination node and not just received by the interface microprocessor and its firmware.

In many applications message accounting is simply unnecessary. For this reason the option of leaving it out is provided. If, for example, the only traffic between two given nodes is operator commands where duplication may not be a problem, MA need not be initialized between them. Message Accounting is only available for DS/1000-IV to DS/1000-IV connections and is not used on the HP 1000-HP 3000 link.

What Price Do I Pay?

Using the MA software means executing more instructions for each message processed by the node. MA appends approximately 416 (octal) words to each DS master program and each DS slave monitor, and approximately 2263 (octal) words to the General Request Reply Processor (GRPM). Further discussion on GRPM is in the *DS/1000-IV Theory of Operation and Troubleshooting Manual*

DYNAMIC MESSAGE REROUTING

Dynamic Message Rerouting in DS/1000-IV provides for automatic communication path switching as a result of a link or node failure. Rerouting is available for DS/1000-IV to DS/1000-IV connections only.

With rerouting, the DS/1000-IV user is not required to manually reinitialize every node affected by the failed path, in order to route traffic around the failure. Instead, the rerouting software maintains tables in System Available Memory (SAM) that indicate the "best" path and alternate paths to various nodes in the network. When a failure occurs, the rerouting software examines its tables and determines if another route to the node being accessed exists, if more than one exists, and which route is the best. When a new best route has been determined, messages are sent out to the neighboring nodes to inform them of the routing change. After these messages have been sent to all affected nodes DS has automatically routed around the failed link. Messages are printed on the system console to indicate the failure has occured. Further discussion on Rerouting is in the *DS/1000-IV Theory of Operation and Troubleshooting Manual*,

When the failed link is restored to service, the availability of the link is automatically recognized on HDLC links. The link up processing consists of making a new evaluation to determine if this new link is a better path to some nodes in the network and make the appropriate changes in the Nodal Routing Vector (NRV).

Do I Need Rerouting?

If your network is critical enough to need secondary communication channels in the event of failure of a primary channel, adding the rerouting software and the hardware to provide alternate paths to your DS generation certainly makes sense.

If you will have only one path to certain nodes, as in the case of a string or star topology, rerouting capabilities and the memory space they occupy will be wasted in those nodes. If you have two computers in your network with one link between them, rerouting is unnecessary. The rerouting option is selectable on a node or link basis:

- A node may or may not have the rerouting capability, depending on the generation;
- The link may or may not be enabled as a rerouting link during node initialization.

What Price Do I Pay?

Rerouting adds approximately 4000 octal words to GRPM. No other software is affected. Another separate program, SEND, recommended to be memory resident, is used to send routing information to other nodes. This program can be disc resident and does not need to occupy a partition when dormant. An ID segment is required at all times.

Additional SAM is required to contain the Cost Matrix (2 words times the number of rerouting LUs times the number of nodes) and the Link Vector (6 words times the number of rerouting LUs).

REMOTE SESSION MONITOR

DS/1000-IV programs cannot execute outside of the RTE Session environment without using special access codes. Remote Session Monitor takes care of establishing a session under which incoming requests are processed.

With Remote Session Monitor present in the session nodes, other nodes are able to attach to various session accounts and access private and group cartridges available to that session, as well as system cartridges.

What Monitors Do I Need?

Both the Operator Request Monitor (OPERM) and the Remote Session Monitor (RSM) must be active in any Session node for other nodes to access it. Therefore, you need RSM and OPERM in all nodes using Session Monitor.

Non-session nodes wishing to access a session node must have the appropriate Remote Session Libraries included in the generation.

What Price Do I Pay?

The Remote Session Monitor, as with all monitors, is fully swappable so it can share a partition with other DS monitors. RSM occupies a four-page partition. The Operator Request Monitor is fully swappable and occupies a five-page partition. Since OPERM provides many services in addition to those related to remote session, you may already plan to use it.

Approximately 2000 (octal) words are appended to any DS program when a session node is anywhere in the network.

REMOTE I/O MAPPING

Remote I/O Mapping provides the capability to map or "redirect" output for logical units existing on one DS/1000-IV node in the network to a logical unit on another DS/1000-IV node in the network. This capability allows programs that have had no special DS calls programmed into them to interact with devices on other nodes as though they were interacting with devices on the local CPU. Remote I/O mapping is not supported on DS/1000 nodes; remote I/O mapping is available for DS/1000-IV to DS/1000-IV connections only.

For instance, FMGR can be made to read from and write to terminals on remote nodes. Remote I/O Mapping also increases the ability to share peripherals in the network. Further discussion on Remote I/O Mapping is in the *DS/1000-IV Theory of Operation and Troubleshooting Manual.*

Do I Need Remote I/O Mapping?

If there are peripheral devices unique to a particular node in the network and the transparent access to those devices would be useful, Remote I/O Mapping should be included in the generation. This feature allows inexpensive memory only nodes in the network to avoid the expense of a terminal. The concept of a terminal-less node is now possible where messages usually sent to the system console on the terminal-less node are actually mapped to an operator or system console somewhere else in the network.

If these features can or should be utilized in a particular node or throughout the network, then you need Remote I/O Mapping.

What Price Do I Pay?

The Remote I/O Mapping feature is implemented with a mapping driver, DVV00 which occupies a driver partition, and at least two EQT and DRT entries are required. Two programs, LUMAP and LUQUE, and the driver, are required in the node where these mapped requests will be initiated. An optional program, SYSAT, is used when a terminal is "mapped" to another node. Further discussion on Remote I/O Mapping is in the "Generating a DS/1000-IV Network" sections of this manual and in the *DS/1000-IV Theory of Operation and Troubleshooting Manual.*

USING DSN/X.25

DSN/X.25 is a set of programs and drivers that can be used in combination with the LAP-B interface card to:

- Connect an HP 1000 to either a public or private X.25-compatible Packet Switching Network (PSN).
- Connect, by means of short haul modem, an HP 1000 to another HP or non-HP computer that uses the same X.25 protocol.
- Connect asynchronous HP terminals to an HP 1000 through a PSN.

The DSN/X.25 connection can consist of either a PSN or a modem link. If a telephone line is not used for the modem link, then a "hardwired link" between two computers can be obtained by using short haul or baseband modems.

DSN/X.25 can be used with DS/1000-IV in HP 1000s with RTE-A or RTE-6/VM operating systems to provide a total network solution for X.25 based connections between HP 1000s. All of the DS/1000-IV features, with the exception of the Forced Cold Load and Virtual Control Panel facilities, are supported over these X.25 links. Communication between HP 1000s utilizing DSN/X.25 can take place using Switched Virtual Circuits (SVCs) with defined addresses, or Permanent Virtual Circuits (PVCs). There is no reestablishment of PVCs when a network restarts after going down. There is a reestablishment of SVCs when a network restarts.

When used in combination with DSN/X.25 on an HP 3000, DSN/X.25 on an HP 1000 can provide communication between an HP 1000 and an HP 3000 over an X.25 link, and supports all of the standard DS/1000 to DS/3000 features. HP 1000 to HP 3000 communication via DSN/X.25 is restricted to SVCs with POOL LUs. (SVCs, PVCs and POOL LUs are described in detail in the X.25 manuals listed below.)

This manual and *DS/1000-IV Theory of Operation and Troubleshooting Manual*, provide information on the DS programs that are needed by a system that uses both DS/1000-IV and DSN/X.25. In addition, the "Example Generation Answer Files" appendix of this manual includes two sample system generation answer files which include X.25, one for RTE-6/VM and another for RTE-A. However, for specific information on system generation and initialization with DSN/X.25, you should refer to the following manuals:

91751-90002 DSN/X.25/1000 Reference Manual
91751-90003 DSN/X.25/1000 Advanced Guide
32187-90001 DSN/X.25 for the HP 3000 Reference Manual
5958-3402 X.25: The PSN Connection, An Explanation of Recommendation X.25
5955-7625 LAP-B Interface Firmware Installation Manual
12826-91001 M/E/F-Series PSI (MODEM) Installation and Service Manual
12042-91001 L/A-Series PSI (MODEM) Installation and Service Manual

DISC SPACE (RTE-6/VM)

In RTE-6/VM, initializing the system (and, if present, the auxiliary disc) disc defines the size of the track pool. The track pool consists of tracks on the system and auxiliary disc between the last track used to store the system and the start of the File Area. Disc space in the track pool is used, among other things, to swap programs. If there are not enough disc tracks to swap a program out of memory, the program remains in memory despite the fact that a higher-priority program may be scheduled. This condition only occurs when both programs are disc-resident and there are no free partitions. It can stall network activity considerably if it happens, possibly resulting in transactions timing out.

The multiple DCB version of RFAM can use disc tracks for overflow storage of DCBs. This disc usage is set up when you answer the DINIT question "INPUT # FILES?" with a positive number larger than the number of DCBs which RFAM can store in its partition. You should allow extra tracks for this if you require RFAM to handle more files than it can store in its partition. If stored on the disc, each DCB requires three 64-word sectors. Refer to the description of RFAM under "DS/1000-IV Software" in this section.

INTERFACES AND DRIVERS FOR RTE-6/VM

On RTE-6/VM systems, select code is affected by the interface card position. The lower the card's position, the higher its priority. Privileged drivers should have a higher priority than unprivileged drivers. Therefore, privileged drivers should have a lower select code. DVA66 is not a privileged driver, so the HDLC and BISYNC interface cards should not be inserted below the privileged fence. In other words, all privileged drivers should be inserted before the HDLC and/or BISYNC cards.

Table 3-1 lists the DS/1000-IV communication drivers for RTE-6/VM.

Table 3-1. DS/1000-IV Communication Interfaces for RTE-6/VM

RTE INTERFACE	LINK TYPE	DRIVER	PRIVILEGED?
12825	direct connect HDLC	DVA66	no
12834	direct connect BISYNC PSI (HP 1000 - HP 3000)	DVA66	no
12250	X.25 LAP-B modem: device driver	DDX60.REL	no
	interface driver	DVM00	no
	pseudo-device driver	DVX00.REL	no
	customizing subr. address table	CSV66	no

The HDLC and BISYNC interface cards used with DS/1000-IV use a microprocessor to perform all line-interrupt processing and to perform all modem and line interfacing functions. Also, messages are passed to and from the microprocessor based cards via DMA channels.

Refer to the *DSN X.25 Reference Manual* for information on all the drivers and modules needed for X.25.

INTERFACES AND DRIVERS FOR RTE-A

On RTE-A, select codes are not tied to the card position and have no affect on privileged drivers. The position of the interface card in the backplane determines the card's priority. The lower the card's position, the higher its priority.

Table 3-2 lists the DS/1000-IV communication drivers for RTE-A.

Table 3-2. DS/1000-IV Communication Interfaces for RTE-A

RTE INTERFACE	LINK TYPE	DRIVER	PRIVILEGED?
12007	modem HDLC	ID*66	no
12044	direct connect HDLC	ID*66	no
12073	modem BISYNC PSI	ID*66	no
12082	direct connect BISYNC PSI	ID*66	no
12075	X.25 LAP-B modem: device driver	DD*60.REL	no
	interface driver	%IDS00.REL	no
	pseudo-device driver	DDX00.REL	no
	customizing subr. DS ports	%CXL66	no

The BISYNC PSI cards are used for HP 1000 - HP 3000 communication.

Refer to the *DSN X.25 Reference Manual* for information on all the drivers and modules needed for X.25.

DS/1000-IV PROGRAMS

This subsection summarizes the DS/1000-IV programs which are used as monitors, communication programs, and utilities. Some programs are required for certain configurations. Other programs are optional depending on the features and user services offered.

The programs are divided into the following groups:

- Required DS/1000-IV Programs
- DS/1000-IV programs for RTE-RTE
- DS/1000-IV programs for RTE-MPE
- Slave monitors

Required DS/1000-IV Programs

The following programs are required in all DS/1000-IV nodes:

DSQ
for RTE-A only

An RTE-A module required to be relocated in the system generation in order to initialize DS/1000-IV. This module re-queues class I/O messages between DS/1000-IV programs. %DSQ is part of the RTE-A operating system software and is partitionable.

DINIT

Initializes the network, and which performs utility functions described in the "Network Initialization" section of this manual. There are two versions of the program DINIT. The relocatable file %DINIT is the standard and smaller version; %DINIS has the extended capability to "shutdown" all DS/1000-IV activities at a given node. "Shutdown" is described in the "Network Initialization" section. Only the RTE-6/VM DINIT softwware can be generated into the system. In RTE-A, DINIT is not generated in. You may also replace one with the other online, but one is required in order to initialize a node for network communications.

DINIT loads as Priority 26, Program Type 19, and uses approximately 10 pages.

DSMOD

Provides a means for altering DS/1000-IV parameters originally set by DINIT during initialization. DSMOD allows the user to change the HP 3000 ID sequence, re-enable a link, display the NRV (Nodal Routing Vector), change the non-Session Monitor password, quiesce the node, schedule additional monitors, adjust timing, change the default Session Monitor user name, and change the Nodal Routing Vector.

DSMOD loads as Priority 26, Program type 19, and uses approximately 8 pages.

WARNING

In RTE-6/VM nodes, DINIT and DSMOD have entry points referenced by appended routines. Undefined external references will result if DINIT and DSMOD are not relocated during generation.

UPLIN — The Communications Management Timeout and Re-enable Module which maintains a running time on all transactions, and artificially terminates ("times out") any transaction which is not serviced within a user-specifiable time limit. It can restart any HP-supplied slave monitor that has been aborted, and logoff HP 3000 or HP 1000 sessions whose creating program has terminated with a session still outstanding. In RTE-6/VM, UPLIN should be made memory resident.

UPLIN loads as Priority 3, Program type 17, and uses approximately 8 pages.

QCLM — Communications Error Logger--Prints most errors on behalf of system programs. QCLM should be made memory resident.

QCLM loads as Priority 28, Program type 19, and uses approximately 4 pages.

QUEUE — A DS/1000-IV program scheduled by DVA66 or ID*66 to allocate a class buffer in SAM to receive incoming messages. QUEUE should be made memory resident. If X.25 is initialized, QUEUE should have a higher priority than XNET. HP recommends two for a priority for QUEUE and three for a priority for XNET.

QUEUE loads as Priority 2, Program type 17, and uses approximately 2 pages.

RES — Contains entry points (for example, list heads and class numbers) stored in SSGA for RTE-6/VM or labeled common for RTE-A.

Use %RESSM for RTE-6/VM systems with Session Monitor.

Use %RESM for RTE-6/VM systems without Session Monitor.

Use %RESA for RTE-A systems.

RES loads as Program type 30 and uses approximately 0.5 pages plus the base page.

DS/1000-IV Programs for RTE-RTE

The following programs are used between RTE nodes. Choosing the programs depends upon the network, the operating system used, and capabilities desired. These programs may be included in the RTE generation or restored with the RP command during boot-up.

If other RTE-6/VM or RTE-A systems are connected, always include the following module:

GRPM — RTE-RTE request/reply processor. In RTE-6/VM, GRPM should be made memory resident.

GRPM loads as Priority 4, Program type 17, and uses approximately 7 pages.

Other DS/1000-IV programs that may be necessary are:

APLDR
for RTE-A only

Absolute program loader. Programs prepared by the appropriate loader can be loaded into a remote system for execution if the remote system has APLDR.

Relocate %APLDL. When loading APLDR in memory-based RTE-A systems, you must search $DSLDR before searching $CMDLB. Do not search $DSLDR in disc-based systems.

APLDR processes REMAT LO, IO, and PL commands and FLOAD utility calls. If you generate in %LOAD and %SWAP or %MEMRY, you can not use the REMAT LO command or the FLOAD utility.

APLDR loads as Priority 40, Program type 1, and uses approximately 8 pages.

DLIST

Remote Directory List. Use %DLIS2 for RTE-A. Use %DLIS1 for RTE-6/VM.

DLIST loads as Priority 30, Program type 19, and uses approximately 6 pages.

DSINF

DS Information Utility. Prints out internal table information, class numbers in use by DS, and parameters for Remote Session Monitor, Message Accounting and Rerouting. The table information is in SAM and SSGA for RTE-6/VM and in SAM and labeled common for RTE-A.

Use %DSINF in RTE-6/VM nodes with RTE-RTE, or RTE-RTE and RTE-MPE links.

Use %DSIN2 in RTE-6/VM nodes with RTE-MPE links only.

Use %DSINL in RTE-A nodes with RTE-RTE, or RTE-RTE and RTE-MPE links.

Use %DSINL in RTE-A nodes with RTE-MPE links only and search $DSLB2.

DSINF loads as Priority 65, Program type 19, and uses approximately 12 pages.

DSVCP

DS Virtual Control Panel operator interface module for remote control of the A-Series front panel.

DSVCP loads as Priority 90, Program type 19, and uses approximately 6 pages.

DVV00

Remote I/O Mapping driver. Use %ADV00 with RTE-A. Use %MDV00 with RTE-6/VM.

DVV00 uses approximately 1 page.

EXECM

Remote EXEC Monitor. Services remote EXEC (DEXEC) calls. This module must be present in all RTE destination nodes where any remote EXEC calls will be processed. These requests may come from other HP 1000 or HP 3000 nodes. EXECM is required for REMAT and I/O Mapping also.

EXECM loads as Priority 30, Program type 19, and uses approximately 9 pages.

EXECW

Remote "schedule with wait" Monitor (with or without queuing). Services remote EXEC (DEXEC) requests to schedule programs with wait. This program must be present in all RTE destination nodes to run a program from REMAT or to execute the

LO (load) and PL (Program List) commands on memory based nodes.

EXECW loads as Priority 30, Program type 19, and uses approximately 5 pages.

IOMAP — User interface for setting up Remote I/O Mapping.

IOMAP loads as Priority 90, Program type 18, and uses approximately 7 pages.

LUMAP — DEXEC Request Module for Remote I/O Mapping.

LUMAP loads as Priority 30, Program type 18, and uses approximately 11 pages.

LUQUE — Provides class buffers for Remote I/O mapped data transfer.

LUQUE loads as Priority 25, Program type 18, and uses approximately 2 pages.

MATIC — Provides time-out processing for the Message Accounting feature.

MATIC loads as Priority 30, Program type 19, and uses approximately 3 pages.

$MWB1 for RTE-A only — Used by APLDR to move words across maps. This module is required only when APLDR is used for downloading programs from remote nodes. If used, %MWB1 must be relocated in the system area during system generation. %$MWB1 is provided with RTE-A software.

$MWB1 loads as Program type 0 and uses approximately 1 page.

OPERM — Remote RTE operator command capability. OPERM is required for all Session Monitor systems (see RSM program). OPERM should be included at all nodes in order for remote RTE operator commands to be executed. Also handles remote RTE commands from an HP 3000.

Use %OPERL with RTE-A; you must search $CMDLB when loading on RTE-A.

Use %OPERM for RTE-6/VM.

OPERM loads as Priority 30, Program type 19, and uses approximately 5 pages.

PLOG — Provides a trace capability for RTE-RTE links. Writes incoming messages to a file for later processing by TLOG.

In RTE-6/VM, PLOG must be loaded with the DC (Don't copy) option.

PLOG loads as Priority 30, Program type 19, and uses approximately 6 pages.

PROGL — Slave monitor for remote download. Can simultaneously handle requests from up to 20 nodes at the same time. Use %PROGL for neighbor download; use%PROGZ for store and forward download. User supplied subroutines enable store and forward and/or LU to file conversion capabilities.

PROGL loads as Priority 30, Program type 19, and uses approximately 9 pages.

PTOPM — PTOP Communication slave monitor. Handles programmatic POPEN, PREAD, PWRITE, PCONT, and FINIS requests and REMAT commands SO (Slave Off) and SL (Slave List)

on the slave side. Handles master PTOP requests from the HP 3000.

PTOPM loads as Priority 30, Program type 19, and uses approximately 5 pages.

REMAT — RTE-RTE remote operator command interface. Provides remote and local file manipulation capability, as well as sending RTE commands to any remote RTE or the local system. It can be used to provide almost unattended operation of other nodes (system error messages will still be printed at the local operator's console unless the system console is mapped to another node by means of Remote I/O Mapping software). REMAT requires slave monitors to exist at the remote node for execution of certain commands (see Table 3-3).

REMAT loads as Priority 80, Program type 19, and uses approximately 12 pages.

Table 3-3. REMAT Commands and Required Slave Monitors

REMAT COMMAND	Slave Monitor Required At "NODE1"	Slave Monitor Required At "NODE2"
AT	RSM	RSM (if SW to an account)
BC	EXECM (at all receiving nodes)	
CL	DLIST	
CR	RFAM,EXECM	
DE	RSM	RSM (if SW to an account)
DL	DLIST	
DU	RFAM	EXECM
FL	RFAM	
IO	APLDR*, EXECW	
LI	RFAM	EXECM
LO	RFAM*, EXECW	APLDR, EXECW
PL	APLDR*, EXECW	
PU	RFAM	
RN	RFAM	
RW	EXECW	
SD	RSM	RSM
SL	PTOPM	
SO	PTOPM	
ST	RFAM, EXECM	RFAM
SW	RSM	RSM (if SW to an account)
TE		EXECM
TR		RFAM is required at the node where the transfer file exists.

* Requires EXECM at operator's node to print results and error messages.

RFAM

Remote File Access Monitor. Handles remote file access calls from the HP 1000 or HP 3000. There are two versions of RFAM, where %RFAM1 is the single DCB version and %RFAM2 is the multiple DCB version.

The single DCB version (%RFAM1) is considerably smaller than the other, and it is designed for memory limited applications. %RFAM1 does not support extended file access. No more than one file can be open to a remote program (or local program if RFA calls are used) at any one time. One DCB is required for each program opening a file located in this node. Even if a file is shared, one DCB is required for each program. If %RFAM1 is used, there can be only one program in the network with only one file open at this node at any one time. This also means that you cannot run REMAT in this node using a transfer file if any commands in the transfer file reference other files (for example, LI, RN, PU, or ST commands). If any attempt is made to open more than one file at a time, the error code -28 occurs.

The multiple DCB version (%RFAM2) is used in nodes where several files may be opened at the same time. The number of DCBs allocated determines the number of files which can be simultaneously opened from remote nodes. Because RFAM uses unused partition space for DCBs, RFAM should be assigned to a reserved partition. If more DCBs are required, %RFAM2 uses the disc as overflow storage. Therefore, %RFAM2 is recommended in disc based DS/1000-IV nodes. In either RTE-A or RTE-6/VM, each DCB requires 144 words of a partition or 3 sectors of disc space plus a nine-word table entry for RFAM. For increased performance, if you access multiple files at the same time, you can increase the size of RFAM.

RFAM loads as Priority 30, Program type 19, and uses approximately 11 pages.

RSM
for RTE-6/VM only

Remote Session Monitor. Used only in RTE-6/VM Session Monitor nodes, RSM associates incoming requests with either a default session or a session previously created by the user program or REMAT. Must have OPERM if you have RSM.

RSM loads as Priority 20, Program type 19, and uses approximately 4 pages.

SEGLD
for RTE-A only

Remote segment loading. %SGLXL for RTE-A. Used with APLDR.

SEGLD loads as Program type 17 and uses approximately 0.5 pages.

#SEND

Used with Dynamic Message Rerouting. Sends update messages to neighboring nodes.

#SEND loads as Priority 3, Program type 17, and uses approximately 3 pages.

#SPLU

Used with Remote I/O Mapping. This module contains one entry point, #SPLU. It must be relocated separately from the other Remote I/O Mapping programs because of the different construction of the various RTE operating systems. When the Remote I/O Mapping driver is initialized, the LU of the reserved mapping LU is placed in this location for use in later mapping functions.

Use %#SPLU in RTE-6/VM. In RTE-6/VM, %#SPLU must be loaded into the System Programs Area. The entry point goes in Table Area I.

In RTE-A, %#SPLU is included in the RTE-A operating system software.

#SPLU loads as Program type 15 and uses 1 word.

SYSAT	System Attention Module required for Remote I/O Mapping. Sends a message to a remote system to set a program's break flag. Also used to send the System Attention request to a remote system. SYSAT requires OPERM to be available at the remote node. SYSAT loads as Priority 45, Program type 19, and uses approximately 6 pages.
TLOG	Allows the user to selectively print trace data recorded by PLOG. TLOG loads as Priority 90, Program type 19, and uses approximately 9 pages.
VCPMN	Virtual Control Panel Monitor. Use this module to monitor the Virtual Control Panel of an A-Series CPU. VCPMN loads as Priority 30, Program type 19, and uses approximately 3 pages.
WHZAT for RTE-6/VM only	DS version of system status module. WHZAT loads as Priority 1, Program type 17, and uses approximately 8 pages.

DS/1000-IV Programs for RTE-MPE

The following programs are used between RTE-MPE nodes. Choosing the programs depends upon the network, the operating system used, and capabilities desired. These programs may be included in the RTE generation or restored with the RP command during boot-up.

CNSLM	HP 3000 $STDLIST Monitor. Reports MPE TELL and WARN commands. CNSLM loads as Priority 30, Program type 19, and uses approximately 4 pages.
DSINF	DS Information Utility. Prints out internal table information, class numbers in use by DS, and parameters for Remote Session Monitor, Message Accounting and Rerouting. The table information is in SAM and SSGA for RTE-6/VM and in SAM and labeled common for RTE-A. Use %DSINF in RTE-6/VM nodes with RTE-RTE, or RTE-RTE and RTE-MPE links. Use %DSIN2 in RTE-6/VM nodes with RTE-MPE links only. Use %DSINL in RTE-A nodes with RTE-RTE, or RTE-RTE and RTE-MPE links. Use %DSINL in RTE-A nodes with RTE-MPE links only and search $DSLB2. DSINF loads as Priority 65, Program type 19, and uses approximately 12 pages.
DSLIN	Establishes PSI BISYNC connection to HP 3000. You must load %DSLIN on line. You cannot include DSLIN in the system generation. DSLIN loads as Priority 99, Program type 19, and uses approximately 25 pages.
DSTES	PTOP slave program (master DSTEST on HP 3000). Verifies the PTOP software. DSTES loads as Priority 110, Program type 19, and uses approximately 3 pages.

EXECM — Remote EXEC Monitor. Services remote EXEC (DEXEC) calls. This module must be present in all RTE destination nodes where any remote EXEC calls will be processed. These requests may come from other HP 1000 or HP 3000 nodes.

EXECM loads as Priority 30, Program type 19, and uses approximately 9 pages.

LOG3K — Provides operator control over recording of DS messages to and from HP 3000s. The LOG3K device must be a magnetic tape.

LOG3K loads as Priority 80, Program type 19, and uses approximately 4 pages.

MVCP3 — Used to install the PTOP slave program COPY3K.PUB.SYS on an HP 3000 for use in implementing the RMOTE MO (move) command. Used only with %RMOT1. The file !COPY3 is required by MVCP3.

MVCP3 loads as Priority 90, Program type 19, and uses approximately 10 pages.

OPERM — Remote RTE operator command capability. OPERM is required for all Session Monitor systems. OPERM should be included at all nodes in order for remote RTE operator commands to be executed. Also handles remote RTE commands from an HP 3000.

Use %OPERL with RTE-A; you must search $CMDLB when loading on RTE-A.

Use %OPERM for RTE-6/VM.

PTOPM — PTOP Communication slave monitor. Handles programmatic POPEN, PREAD, PWRITE, PCONT, and FINIS requests and REMAT commands SO (Slave Off) and SL (Slave List) on the slave side. Handles master PTOP requests from the HP 3000.

PTOPM loads as Priority 30, Program type 19, and uses approximately 5 pages.

QUEX — HP 3000 communication monitor. Use %QUEX1 with PSI BISYNC interfaces and HP 12250A/12075A X.25 interfaces. For faster response, QUEX can be made memory resident. However, appended communication buffers can make QUEX quite large.

QUEX loads as Priority 4, Program type 19, and uses approximately 5 pages.

QUEZ — HP 3000 slave request and I/O completion monitor (PSI). Use %QUEZ1 for PSI BISYNC interfaces and HP 12250A/12075A X.25 interfaces. For faster response, QUEZ can be made memory resident. However, appended communication buffers can make QUEZ quite large.

QUEZ loads as Priority 5, Program type 17, and uses approximately 3 pages.

RFAM — Remote File Access Monitor. Handles remote file access calls from the HP 1000 or HP 3000. There are two versions of RFAM, where %RFAM1 is the single DCB version and %RFAM2 is the multiple DCB version.

The single DCB version (%RFAM1) is considerably smaller than the other, and it is designed for memory limited applications. %RFAM1 does not support extended file access. No more than one file can be open to a remote program (or local program if RFA calls are used) at any one time. One DCB is required for each program opening a

file located in this node. Even if a file is shared, one DCB is required for each program. If %RFAM1 is used, there can be only one program in the network with only one file open at this node at any one time. This also means that you cannot run REMAT in this node using a transfer file if any commands in the transfer file reference other files (for example, LI, RN, PU, or ST commands). If any attempt is made to open more than one file at a time, the error code -28 occurs.

The multiple DCB version (%RFAM2) is used in nodes where several files may be opened at the same time. The number of DCBs allocated determines the number of files which can be simultaneously opened from remote nodes. Because RFAM uses unused partition space for DCBs, RFAM should be assigned to a reserved partition. If more DCBs are required, %RFAM2 uses the disc as overflow storage. Therefore, %RFAM2 is recommended in disc based DS/1000-IV nodes. In either RTE-A or RTE-6/VM, each DCB requires 144 words of a partition or 3 sectors of disc space plus a nine-word table entry for RFAM. For increased performance, if you access multiple files at the same time, you can increase the size of RFAM.

RFAM loads as Priority 30, Program type 19, and uses approximately 11 pages.

RMOTE — This program provides "virtual terminal" capability, which allows an RTE terminal to appear as though it were connected directly to an HP 3000. Use RMOTE in nodes neighboring an HP 3000. %RMOT1 contains the MO (move) file command; %RMOTE does not. %RMOT1 requires 1 to 4 extra pages for its internal buffer.

Refer to the load file #RMOTA (91750-17005) or load file #RMOTM (91750-17004) for special loading considerations with RTE-A X.25 links.

RMOTE loads as Priority 80, Program type 19, and uses approximately 20 pages.

RPCNV — DS/3000 to DS/1000-IV reply converter. Required in any node neighboring an HP 3000.

RPCNV loads as Priority 25, Program type 19, and uses approximately 6 pages.

RQCNV — DS/1000-IV to DS/3000 request converter. Required in any node neighboring an HP 3000.

RQCNV loads as Priority 25, Program type 19, and uses approximately 9 pages.

TRC3K — Prints the data recorded by LOG3K.

TRC3K loads as Priority 90, Program type 4, and uses approximately 9 pages.

Slave Monitors

The following information lists the slave monitors that are required for DS/1000-IV subroutine calls. You may exclude any software module if your application will not utilize the services it provides, but remember that remote HP 1000 and HP 3000 master programs might require slave monitors such as OPERM and EXECM in the destination HP 1000. If, by error, a request is made to a node which does not have the required monitor, the request will be returned with a DS06 error, illegal request.

The following Remote File Access (RFA) subroutines require RFAM at the node where the file exists:

```
DCRET DPURG  DOPEN  DCLOS  DREAD  DWRIT
DPOSN DWIND  DNAME  DCONT  DLOCF  DAPOS  DSTAT
DXPOS DXLOC  DXAPO  DXCRE  DXCLO  DXREA  DXWRI
```

DS/3000 software must be installed, and an RTE node connected directly to an HP 3000 computer to use the following subroutines:

```
FCHEK  FCNTL  FINFO  FLOCK  FOPEN  FPOIN  FREAD
FRDIR  FRLAB  FRDSK  FRLAT  FRNAM  FSTMD  FSPAC
FUNLK  FUPDT  FWRIT  FWDIR  FWLAB
```

The following subroutine calls require either EXECM or EXECW:

Subroutine	Slave Monitor Required
DEXEC (1)	EXECM
DEXEC (2)	EXECM
DEXEC (3)	EXECM
DEXEC (6)	EXECM If program was scheduled with wait, or queue scheduled (with or without wait), EXECW is also required.
DEXEC (9)	EXECW
DEXEC (10)	EXECM
DEXEC (11)	EXECM
DEXEC (12)	EXECM
DEXEC (13)	EXECM
DEXEC (23)	EXECW
DEXEC (24)	EXECW
DEXEC (25)	EXECM
DEXEC (99)	EXECM

The following are PTOP master calls:

```
POPEN  PWRIT  PREAD  PCONT  PCLOS  PNRPY
```

The following are PTOP slave calls:

```
GET  ACEPT  REJCT  FINIS
```

If the slave-side node is an RTE, PTOPM is required in that node. If the node is an HP 3000, DS/3000 software must be installed. Remote RTE commands require OPERM at the remote node.

Utility calls:

Subroutine	Slave Monitor Required	
BYE	none	DS/3000 software installed.
DLGOF	RSM, OPERM	
DLGON	RSM, OPERM	
DLGNS	RSM, OPERM	
DMESG	EXECM	
DMESS	OPERM	
DSERR	none	
FCOPY	RFAM	At both the origination and destination node.
FLOAD	APLDR EXECW	Force-loads a program into a remote RTE-A system (scheduled with wait).
HELLO	none	DS/3000 software installed.
PRCNM	none	DS/3000 software installed.
SEGLD	APLDR	

BUILDING LIBRARIES

When linking DS/1000-IV user programs, such as PTOP programs, you must search the DS libraries. To facilitate this search, create a non-CDS library with the DS libraries you need. This is referred to as the "big library."

To form the big library, merge (RTE MERGE command) and index (RTE LINDX command) the libraries you need into one file, such as */LIBRARIES/$bigds.lib*. Remember not to use the name of any existing big libraries. In the non-CDS library specification of the system generation, specify your */LIBRARIES/$bigds.lib*.

The following subsections list the various libraries needed by DS/1000-IV.

DS/1000-IV Libraries

Choose one of the following DS/1000-IV libraries for your specific RTE system.

$DSAL	For RTE-A.
$DSMX6	For RTE-6/VM.

X.25 Libraries

Choose one of the following libraries depending upon if you have X.25 or not:

REL,$D3N25 Required if you do not use X.25 to communicate with an HP 3000. That is, one or more of the following is true:

1. You have only BISYNC links to the HP 3000,
2. You have 1000-to-1000 X.25 links, or
3. You have no X.25 links.

REL,$D3X25 Required if you use X.25 links to communicate with an HP 3000.

If you relocated $D3X25, then in addition, you must relocate the following:

REL,X25DS.LIB,NOLIB
RTE-6/VM; $D3X25 contains modules which call the DSN/X.25 routines, ALTAD and RPOOL. In RTE-6/VM to resolve these external references and to ensure proper DS operation, you must include the library, X25DS.LIB.

REL,XINEF.REL RTE-6/VM

REL,XINXA.REL RTE-A

NOTE

In RTE-6/VM and RTE-A systems with X.25 links to a DS/3000 node you must search the DSN/X.25 library X25LB.LIB when loading UPLIN, RQCNV, RMOTE and any master program that accesses DS/3000.

Node Libraries

REL,$DSLB1 Required in all DS/1000-IV nodes.

Choose one of the following libraries:

REL,$DSLB2 If there are other HP 1000s in the network.

REL,$D3KL2 If there are NO other HP 1000s in the network.

Choose one of the following libraries:

REL,$D3KLB If the node has links to HP 3000s.

REL,$DSLB3 If the node has NO links to HP 3000s.

If you have a link to an HP 3000, choose one of the following libraries:

REL,$D3KRB Used for 304-word communication line buffers.

REL,$D3KBB Used for 1072-word communication line buffers.

REL,$D3KMB Used for 4096-word communication line buffers.

The choice of buffer size can affect your system performance since messages must be held in request/reply converter buffers until the completed message is received. However, the larger buffers use up more of System Available Memory (SAM) for each message.

Session Monitor Libraries

Choose one of the following libraries:

REL,$DSSM Used on nodes with Session Monitor. Never choose this library in an RTE-A system; Session Monitor does not exist on these systems.

REL,$DSLSM Used on nodes without Session Monitor but Session Monitor exists elsewhere in the network.

REL,$DSNSM Used when Session Monitor does not exist anywhere in the network.

Message Accounting Libraries (HP 1000 - HP 1000)

Choose one of the following libraries for Message Accounting or no Message Accounting:

REL,$DSMA If you want message accounting on this node.

REL,$DSNMA If you do NOT want message accounting on this node.

Rerouting (HP 1000 - HP 1000)

Choose one of the following libraries for Rerouting or no Rerouting:

REL,$DSRR If you want Rerouting on this node.

REL,$DSNRR If you do NOT want Rerouting on this node.

NOTE

If you have HP 1000 - HP 3000 links only, you must relocate $DSNMA and $DSNRR for no Message Accounting and no Rerouting. In a HP 1000 - HP 3000 network with only one HP 1000, there would be no Rerouting or Message Accounting. These features exist with HP 1000 - HP 1000 links only.

SYSTEM RESOURCES

This section describes the system resources required for DS/1000-IV:

- ID Segments
- Class I/O Numbers
- Resource Numbers
- Subsystem Global Area (SSGA) and Labeled Common
- Memory Resident Program Considerations
- SAM (System Available Memory)
- SMB (System Memory Block)

ID Segments

Each DS/1000-IV program requires an ID segment. Because not all the DS/1000-IV programs are always active, you do not have to allocate an ID segment for each and every DS/1000-IV program. ID segments may be shared by the programs. Allocate enough ID segments to sustain satisfactory system performance.

Class I/O Numbers

You should allocate as many class I/O numbers as possible. However, if memory is limited, use Table 3-4 to calculate your DS/1000-IV requirements. Then, add the number needed for other subsystems (Session Monitor and user application programs). If possible, add a few extra class numbers for future programs added later. This may help you avoid a system re-generation.

In RTE-6/VM, the size of Table Area II plus your programs must be less than 31 pages.

Resource Numbers

Table 3-4 summarizes the class I/O and resource number requirements of DS/1000-IV. Also add resource numbers as required by HP-supplied subsystems and your own programs.

Table 3-4. DS/1000-IV Resource Number and Class I/O Requirements

TYPE OF CONNECTION	RESOURCE NUMBERS	CLASS I/O NUMBERS
Any	One resource number for Table Access and one for quiescing the system.	One for each monitor scheduled by DINIT. DINIT schedules all monitors if the default is taken (schedule all monitors): DLIST, EXECM, EXECW, VCPMN, OPERM, PROGL,PTOPM, TRFAS, RFAM, RDBAM If there are HP 3000 links, schedule an additional three monitors: CNSLM, RPCNV, and RQCNV EXECM requires 3 class I/O numbers. Each slave P-to-P program requires one class I/O number, which is allocated automatically in the slave program's node when the program is "opened" and returned automatically when the slave terminates, either with a FINIS or PCLOS call, or a SO (Slave Off) REMAT command. Each master program requires one class I/O number, which is allocated automatically by the DS/1000-IV master routines, and returned when the request completes. Thus, class numbers may be shared among programs. That is, any program which calls any RFA or P-to-P routine, DEXEC, FLOAD, DMESS, DMESG, FCOPY, and so forth, requires a class number for the duration of the request only. In RTE-6/VM, the Remote Session Monitor monitor (RSM) requires one class I/O number.

Table 3-4. DS/1000-IV Resource Number and Class I/O Reqts (cont'd)

TYPE OF CONNECTION	RESOURCE NUMBERS	CLASS I/O NUMBERS
RTE-RTE	PLOG and Message Accounting require one resource number each.	One each for QCLM, RTRY, and GRPM. One is required for each active copy of REMAT. Message Accounting requires one class number. Remote I/O Mapping requires one class I/O number. PLOG requires one class number. For example, in a node with links limited to RTE systems only, 24 would be a practical minimum--one for each of the nine monitors, one for REMAT, one for Session Monitor and four for user programs. MA, Remote Session Monitor, Remote I/O Mapping, all require additional class numbers when activated. [GRPM, RTRY, QCLM, DLIST, EXECW, PTOPM, EXECM(3), RFAM, OPERM, PROGL, RDBAM, INCNV, OTCNV, MA, RSM, VCPMN, LUMAP, REMAT, PLOG + Users(4) = 25]

Table 3-4. DS/1000-IV Resource Number and Class I/O Reqts (cont'd)

TYPE OF CONNECTION	RESOURCE NUMBERS	CLASS I/O NUMBERS
RTE-MPE	One resource number is required for QUEX/QUEZ synchronization. One resource number is required for clean-up as part of initialization. This resource number is used by QUEX and UPLIN. TRC3K requires one resource number.	If a node has links only to an HP 3000, only five monitors should be scheduled: RFAM, EXECM(3), OPERM, PTOPM, and CNSLM. HP 3000 masters do not make requests to EXECW, DLIST, PROGL, RDBAM or VCPMN. The request/reply converters, RQCNV and RPCNV, require one class I/O number each plus one temporary class I/O number for every DS/3000 message that uses continuation buffers. QUEX requires one class I/O number. One class I/O number is required for each active copy of RMOTE. For example, in a system with MPE and and RTE links, 31 would be a practical minimum--one for QUEX, RPCNV, RQCNV, CNSLM, Continuation buffer class, RMOTE, and TRC3K and four for user programs.

SSGA and Labeled Common

In RTE-6/VM, all DS/1000-IV monitors require access to SSGA (Subsystem Glogal Area). In RTE-A, this area is labeled system common.

For RTE-6/VM, the generator prints the maximum program size for programs with and withOUT COMMON. **ALL PROGRAMS CALLING ANY DS/1000-IV SUBROUTINE REQUIRE ACCESS TO SSGA IN RTE-6/VM AND LABELED COMMON IN RTE-A.** Therefore, the maximum program size for these programs is the size shown by the generator for the programs WITH COMMON.

In RTE-A, the maximum program size is 32 pages with common.

Memory Resident Program Considerations

To improve system performance in RTE-6/VM, you can make some monitors memory-resident.

- In all nodes, QUEUE and QCLM should be memory resident.
- In nodes with links to other RTE nodes, you should generate GRPM as memory resident.
- The PSI versions of QUEZ and QUEX can be made memory resident for faster response, but appended communications buffers can make these programs quite large. In this case, you will want to RP the correct versions before initializing the system with DINIT.

Partition Assignments

To improve performance in RTE-A, restore (RTE RP command) programs and assign partitions to the following modules:

GRPM
MATIC
QUEUE
QUEX
QUEZ
UPLIN

If memory availability is a problem, several DS monitors can be assigned to the same partition making more memory available for user application programs. This can work only if an adequate number of system disc tracks are available to allow the monitors to swap.

System Available Memory and System Memory Block

System Available Memory (SAM) is used in both RTE-A and RTE-6/VM. SMB is memory area in the system map that is specified in the system generation by the MB command. SMB is used for DS/1000-IV tables for transactions and user information.

SAM is an extremely critical resource. User requests can be delayed if you do not generate enough SAM into each node. DS/1000-IV uses class I/O for most transactions. A given transaction (and perhaps network activity) might be delayed if, at the moment a request is made or a message received, there is insufficient SAM to contain it. Since the user program will resume as soon as enough SAM becomes available to handle the request, this lack of SAM will be visible as a lower-than-expected throughput. It may also result in a DS08 error message (remote-busy timeout) in severe cases.

It is best to allocate about one-third more SAM than you expect your programs to use. This will allow for memory fragmentation, particularly if large P-to-P data buffers are used, and also for a margin of safety for your calculations. You may be able to separate your programs into functional groups that never run concurrently. In this case, sum the items below for each such group; the SAM you require will be the maximum value calculated for any group. In a central node, more SAM may be required to handle the store-and-forward traffic to other nodes. If large P-to-P buffers are used by your application, additional SAM may be required.

Uses of SAM:

- Buffered output: Multiply the high buffer limit (set at RTE generation time, but overridable online) by the number of programs which output to buffered devices (some of these may not need to run concurrently). For example, FMGR, ASMB, and LOADR, would all be included if the terminals and line printer are buffered.

- Class I/O: Include the data sizes plus RTE header (8 words for the RTE-6/VM header and 16 words for the RTE-A header) for each user program or HP-supplied subsystem which uses class I/O.

- "Mailbox" communication between programs: Add the RTE header plus the data size(s) for each such instance in your programs and HP-supplied subsystems excluding DS/1000-IV.

- DS/1000-IV Requests and Replies: Each has a variable sized header attached (see Appendix A). Add RTE's own header plus the data size.

- Operating System Uses: Refer to the appropriate operating system Reference Manual.

Add the size of each of the following tables that your configuration requires. In RTE-6/VM, these tables reside in SAM. In RTE-A, allocate space for these tables in the System Memory Block (SMB).

- Transaction Control Block (TCB): Six words each. Default = 20, Maximum = 100. One is needed for each active request or reply.

- Transaction Status Table: Fourteen words for each concurrent HP 3000 master request. Default = 4, Maximum = 10.

- NRV: Three words are required for every node in the Nodal Routing Vector (NRV).

- Remote Session Monitor: Seven words times the maximum number of local sessions active concurrently from remote nodes plus one additional word. Default = 7 when $DSLSM and $DSSM are part of the system generation; if $DSNSM is used, no space is allocated. Maximum = 253.

- Link Vector: Used by the rerouting software. Each entry is six words long. There is one entry for each rerouting link declared at initialization.

- Cost Matrix: Used by rerouting software. Each entry uses two words times the number of rerouting links in the node times the number of nodes in the NRV.

  $$(2 \times \#\ of\ rerouting\ links \times \#\ of\ nodes)$$

- Message Table: Used by Message Accounting. There is a ten word entry for each Message Accounting link in the node.

- 3000 LU Table: Two words per entry, one entry for each BISYNC or HSI link. One entry for each X.25 virtual circuit to an HP 3000.

If you do not have that much SAM, you will have to plan on delays, which can be significant, or arrange your program activities so that the maximum SAM requirement is much lower. In addition, you may have to change master timeouts and link timeouts to avoid DS05 (request timeout) errors.

Basically, queue sizes and waiting times increase exponentially with the probability that a request for service cannot be granted immediately. If the probability is greater than 60%, the delays can be several times the average service time. If the probability is greater than 80%, they can easily be an order of magnitude longer than the service time.

REMOTE DATABASE ACCESS

The programs that must be generated into the system for remote database access are provided in the IMAGE/1000 product software. Refer to the manuals for the 92069A IMAGE/1000 and 92073A Database Management System products.

VPLUS/V INTRINSICS

If you are using VPLUS/V intrinsics for block mode over a DS/1000-IV to DS/3000 communications line, the DS/3000 pseudo terminals (IOSTRM0 or IODSTRMX) must be subtype 8.

APLDR VS. LOAD AND MEMRY

For RTE-A, use APLDR or the RTE modules, LOAD and MEMRY. In memory-based RTE-A systems, APLDR usually handles memory management since programs are downloaded from remote nodes.

LOAD and MEMRY handle memory management in disc-based RTE-A systems. However, APLDR is needed for the FLOAD utility and the REMAT PL command. You can put LOAD, MEMRY and APLDR in a disc-based system. If you do this, LOAD and MEMRY handle memory management and you cannot use the REMAT LO command or the FLOAD utility.

FMGR FILES

You must have a FMGR cartridge if you want to use files for the following DS/1000-IV utilities:

```
Forced Cold Loads
RFA
```

As of software version 5.2 or later, the following DS/1000-IV utilities may use either FMGR or non-FMGR files:

```
PLOG
TLOG
DSVCP
DSMOD
DINIT
REMAT
```

RTE-A DS transparency, documented in the *RTE-A User's Manual*, provides remote file access to non-FMGR and FMGR files.

BLOCK TRANSFERS

The REMAT ST command and FCOPY do not support block transfers of files with odd byte-length records from RTE-A systems to non RTE-A systems.

MULTIUSER ENVIRONMENT

DS/1000-IV only supports multiuser access to RTE-A systems via remote I/O mapping. Thus, DS/1000-IV does not support the REMAT AT command or the DLGON/DLGOF/DLGNS utilities to RTE-A systems. Do not load RSM in RTE-A systems; use $DSLSM or $DSNSM.

If you access an RTE-A system using DS/1000-IV but not with remote I/O mapping (such as with REMAT), commands are processed by DS/1000-IV monitors. These monitors are attached to the system session and override all capability checks. Thus, you would have the same capabilities on the RTE-A system as a super user.

Remote I/O Mapping: Do not relocate %#SPLU as it is provided in the operating system software. Do not specify a select code for the LU mapping IFT.

RTE-A System Generation

SECTION 4

This section describes the following information for RTE-A system generation. (RTE-6/VM is discussed in the Section "RTE-6/VM System Generation.")

- Check your RTE-A system before adding DS/1000-IV. Make sure that it works.
- DS/1000-IV answers needed for a system generation. An example system generation answer file is provided in Appendix A. The previous section, "Planning a DS/1000-IV Node Configuration," will also help you prepare for your system generation. Please review that section thoroughly before proceeding.

NOTE

You must keep an up-to-date copy of the generation answer file, installation, boot, and welcome files. Should you have any problems with your system, HP will require these files.

BEFORE YOU ADD DS/1000-IV

The next few paragraphs present some general guidelines for installing hardware and software and performing system generations.

Installing Hardware

Before you bring up the network, install the hardware and check it using the diagnostics described in the documentation that accompanied the hardware.

Installing Software

For information on installing software files, refer to the *RTE-A Primary System Software Installation Manual* and other appropriate RTE system generation manuals.

Use the following guidelines to help you test your new system for any major hardware or RTE problems.

- Test the factory system using operator commands. For example, enter TM several times to check the system time.
- Run CI and list a directory and some of the source files. Create some simple source files using EDIT, which you should compile, load and run. Dump source files to any output device, and re-submit the output tape, listing it. It should be identical to the disc file. It is important that you gain familiarity with the system because you will probably be generating other RTE systems and will want to check them out quickly.

Backing-up the System Disc

Back up your system disc. This is very important. You must always be sure that you have access to a working RTE system in case you make a mistake and need to regenerate the system. The disc shipped with your system contains the software you will need to generate all future systems. This disc cannot be overwritten by any RTE generation, even an error-free one. Consult the *RTE-A Utilities Manual* for disc backup directions.

Generating an RTE-A System for the First Time

Before generating an RTE-A system with DS/1000-IV, you must already know how to generate an RTE system. For detailed information, refer to the RTE system generation manuals.

For your very first RTE-A system generation, Hewlett-Packard recommends that you exclude all non-RTE subsystems, including DS/1000-IV. Most subsystems require additional generation procedures and can be confusing for the first time user. After you feel comfortable with RTE generations, then add the subsystems such as DS/1000-IV, graphics, or IMAGE.

Examine the system generation list file. Consulting the appropriate RTE system manual for generation procedures, build an answer file according to your preferences and the needs of your application. Be sure to follow any recommendations in the generation manual unless you have a specific requirement which cannot be met by following them.

Run the RTE generator program. If there are errors, correct them and re-run the generator. Before you actually ran the RTE generator, you should have used the RTE system generation worksheets to construct a table showing the relationship between your interfaces and devices, their select codes, device addresses, and logical units, and their drivers. Verify generator output, correct any mistakes, and if necessary, re-run the generator.

When you generate systems for a *network* for the first time, you will probably find it easier to use the same generation at each node. Becoming accustomed to the network will be much easier for all users if the capabilities of each node are the same. You can streamline the system later, as you determine your response time and memory space needs. When the system is booted up, test it as you did the factory system. It should behave as the previous one did. If anything goes wrong, note the specific symptoms, consult the RTE generation manual examples, and read the generation listing that came with your system. Pay particular attention to those questions you answered differently than shown in the factory examples. When you have solved the problems, replace the factory-generated cartridge in the disc drive, boot up that system, purge all copies of the previous generation and list file, edit the answer file, pack the disc, and re-run the RTE generator.

SYSTEM RELOCATION PHASE

You must relocate the following RTE-A module in the system area:

RE,/RTE_A/%DSQ	%DSQ requeues class I/O messages. %DSQ is part of the RTE operating system and is partitionable.

X.25 Links

For X.25 links, you must relocate the following modules:

RE,/X25/REL/CSTB.REL	
RE,/DS1000/%CXL66	Customizing routine for DS ports
RE,/RTE_A/XMB.REL,MB01	A900 only
RE,/RTE_A/XMB.REL,MB02	A900 only
RE,/RTE_A/XMB.REL,MB10	A900 only
RE,/RTE_A/XMB.REL,MB12	A900 only

The %CXL66 customizing subroutine may be partitioned. If it is partitioned, it must be in the same driver partition as DDX00.REL.

For A900s with pre Rev. 4 firmware only and X.25, XMB.REL is an RTE-A module which must be relocated before the dummy library, /RTE_A/$SYSA, is searched. XMB.REL contains entry points for the cross map move byte instructions which are NOT in the A900 RPL file, %RPL91. They are referenced by the X.25 pseudo-device driver, IDZ00, and the X.25 pseudo-device driver, DDX00. If these modules are not relocated, an undefined external error is displayed.

For more information on X.25 generation requirements, refer to the *DSN/X.25/1000 Reference Manual.*

DRIVER PARTITION PHASE

Because DS/1000-IV drivers are partitionable, you can relocate them during this phase. You must relocate drivers for DS/1000-IV links and Remote I/O Mapping, if your node supports that service.

RE,/DS1000/%ID*66	HDLC and BISYNC driver. Uses approximately 1 page.
RE,/DS1000/%ADV00	Remote I/O Mapping driver. Uses approximately 1 page.
RE,/RTE_A/%IDS00	X.25 LAPB interface driver. Uses approximately 1.25 pages.
RE,/X25REL/DDX00.REL	X.25 pseudo-device driver. Uses approximately 2.5 pages.
RE,/X25REL/DD*60.REL	X.25 device driver. Uses approximately 0.75 page.

TABLE GENERATION PHASE

The table generation phase of the system generation sets up interface and device tables for the system. The interface table (IFT) entries identify the interface cards to the system and include such information as the interface driver and the card's select code. The IFT handles all interface I/O requests. The device table (DVT) entries contain device specific information, and establish LU numbers for devices.

LU Assignments

When assigning LUs, you must follow the restrictions listed below. You can only use LUs less than or equal to 63, with the following three exceptions:

1. Communication links can have LUs greater than 63.

2. Because programs can address their scheduling terminal as LU 1, terminals from which DS/1000-IV services are scheduled can have LUs greater than 63. This includes Remote I/O Mapping terminals.

3. DSINF and TLOG can have output LUs greater than 63.

For example, you can run REMAT from a terminal that is LU 78 and store data entered at the terminal to a file. The command would be ST,1,*file*. You could also store the data to any other device with an LU less than 63. However, you could not run REMAT and store data from your terminal to a printer that was LU 78.

DS/1000-IV writes several logging messages to system LU 1. You should associate LU 1 with an *unbuffered* device. Do not associate the system LU 1 to a buffered device. If the system runs out of SAM, DS/1000-IV cannot post messages to a buffered device.

Logging and Tracing Disc LUs

If you partition your discs, be sure to allocate disc LUs with adequate space for any log or trace files you may use.

HDLC and Bisync Links IFT and DVT Entries

Each HDLC or Bisync link requires one IFT entry and two DVT entries. The first DVT entry is for the **transmit LU**, which is the logical communication channel for transmitting messages. The second DVT entry is for the **receive LU**, which is the logical communication channel for receiving messages. The interface driver uses the DVTs to monitor activity on the communication link, which is full duplex. The transmit LU defined in each pair of DVTs is also used by DS/1000-IV network administration programs (such as DINIT and DSINF).

Format

```
IFT,/DS1000/%ID*66,,SC:selectCode
*
DVT,,,LU:transmitLU,DT:66B
DVT,,,LU:receiveLU,DT:66B
```

Parameters

selectCode	The select code of the HDLC or Bisync interface card.
receiveLU	Must equal *transmitLU* + 1.

Do not specify the number of extent words; use the default value in %ID*66 instead.

Remote I/O Mapping IFT and DVT Entries

Remote I/O Mapping requires one IFT entry, one reserved DVT entry (used to initialize Remote I/O Mapping); and, for each Mappable LU (used to establish maps to remote devices), a DVT entry.

Format

```
IFT,/DS1000/%ADV00,EIDV00,AL:DY,QU:FI,TX:2
*
DVT,,,LU:reservedLU,EDDV00,TX:0
*
DVT,,,LU:mappableLU,EDDV00,TX:5
DVT,,,LU:mappableLU,EDDV00,TX:5
                :
                :
DVT,,,LU:mappableLU,EDDV00,TX:5
```

Parameters

reservedLU — A dummy LU that is otherwise unused.

mappableLU — An LU to be used as a Mappable LU. Each *mappableLU* must be unique and otherwise unused. The *mappableLU*s can be used for resource sharing and from remote HP 1000 nodes to establish interactive sessions.

Note that the IFT entry does not specify a select code (SC), and that the reserved DVT entry has no extent words.

X.25 IFT and DVT Entries

X.25/1000 used with DS/1000-IV requires the following table entries:

- one IFT entry per X.25 interface card,
- two DVT entries per X.25 interface card,
- one reserved IFT entry for DDX00 driver,
- two reserved DVT entries for communication with XNET, and
- two DVT entries per switched or permanent X.25 Virtual Circuit (user LUs).

Format

```
*Interface card entries
*
IFT,/RTE_A/%IDS00,SC:selectcode,EIDS00,QU:PR,TX:12
DVT,/X25/REL/DD*60.REL,,LU:transmitLU,TX:24,EDD.60
DVT,/X25/REL/DD*60.REL,,LU:receiveLU,TX:24,EDD.60
*
*Reserved entries for communication with XNET
*
IFT,/X25/REL/DDX00.REL,EIDX00,TX:1
DVT,,,LU:XNETWriteLU,EDDX00,TX:2
DVT,,,LU:XNETReadLU,EDDX00,TX:2
*
*Virtual Circuit (user) LUs
*
DVT,,,LU:userWriteLU,EDDX00,TX:32
DVT,,,LU:userReadLU,EDDX00,TX:32
:
:
DVT,,,LU:userWriteLU,EDDX00,TX:32
DVT,,,LU:userReadLU,EDDX00,TX:32
```

Parameters

selectCode	The select code of the X.25 interface card.
transmitLU *receiveLU*	Consecutive LUs for the interface card.
XNETWriteLU *XNETReadLU*	Reserved, consecutive LUs for communication with XNET.
userWriteLU *userReadLU*	Reserved, consecutive LUs for each X.25 Virtual Circuit. DS/1000-IV uses the *userWriteLU*s.

Note that you do not specify a select code for the DDX00 IFT entry; this is because DDX00 is a pseudo-inteface driver. The number of extent words for the user LUs is 32 (19 words for DDX00 plus 13

for %CXL66, the DS/1000-IV customizing subroutine). For more information on X.25 generation requirements, refer to the *DSN/X.25/1000 Reference Manual.*

Node Lists

Do not link any DS/1000-IV DVTs with an RTE generator NODE statement. In the RTE-A Table Generation Phase, a "node" describes a specific relationship between the devices (DVTs) connected to an interface (IFT). These nodes are not related to DS/1000-IV nodes.

MEMORY ALLOCATION PHASE

This subsection describes the portions of the memory allocation phase that may be affected by DS/1000-IV. For more information on the following items, refer to the Section "Planning a DS/1000-IV Node Configuration."

Class Numbers

DS/1000-IV requires a minimum of 22 class numbers if all monitors are scheduled.

Resource Numbers

DS/1000-IV requires a minimum of two resource numbers. A total of three is needed if Message Accounting is included. A total of four is needed if PLOG is used.

ID Segments

DS/1000-IV requires up to 35 ID segments. If some DS monitor programs are not needed, then the total may be reduced accordingly.

System Memory Block (SMB)

DS/1000-IV uses the System Memory Block (SMB) area to store DS/1000-IV tables -- transaction control blocks (TCB), Nodal Routing Vector (NRV), Remote Session Monitor, Link Vector, Cost Matrix, Message Table, and HP 3000 LU Table.

If you configure the default values for these tables in the DINIT dialogue, you will need 512 words for the SMB. The maximum amount of SMB required is 3312 words.

System Available Memory (SAM)

DS/1000-IV user data and headers require SAM for buffered output, class I/O, "mailbox" communication, and request/reply messages. Allocate approximately 30 pages of SAM.

Memory Resident Library

No DS/1000-IV subroutines are placed in the memory resident library.

Unlabeled Common

DS/1000-IV does not use unlabeled common.

Labeled Common

All programs that contain DS/1000-IV calls require access to labeled common. DS/1000-IV stores entry points and TCBs into labeled common.

RE,/DS1000/%RESA RE,/DS1000/$DSLB1 #LEVL	Required labeled common module.
RE,/X25/REL/#XCOM.REL	optional. Relocate this X.25 module if you have X.25 links.
RE,/IMAGE/RDTB.REL	optional. Relocate this remote Image module if you have Image/1000.

System Libraries

DS/1000-IV libraries should be merged into one big user library (refer to the subsection, "Building Libraries," in the previous section, "Planning a DS/1000-IV Node Configuration"):

```
LIB,$BIGDS.LIB,,
```

This library is automatically searched when DS/1000-IV user programs are loaded/linked.

In the non-CDS library specification of the system generation, specify the following libraries, in the order listed below:

LIB,*$BIGDS*.LIB,,	Merged DS/1000-IV user library.
LIB,SEC1000.LIB,,	Security/1000 library.
LIB,$FNDLB	Required for DS/1000-IV programs appended to user programs.
LIB,PASCAL.LIB	Required for DS/1000-IV programs appended to user programs.
LIB,$BIGLB,,,,,,	RTE-A library.

RTE-6/VM System Generation

SECTION 5

This section explains the following information for RTE-6/VM system generation with DS/1000-IV. (RTE-A system generation is explained in a previous section.)

- Check your RTE-6/VM system before adding DS/1000-IV.
- Check your RTE-A system before adding DS/1000-IV. Make sure that it works.
- DS/1000-IV answers needed for a system generation. An example system generation answer file is provided in Appendix A. The previous section, "Planning a DS/1000-IV Node Configuration," will also help you prepare for your system generation. Please review that section thoroughly before proceeding.

NOTE

You must keep an up-to-date copy of the generation answer, installation, boot, and welcome files. Should you have any problems with your system, HP will require these files.

BEFORE YOU ADD DS/1000-IV

The next few paragraphs present some general guidelines for installing hardware and software and performing system generations.

Installing Hardware

Before you bring up the network, install the hardware and check it using the diagnostics described in the documentation that accompanied the hardware.

Installing Software

For information on installing software files, refer to the *RTE-6/VM Software Installation Manual* or other appropriate RTE system generation manual.

Use the following guidelines to help you test your new system for any major hardware or RTE problems.

- Test the factory system using operator commands. For example, enter TI several times to display the system time. If the time-of-day message that is printed does not change, the Time Base Generator is installed in the wrong slot, or is not working.

- Run the File Manager or CI, list a directory and some of the source files. Create some simple source files using EDIT, which you should compile, load and run. Dump source files to any output device and re-submit the output tape, listing it. It should be identical to the disc file. It is important that you gain familiarity with the system because you will probably be generating other RTE systems and will want to check them out quickly.

Backing-up the System Disc

Back up your system disc. This is very important. You must always be sure that you have access to a working RTE system in case you make a mistake and need to regenerate the system. The disc shipped with your system contains the software you will need to generate all future systems. This disc cannot be overwritten by any RTE generation, even an error-free one. Consult the *RTE-6/VM Utilities Reference Manual* for disc backup directions.

Generating an RTE-6/VM System for the First Time

Before generating an RTE-6/VM system with DS/1000-IV, you must already know how to generate an RTE system. For detailed information, refer to the RTE system generation manuals.

For your very first RTE-6/VM system generation, Hewlett-Packard recommends that you exclude all non-RTE subsystems, including DS/1000-IV. Most subsystems require additional generation procedures and can be confusing for the first time user. After you feel comfortable with RTE generations, then add the subsystems such as DS/1000-IV, graphics, or IMAGE.

Examine the system generation list file. Consulting the appropriate RTE system manual for generation procedures, build an answer file according to your preferences and the needs of your application. Be sure to follow any recommendations in the generation manual unless you have a specific requirement which cannot be met by following them.

Run the RTE generator program. If there are errors, correct them and re-run the generator. Before you actually ran the RTE generator, you should have used the RTE system generation worksheets to construct a table showing the logical unit, equipment table, interrupt table, subchannel and driver type for each I/O select code you intend to use. Include the Time Base Generator and privileged interrupt board (if used). Verify generator output, correct any mistakes, and if necessary, re-run the generator.

When you generate systems for a *network* for the first time, you will probably find it easier to use the same generation at each node. Becoming accustomed to the network will be much easier for all users if the capabilities of each node are the same. You can streamline the system later, as you determine your response time and memory space needs.
When the system is booted up, test it as you did the factory system. It should behave as the previous one did. If anything goes wrong, note the specific symptoms, consult the RTE generation manual examples, and read the generation listing that came with your system. Pay particular attention to those questions you answered differently than shown in the factory examples. When you have solved the problems, replace the factory-generated cartridge in the disc drive, boot up that system, purge all copies of the previous generation and list file, edit the answer file, pack the disc, and re-run the RTE generator.

INITIALIZATION PHASE

This phase defines the system disc subchannels and various system parameters.

TBG SELECT CODE?

Specify the number of the I/O slot in which you have placed the Time Base Generator card (TBG card). If you use a privileged I/O card (HP 12620A), then you must place the Time Base Generator in a higher-numbered (lower priority) I/O slot than the privileged I/O card. Hewlett-Packard recommends that you place the Time Base Generator in the next slot immediately after the privileged I/O board (HP 12620A).

PRIV. INT. SELECT CODE?

Specify the select code of the privileged card. Enter 0 (zero) if you are not generating a privileged system.

MEM. RES. ACCESS TABLE AREA II?

Specify any memory-resident programs. You must respond YES if RTRY, QUEUE, QCLM, GRPM or any other DS/1000-IV module will be generated as a memory-resident program.

PROGRAM INPUT PHASE

Specify what DS/1000-IV programs, libraries, and drivers to relocate into the system. Refer to the previous Section "Planning a DS/1000-IV Node Configuration," to help you determine your needs.

The NOLIB feature for RTE-6/VM libraries cannot be used on DS/1000-IV libraries. DS/1000-IV programs will not be allowed to use SSGA if this option is chosen and therefore will not work properly.

PARAMETER INPUT PHASE

This phase of the system generation allows you to override default values and define the amount of system resources. Entry points can be modified.

Six critical DS/1000-IV system modules -- QUEUE, GRPM, RTRY, UPLIN, and for RTE-MPE, QUEX, QUEZ -- should be made memory-resident for high performance. Any or all of these modules may be made disc-resident. QUEX, QUEZ, QUEUE and GRPM are the modules which most affect system throughput if made disc-resident. You may assign each to a separate partition if you cannot make them memory-resident. All the modules must be given access to SSGA or labeled common. Consult the *RTE-6/VM On-Line Generator Reference Manual* for a list of program types. If space permits, PTOPM should also be made memory resident. Besides improving system performance on PTOP transactions, system resource information maintained by PTOPM (that is, slave class numbers) will be retained if PTOPM is aborted.

NOTE

DO NOT ALTER THE PRIORITIES OF ANY DS/1000-IV SYSTEM PROGRAMS.

DO NOT SPECIFY TYPE 6 FOR ANY DS/1000-IV SYSTEM OR USER PROGRAM IN RTE-6/VM.

The priorities of all the DS/1000-IV programs must be higher than any user program which makes use of their capabilities. The Section, "Planning a DS/1000-IV Node Configuration," shows the priorities of the DS/1000-IV programs. Be sure that your own programs do not have priorities higher than 30, that is, they are not in the range of 1 to 30. User programs with unnecessarily high priorities can delay necessary network processing, causing timeout errors. If necessary to do so, however, you may need to increase the master and slave timeouts by an amount sufficient to cover the increased processing time.

CHANGE ENTS?

To include the automatic message logging feature for program download in a disc-based RTE node, enter:

PRGL,AB,*lu*

where *lu* = the number of the logical unit where the messages will be printed.

This logging feature can be overridden later by a special user program (see "Extended Messages For Program Download" in the Network Initialization section). This feature must have PROGL as part of the node's software.

TABLE GENERATION PHASE

This phase defines the I/O configuration for the following tables:

- Equipment Table (EQT) - The EQT contains information on devices and drivers.
- Device Reference Table (DRT) - The DRT points an LU to a particular EQT entry which contains the device driver information.
- Interrupt Table - The Interrupt Table contains information about how to handle an interrupt on a particular select code.

HDLC and Bisync Links EQT Entries

Each HDLC or Bisync link using DVA66 needs two consecutive Equipment Table entries and two consecutive LU entries per link. The first EQT entry is for the transmit LU, which is the logical communication channel for transmitting messages. The second EQT entry is for the receive LU, which is the logical communication channel for receiving messages.

Format

```
sc,DVA66,X=12          * TRANSMIT
sc,DVA66               * RECEIVE
```

Parameters

sc	The select code of the HDLC or Bisync interface card.
X=12	A 12-word EQT extension is needed for the first EQT only.

The driver always uses DMA transfers to and from the card but does not supply the "D" flag. The device timeout processing is done by the processor on the card, and the timeout value is calculated from switch settings on the card. Providing a non-zero timeout value causes that timeout value to be passed to the card and used as an override of the switch settings.

With the full-duplex link and two EQTs, loop-back testing of the link is achieved by attaching the loop back connector anywhere in the link.

Remote I/O Mapping EQT Entries

Remote I/O Mapping requires at least two EQT entries. All Remote I/O Mapping EQTs should have the same select code.

Format

```
sc,DVV00        * EQT 25 = Remote I/O Mapping Reserved EQT
sc,DVV00,X=7    * EQT 26 = Remote I/O Mapping EQT, subchannel 0
sc,DVV00,X=7    * EQT 27 = Remote I/O Mapping EQT, subchannel 1
sc,DVV00,X=11   * EQT 28 = Remote I/O Mapping EQT,
                *            X=11 for subchannels 0,1,2
                :
                :
```

Parameters

sc	The select code of the HDLC or Bisync interface card.
X=7	The mapping EQTs require a minimum of seven words in their extensions to map an LU with a subchannel number of 0. Additional LUs with increasing subchannels may point to the same mapping EQT.
X=11	An addition of two words per subchannel allows multiple subchannels for the same EQT. For example, an extension of 11 words would allow three subchannels to be mapped; 7 + (2 × 2) = 11 words.

The first Remote I/O Mapping EQT entry is used by the programs, LUQUE and LUMAP, for communication to the Remote I/O Mapping driver, DVV00. The additional EQT entries are for the actual mapped LUs which will be set up later by running IOMAP. The reserved EQT must not include any extension words. Otherwise, Remote I/O Mapping will not work.

Any LU whose subchannel is not zero should not be used to map to a remote terminal. Any program calling IFTTY in the RTE System library may interpret that subchannel to mean that the LU is not interactive, particularly if the physical device type is 5 (DVA05 or DVR05).

X.25 EQT Entries

X.25/1000 requires the following table entries:

- two EQT entries per X.25 interface card,
- two reserved EQT entries for communication with XNET, and
- two EQT entries per switched or permanent X.25 Virtual Circuit (user LUs).

Format

```
*Interface card entries
*
sc,DVM00,X=34
sc,DVM00,X=34
*
*Reserved entries for communication with XNET
*
dummy1sc,DVX00
dummy1sc,DVX00
*
*Virtual Circuit (user) LUs
*
dummy2sc,DVX00,X=24
dummy2sc,DVX00,X=24
                :
                :
dummy2sc,DVX00,X=24
dummy2sc,DVX00,X=24
```

Parameters

sc	The select code of the X.25 interface card.
dummy1sc	Any unused select code.
dummy2sc	Any unused select code. All user EQTs may use the same *dummy2sc*.

Note that you specify dummy select codes for the DVX00 EQT entries; this is because DVX00 is a pseudo-inteface driver. The number of extent words for each user EQT is 24 (11 words for DVX00 plus 13 words for %CSV66, the DS/1000-IV customizing subroutine). For more information on X.25 generation requirements, refer to the *DSN/X.25/1000 Reference Manual.*

HDLC and Bisync Links DRT Entries

For the HDLC and BISYNC links, two consecutive LUs (DRT entries) are needed per link. The lower LU number is associated with the first EQT and is the LU used when answering the DINIT initialization questions and when using the DSMOD /L command. The lower LU is also the transmit LU, which is the logical communication channel for transmitting messages. The second or higher LU is the receive LU, which is the logical communication channel for receiving messages.

Values for link LUs can be in the range 4 to 246. Some confusion can be avoided by not using LUs 4, 5, 6 and 8, because these are used for peripheral devices such as printers and magnetic tape devices.

X.25 DRT Entries

For X.25 links, DRT entries are as follows:

- two sequential LUs each per card, one for input and one for output.
- two sequential LUs for XNET and DVX00 communication.
- two sequential LUs per switched or permanent X.25 Virtual Circuit (user LUs).

Example

```
60=EQT?
* X.25 interface card
*
20,0            * LU 60 WRITE PORT
20,1            * LU 61 READ PORT
*
*Reserved entries for communication with XNET
*
22,0            * LU 62 DVX00 WRITE RESERVED LU
23,0            * LU 63 DVX00 READ RESERVED LU
*
*Virtual Circuit (user) LUs
*
24,0            * LU 64 WRITE LU
25,0            * LU 65 READ LU
*
```

Values for link LUs can be in the range 4 to 246. Some confusion can be avoided by not using LUs 4, 5, 6 and 8, because these are used for peripheral devices such as printers and magnetic tape devices.

Session Monitor DRT Entries

In Session Monitor nodes it is necessary to leave some of the 255 possible LUs undefined. Remote Session Monitor uses these undefined (not declared in the generation) LUs for the session numbers it assigns to each Remote Session Monitor established. You cannot define all 255 LUs and have Remote Session Monitor capabilities. Note that an LU assigned to EQT number 0, the bit bucket, is considered an assigned LU and cannot be used by Remote Session Monitor.

HDLC and BISYNC Interrupt Table Entries

Each link interface card, including any spares, requires one interrupt table entry. The interrupt table entry is as follows:

```
sc,EQT,yy
```

Parameters

sc	Interface card select code.
yy	EQT number. For links requiring two EQTs, the EQT number used is that of the transmit EQT.

Remote I/O Mapping Interrupt Table Entry

The following Interrupt Table entry should be used if you wish the mapped LU to respond as a terminal LU. The LU can be mapped and used to acquire a LOGON prompt or a system prompt at the remote system.

```
sc,PRG,PRMPT
```

The select code (*sc*) used here must be the select code assigned to Remote I/O Mapping in the Equipment Table.

If PRMPT is not in the system, or if the LU will be mapped to a non-interactive device, the Interrupt Table entry should be:

```
sc,ABS,0
```

If IOMAP, LUQUE and LUMAP are loaded after the generation, they must be RPed in order for Remote I/O Mapping to function. There is very limited error information printed when these programs are not available in the system.

X.25 Interrupt Table Entries

X.25 requires the following interrupt table entries:

- One entry per X.25 interface card.
- One entry per switched or permanent X.25 Virtual Circuit (user LUs).

There are no entries for the reserved entries for communication with XNET.

SYSTEM LOADING PHASE

This phase defines the Table Area II modules or system resources -- class numbers, resource numbers, and ID segments.

I/O Classes

DS/1000-IV requires a minimum of 22 class numbers if all monitors are scheduled. If possible, add a few extra classes so that if software is added later which makes use of these, it will not be necessary to re-generate. If re-generation becomes necessary for other reasons and additional class numbers or RNs are necessary, you will not be too cramped by the size of Table Area II plus your programs, the sum of which must be less than 31 pages.

Resource Numbers

DS/1000-IV requires a minimum of two resource numbers. A total of three if Message Accounting is included. A total of four is needed if PLOG is used.

Blank ID Segments

DS/1000-IV requires up to 35 ID segments. If some DS monitor programs are not needed, then the total may be reduced accordingly.

If you plan to use the Session Monitor, or plan to load programs online later (permanently), include enough blank ID segments for these programs, and for each copy of the remote EDITR, REMAT, and RMOTE you will have.

PARTITION DEFINITION PHASE

This phase defines memory partitions and their sizes and the maximum program size with and without COMMON.

At least one of the partitions should be large enough for the largest program which may be run.

Assigning a DS/1000-IV monitor to its own partition will tend to improve the performance of those master requests which it services. In particular, if high throughput is required for Program-to-Program Communication (P-to-P), the P-to-P slave monitor (PTOPM) must be given a partition separate from any other P-to-P master or slave programs, in order to minimize swapping. For fastest throughput, a monitor should be made memory resident.

An alternative to avoid having DS monitors use too many partitions is to do one of the following:

- assign them all to the same one or two partitions, or
- create a program that scans the memory allocation tables and forces a swap of any program that is not in need of that partition at that moment. That is, programs in the general wait state would be swapped. The swap is forced by scheduling another program of priority 1 to run in each partition occupied by a program in the general wait state. The second program consists merely of an EXEC 6 call.

The RTE-6/VM generator also prints the maximum program size for programs with and without COMMON. All programs calling any DS/1000-IV subroutine require access to SSGA. Therefore, the maximum program size for these programs is the size shown by the generator for the programs with COMMON.

Installing DS/1000-IV Programs

SECTION 6

OVERVIEW

This section describes the tasks you need to perform to install the DS/1000-IV programs. The tasks you must execute from the BOOT command and system WELCOME files are also described later in this section.

NOTE

If you have special application needs that require changes to the following areas from the system default, refer to the Section "Planning a DS/1000-IV Node Configuration," before installing DS/1000-IV:

- Memory used for DS/1000-IV
- System resources used for DS/1000-IV

LOADING WITH TRANSFER FILE, *LDDS

To load the DS/1000-IV programs on your system, **HP recommends that you use the supplied CI transfer file,** /DS1000/*LDDS. Read this file carefully. This file loads the DS/1000-IV programs in recommended directories. You may modify these directories online. You can edit this CI transfer file to select the directories in which the programs are placed. In addition, you can set the system SNAP file that LINK uses when loading the programs. To use /DS1000/*LDDS, execute the following runstring:

```
TR,/DS1000/*LDDS,snapfile,stoperrorflag,3K,X25
```

Parameters

snapfile	Snap file specification. Default is SNAP.SNP::SYSTEM.
stoperrorflag	Null or blank to stop on error (default), or anything else to continue after an error.
3K	Indicates request for loading HP 1000-HP 3000 modules. If anything except 3K is entered, the DS/1000-IV 1000-3000 modules will not load.

X25	Indicates request for loading with the DSN/X.25 subsystem. If anything except X25 is entered, the DS/1000-IV programs will not load.

/DS1000/*LDDS sets up the following paths which stay the same as long as the session is active:

$DS_RT	Directory path for DS/1000-IV relocatables. The default is /DS1000.
$OS	Directory path for RTE relocatables. The default is /RTE_A on an RTE-A system or /RTE-6 on an RTE-6 system.
$X25	Directory path for DSN/X.25/1000 relocatables. The default is /X25/REL.
$DS_RUN	Directory path for placing run files. The default is /PROGRAMS.

/DS1000/*LDDS also sets up the following CI variables based on the runstring parameters for TR,/DS1000/*LDDS; the CI variables can be changed:

$SNAP	Snap file name used for loading programs. The default is /SYSTEM/SNAP.SNP.
$STOP	Stop-on-error flag. The default is 1 (to stop).
$X25_FLAG	Flag to indicate loading with X.25/1000. The default is 1 (no X25).
$DS3K_FLAG	Flag to indicate loading with HP 1000 - HP 3000 modules. The default is 1 (no 3K).

/DS1000/*LDDS calls either Y.CMD or N.CMD, depending on the response to the following prompt:

```
[Y/N/SET]:
```

A N response calls N.CMD, which resets the previous CI environment and quits.

A Y response calls Y.CMD, which loads the DS/1000-IV modules. Y.CMD can be modified to change the loading of some DS/1000-IV modules. Alternate program loading is commented out in Y.CMD. It is assumed that rerouting and message accounting is requested. #SEND and MATIC entries in the command file should be commented out if rerouting or message accounting is not desired in your DS/1000-IV node.

There are also command files, yes and no, that perform the same functions as Y.CMD and N.CMD.

Some DS/1000-IV modules have entry points that are resolved in the library PASCAL_FMGR_ALT.LIB. Hewlett-Packard recommends that if $BIGDS is a system library, PASCAL_FMGR_ALT.LIB be a system library, also. /DS1000/*LDDS assumes that $BIGDS is a system library. It also assumes that $BIGDS contains the modules for Message Accounting (MATIC) and rerouting (#SEND). If not, some programs will fail to load.

After /DS1000/*LDDS sets up all of its CI variables, these CI variables stay set up as long as the session is active. The CI variables will not change even if /DS1000/*LDDS is run again, unless the variables are taken from the runstring.

DS/1000-IV PROGRAM AND FILE DIRECTORIES

The DS/1000-IV programs and files should be installed in the directories listed below. This is done for you if you use the file /DS1000/*LDDS with the default values.

/PROGRAMS (Optional)

- CNSLM
- DSLIN
- DSTES
- LOG3K
- QUEX
- QUEZ
- RMOTE *
- RPCNV
- RQCNV
- TRC3K

/PROGRAMS

- CLOSE
- DINIT
- DSMOD
- DSINF
- DSRTR
- DLIST
- EXECM
- EXECW
- GRPM
- IOMAP
- LUMAP
- LUQUE
- MATIC
- OPERM
- PLOG
- PROGL
- PTOPM
- QCLM
- QUEUE
- REMAT
- RFAM
- #SEND
- SYSAT
- TLOG
- TRFAS
- UPLIN
- VCPMN

/LIBRARIES

- $BIGDS.LIB
- (user created)

* RMOTE is not loaded by *LDDS; it must be loaded by the user. RSM will be loaded if you update Y.CMD and yes.

For more information on which DS/1000-IV programs and files to restore, refer to the Section "Planning a DS/1000-IV Node Configuration." Restore programs either in the BOOT command file or WELCOME file.

SYSTEM UTILITIES

On systems with multiuser environment, all DS/1000-IV programs must be loaded as system utilities except for DSLIN, DSMOD, DSVCP, REMAT, RMOTE, TLOG, and TRC3K. Specify the system utility, SU, command in LINK. This is done for you in *LDDS.

You must also load user programs controlled by PTOP slave calls or DEXEC 9, 10, 23, 24, 12, or 99 as system utilities.

As of software version 5.0, all system utilities in DS/1000-IV must also have program capability of 31 and allow access from programs with capability of 0. Specify PC,31,0 in LINK. This is done for you in *LDDS.

LOADING SEGMENTED PROGRAMS

In order to request and/or overlay segments, programs must contain a call to SEGLD. Program segments can be stored locally at the RTE-A Operating System or they may reside at a remote node. Two versions of SEGLD are provided to accommodate local or remote segment calls. When loading segmented programs, you MUST reference the correct version of SEGLD or the program will not execute. The version of SEGLD which is used with local segments is provided with the RTE-A software in the library, $SYSLB. The version of SEGLD which is used with remote segments is provided with the DS/1000-IV software, %SGXL (RTE-A).

The following example is a LINK command file for a segmented program on RTE-A:

```
SN,SNAPDS
LC
OU,FILEX
RE,%SGXL
RE,%FILEX
EN
```

#SEND

Because of LINK's file naming conventions, you cannot use a FMGR namr to designate #SEND as the output file in a runstring. You can designate #SEND.RUN as the output file in a LINK runstring.

APLDR

If you load APLDR in a memory-based RTE-A system, you must first search $DSLDR, then search the RTE-A library $BIGLB. Do not search $DSLDR in disc-based systems.

%LOG3K AND %RMOT1

The LOG3K log device must be a magnetic tape.

RTE-6/VM ACCTS AND SSGA

If you have a system with DS/1000-IV you must load ACCTS with access to SSGA (Subsystem Global Area).

RTE-6/VM EXTENDED BACKGROUND PROGRAMS

RTE-6/VM has a program type called extended background disc resident (EB). This is program type 6 (not file type 6). Type 6 programs do not have access to Table Areas I & II, common, SSGA, or drivers. Because all programs making DS calls require access to SSGA, they cannot be loaded as type 6. MLLDR defaults to EB; so when using this loader with DS programs, you must specify OP,BG or OP,LB.

If you have EB programs that need DS access, schedule a son program to actually make the DS calls and pass the information back to its EB father via class I/O.

RELATED SUBSYSTEMS

If you are using any of the following subsystems, you must relink the listed modules each time you install a new version of DS/1000-IV to ensure compatibility (refer to Table 6-1).

Table 6-1. Related Subsystem Modules

Subsystem	Module	Comments
Transparent File Access - These modules are loaded in *LDDS	DSRTR	Required at the node that is to service the file access request. Run LINK with the PC,31,0 command. Load as a system utility (SU) and with access to system labeled common (LC).
	TRFAS	Required at the node at which the file access request originates. Run LINK with the PC,31,0 command. Load as a system utility (SU) and with access to system labeled common (LC).
Remote Image/1000	RDBAM	Remote Data Base Access Monitor. Refer to Image/1000 manuals.

BOOTING UP THE SYSTEM

This section describes the tasks that you must execute from the Boot command file and system WELCOME file.

Disc Space in RTE-6/VM

In RTE-6/VM, you need to initialize system disc LUs 2 and 3. Initializing the system (and, if present, auxiliary) disc defines the size of the track pool. Disc space in the track pool (those tracks on the system and auxiliary disc between the last track used to store the system and the start of the File Area) is used, among other things, to swap programs. If sufficient contiguous disc tracks are unavailable to swap a program out of memory, it will remain in memory despite the fact that a higher-priority program may be scheduled. This condition only occurs when both programs are disc-resident and there are no free partitions. It can stall network activity considerably if it happens, possibly resulting in transactions timing out.

NOTE

The multiple-DCB version of RFAM will use disc tracks for overflow storage of DCBs if the user answers the initialization-time question "INPUT # FILES?" with a positive number that is larger than the number of DCBs that RFAM can store in its partition (and if the system is RTE-6/VM). You should allow extra tracks for this if you require RFAM to handle more files than it can store in its partition. If stored on the disc, each DCB requires three 64-word sectors, so, for example, a single HP 7900, 7905 or 7920 disc track can store up to 32 DCBs (containing 96 64-word sectors) (HP 7925: 64 DCB's per track).

Assigning Other Partitions in RTE-A

In the Boot command file, HP recommends that you restore (RP) and assign partitions for the following programs:

```
UPLIN
```

HP recommends that you RP and assign a partition for the following program:

```
QUEUE
```

If the local node has any X.25 links, HP recommends that you restore (RP) and assign a partition for the following program:

```
XNET
```

Refer to the X.25 manuals for complete information about X.25 links.

For example, you could include the following commands in your Boot command file:

```
RP,UPLIN
RP,QUEUE
 :
 :
END
AS,UPLIN
AS,QUEUE
 :
 :
```

You can restore (RP) the remaining DS/1000-IV programs required for your system. For a list of the DS/1000-IV programs required for your systems, refer to the Section "Planning a DS/1000-IV Node Configuration."

WELCOME File

For both RTE-A and RTE-6/VM, you should perform the following tasks from the system WELCOME file; example WELCOME files are shown later in this subsection:

1. Restore any DS/1000-IV programs not RPd from the Boot command files (via the RP command). For a list of the DS/1000-IV programs required for your systems, refer to the Section "Planning a DS/1000-IV Node Configuration."

2. Initialize the link subsystems (X.25/1000).

3. (Optional) Set the system time with the RTE TM command before initializing DS/1000-IV via DINIT.

4. Initialize DS/1000-IV by running DINIT. Refer to the Section "Network Initialization."

5. (Optional) Initialize Remote I/O Mapping. Refer to the next subsection, "Remote I/O Mapping Initialization."

6. (Optional) Initialize Bisync links to HP 3000s. Refer to the Section "Network Initialization."

Remote I/O Mapping Initialization

If you have I/O mapping generated into your system, then there is one additional step you must take before you can establish maps with the IOMAP program. You must run the IOMAP program using a mappable LU (which is not associated with the special I/O mapping EQT or DVT) as the first parameter, and a negative one (-1) as the second parameter. Assuming LU 27 was associated with a mappable EQT or DVT, the scheduling command would have the following form:

```
RU,IOMAP,27,-1
```

You must initialize DS on the local node with DINIT before running IOMAP.

NOTE

HP recommends that Remote I/O Mapping be initialized in the WELCOME file after DS is initialized.

RTE-6/VM WELCOM File Example

```
:SV,1,,IH
:* WELCOME FILE FOR NODE 3
:* LAST UPDATED <891210.1728>
:SYCU,ON
:PK,2
: *
: * SET THE CURRENT TIME
:TR,*STIME
: * RP DS/1000 programs from /programs
:TR,RP_DS.CMD::CMDFILES
: *
: * Initialize X.25
: *
:DP,Setting up X25....
:RU,XINIT,XFILE,XOUT
: * Initialize DS/1000
:DP,Setting up DS....
:RU,DINIT,DSFILE
: *
: * Start UPLIN
: *
:SYON,UPLIN,NOW
: *
: * Set IOMAP priority
: *
:SYPR,IOMAP,50
: *
: * Initialize IOMAP
: *
:RU,IOMAP,33,-1
: *
: * Start MATIC
: *
:SYON,MATIC,NOW
: *
: * PRINT WELCOM BANNER
: *
:DU,*BANNR,1
: *
:* ENABLE SESSION
: *
:SYEN,HP
: *
:* Enable the mux ports
: *
:RU,CI,*MUXUP::2
:SV,0,,IH
:EX
```

RTE-A WELCOME File Example

```
* Example welcome file for RTE-A and DS/1000-IV
set log = on
tr /system/upterms.cmd
*
*  X.25/1000
*
rp,/programs/xnet.run
*
*  DS/1000 network programs including MA and RR
*
rp,/programs/#send.run
rp,/programs/grpm.run
rp,/programs/matic.run
rp,/programs/queue.run
rp,/programs/rtry.run
rp,/programs/uplin.run
*
*  Transparent File Access (RTE-A)
*
rp,/programs/dsrtr.run
rp,/programs/trfas.run
*
*  Monitors
*
rp,/programs/dlist.run
rp,/programs/evmon.run
rp,/programs/execm.run
rp,/programs/execw.run
rp,/programs/operm.run
rp,/programs/ptopm.run
rp,/programs/qclm.run
rp,/programs/rfam.run
*
*  Remote I/O mapping
*
rp,/programs/iomap.run
rp,/programs/lumap.run
rp,/programs/luque.run
*
*  DS/1000 to 3000 network programs and monitors
*
rp,/programs/quex.run
rp,/programs/quez.run
rp,/programs/rpcnv.run
rp,/programs/rqcnv.run
rp,/programs/cnslm.run
rp,/programs/dslin.run
rp,/programs/dstes.run
*
*  Start X.25/1000 and DS/1000
```

```
*
xinit /system/sys1.xin /system/sys1.xout
dinit /system/sys1.dsin
*
*  Initialize remote I/O mapping
*
iomap 79 -1
*
*  Users should set the system time before using the system
*
wd 0
ex
```

NETWORK INITIALIZATION

SECTION 7

This section describes the three main utilities used for network initialization:

- DINIT - DINIT initializes each node in your network. DINIT also includes a shutdown version.
- DSMOD - DSMOD modifies parameters which were set during initialization.
- DLSIN - DSLIN initializes the BISYNC link between an HP 1000 and HP 3000.

Further network initialization tasks are described in the next section, "Additional Initialization Tasks."

NETWORK INITIALIZATION USING DINIT

DINIT is used to initialize each RTE node on the DS/1000-IV network. It allocates system resources, builds DS tables, and enables communications ports. You must execute DINIT at each node to make the network operational. Node initialization consists of the following tasks:

- Allocating required resources, such as class numbers, transaction lists, pointers and timers.
- Establishing the network routing vector for each node, the number of files that can be opened remotely, and setting up rerouting, message accounting and remote session tables.
- Enabling the communication line interface.
- Scheduling DS monitor and queuing programs that service incoming requests from remote network nodes.

NOTE

Make sure your RTE operating system operates correctly *before* initializing your node for the network.

There are two versions of DINIT -- %DINIT and %DINIS. The %DINIT version of DINIT is a smaller module for initializing a DS network. The %DINIS version is larger because it provides the shutdown option. Thus, %DINIT should be used in memory limited applications and %DINIS should be used in disc based nodes when the shutdown feature is desired. More information about shutdown is explained in "%DINIS - Shutdown Version" later in this section.

Preparing to Use DINIT

Before you schedule DINIT, you must generate and boot-up your RTE system.

If DSN/X.25 is included in your HP 1000 system, you must initialize X.25 before you initialize DS/1000-IV. Refer to the *DSN/X.25 for HP 1000 Computers Reference Manual* (91751-90002) for the procedure.

If Session Monitor is installed in the node, it must be activated before before you run DINIT. Session Monitor changes the sequence of questions asked by DINIT.

NOTE

Record all DINIT initialization answers on paper, minicartridge, or disc file. Should any problems arise in the future, HP support personnel may require this information.

Scheduling DINIT

You can use DINIT to initialize your node in one of three ways:

- Interactively as explained below in "DINIT Interactive Dialogue."
- Using a transfer file containing your responses, as explained below in "Scheduling DINIT from a Transfer File."
- Using a start-up program if you have an RTE-A system as explained in "Automatic Network Initialization (No File System)" later in this section.

NOTE

Only one copy of DINIT may run at a time. It may not be cloned; it must be named DINIT. In a Session Monitor environment, a capability of 60 (or higher) is necessary for DINIT to run successfully.

To schedule DINIT, use the following syntax:

```
RU,DINIT [,inputLU][,errordevice]
         [,namr  ]
```

Parameters

inputLU — The logical unit number of the device from which responses to DINIT queries will be entered. If the device specified is interactive, DINIT displays each query and waits for you to respond. This parameter is optional. If you omit it, DINIT assumes the value returned by the RTE LOGLU program is the input device.

namr — The transfer file that must contain the responses to DINIT queries in the correct entry sequence. The file may be an FMGR or non-FMGR file. If a full path name is not given, the default is the current working directory.

errordevice — The logical unit number of the device to which DINIT directs messages if an error condition is encountered. Specification of this parameter is optional. If this parameter is omitted, DINIT assumes the value returned by LOGLU as the error device. Further, if you specify the logical unit number of a non-interactive device in this parameter position, DINIT ignores your specification and assumes the value returned by LOGLU.

Scheduling DINIT from a Transfer File

If you schedule DINIT from a transfer file, you must specify the responses in the same order as the interactive prompt messages appear. In DINIT's transfer file, a comment line may be added by placing an asterisk in column 1.

When you execute DINIT with input from a transfer file, DINIT does not display any messages except when it encounters an error condition. When DINIT encounters an error in a transfer file, it reports the error and displays the outstanding query prompt on the error device if it is possible to continue without repositioning the transfer file. After you enter the correct response to this query, DINIT automatically returns to the transfer file for subsequent responses. If it is not possible to continue without repositioning the transfer file, DINIT returns all resources which it had allocated and aborts, leaving the node uninitialized.

Verifying Your Network Initialization

If there are two or more RTE nodes in the network, select two that are directly connected, run DINIT to initialize each, and build very simple network routing vectors in each which only allow them to talk to one another.

You must include the local node when building the NRV using DINIT if you wish the node to be able to "talk to itself" (that is, service requests destined to itself made in the same node). Otherwise, such requests will result in the error message DS04(0), node inaccessible.

When DINIT has completed successfully on both sides, verify the network initialization by running REMAT on one of the nodes. Use the SW and TE commands to send messages to the operator console at the other system.

NOTE

If there are programs waiting for input from the operator's console on the slave side, the request will timeout. The slave side must have EXECM as an active monitor. If EXECM is not present on the slave side but OPERM is, substitute TI for TE in RTE-6/VM, or TM in RTE-A.

Verify with an operator at the other system that the message appears. If not, note the error messages printed and refer to the error messages section of the *DS/1000-IV User's Manual* for the solution. When the TE or TI command works, terminate REMAT and repeat this test at the other node. Next, run REMAT and try sending a file to the other node and LIsting it from the remote node to the local node. If even short files seem to take more than a few seconds to send, check the troubleshooting suggestions in the the *DS/1000-IV Theory of Operation and Troubleshooting Manual.* Unless the communication line is very slow (less than 1200 baud) or very noisy (causing retries on every transmission) there should be no long delays for very short files (say 5 to 10 records).

Leaving DINIT

You may enter an abort request (/A) in response to any prompt. This terminates the execution of DINIT. If the abort request is entered at any time during the initialization phase, the node remains uninitialized, and all resources allocated to DINIT (for example, SAM, I/O classes, RNs) are returned to RTE.

DINIT Interactive Dialogue

The initialization session begins with:

```
/DINIT:  SYSTEMS CONNECTED TO THIS NODE:

/DINIT:  HP 1000?
```

Respond YES to indicate that one or more RTE systems are connected to this node.

Respond NO to indicate that no other RTE system is connected to this node.

```
/DINIT:  HP 3000?
```

Respond YES to indicate that one or more HP 3000s are connected to this node.

Respond NO to indicate that no other HP 3000 is connected to this node.

NOTE

If you do not respond YES to at least one of the above queries, DINIT will ask them again.

```
/DINIT: # ACTIVE TRANSACTIONS?
```

The response to this question establishes the number of transaction control blocks (TCB's). Respond with a decimal number in the range from 1 through 100 to indicate the total number of concurrently active transactions allowed in this node.

Respond with /D to indicate a default value of 20 transactions.

Each transaction allowed requires 6 words of System Available Memory for the Transaction Control Block.

If you have applications with programs that create remote sessions and then terminate without calling DLGOF, the TCB is not cleared until UPLIN runs. Allocate 10 extra TCBs for such applications.

NOTE

The following question is asked only if the node is part of a network with Session Monitor nodes.

```
/DINIT: MAX # LOCAL SESSIONS FOR REMOTE NODES?
```

Reply with the number of local "sessions" you expect to be created from remote nodes and active simultaneously at this node. The range is 1 to 253. The reply is used to allocate table space to keep track of each actual remotely initiated session. One entry in this table (Session ID 253) is always used for access to the DS/1000-IV node by DS/1000 nodes in the network. Because of this the actual number of remote sessions allowed in the local node will be one less than the number entered in response to this question.

Respond with /D to indicate a default value of seven concurrent remote sessions. If you have applications with programs that create remote sessions to this node and then terminate without calling DLGOF, the table entry is not cleared until UPLIN runs. Allow 10 extra local sessions for such applications.

NOTE

The following question is asked only if the node has been generated with Message Accounting libraries.

```
/DINIT: ENTER # OF REMOTE MA NODES [,RETRY LIMIT]?
```

A positive answer causes DINIT to allocate space in SAM for Message Accounting Tables.

Answer 0 if none is desired.

Do not include the local node when specifying the number of MA nodes.

The requested retry limit is optional, with the default equal to 15. Values from 1 to 15 are valid. The retry limit specifies the number of times the Message Accounting feature will request an acknowledgement message from the destination node before a DS05(3) error message, (timeout signaled by Message Accounting), is returned to the user program. The MA TIMEOUT value, specified in a later DINIT question, provides the time value used to schedule message acknowledge retries.

NOTE

The next three queries are asked only if an HP 3000 is connected to this node.

```
/DINIT: MAX # CONCURRENT HP 3000 USERS?
```

Respond with a decimal number in the range from 1 to 10 to indicate the maximum number of user requests simultaneously made to the HP 1000 from all connected HP 3000 nodes.

Respond with /D to indicate a "default" value of 4 logged-on users. Fourteen words of SAM are allocated for each possible user.

```
/DINIT: #HSI OR BISYNC HP 3000 LINKS?
```

Respond with the number of DS 1000/3000 communications links (DVA66/ID*66 for BISYNC links). This value is used to build the HP 3000 LU table. Do not include X.25 links.

NOTE

The following question is asked only if the library $D3X25 is used in generating the system.

```
/DINIT: MAX. # CONCURRENT 3K-1K & 1K-3K USERS ON X.25?
```

Respond with a decimal number to indicate the maximum number of users that can concurrently access X.25 pool LUs to or from an HP 3000. Do not include BISYNC links in your response.

NOTE

The next two questions are asked only if the HP 3000 LU indicated above was for a BISYNC PSI link to the HP 3000 (DVA66 or ID*66).

```
/DINIT: LOCAL ID SEQUENCE?
```

Enter /E for a null ID sequence. Otherwise enter from 1 to 15 characters. Do not enter /D.

These characters will be used as a security code to limit access to the local HP 1000 node by any dial-up BISYNC link (HP 3000) which attempts to establish communications with the HP 1000. When an incoming call is detected, the two nodes exchange the ID sequences set up by this query to validate the request for access, as shown in the diagram below.

/DINIT: REMOTE ID SEQUENCE?

Enter /E for a null ID sequence. Otherwise enter from 1 to 15 characters. Do not enter /D.

When an incoming call is detected and the two nodes exchange local ID sequences, as shown below, this is the ID sequence with which a comparison is made on the remote side to validate the request for access. If the sequences do not compare properly, the link initialize request is rejected. Additional remote ID sequences may be specified using DSLIN.

HP 1000 Node	HP 3000 Node
Local ID Sequence	Comparison with Remote ID Sequence
ENQ ⟶	
	Local ID Sequence
	⟵ACK0
Comparison with Remote ID Sequence	
TEXT ⟶	

NOTE

The next two queries are asked only if one or more RTE systems are connected to this node.

/DINIT: TOTAL # OF HP 1000 NODES?

Enter the total number of RTE nodes that will exist in the nodal routing vector. Include the local node if you wish to reference the local node number for local node access.

NOTE

The following question is asked only if you have generated in rerouting.

/DINIT: # OF REROUTING LINKS?

Enter the number of links connected to this node that may be used for rerouting. You may generate in the rerouting feature and then not use it by simply answering zero in response to this question.

You may not wish to declare links to DS/1000-IV nodes for which only one path is possible as a rerouting link, as a means of saving SAM table space, but doing so (declaring it a rerouting link) allows the LU to be placed in the NRV automatically.

NOTE

The next two queries are only for nodes with Session Monitor installed and initialized.

```
/DINIT: ENTER DEFAULT SESSION USER-NAME:
```

Enter the account name and account password (if one exists) that you want remote users to execute under when they access this node without performing a specific account logon. If a password exists and you fail to enter it, DINIT stops with the `Invalid Response` error message. If a password does not exist, no error message occurs.

Entering /D will cause a default to USER.GENERAL provided that USER.GENERAL is a valid account.

```
/DINIT: ENTER PASSWORD FOR NON-SESSION ACCESS:
```

Enter a minimum of 1 character and as many as 10 characters. Supplying this password to REMAT allows you to gain non-session access to a node. Non-session access means a remote user can modify system discs and execute any RTE operator command in this Session Monitor node. Refer to the *DS/1000-IV User's Manual* for details on how this password is used and the format for supplying it.

A default of no password can be specified by answering /D.

NOTE

The next three questions are asked only if other HP 1000s exist in the network.

```
/DINIT: LOCAL CPU #?
```

Respond with a decimal node number in the range from 0 through 32767. You must assign a unique number to each node in the network. The number you provide becomes this node's address in the network. It is recommended that zero (0) not be used as a node number. Zero is often used as a default value and may cause programming confusion.

NOTE

The following question is asked for each node specified in response to the previous DINIT query:

```
TOTAL # OF HP 1000 NODES?
```

```
/DINIT: CPU#,LU,TIMEOUT,UPGRADE LEVEL,"N","MA",MA TIMEOUT?
```

Respond with one to seven values, suppying answers, in the correct order, for each of the requested items: CPU, LU, TIMEOUT, UPGRADE LEVEL, "N", "M", and MA TIMEOUT. The requested items are defined as follows:

CPU# — The assigned node number, 0-32767. The use of node number zero is not recommended.

LU — The LU of the communication link. If the rerouting option has been generated in, and the possible paths to this node are all declared as rerouting links, leaving this field blank causes rerouting to automatically find the most efficient path to this node and place that LU into the NRV. This field MUST be left blank; commas MUST be left as placeholders, (that is , ,) for rerouting to occur. If an LU is specified, it must never be a rerouting LU. Otherwise, invalid routing tables will be created.

Entering zero (0) will cause LU 0 to be assigned to the communications link.

Communication link numbers in the range 1-255 are valid.

DS/1000-IV HDLC links require two consecutive communication link LUs, one for transmission and one for reception; use the lower of the two LUs for the entry here.

TIMEOUT — Transaction timeout value for messages from the local node to the node indicated by CPU#. If a zero is entered here, the Network Master Timeout value will be used.

If a non-zero value is entered here, that value becomes the master timeout value which will be used for all communication from the local node to the specified node (CPU#). This value overrides the Network Master Timeout for communication with this specific node (CPU#). This timeout value is the amount of time a master program will wait for a response before receiving a timeout error from DS.

UPGRADE LEVEL — The software upgrade field is defined as a 1 for DS/1000-IV. The default value is 1.

"N" — Indicates whether this node is a neighbor to the node that generated the query that is now reflected in the nodal routing vector. Enter N if the node is a neighbor.

If LU has been left blank because this is a rerouting link, this field must be left blank; commas must be left as placeholders (that is , ,) and neighboring nodes will be filled into the NRV automatically.

"MA" — Indicates Message Accounting. If the node has the message accounting feature generated in enter MA, otherwise leave blank. If the Message Accounting feature is generated in and you want to disable it, also leave it blank.

If MA is not generated in the local node, this field is ignored.

If you declare a remote node as an MA node when it is not generated as one, table space is wasted and you will receive an error message that message accounting has been turned off.

MA TIMEOUT — The MA timeout value is used to schedule the MA acknowledge requests. The default value is 3 seconds. The MA timeout is the amount of time the sending node will wait for a message acknowledgement before sending a cancellation. The program MATIC (message accounting tick) takes care of this timing. When a message arrives on the receiving side, an "idle timer" is set. If an outgoing message, that can carry the acknowledgement is not generated before the idle timer expires (one-fourth the MA timeout or 1 second, whichever is larger) an idle message is generated to return the acknowledgement. MA timeout values between 0 and 255 are accepted. However, the MA timeout should never exceed the "network" or "nodal" master timeout. Choose

your value based on the number of intervening nodes and the link rates. If you experience (DS05(2) MA timeout errors:

```
too many retries by message accounting,
```

or DS08(1) errors,

```
too many unacknowledged messages between source and destination
node for message accounting
```

while using the network, increasing this value may solve the problem.

```
/DINIT: ENABLE HP 1000 LU#[,COST]?
```

Respond first with the LU of those links where rerouting is defined and then list all other LUs. In the case of DVA66 links, respond with only the first LU of the transmit/receive pair. You must enter an LU (and optionally, a cost value) for each of the links you specified as being rerouting links. If no cost value is provided, a default of 1 is used.

Responding /E terminates this question.

The cost value is a value from 1 to 99. A cost of 1 is considered the best link in that it is efficient. Cost is assigned relative to the various link speeds. If you have a hardwired link you can run at full speed, you could assign that link a cost value of 1. If you have a modem link running at 300 BAUD you could assign that link a cost value of 99. The links between fast and slow would have costs between 1 and 99 associated with them. Cost can also be assigned to links so that a heavily trafficked node can be avoided unless there is no other physical route. If your network architecture is such that certain nodes are involved in every transaction, setting up link costs in other nodes to force routings that will avoid these nodes can reduce the store-and-forward traffic through them. Of course, if a failure occurs, rerouting still allows traffic through these nodes if necessary, until the failure is repaired.

If the # OF REROUTING LINKS (specified for an earlier query) is greater than the total number of LUs enabled here, DINIT aborts, printing the message:

```
/DINIT: NOT ENOUGH LINKS SPECIFIED FOR REROUTING.
```

NOTE

The next question is asked only if HP 3000s exist in the network. This question may be asked more than once, depending on the value specified in response to the earlier query:

```
# HSI OR BISYNC HP 3000 LINKS?
```

```
/DINIT: LU OF HP 3000?
```

Respond with the positive value of the HP 3000 LU(s).

```
/DINIT: MONITOR NAME?
```

To schedule a monitor program, respond with one of the following monitor names:

CNSLM	EXECM	OPERM	PROGL	RDBAM	TRFAS
DLIST	EXECW	PTOPM	RFAM	VCPMN	

One, some, or all monitors may be scheduled in this manner. This query will be redisplayed until you terminate the monitor name list by entering /E.

Respond /D to indicate the default condition. In this case, all of the monitors named above will be scheduled. CNSLM is scheduled only if there is an HP 3000 connected to this node. Descriptions of these monitors can be found in the "Planning a DS/1000-IV Node Configuration" section.

NOTE

TRFAS is part of the operating system software. More information on DS transparency and nodenames can be found in the RTE system generation and system manager manuals.

If a monitor that DINIT expects is not available, you will see the following message printed on the error LU device:

```
/DINIT:  ERROR: SC05 : <monitor name>
```

DINIT allows you to specify the scheduling of slave monitors which are not present at initialization. These monitors can later be downloaded (or RP'ed in disc based systems, but only if you request them by name). UPLIN will automatically enable these monitors within 5 seconds. The warning message shown above is still printed at initialization, but resources for the monitors are left.

If /D is specified, monitors not present at DINIT run time will not be enabled; the SC05 error is printed.

If you request monitors by name and make an illegal request, DINIT will respond with:

```
/DINIT: INVALID NAME
```

If one of the queuing processors (GRPM, RTRY, QUEUE, RES, QCLM, RPCNV, RQCNV, etc.) is not available (not generated), DINIT will respond with:

/DINIT: WARNING! *program name* IS A REQUIRED PROCESSOR FOR DS/1000!

If you intend to load this program online later, ignore the above message.

NOTE

The next question is asked only if the Remote File Access Module (RFAM) is scheduled, in which case DINIT expects you to declare the total number of files open on the network at one time.

```
/DINIT:  # OF FILES FOR RFAM:
```

Respond with a positive number to indicate the total number of files that may be simultaneously open at this node from all other network nodes. RFAM uses this value to allocate a corresponding number of Data Control Blocks and uses space on disk if necessary to contain the desired amount of DCBs. In

RTE-A systems, DCBs are allocated in RFAM's code space (there is no DCB swapping). If you indicate a number larger than will fit in this space, DINIT will allocate only the number of DCBs that will fit in the partition RFAM occupies.

The single-DCB version of RFAM allows only one file to be simultaneously open to all network nodes; in this case the answer to this query is not relevant. (Any numeric response will suffice.)

The multiple-DCB version of RFAM calculates the number of files that it allows to be simultaneously open to all network nodes.

If you enter -1, RFAM allocates only the number of data control blocks that will fit in the partition RFAM occupies without resorting to disc virtual memory for storage of additional data control blocks. This improves RFA performance, but the maximum number of files which can be open is limited. The actual number of DCBs allocated is printed by RFAM.

If your response to the # OF FILES FOR RFAM question was greater than zero, RFAM allocates the following:

1. The number of Data Control Blocks (DCB) that can fit into its internal buffer and in the remainder of its partition space (each DCB requires 153 words of memory storage space),

2. The number of contiguous disc tracks necessary, divided by 32 DCB/track (each DCB requires 3 sectors or 192 words of disc storage space) (64 DCB's/track on 7925 discs). If space for any of the DCBs has to be placed on disc, space for the entire number requested has to be set aside to allow for swapping of DCBs in and out of RFAM's partition.

3. If the result of the following calculation (3) is less than the sum of calculation (1) and (2), then RFAM allocates:

   - room for one or more DCBs in its partition, plus,

   - a nine word table entry for each DCB stored on disc.

   This table is then used to keep track of the swap status of DCBs. Thus, available partition space limits the number of files either by the DCB table entries or the DCBs themselves.

If the number calculated by RFAM is less than the number you entered, or if you entered -1, RFAM displays the following message on the system console (logical unit 1):

```
RFAM: LIMITED DISC SPACE, THE NUMBER OF FILES HAS BEEN LIMITED TO nn
```

where *nn* is the value calculated by RFAM.

NOTE

The DINIT program requires that you declare security codes for your node. The queries for these entries are:

```
/DINIT: NETWORK USER SECURITY CODE?
```

Specify two non-blank ASCII characters: both cannot be a numeric and the first must be alphabetic. This security code is used to restrict access to DS capabilities to those who know the security code. This

security code must be known to all users of REMAT where it is required to use the SW command. Be sure that you remember the security code supplied to DINIT. It cannot be retrieved for examination once it has been declared.

```
/DINIT: NETWORK MANAGEMENT SECURITY CODE?
```

Enter two non-blank ASCII characters. This security code is used to restrict access to the following DSMOD commands:

/Q	Nodal Quiescence
/R	Quiescent node restart
/T	Timing modification
CN	Change NRV, Shutdown (DINIT), Remote I/O Mapping

At this point, DINIT terminates with the message:

```
END DINIT.
```

NOTE

Do not alter the system time of day at any time after running DINIT. Doing so may cause UPLIN, MATIC, RTRY and possibly user programs, to run 24 hours later. If it is necessary to reset the system time, be sure to reschedule these programs.

%DINIS - Shutdown Version

There are two versions of DINIT -- %DINIT and %DINIS. The %DINIT version of DINIT is a smaller module for initializing a DS network. The %DINIS version is larger because it provides the shutdown option. Thus, %DINIT should be used in memory limited applications and %DINIS should be used in disc based nodes when the shutdown feature is desired.

The shutdown version is DINIT's secondary execution mode (executed after the original initialization of the node) and it gives you the capability of doing online deallocation of all system resources used by DS. The following are the possible situations when this might be desired:

- When the resources are required by another job.
- When, for security reasons, you want the node to be inaccessible from other nodes for certain periods of time.
- When a change in any of the initialization answers is required: to add a node, add or delete Message Accounting or Rerouting parameters, etc.

"Shutdown" may be invoked after DINIT has initialized the node. When shutdown is complete, the following will have occurred:

- The resources that were allocated by the previous initialization are returned to RTE. This

includes all class numbers, class buffers, resource numbers, network-related programs (GRPM, RTRY, QCLM, UPLIN, QUEX, QUEZ, RPCNV, RQCNV, QUEUE, RSM, etc.), all remote sessions are logged off, and all allocated SAM is returned to RTE.

- All communication logical units defined in the NRV are cleared and will not respond to any incoming messages.
- All slave monitors are aborted and their class numbers and any buffers outstanding are cleared.
- All master programs waiting for replies are given master timeout errors. If they repeat their requests, they will receive a DS00(0) error (system not initialized), at which time they should either terminate immediately or retry after a reasonable delay.
- All local sessions created from remote nodes are logged off.

NOTE

All files currently open to RFAM will be closed without posting current modifications. Files that have been written on but not yet closed or posted will be left corrupt.

Any attempt to run the non-shutdown version of DINIT (%DINIT) after the node is initialized will result in the following messages being displayed:

```
/DINIT: NODE ALREADY INITIALIZED

/DINIT: DINIT ABORTED
```

Running the "shutdown" version of DINIT (%DINIS) will result in the shutdown procedure being initiated. The following query appears:.

```
/DINIT: SHUTDOWN?
```

Answer NO and DINIT exits.

Answer YES and the following messages are displayed:

```
/DINIT: SHUTDOWN

/DINIT: # ACTIVE TCBS = 0

/DINIT: # ACTIVE REMOTE SESSIONS: 0
```

Then DINIT asks for the network security code:

```
/DINIT: NETWORK MANAGEMENT SECURITY CODE?
```

Enter the correct security code and shutdown occurs. Enter an incorrect security code and DINIT aborts.

If the number of active TCBs and active remote sessions are not both zero, then there are currently active transactions in the network and issuing the shutdown request terminates them without warning. (The "active remote sessions" are those sessions created at remote nodes by programs of this node.)

Once shutdown has been completed, the next time DINIT is scheduled, it enters initialization mode.

Avoiding SAM Fragmentation

When a node is initialized, a block of SAM is allocated for the DS table areas (such as transaction control blocks, nodal routing vectors, link vectors, cost matrices). It is not returned to RTE until DS is shut down or the system is re-booted. Initializing DS while other programs have SAM blocks allocated may severely fragment SAM. (In RTE-A, DS tables are established in the system memory block; as a result, there is not a SAM fragmentation problem.) In granting this SAM block to DS, the total SAM area, indicated as the "largest possible SAM block determined at boot-up," may be divided into two non-contiguous portions. A user program requesting a large SAM block would not be satisfied because neither portion is large enough or the request, yet their combined size exceeds the requested size. This program will be memory-suspended (state 4) for as long as DS is initialized, which may prevent SAM allocation requests from any lower-priority from being satisfied, also putting them into the memory-suspend state even though they may be requesting much smaller blocks. This is a design feature in RTE to ensure that higher-priority programs making SAM allocation requests "sneak in" to take away smaller SAM blocks, preventing a large block from ever becoming available. This may put more programs in memory-suspend than actually needed, creating a "deadlock" condition.

Therefore, do not frequently shut down and initialize DS at a node. The best time to initialize DS is at boot-up, when there is no fragmentation of SAM in the system. If you must shutdown the system, initialize DS only after you have made sure that no other programs have SAM blocks allocated. The next time DINIT is scheduled, it will request initialization.

DINIT File Example, HP 1000 to HP 3000

The example below shows a sample DINIT initialization file for a node which communicates with a number of other RTE links and an HP 3000.

```
* HP 1000?
*
YES
*
* HP 3000?
*
YES
*
* NUMBER OF ACTIVE TRANSACTIONS?
*
/D
*
* MAX # LOCAL SESSIONS FOR REMOTE NODES?
*
5
*
* NUMBER OF REMOTE MA NODES [,RETRY LIMIT]?
*
1,4
*
* MAX # CONCURRENT HP 3000 USERS?
*
5
*
* # OF HP 3000 LINKS?
*
1
*
* # OF HP 1000 NODES?
*
12
*
* # OF REROUTING LINKS?
1
*
* ENTER DEFAULT SESSION USER-NAME:
*
USER.GENERAL
*
* ENTER PASSWORD FOR NON-SESSION ACCESS
*
XXXX
*
* LOCAL NODE NUMBER?
*
500
*
```

```
* CPU#, LU, TIMEOUT, UPGRADE LEVEL, NEIGHBOR, "MA", MA TIMEOUT
*
500
100,    58,      15,             0
200,    58,      30,             0
300,    58,      15,             0
400,    58,      15,             0
600,    58,      15,             0,        N
700,    60,      10,             1,        N
  1,      ,      15,             1
  2,      ,      15,             1
  3,      ,      15,             1,        N
  4,      ,      15,             1,         ,   MA,    20
*
* ENABLE HP 1000 LU# [,COST]  (REROUTING LU'S FIRST)
*
64
*  NON REROUTING LU'S
60
58
/E
*
* LU OF HP 3000?
*
59
*
* MONITOR NAME?    (SCHEDULE MONITORS)
*
/D
*
* NUMBER OF FILES  (OPEN SIMULTANEOUSLY THROUGH RFAM)
*                  (-1 = AS MANY AS WILL FIT IN RFAM'S PARTITION)
-1
*
* NETWORK MANAGEMENT PASSWORD
*
DS
*
* NETWORK USER'S PASSWORD
*
DS
*
*END DINIT
```

DINIT Interactive Example, HP 1000 to HP 1000

The example below shows a sample interactive DINIT initialization for a system with only RTE-RTE links. This system is also generated with message accounting, dynamic message rerouting, and session monitor. User-supplied responses are underlined.

```
:RU,DINIT

/DINIT: SYSTEMS CONNECTED TO THIS NODE:

/DINIT:  HP 1000?YES

/DINIT:  HP 3000?NO

/DINIT: # ACTIVE TRANSACTIONS? /D

/DINIT:  MAX # LOCAL SESSIONS FOR REMOTE NODES?/D

/DINIT: # OF REMOTE MA NODES [,RETRY LIMIT]?  1,4

/DINIT: # OF HP 1000 NODES?2

/DINIT: # OF REROUTING LINKS?1

/DINIT:  ENTER DEFAULT SESSION USER-NAME:  USER.GENERAL

/DINIT:  ENTER PASSWORD FOR NON-SESSION ACCESS:   XXXX

/DINIT: LOCAL CPU#?   500

/DINIT:  CPU#,LU,TIMEOUT,UPGRADE LEVEL,"N","MA",MA TIMEOUT?
         500
         3   ,  ,    20 ,            1, N , MA

/DINIT: ENABLE HP 1000 LU#[,COST]?    64,1

/DINIT: ENABLE HP 1000 LU#[,COST]?    /E

/DINIT: MONITOR NAME?          /D

/DINIT: # OF FILES FOR RFAM?           -1

/DINIT: NETWORK USER SECURITY CODE?          DS

/DINIT: NETWORK MANAGEMENT SECURITY CODE?    DS

END DINIT
```

MODIFICATIONS USING DSMOD

Once your node has been initialized, you can schedule DSMOD to make adjustments to parameters set during initialization or to change timing parameters which are not set through DINIT questions. To schedule DSMOD at an initialized node, use the following syntax:

RU,DSMOD[,*inputdevice* / ,*namr*] [,*errordevice*]

Parameters

inputdevice — The logical unit number of the device from which responses to the /DSMOD: OPERATION? query will be entered. Specification of this parameter is optional. If this parameter is omitted, DSMOD assumes the value returned by LOGLU as the input device.

namr — The name of a local transfer file that must contain the response to DSMOD queries in the correct entry sequence. May be an FMGR or non-FMGR file. If full pathname is not specified, the default is the current working directory.

errordevice — The logical unit number of the device to which DINIT directs messages if an error condition is encountered. Specification of this parameter is optional. If this parameter is omitted, DINIT assumes the value returned by LOGLU as the error device. Further, if you specify the logical unit number of a non-interactive device in this parameter position, DINIT ignores your specification and assumes the value returned by LOGLU.

There are two points to remember:

1. Any parameter modifications made using DSMOD remain in effect until they are changed by running DSMOD again, or the node is re-booted.

2. If DS is shut down while DSMOD is running, DSMOD may abort with a request error (RN02).

Summary of Commands

When you execute DSMOD in a node that has been initialized, the interactive dialogue begins with the DSMOD query shown below. Respond with any command listed in Table 7-1.

```
/DSMOD: OPERATION?
```

DSMOD Operation Commands

Command	Description
??	Displays a list of valid DSMOD commands. Actually, if you respond to the DSMOD operation query with anything other than the commands listed in this table, DSMOD displays a list of valid commands: DSMOD COMMAND LIST /DSMOD: OPERATION? ?? ??: LIST COMMANDS /A: ABORT /E: TERMINATE /I: CHANGE 3000 ID SEQ /L: RE-ENABLE LINE /N: DISPLAY NRV /P: CHANGE NON-SESN PASWD /Q: QUIESCE NETWORK /S: SCHEDULE MONITOR(S) /T: ADJUST TIMING /U: CHANGE DEFAULT SESN USR-NAME CN: CHANGE NRV DI: DISABLE LINE QUIESCENT SYSTEM ONLY: /R: RE-START NETWORK
/A	Abort DSMOD. If entered, DSMOD terminates abruptly; however, the modifications made remain. The message is: /DSMOD: DSMOD ABORTED.
/E	End DSMOD program or command execution. If used in response to a multi-question command query, DSMOD will return to the /DSMOD: OPERATION? query. To terminate DSMOD enter /E in response to the /DSMOD: OPERATION? query and the message is: END DSMOD.
/I	Change HP 3000 ID sequence. (Used only for DVA66 links.) This command allows the user to specify a new Local and Remote ID sequence of from 1 to 15 alphanumeric characters or /D for a null sequence. This ID is used when the BISYNC link to the HP 3000 makes a connection. The local ID sequence is sent to the HP 3000 and compared with the HP 3000's remote ID sequence. The HP 3000 then provides its local ID sequence to the HP 1000 which compares this sequence to its remote ID sequence. This comparison is made to determine whether communication can be established. The ID sequences are passed to the firmware on the BISYNC board following a disconnect or line re-enable. To insure the firmware receives the new IDs, it may be necessary to use the /L command to re-enable link. The /L command should not be used if anyone is using the link because it will terminate any ongoing HP 1000-HP 3000 activity,

DSMOD Operation Commands, cont'd.

Command	Description
/L	Line re-enable. Re-enables communications line. DSMOD will ask which logical unit number is to be re-enabled. When the HP 3000 link is re-enabled, any ongoing activity will be terminated. Be sure there are no active sessions to the HP 3000 when this command is issued using the HP 3000 LU. This command cannot be used for X.25 pool LUs. Use the DSMOD DI command to disable these LUs.
/N	NRV list. Displays a list of nodal routing vector specifications.
/P	Change the non-session password. You must first know the current password, if one exists. Entering an incorrect current password will cause DSMOD to abort. You may enter from 1 to 10 characters for the new password. If you had a password before and you do not want one now, enter /D. This command is ignored if session monitor is not installed.
/Q	Quiesce node. Sets local node to quiescent state. DSMOD will ask for the network management security code before acting upon the request.
/R	Restart quiescent node. This request is valid only when the node is in quiescent state. DSMOD will ask for the network management security code before acting upon the request.
/S	Schedule monitor. Schedule system monitor that previously has not been scheduled. DSMOD will ask for monitor names until you terminate the entry list via the /E terminator request. Only the following monitor program names are legal entries: CNSLM EXECM OPERM PROGL RDBAM DLIST EXECW PTOPM RFAM VCPMN
/T	Timing adjustment. DSMOD will display current transaction timeout values and then accept new timeout values. Changing the Network master timeout is effective only for the HP 3000 link and those nodes which show a 0 timeout value in the NRV listing. Use the /N command to get a NRV listing and verify the timeout value.
/U	Change the default Session user name. The old account name is displayed and you are asked for a new name. It must be a valid account name and password if one is used. Enter /E if no change is desired. This command is ignored if session monitor is not installed.
CN	Change Network Routing Vector. You can change the entry for a particular node. The LU, NODAL master timeout, upgrade level, and neighbor flag can be changed.
DI	Disable Line. Can be used to disable X.25 pool LUs; do NOT use the DSMOD /L command.

Example DSMOD Transfer File

Running DSMOD with a transfer file may be useful if there are DS/1000-IV changes that need to be made on boot-up. You could add the DSMOD runstring to the welcome file. An example of a DSMOD transfer file is shown below.

```
**REQUEST TIMING CHANGES
/T
**GIVE THE NETWORK MANAGER'S SECURITY CODE
NM
**CHANGE THE MASTER TIMEOUT (DIRECT CONNECT LINK TIMEOUT CAN BE
**                          SHORTER)
20
**LEAVE THE SLAVE TIMEOUT UNCHANGED
22
**LEAVE THE REMOTE BUSY RETRIES UNCHANGED
3
**LEAVE THE REMOTE QUIET RETRIES UNCHANGED
0
**CHANGE THE MAX. HOP COUNT (DEFAULT=NUMBER OF NODES)
7
**LEAVE THE MAX LINE DOWN COUNT UNCHANGED
10
**LEAVE THE IDLE SESSION TIMEOUT UNCHANGED
5
**END DSMOD
/E
```

/A, Abort DSMOD Execution

In DSMOD, the /A command is equivalent to the /E operation, except that DSMOD terminates and displays the message: DSMOD ABORTED.

```
/DSMOD: OPERATION?  /A
/DSMOD: DSMOD ABORTED!
```

If adjusting timeout values, previous values specified (if any) remain in effect. For example, if you change the Network Master Timeout value using the /T command and then respond to a later query with /A (or /E) to the slave timeout value, then the new Network Master Timeout value will be in effect, but the other timeout values will remain unchanged.

/E, End DSMOD Operation Phase

```
/DSMOD: OPERATION?  /E
END DSMOD
```

/I, Change ID Sequences

For the ID sequence, you may enter from 1 to 15 characters or /D, which provides no ID sequence.

```
/DSMOD: OPERATION?  /I
/DSMOD: LOCAL ID SEQUENCE?  HI THERE 3000
/DSMOD: REMOTE ID SEQUENCE?  HI THERE 1000
```

When the HP 1000 calls the HP 3000 to establish a hardware connection, the line bidding procedure will occur and the ID sequences are exchanged and compared. A successful comparison will complete line bid sequence. This procedure provides a measure of security since callers on each side must know the the ID sequence used by the other side. With the modem link to HP 3000s it is possible to dial-up several different HP 3000s. If a unique ID sequence is used at each HP 3000, no accidental connection to the wrong HP 3000 will occur.

/L, Line Re-Enable

The /L command may be used to enable a DS/1000 link not previously enabled, recently connected, or recently repaired.

```
/DSMOD: OPERATION?  /L
/DSMOD: ENABLE LU# ? 14
/DSMOD: ENABLE LU# ? /E
/DSMOD: OPERATION?
```

A previously enabled DS/1000-IV link which has been disconnected or which is connected to a computer to which power has just been restored will require the powerfail program AUTOR to be modified to schedule DSMOD with a command file to enable the DS LUs using the /L command. The /L command can also be used to enable the link to an HP 3000. Do NOT use this command for X.25 pool LUs. If you do, the following error message will be printed:

```
LU ERROR:
"/L" NOT VALID FOR X.25 POOL LUS. USE DSMOD "DI" TO DISABLE THE LU
```

/N, Nodal Route Vector List

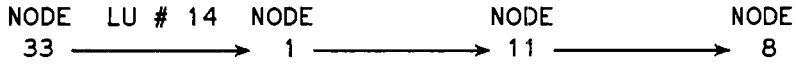
You may use the /N command to determine whether the nodal routing vector at each node correctly matches your network connections. However, if the rerouting feature is enabled, the NRV changes that it makes are reflected at the time the /N command is issued.

```
/DSMOD: OPERATION?  /N
NRV SPECIFICATIONS:
LOCAL NODE :    33   NO. OF NODES =  4

NODE=    1    LU=  14    TO(SEC.)=    0    LEVEL = 1,(N)
NODE=   11    LU=  14    TO(SEC.)=   60    LEVEL = 0
NODE=   33    LU=   0    TO(SEC.)=    0    LEVEL = 1
NODE=    8    LU=  14    TO(SEC.)=   70    LEVEL = 1

/DSMOD: OPERATION?
```

Interpreting the NRV Printout. The above NRV printout indicates that the local node number is 33 and presently uses LU 14 to communicate with nodes 1, 8, and 11. The master timeout for communication with node 11 has been overridden to 60 seconds. From this, we can infer that node 1 (which does not have a timeout override specified) is node 33's neighbor and further, that the link between nodes 1 and 11 is relatively slow, since the override value is so high.

From the fact that a 70-second override is specified for node 8, we can infer that node 8 is even further from node 33, probably is node 11's neighbor, with a faster link than between nodes 11 and 33, since the difference between 70 seconds and 60 seconds is relatively small.

The diagram below is only one possible inference from the printout above. Of course, the rules of inference used are valid only if reasonable initialization procedures have been followed:



The level number (LEVEL =) refers to the software upgrade level. Level 1 means DS/1000-IV (91750) is installed in this node while level 0 means DS/1000 (91740) is installed.

The (N) indicates neighbor node. This information is used as a check for allowing neighbor node addressing. This bit is set when the neighbor link is first established. Once that link is enabled, the neighbor bit remains set even if rerouting software changes the route.

/P, Change Non-Session Password

You must provide the current password before you can change the password. Enter from 1 to 10 ASCII characters.

```
/DSMOD: OPERATION? /P
/DSMOD: CURRENT PASSWORD FOR NON-SESSION? XXXX
/DSMOD: ENTER NEW PASSWORD FOR NON-SESSION  YYYY
/DSMOD: OPERATION?
```

/Q, Quiesce Node

The /Q operation request is necessary whenever you must replace any monitor program, or wish to "freeze" network communication activity.

```
/DSMOD: OPERATION?  /Q
/DSMOD: SYSTEM QUIESCENCE
/DSMOD: NETWORK MANAGEMENT SECURITY CODE? DS
/DSMOD: SYSTEM IS QUIESCENT
END DSMOD
```

It may take a few seconds for activity currently being processed to be completed. The message SYSTEM IS QUIESCENT is displayed on the system console when this operation is completed. Network resources remain allocated.

/R, Restart Quiescent Node

The /R and /T operations are the only requests allowed in a quiescent node.

```
/DSMOD: OPERATION? /R
/DSMOD: QUIESCENT RESTART
/DSMOD: NETWORK MANAGEMENT SECURITY CODE? DS
/DSMOD: OPERATION?
```

Once entered, the /R operation allows network activity to continue.

NOTE

During quiescence there may be user programs suspended waiting on the DS quiescent resource number. The WHZAT program will show which programs are suspended on an RN lock attempt prior to restarting the node. You can determine the resource numbers used by running DSINF, described in the *DS/1000-IV Theory of Operation and Troubleshooting Manual.*

/S, Schedule Monitor

The /S operation request is used to schedule a system monitor that has not been scheduled.

```
/DSMOD: OPERATION? /S
/DSMOD: MONITOR NAME? PTOPM
/DSMOD: MONITOR NAME? /E
/DSMOD: OPERATION?
```

If you request the scheduling of a monitor that is already active, the following will result:

```
/DSMOD: ERROR: STAT: PTOPM
/DSMOD: MONITOR NAME?
```

/T, Network Timing Adjustment

The /T and /R operations are the only requests allowed in a quiescent node. The /T operation is particularly useful when you first set up a network and notice that transactions are timing out. The /T command allows you to do the following tasks:

- modify the network timeout values for the master and slave requests,
- modify the number of retries for a remote node is busy" condition,
- modify the amount of time for a master program suspension between retries in the case of a "remote node is busy" condition, and
- adjust the maximum hop count and the maximum line down count.
- modify the idle session time-out.

If you wish to change some but not all of the values, respond with a space and carriage return to those you wish to leave unchanged. Transaction timing details are discussed in the Transactions Timeout section of this section.

```
/DSMOD: OPERATION?  /T
TIMING MODIFICATION--CURRENT VALUES:

MASTER T/O=45
SLAVE  T/O=30
REMOTE-BUSY=3
REMOTE-QUIET=0
MAX. HOP COUNT=12
MAX LINE DWN CNT IN 5 MIN=10
IDLE SESSION T/O = 5

/DSMOD: NETWORK MANAGEMENT SECURITY CODE?  ZZ

/DSMOD: MASTER T/O [5 TO 1275 SECONDS] ? 25
/DSMOD: SLAVE T/O  [5 TO 1275 SECONDS] ? 35
/DSMOD: REMOTE-BUSY RETRIES [1 TO 10]?  5
/DSMOD: REMOTE-QUIET WAIT [0 TO 7200 SEC]?  0
/DSMOD: MAXIMUM HOPCOUNT [1 TO 32767]?  5
/DSMOD: MAX LINE DOWN COUNT IN 5 MIN [1 TO 32767]?  20
/DSMOD: IDLE SESSION TIMEOUT [0 to 45 HRS]?  5
```

MASTER T/O

A master timeout is the number of seconds that can elapse before your master request is timed out by UPLIN, the system transaction monitor. If a master request timeout occurs, system resources allocated for the transaction are returned to the system and the error DS05(0) or DS05(1), request timeout, is reported. If MA is present and active in these two nodes the software can distinguish whether it was the request or reply that timed out. This information is contained in the error qualifier that is returned.

The network master timeout value is adjusted with the /T command *only* for messages originated from nodes which have defaulted (assigned 0) to their nodal master timeout in their NRV. If a value greater than zero was assigned in response to the following question during initialization, that nodal master timeout overrides the network master timeout.

```
/DINIT: CPU ,LU,[TIMEOUT],UPGRADE LEVEL,"N","MA",MA TIMEOUT?
```

When you provide a non-zero value for the nodal master timeout during initialization, the value is then not alterable later with the DSMOD /T command. You must use the DSMOD CN command.

SLAVE T/O

A slave timeout is the number of seconds that can elapse before an incoming slave request is timed out by UPLIN. If a slave request timeout occurs, system resources allocated for the transaction are returned to the system.

REMOTE-BUSY RETRIES

A remote-busy retry is the number of retries that will be performed to transmit a message during a "remote node is busy" condition. The transmission will be retried at one second intervals from 1 (default) to 10 times, depending on the remote-busy retries count.

REMOTE-QUIET WAIT A remote-quiet wait is the number of seconds to suspend the master program before resubmitting a master request to a remote system that has returned a node quiesced reply to the initiating node. The initiating node continues to alternately suspend the master program for the remote-quiet wait timing value and then resubmit the master request until the remote system accepts it. If a remote-quiet wait timing value of zero is specified, the master program is not suspended if all the remote-busy retries fail, and the error DS08(0), remote busy, is returned Hewlett-Packard recommends that you specify this value as zero (default condition) until you have more experience using your network. If you specify a non-zero value here and encounter error conditions that result in the DS08(0) error message, the master program will attempt to retry the master request indefinitely until the error condition is resolved. Certain generation errors can result in DS08 errors that can never be resolved.

MAXIMUM HOPCOUNT The maximum hop count is the number of store-and-forward operations that can occur on a message before it is determined to be "caught in a loop". The maximum hop counter is provided to protect against temporary message loop situations that can occur if there are several simultaneous topology changes in the network. It is also protects against the chance of NRVs being set up incorrectly or a user changing the NRV manually using DSMOD and specifying it incorrectly. Each node processing the message decrements a counter in the message header. When the count reaches zero, the message is flushed. The maximum hop count defaults to the number of nodes in the network.

MAX LINE DOWN COUNT The maximum line down count is the number of times an irrecoverable failure can occur on a line in a five minute period, before the line is declared too unstable for use and removed as a possible message route in the NRV. This parameter has no effect if rerouting is not generated in.

IDLE SESSION TIMEOUT The idle session timeout is the length of time a remotely established session will be allowed to remain if it is not actively being accessed. A value of zero implies no time limit. The default timeout values are:

```
Master Time-out       :  45 seconds
Slave Time-out        :  30 seconds
Remote-Busy           :   3 retries
Remote-Quiet          :   0 retries
Max Hop Count         :  # of nodes in the network
Max Line Down Count   :  10
Idle Session Timeout  :   5 hours
```

/U, Change Default Session User Name

You may enter any valid (previously defined) account name. At this time, all new accesses to the session node will be made under the new account name. The previous default session accounts are not automatically logged off and continue to be used by the programs, including REMATs, that were active before the default account name changed.

```
/DSMOD: OPERATION? /U
/DSMOD: CURRENT NAME= USER.GENERAL
/DSMOD: ENTER NEW DEFAULT SESSION USER NAME: PHIL.DS
/DSMOD: OPERATION?
```

One special default account is established when a DS/1000 node accesses a DS/1000-IV node. This session remains active indefinitely and is used by all DS/1000 nodes accessing the DS/1000-IV node.

CN, Change NRV

The CN command allows you to change the LU, Nodal master timeout, upgrade level and whether or not the node is a neighbor to the local node. However, rerouting can change the LU and neighbor status back as links are restored. This nodal master timeout, when specified non-zero, overrides the network master timeout displayed by the DSMOD /T command. It is used for all messages directed to this node.

```
/DSMOD: OPERATION? CN
/DSMOD: NETWORK MANAGEMENT SECURITY CODE? DS
/DSMOD: NODE # TO CHANGE? 1
```

Current values are displayed:

```
 NODE = 1    LU = 64    TO (SEC.) = 15    LEVEL = 1
```

Change values are entered:

```
/DSMOD: LU,TIMEOUT,UPGRADE LEVEL [,N]? 60,20,0,N
```

New values are displayed:

```
 NODE = 1    LU = 60    TO (SEC.) = 20    LEVEL = 0,(N)

/DSMOD: NODE # TO CHANGE? /E
/DSMOD: OPERATION?
```

When entering new values, parameters not to be affected can be skipped by entering commas as place-holders as follows:

```
/DSMOD: LU,TIMEOUT,UPGRADE LEVEL [,N]? ,,,N
```

DI, Disable Line

The DI command can be used to disable X.25 pool LUs, HDLC links, and BISYNC links.

```
/DSMOD: OPERATION? DI
/DSMOD: DISABLE LU#? 14
/DSMOD: DISABLE LU#? /E
/DSMOD: OPERATION?
```

USING DSLIN

Before you can begin sending messages over a BISYNC link, you must initialize the link by running the DS/1000-IV program DSLIN at the HP 1000 or by issuing the DSLINE command at the HP 3000.

The following paragraphs describe how to use DSLIN to initialize a BISYNC link. If your node only needs to receive data from the HP 3000 (i.e., it will never need to initiate traffic), you do not need to run DSLIN; the DSLINE command should be used at the HP 3000 instead. (For more information on the DSLINE command, refer to the *DSN/DS HP 3000 to HP 1000 Reference Manual for HP 3000 Users.*)

Both the HP 1000 and the HP 3000 BISYNC cards must be enabled before initialization messages can be exchanged. On the HP 1000, the card is enabled when DINIT is used to initialize DS/1000-IV. On the HP 3000, the DSCONTROL command must be used.

Initializing a BISYNC Link

When DSLIN is used to initialize a BISYNC link, it determines:

- the HP 3000 LU number to initialize;
- the communications block size to use;
- the maximum retry count;
- the connect timeout;
- the local and remote ID sequences; and
- the connect mode (primary or secondary) of the link.

These characteristics may be provided as parameters in the DSLIN run string, as answers in an answer file, or as responses to interactive DSLIN prompts.

DSLIN is scheduled automatically (if it has an ID segment) when RMOTE is used to execute the HELLO command or call is used at the HP 1000 and the BISYNC link is not initialized. When DSLIN is scheduled automatically, the link is initialized in primary mode with the default DSLIN line characteristics. (These line characteristics are described later in this chapter.)

DSLIN Syntax

DSLIN is scheduled with the RTE RU command. DSLIN may also be scheduled from a program with an EXEC or DEXEC call.

```
RU,DSLIN[,lu][ -[,S]  ]
            [ ,P      ]
            [,answerfile ]
```

Parameters

lu

The positive HP 3000 logical unit number. It is also the transmit LU of the transmit/receive fair. If this parameter is omitted, DSLIN prompts you for the LU number.

answerfile

An answer file that contains responses to the DSLIN prompts. Can be an FMGR or non-FMGR file. The DSLIN prompts are listed below. If this parameter is omitted and - is also not specified, DSLIN will prompt you for line characteristics.

-

Indicates that the line will be opened in primary mode with the following DSLIN default line characteristics:

- Communications Block Size = 1024 words
- Maximum Retry Count = 16
- Connect Timeout = 255 seconds
- Local and Remote ID Sequences = as specified at DS initialization

If this parameter is omitted and *answerfile* is also not specified, DSLIN will prompt you for the line characteristics.

S

Indicates that the link should be initialized in secondary mode. If the link is placed in secondary mode, the HP 1000 will wait for the HP 3000 to initiate communication. This mode is useful if you have a modem connection to the HP 3000 and cost is a consideration. (BISYNC links are automatically initialized in secondary mode by DINIT.) If neither S nor P is specified, the link will be initialized in primary mode.

P

Indicates the link should be initialized in primary mode. If the link is placed in primary mode, the HP 1000 will initiate communication with the HP 3000. If neither S nor P is specified, the link will be initialized in primary mode.

DSLIN Dialogue

The following is an example of the DSLIN dialogue. When a DSLIN parameter has a default value, it is displayed in brackets ([]) as part of the prompt. Type /D or press return to indicate that you want to use the default value. Entering /A at any time after the LU has been entered will cause DSLIN to terminate.

To use DSLIN interactively, type the following run string:

```
RU,DSLIN
```

DSLIN begins by prompting you for the positive HP 3000 LU number. DSLIN will also prompt you for an LU number when an answer file is used. Do not include an LU number in the answer file.

```
LU OF HP 3000:
```

If an invalid HP 3000 LU is entered, DSLIN displays the following message and terminates:

```
LU xx IS NOT IN THE 3000 LU TABLE
END OF DSLIN
```

If you do not enter an LU, DSLIN repeats the prompt with the following message:

```
PLEASE ENTER THE LU.
```

Once a valid HP 3000 LU has been entered, DSLIN asks you if you want to open or close the BISYNC link:

```
OPEN (DEFAULT) OR CLOSE THIS LU?
```

If you reply CLOSE, DSLIN attempts to close the line. Once the line is closed, DSLIN displays the following message and then terminates:

```
LU xx WAS CLOSED
END OF DSLIN
```

The line is not closed until a termination reply is received from the HP 3000. If the HP 3000 does not respond, the line may not be closed. (DSLIN offers an alternate way to close a BISYNC link. This method is described later in this chapter in "Using DSLIN to Alter Line Characteristics.")

If you reply OPEN (the default response), DSLIN proceeds by prompting you for the communications block size:

```
COMMUNICATIONS BLOCK SIZE [xxxxx] :
```

The communications block size is the maximum size message, including the header and appendage, that DS/1000-IV will attempt to send across the link. You may select a communications block size in any multiple of 16 between 304 and 4096.

Although you can specify a communications block size of 4096 words, the actual block size used is limited to the buffer size of the card installed at the HP 3000. HP 3000 BISYNC cards may have buffer sizes of either 1024, 1072 or 4096 words.

The default communications block size (*xxxxx*) depends on the buffer size library specified at generation time. $D3KRB is 304 words; $D3KBB is 1072 words; and $D3KMB is 4096 words.

If you respond to this prompt with an out-of-range value, DSLIN displays the following message:

```
INPUT VALUE [xxxxx] OUT OF RANGE; MUST BE BETWEEN 304 AND 4096
DEFAULT VALUE OF 1024 USED
```

If a value which is not a multiple of 16 is specified, DSLIN uses the next highest multiple and prints the following message:

```
BLOCK SIZE CHANGED TO xxxxx
```

DSLIN then prompts for the maximum retry count:

```
MAXIMUM RETRY COUNT [16] :
```

Indicate the number of times a message will retry if an acknowledgement fails to arrive. The value must be between 1 and 255.

Next, DSLIN prompts for the response timeout:

```
CONNECT TIMER (SECONDS) [255] :
```

Indicate the time allowed for response before the line is placed in secondary mode. The value must be between 1 and 255. If you respond to this prompt with an out-of-range value, DSLIN displays the following message:

```
INPUT VALUE [xxxx] OUT OF RANGE; MUST BE BETWEEN 1 AND 255
DEFAULT OF 255 USED
```

DSLIN then asks for the local ID sequence:

```
LOCAL ID SEQUENCE :
```

The local ID sequence may consist of up to 15 ASCII characters. If you want a null ID sequence, respond with /D. If you do not want a local ID sequence or any remote ID sequences, respond with /E.

If you respond to the local ID sequence prompt with a /D or an ASCII string, DSLIN prompts you for up to 15 remote ID sequences:

```
REMOTE ID SEQUENCE 1:

REMOTE ID SEQUENCE 2:

        .
        .
        .

REMOTE ID SEQUENCE 15 :
```

Up to 15 ASCII characters are allowed per remote ID sequence. You may also respond with /D to indicate a null sequence. Type /E to indicate that no more ID sequences are to be used. For multiple HP 3000 connections, each with a unique ID sequence, the values specified here are searched for any match.

At this point in the dialogue, DSLIN sends the configuration information to the board and reads back the board's parameters. If the board type is not 0, DSLIN prints the following message and then terminates:

```
THE BOARD ON LU xx DOES NOT CONTAIN BISYNC FIRMWARE!
```

If the board is type zero, DSLIN prompts for the connection mode:

```
INITIALIZE STATION AS PRIMARY OR SECONDARY?
```

You may respond with either P or S for primary or secondary mode, respectively. (You may also type /D to indicate primary mode.)

If you respond with S, DSLIN prints the following message and then terminates:

```
CONNECTING AS SECONDARY STATION ON LU xx
BISYNC BOARD ON LU xx REPORTS BUFFER SIZE OF xxxxx WORDS
```

```
AWAITING CALL ON LU xx
END OF DSLIN
```

If P is the response, the link is initialized in primary mode and DSLIN displays the following message:

```
HP 3000 BISYNC LINK ON LU xx READY FOR CONNECTION
BISYNC BOARD ON LU xx REPORTS BUFFER SIZE OF xxxxx WORDS
```

DSLIN now goes into a loop where it waits one second, writes a DS/3000 initialization request, and checks the returned I/O status until the message is sent or a timeout occurs. You can prematurely terminate this loop and force a secondary connect by setting DSLIN's break flag with the RTE BR command. When DSLIN detects the flag, it prints the following message:

```
BREAK FLAG SET.
```

DSLIN then connects as a secondary station.

If the primary connect request times out (this is usually because the modem connection was not made or, on a direct connection, because the HP 3000 DSCONTROL command was not issued at the HP 3000), DSLIN connects as a secondary station and prints the following message:

```
PRIMARY CONNECT TIMED OUT
```

If the HP 3000 BISYNC board is enabled and the HP 1000's primary connect request does not time out, the HP 3000 responds and the link is initialized. DSLIN also displays the following message:

```
LINE IS UP WITH BUFFER SIZE xxxx.
```

If the initialization message is sent but the HP 3000 does not respond within 50 seconds, DSLIN disconnects the link and reconnects as a secondary station. DSLIN also displays the following message:

```
LINE IS UP BUT 3000 IS NOT REPLYING
```

Using DSLIN to Alter Line Characteristics

After a BISYNC link has been initialized with DSLIN, you can rerun DSLIN to alter line characteristics. Primary connections must be placed in secondary mode before their line characteristics can be altered. To place a primary connection in secondary mode, you must close the line by using DSLIN with the following run string:

Syntax

```
RU,DSLIN[,lu],CLOSE
```

Parameters

lu	The positive HP 3000 logical unit number.
CLOSE	Indicates that the line should be closed.

Discussion

DSLIN will close a BISYNC connection only if there are no other users on line. If there are other users on the line, DSLIN prints the following message:

```
SESSIONS STILL OPEN ON LU xx
THE LU WAS NOT CLOSED.
```

If there are no other users on the line, DSLIN sends a close request to the HP 3000, prints the following message and then terminates:

```
LU xx WAS CLOSED
```

The line is not closed until a termination reply is received from the HP 3000. If the HP 3000 does not respond, the line may not be closed. If the reply is received, the line closes. The physical link (for example, a modem line) also closes. You can use DSINF to verify that the line was closed. DSINF is documented in the *DS/1000-IV Theory of Operation and Troubleshooting Manual*

After the line is closed, you can rerun DSLIN as described earlier in "Using DSLIN."

ADDITIONAL INITIALIZATION TASKS

SECTION 8

This section includes initialization information and considerations for the following topics:

- Memory-Based System Considerations
- HP 1000 - HP 3000 Considerations
- Transaction Timeout Considerations
- Data Security Considerations
- Miscellaneous Considerations

MEMORY-BASED SYSTEM CONSIDERATIONS

This subsection includes information for a memory-based system regarding the following areas:

- Remote Program Loading
- Store-and-Forward PROGL
- Automatic initialization
- Slave Monitors
- Extended messages for program download

Remote Program Loading

On computers having the remote program loading (RPL) feature, the automatic initialization feature may be used to cause an RTE-A Operating System to be downloaded automatically upon application of power to the computer.

The virtual control panel (VCP) on the A-Series is executed whenever power to the computer is turned on. Details of the A-Series procedure are found under "DSVCP" in the *DS/1000-IV Theory of Operation and Troubleshooting Manual.* You must have the desired operating system stored in a file at a neighboring computer under the name of P00000 or P00001. The P file name is limited to P00000 or P00001, because only one bit in the special RPL configuration block is available for selecting the file name. (Refer to the Programming and Operating manual for your computer for the relationship between RPL description block and the switch register.)

For information on forced cold loads, refer to the *DS/1000-IV Theory of Operation and Troubleshooting Manual.*

Store-and-Forward PROGL

This version of PROGL will run in both a memory-based and a disc-based node. It will attempt to open the requested file from either one of two remote nodes. The relocatable file for this version is %PROGZ. A user-supplied module, appended to the "Z" version of PROGL during relocation, must contain the entry points #RMT1 and #RMT2 (see example below). The node defined by #RMT1 is tried first. If there is any error when attempting to open or read the file, PROGL will check to see if it has tried the second ("fallback") node defined by #RMT2. If it hasn't, and if #RMT2 has been defined (not = -1), PROGL will go back and start over with the download "from the top". #RMT1 and #RMT2 can also be defined as the local node, however, the actual local node number must be specified since -1 means "undefined".

Downloading RTE-A involves several separate but automatically "chained" downloads from a single file. Each "continuation" download is an RTE-A 32K block. The fallback node will only be tried if an error occurs in downloading the first partition of the RTE-A Operating System or the first 32K of the RTE-A system. Thereafter, the node number becomes committed, and subsequent errors will result in failure of the download.

```
ASMB,Q
      NAM #RMT1,7  * NODE DEFINITION FOR STORE-AND-FORWARD PROGL *
*
      ENT #RMT1,#RMT2
*
* NODE DEFINITION FOR STORE-AND-FORWARD VERSION OF PROGL.
*
#RMT1 DEC 1          PRIMARY NODE FOR FILE SEARCH.
#RMT2 DEC 3          SECONDARY NODE FOR FILE SEARCH.
*
      END
```

LU to File Conversion PROGL

In a network with multiple memory-based nodes connected to a single central node, it becomes necessary to have PROGL download a unique system file to each of these memory-based nodes. Both versions of PROGL, %PROGL, and %PROGZ, have the flexibility to expand the choices beyond the P00000 and P00001 restriction. By appending a user supplied version of the PROGL subroutine, #DNFL, the user can specify the system file to be downloaded dependent on the LU making the request. #DNFL uses the following six arguments:

lu	The LU of the link requesting the download (integer value passed to #DNFL).
file	The file number requested (0 or 1, previously P00000 or P00001) (integer value passed to #DNFL).
filename	Six character ASCII string (returned by #DNFL).
secod	Security code of the file (integer value returned by #DNFL).
crn	Cartridge reference number of the file (integer value returned by #DNFL).
node	Remote node number (integer value returned by #DNFL for store-and-forward version only).

This routine may choose any legal file name/security code/cartridge reference number combination given the logical unit number of the link requesting the download and the "file number" it requests. You can create any algorithm needed to convert the LU and file number to the true system file. (Perhaps make the first two characters PO, characters 7-4 = link LU, and the last two characters equal the file number or use a simple table look-up scheme). If you use a table look-up scheme, HP recommends that you code the routing to convert LU/file number values not found in the table to a character string containing the LU/file number values. This will aid greatly in troubleshooting. PROGL can be made to display the file name as downloads are begun (Refer to "Extended Messages for Program Download" later in this section). Should an improper name be requested, the user can easily determine what has occurred.

NOTE

Regardless of the algorithm you implement, it should always return the same file name for the same LU/file number combination. This algorithm should be coded such that it can be executed within the remote node's timeout or the remote node will send another download request before PROGL can respond to the first request. This may be of concern when using the store-and-forward version of PROGL.

The *secod* and *crn* arguments should be returned as zero if specific values do not exist. This will prevent values used in previous requests from being used. If the store-and-forward version of PROGL is used, *node* will be defaulted from #RTM1 and #RTM2, but may be changed by #DNFL.

LU to File Name PROGL Example

```
FTN4X,L
      SUBROUTINE DNFLN(LU,FNUMB,NAME,SECOD,CRN,NODE)

C  THIS IS AN EXAMPLE SHOWING A DISC-FILE LOOK-UP TECHNIQUE
C  FOR CONVERTING THE LINK LU REQUESTING A DOWNLOAD AND THE
C  FILE NUMBER BEING REQUESTED TO A FILE NAME.

C  TO USE THIS EXAMPLE, A USER SUPPLIED FILE IS REQUIRED AS
C  FOLLOWS:

C  NAME:  'PROGL
C  SECURITY CODE:  DS
C  CRN:  DS
C  TYPE:  4 (ASCII) MAY BE CREATED AND CHANGED USING THE EDITOR

C  RECORD FORMAT:  EACH RECORD HAS 3 ITEMS SEPARATED BY COMMAS

C                  ITEM 1 = LINK LU (INTEGER)
C                  ITEM 2 = FILE# (INTEGER)
C                  ITEM 3 = FILE NAMR (CHARACTER STRING--
C                           NORMAL 'FMGR' CONVENTIONS APPLY)

C                  NOTE:  NODE NUMBER IS SET TO -1 BY THIS
C                         ROUTINE, SINCE IT IS DESIGNED TO
C                         BE USED WITH %PROGL.
```

```
C  A MAXIMUM OF 30 CHARACTERS PER LINE IS ALLOWED.
C  FOR EXAMPLE:

C          79,1,NODE4E::E4

C  WHEN A DOWNLOAD REQUEST IS RECEIVED ON LU 79 WITH
C  FILE NUMBER 1 SPECIFIED, THIS PROGRAM WILL RETURN FILE
C  FILE "NODE4E" LOCATED ON THE LOCAL NODE ON CARTRIDGE
C  "E4".
C  ANY RECORD BEGINNING WITH AN ASTERISK OR ANY RECORD WHOSE
C  FORMAT IS NOT AS DESCRIBED ABOVE, IS CONSIDERED A COMMENT
C  AND IGNORED.

C  NOTE:  THE DATA FILE IS OPENED AND CLOSED AT EACH CALL TO
C         ALLOW THE CARTRIDGE ON WHICH IT IS LOCATED TO BE PACKED.

C  FOR MAXIMUM SPEED, ENTRIES SHOULD BE RANKED IN DESCENDING
C  FREQUENCY OF USE (I.E., MOST OFTEN DOWNLOADED NODES OCCURRING
C  FIRST).

C  NOTE:  A "BRIDGE" IS REQUIRED FROM THE ASSEMBLY-ONLY CALLING
C         SEQUENCE FOR #DNFL TO THIS ROUTINE, AS FOLLOWS:

C         NAM #DNFL,U    LINKAGE TO FTN "#DNFL" ROUTINES
C         ENT #DNFL
C         EXT DNFLN,.ENTR
C *
C *    THIS ROUTINE IS USED TO "BRIDGE" FROM THE ASSEMBLY CALLABLE
C *    #DNFL ROUTINE TO A MORE EASILY MANAGED VERSION WRITTEN IN
C *    FORTRAN.
C *
C LU    NOP            LOGICAL UNIT OF LINK REQUESTING DOWNLOAD
C FNUMB NOP            FILE NUMBER
C NAME  NOP            FILE NAME
C SECOD NOP            FILE SECURITY CODE
C CRN   NOP            FILE CARTRIDGE REFERENCE NUMBER
C NODE  NOP            REMOTE NODE NUMBER
C *
C #DNFL NOP            ENTRY/EXIT
C       JSB .ENTR      GET SUBROUTINE PARAMETERS
C       DEF LU
C *
C *    PASS THE SUBROUTINE PARAMETERS ON TO THE FORTRAN ROUTINE
C *
C       JSB DNFLN      CALL THE FORTRAN ROUTINE
C       DEF *+7        PASS THE SUBROUTINE PARAMETERS
C       DEF LU,I
C       DEF FNUMB,I
C       DEF NAME,I
C       DEF SECOD,I
C       DEF CRN,I
C       DEF NODE,I
C       JMP #DNFL,I    RETURN TO PROGL
C       END
```

```
      IMPLICIT INTEGER (A-Z)
      INTEGER NAME(3),SECOD,CRN,NODE,FNUMB,LISTT(3),BUFFER(15),
     *        LISTV(2),PARSB(10),DCB(144),DBASE(3),DSECOD,DCRN
      EQUIVALENCE (LISTT(2),LISTT2),(LISTT(3),LISTT3)
      EQUIVALENCE (LISTV(2),LISTV2)

C  DEFINE ITEM TYPES: NUMERIC,NUMERIC,ASCII

      DATA LISTT/1,1,3/

C  DEFINE "DATA" FILE NAME, SECURITY CODE, AND CRN

      DATA DBASE/6H'PROGL/,DSECOD/2HDS/,DCRN/2HDS/

C  BEGIN ROUTINE

C        CONVERT FILE NUMBER TO 6 DIGIT ASCII, SO THAT IF ENTRY
C        IS NOT FOUND; THE USER CAN TELL WHO MADE THE REQUEST.

      CALL CNUMD (FNUMB,NAME)

C  OPEN THE DATA FILE  (RFA CALLS WOULD ACCESS A REMOTE FILE)

      CALL OPEN (DCB,ERR,DBASE,1,DSECOD,DCRN)
           IF (ERR .LT. 0) THEN
               CALL CLOSE (DCB)
               RETURN
           ELSE
                CONTINUE
           ENDIF

      LISTV = LU
      LISTV2 = FNUMB

C  BEGIN THE SEARCH LOOP

 100  CONTINUE
      CALL READF (DCB,ERR,BUFFER,15,LEN)

C  CHECK FOR FILE ERROR OR EOF

           IF ((ERR .LT.0) .OR. (LEN .LT. 0)) THEN
                CALL CLOSE (DCB)
                RETURN
           ELSE
                CONTINUE
           ENDIF

C  CHECK FOR COMMENTS (*) IN THE FILE

      IF (IAND (BUFFER,77400B) .EQ. 25000B) THEN
          GO TO 100
      ELSE
          PTR = 1
```

```
          CNTR = 2 * LEN
       ENDIF

C  JUDGE THE VALIDITY OF EACH FIELD.  FIRST TWO FIELDS MUST BE
C  INTEGER AND MUST MATCH "LU" AND "FILE#", RESPECTIVELY.
C  THE THIRD FIELD MUST BE ASCII.

       DO 150 J = 1,3
            I = NAMR (PARSB,BUFFER,CNTR,PTR)
                IF (I .LT. 0) THEN
                    GO TO 100
                ELSE
C                   CHECK FOR CORRECT FIELD TYPE
                    IF (IAND(PARSB(4),3) .NE. LISTT(J)) THEN
                         GO TO 100
                    ELSE
C                        CHECK FOR CORRECT VALUE
                         IF ((J .LT. 3).AND.(PARSB .NE. LISTV(J))) THEN
                              GO TO 100
                         ELSE
                              CONTINUE
                        ENDIF
                    ENDIF
                ENDIF
 150    CONTINUE

C  AFTER ALL THESE CHECKS, WE MUST HAVE A VALID REQUEST!!

C  SET UP TO RETURN FILE NAME, SECURITY CODE AND CRN TO CALLER.

       DO 200 I = 1,3
 200   NAME(I) = PARSB(I)
       SECOD = PARSB(5)
       CRN = PARSB(6)
       NODE = -1

C  CLOSE UP THE DATA FILE

       CALL CLOSE (DCB)
       RETURN
```

Automatic Network Initialization (No File System)

Automatic network initialization is also possible in RTE-A systems that do not have a file system. DINIT is passed the initialization answers by means of a DS-supported subroutine, BFPAS.

Use the start-up program feature in the BUILD program for RTE-A to specify a program which will schedule BFPAS and pass it the DINIT initialization answers.

Programmatic initialization may be used for DINIT (DS/1000-IV initialization), for shutting down DS and returning all resources (if the shut-down version of DINIT is available), and for DSMOD (used to adjust timing, look at or modify the NRV, enable communications LUs, and so on).

Programmatic initialization is most often used by memory-based nodes with no file system for automatic initialization, but is also allowed for disc-based nodes. There are several advantages to programmatic initialization, in comparison to the alternative of running DINIT in the WELCOM file from a separate DS/1000-IV initialization command file. These advantages are:

- The network user and management security codes are not available in a file accessible to any user.
- The initialization answers can only be modified by someone who knows and has access to the initialization program.

Features of programmatic initialization are:

- BFPAS is a FORTRAN-callable subroutine, which facilitates writing the initialization program in higher-level languages.
- The buffer containing the initialization answers is not restricted to 128 words as it was previously. However, the buffer of responses still must consist of a series of equal-length "records". The length of the longest response line determines the length of each of the others. "Records" which are shorter than the longest "record" must be padded at the end with blanks (examples are given later in this section).

Technique for Freeing Partition Space

The call to the DS/1000-IV subroutine BFPAS, which calls RMPAR, adds approximately 214 octal words to the initialization program. The size of the initialization program will vary somewhat depending upon the operating system used, the size of RMPAR, and also upon whether your own initialization program changes in other ways due to increased capability (possible conversion to higher-level language, and so forth).

In RTE-A, it is possible for the initial forced cold-load ("boot-up") to contain partition-resident programs. Since there is no need for the initialization program after it has initialized DS, this program may terminate and eliminate itself from the system, thus creating a free partition into which other programs may be downloaded as needed. This may be accomplished by including a call to the system message processor (MESSS) and passing a buffer which aborts the initialization program. An example is shown below. An EXEC termination call MUST immediately follow the call to MESSS.

```
FTN7X,L
      PROGRAM PASS
      INTEGER MESSG(14)
      DATA MESSG/28HOF,PASS,ID
      ....
      ....
      CALL MESSS(MESSG,14)
      CALL EXEC (6)
      END
```

This technique for freeing partitions may be extended to include DINIT. Add another call to MESSS before the call offing the initialization program which removes DINIT. The message buffer passed to MESSS may be overlaid with a message returned by RTE.

Using Programmatic Initialization

When using a start-up program to pass responses to DINIT, the subroutine BFPAS must be called. It will schedule DINIT and handle sending the DS initialization answer buffers to DINIT. No comments are allowed in the buffer of responses when using BFPAS. It is called as follows:

```
CALL BFPAS(iprgm,ibuf,ibfln,ircln,ierr)
```

iprgm Either 0 for DINIT or 1 for DSMOD. Anything else results in an error.

ibuf The buffer of responses (see examples).

ibfln The length of entire buffer (in words).

ircln The length of each response (in words). Each response must be the same length.

ierr The error return code, where:

0 = no error
1 = invalid value for *iprgm*
2 = DINIT or DSMOD terminated and all the responseshad not been used
3 = error in command buffer
4 = DINIT or DSMOD aborted
5 = DINIT or DSMOD scheduling error
(call ABREG for actual error)

Internal Operation of BFPAS

- BFPAS schedules DINIT or DSMOD "with wait".
- DINIT/DSMOD terminates, indicating in its return parameters that it needs another input line.
- BFPAS "writes" the next line in the response buffer by writing it onto a class number (a new class number is allocated with each buffer). DINIT or DSMOD is scheduled again, "with wait".
- DINIT/DSMOD obtains the buffer by issuing a class-I/O "read" call. The class number and buffer are not saved and so are returned to the system.
- Whenever DINIT or DSMOD needs another buffer, it goes back to step 3 above. When the last "response" line has been sent, BFPAS returns to the caller. BFPAS assures that DINIT or DSMOD will not terminate with more data to be read or continue reading past the end of its input buffer.

This method requires only a small area of SAM at a time (the length of one response plus the RTE class-I/O header, typically less than 20 words). This area is returned to RTE, along with the class number, before DINIT processes the response, thus avoiding a "fragmentation of SAM" problem.

Programmatic Initialization Example 1

Below is an example showing a FTN7X call to BFPAS. It also checks the error return parameter (*ierr*), and prints either:

```
NODE # 579 INITIALIZED or
```

```
NODE # 579 NOT INITIALIZED IERR=xxxxxxx
```

where *xxxxxxx* is a six-digit decimal ASCII field.

```
FTN4X,L
      PROGRAM PASS(19),FTN7X INTIALIZATION EXAMPLE
C
C     THIS IS A FORTRAN PROGRAM TO INITIALIZE A DS/1000-IV NODE
C     CALLS THE 'BFPAS' SUBROUTINE
C     THE NETWORK CONSISTS OF 4 RTE NODES (579, 580, 578, AND 577).
C     THERE IS NO REROUTING OR MESSAGE ACCOUNTING.
C
      COMPLEX MSG2X(5)
      INTEGER BUFFER (112),MSG2(22)
      INTEGER RLEN
C
      EQUIVALENCE (MSG2X(1), MSG2(1))
C
      DATA BUFFER/14HYES           ,
     &14HNO             ,
     &14H/D             ,
     &14H4              ,
     &14H579            ,
     &14H577,79,0,1,,,,,
     &14H578,79,0,1,,,,,
     &14H579            ,
     &14H580,79,0,1,N,,,
     &14H79             ,
     &14H/E             ,
     &14H/D             ,
     &14H-1             ,
     &14HDS             ,
     &14H19             ,
     &14HDS             /
      DATA LEN/112/
      DATA RLEN/7/
      DATA MSG2X/40HNODE #579 NOT INITIALIZED IERR=          /
      DATA MSG2L/18/
C     ************************************************************************
C     *    SCHEDULE DINIT VIA BFPAS
C     ************************************************************************
      CALL BFPAS(0,BUFFER,LEN,RLEN,IERR)
C     ************************************************************************
C     *     PRINT STATUS
C     ************************************************************************
      CALL CNUMD(IERR,MSG2(15))
      IF(IERR.EQ.0) CALL EXEC(2,1,21HNODE #579 INITIALIZED,-21)
      IF(IERR.NE.0) CALL EXEC(2,1,MSG2,MES3L)
C     ************************************************************************
C     *     TERMINATE
C     ************************************************************************
      END
```

Programmatic Initialization Example 2

In the previous example, the RTE clock was not set. Thus, any messages which may be printed later would not reflect the correct time. The following example initializes the node and sets the local time clock based upon the values at a remote node. It is shown to illustrate that the initialization program can do many other useful initialization tasks.

A more sophisticated version might contain a list of alternate nodes to which it could send the request for remote time, should some nodes fail to respond.

```
ftn7x,l,c,s

$FILES 0,0

$ALIAS XLA = '.XLA', DIRECT
$ALIAS /OPSY/ = '$OPSY', NOALLOCATE

      PROGRAM STIME(19,70),SET TIME AT ANY RTE VIA DS
C
C   SET TIME IN ANY RTE FROM NODE PASSED AS PARAMETER
C
C
      IMPLICIT NONE

      COMMON /OPSY/ opsy
      INTEGER opsy, xla

      INTEGER IA, IB, P(5), NODEINDEX, NODE, KCVT
      INTEGER ERMSG(13), TIME(40), DTIME(5), DYEAR
      INTEGER OFUPLN(40), OFMATC(40), OFRTRY(40), ONUPLN(40)
      INTEGER TIMER(3), RUTIMER(40), RUTIMLEN
      INTEGER MONTH(12), IMONTH, IDAY, MOD


      INTEGER RTEA
      PARAMETER (RTEA = -61)

      INTEGER RTE6VM
      PARAMETER (RTE6VM = -17)

C
C   OPERATOR REQUESTS TO TURN OFF UPLIN, MATIC, AND RTRY
      DATA OFUPLN/'OF,UPLIN,FL '/
      DATA OFMATC/'OF,MATIC,FL '/
      DATA OFRTRY/'OF,RTRY,FL  '/
      DATA TIMER/'TIMER '/, RUTIMER/'RU,TIMER,NS '/,RUTIMLEN/-12/
C
C   TM OPERATOR REQUEST FOR MESSS GOES IN THIS BUFFER
C     M/E/F:    'TM,   year,    day,   hour, minute, second,       '/
C     L/XL/A:   'TM,   hour, minute, second,  month,    day,   year'/
      DATA TIME/'TM,       ,       ,       ,       ,       ,       '/
C                1 2 3 4 5 6 7 8 9 * 1 2 3 4 5 6 7 8 9 * 1 2 3 4 5
C
C   OPERATOR REQUEST TO TURN ON UPLIN
```

```
      DATA ONUPLN/'ON,UPLIN,NOW'/
C
C   DS ERROR MESSAGE
C                                      1 1 1 1
C     Word:        1 2 3 4 5 6 7 8 9 0 1 2 3
      DATA ERMSG/'     ERROR, NODE  123456. '/
C                          1111111112222222
C     Char:        12345678901234567890123456

C
C   NUMBER OF DAYS IN EACH MONTH OF THE YEAR
      DATA MONTH/31,28,31,30,31,30,31,31,30,31,30,31/
C
C
C-- BEGINNING OF PROGRAM --
      CALL RMPAR(P)

      IF ( P(1) .EQ. 2h?? ) THEN
          CALL EXEC ( 2, 1,
     .    26hUsage: stime [node . . .] ,
     .    -25 )
          DTIME(1) = 1
          GOTO 900
      ENDIF

C
C   GET REMOTE NODE NUMBER FROM SCHEDULING PARAMETER
C
      NODE = -2
      DO NodeIndex = 1,5

          IF ((P(NodeIndex) .EQ. 0) .AND. (NodeIndex .NE. 1)) THEN
             GOTO 900
          ELSE
             NODE = P(NodeIndex)
          ENDIF

C
C   GET TIME FROM REMOTE NODE
C
          CALL DEXEC(NODE,11+100000B,DTIME,DYEAR,*800)
C
C   CHANGE JULIAN DAY TO MONTH AND DAY
C
C    FIRST, CHECK FOR LEAP YEAR
          IF(MOD(DYEAR,4) .EQ. 0)MONTH(2)=29
C    COUNT UP MONTHS AND COUNT DOWN DAYS
          IMONTH = 1
          IDAY = DTIME(5)
          DO WHILE (IDAY .GT. MONTH(IMONTH))
             IDAY = IDAY - MONTH(IMONTH)
             IMONTH = IMONTH + 1
             ENDDO
```

```
C
C   CONVERT TIME TO ASCII AND FORMAT INTO TM REQUEST.
C     L/XL/A format (fix for M/E/F later)
C
          TIME(5) = KCVT(DTIME(4))
          TIME(9) = KCVT(DTIME(3))
          TIME(13) = KCVT(DTIME(2))
          TIME(17) = KCVT(IMONTH)
          TIME(21) = KCVT(IDAY)
          CALL CNUMD(DYEAR,TIME(23))

C
          IF  ( XLA(OPSY) .EQ. RTE6VM )   THEN
C
C   CONVERT TIME TO ASCII AND FORMAT INTO TM REQUEST.
C
               CALL CNUMD(DYEAR,TIME(5))
               CALL CNUMD(DTIME(5),TIME(9))
               TIME(13) = KCVT(DTIME(4))
               TIME(17) = KCVT(DTIME(3))
               TIME(21) = KCVT(DTIME(2))
C
C   TURN OFF UPLIN, MATIC, AND RTRY
C
               CALL MESSS(OFUPLN,10,1)
               CALL MESSS(OFMATC,10,1)
               CALL MESSS(OFRTRY,10,1)
C
C   SEND TIME TO RTE AND PRINT NEW TIME
C
               CALL MESSS(TIME,42,1)
               CALL FTIME(TIME)
               CALL EXEC(2,1,TIME,15)
C
C   TURN UPLIN BACK ON. (UPLIN TURNS ON RTRY AND MATIC, IF NEEDED)
C
               CALL MESSS(ONUPLN,12,1)

          ELSE    !   Assume RTEA

C
C   SEND TIME TO RTE-A AND PRINT RETURNED MESSAGE
C     No OFing needed in A and subsequent.
C     But, we will run TIMER, for NS systems
C
               CALL MESSS(TIME,50)
               CALL ABREG(IA,IB)
               CALL EXEC(2,1,TIME,IA)

               CALL EXEC(24,TIMER,2HTI,2HNS,0,0,0,RUTIMER,RUTIMLEN)

          ENDIF
```

```
          DTIME(1) = 0      !   Show success
          GO TO 900         !   and exit
C
C   ERROR IN DS/1000 TIME CALL. REPORT IT.
C
 800      CALL ABREG(IA,IB)
          ERMSG(1) = IA
          ERMSG(2) = IB
          CALL CNUMD(NODE,ERMSG(10))
          CALL EXEC(2,1,ERMSG,13)
C
C   INDICATE ERROR TO FATHER BY RETURN PARAMETERS
C
          DTIME(1) = -1
          DTIME(2) = IA
          DTIME(3) = IB
          DTIME(4) = 0
          DTIME(5) = 0

          ENDDO

C
C   ALL DONE
C
 900      CONTINUE
          CALL PRTN(DTIME)
        END
```

Slave Monitors

In memory-based systems, it may be convenient to bring some of the DS monitors across the link after DS has been initialized using FLOAD calls. Another advantage, which applies to other RTE systems as well, is that the monitor may be changed (updated) online and replaced without rebooting the node.

To facilitate this, DINIT allows you to specify slave monitors that may not have been loaded into memory. The slave monitor must have one of the following monitor names:

CNSLM	EXECM	OPERM	PROGL	RDBAM	TRFAS
DLIST	EXECW	PTOPM	RFAM	VCPMN	

After the program is loaded, the next execution of UPLIN will cause the monitor to be scheduled. Conversely, after a monitor is purged, the next time UPLIN executes, any requests on the monitor's queue will be purged. (The respective masters will receive a master timeout error.) Until the monitor is loaded, incoming requests for its services will be rejected with a DS06 error.

Hewlett-Packard recommends that you name only those monitors which are used, since each one named causes a class number to be allocated, regardless of whether it exists.

Extended Messages for Program Download

PROGL optionally outputs messages to inform the operator of requests for downloads, and of their success or failure status. Normally these messages are inhibited, but the system manager may choose to receive these printouts, in which case all messages are printed using class-I/O on PROGL's class. For error messages, see the Program Download Error Messages in the *DS/1000-IV User's Manual.* Request printouts with either of two methods:

- Programmatically, by writing an assembly language program that has #PRLU declared as an external symbol. This symbol is in subsystem global area. Therefore, the program must be relocated with access to SSGA in RTE-6/VM or labeled system common in RTE-A. The program should store the number of the LU on which these messages will be printed in #PRLU, and should be run as part of the boot-up initialization of the node. To "turn off" this option, store a zero in #PRLU.

- For an RTE-6/VM system generation, enter the following response to the CHANGE ENTS? phase:

  #PRGL,AB,*lu*

  where *lu* is the number of the print logical unit, for example, 1 for system console.

When the message logging option has been selected, a request for download will cause the following message to be printed.

INITIATING VIA LU *lu* DOWNLOAD OF FILE:*namr*

AT DAY *nnn hr,min:sec* { AM / PM } *ASCII MESSAGE*

Upon successful completion, the following message is printed:

DOWNLOAD OF FILE:*file name*::-*lu*:*type*

AT DAY *nnn hr,min:sec* { AM / PM } WAS SUCCESSFUL

The time of day printed will be that at completion of download.

HP 1000 - HP 3000 CONSIDERATIONS

This subsection includes information for the following:

- Verifying a DS/1000 to DS/3000 link.
- Installing the RMOTE MO command slave.

Verifying a DS/1000 - DS/3000 Link

If a link to an HP 3000 does not exist, you may skip this section and go on to the next section.

If a link to an HP 3000 does exist, then verify HP 1000-to-HP 3000 links. Consult the following documentation:

- *DSN/DS HP 3000 to HP 1000 Reference Manual for HP 3000 Users* for information on opening the link on the MPE side.
- *DS/1000-IV Theory of Operation and Troubleshooting Manual*
- *DSN/X.25 for the HP 3000 Reference Manual* for X.25 links.
- RMOTE section of the *DS/1000-IV User's Manual* to log on to the HP 3000 node.

For BISYNC (driver DVA66) links to an HP 3000, the line is put in secondary mode when you enable the PSI BISYNC LU with DINIT. To open a line in primary mode, you must run DSLIN. If DSLIN is RP'ed, the HELLO command will cause DSLIN to be automatically scheduled and the line will be enabled in primary mode.

DSLIN

DSLIN opens a PSI BISYNC link for HP 1000/HP 3000 communication. DSLIN initializes the DS interface card with the specified parameters and checks the HP 3000 LU Table to see if an entry has been made. There is a 50-second timeout on the request. Refer to the previous "Using DSLIN" section.

For an X.25 link, DSLIN does not need to be executed to run RMOTE.

Logging On to the HP 3000

If you are unfamiliar with HP 3000 log-on procedures, consult the appropriate HP 3000 documentation before proceeding further.

After obtaining an account and establishing communication at the HP 3000, consult the *DS/1000-IV User's Manual* for directions on using RMOTE. Run RMOTE, switch (SW) to an MPE node, and log on. If no LU number is provided in the SW command and the HP 3000 is connected via a BISYNC link, the default is the first entry in the HP 3000 LU table. For X.25 links, use a pound sign (#) followed by the X.25 address of the HP 3000, for example, SW,#123456789. When your log-on message appears, communication with the HP 3000 has been established. You should see the "prompt" character when the system is ready. You can test the system further by entering MPE commands, such as LISTF and SHOWJOB. Consult the appropriate HP 3000 documentation for the description of these commands. Remember, when logged on to an HP 3000, your terminal becomes a "virtual HP 3000 terminal" even though it is connected to RTE. An example of the log-on procedure is shown below. Consult the *DSN/DS HP 3000 to HP 1000 Reference Manual for HP 3000 Users* for information on running the DS/3000 system verification DSTEST.PUB.SYS to check PTOP and RFA operation. For PTOP

verification, DSTES must be loaded on the HP 1000 side. For PSI links, DSLIN must be run to put the link in primary mode.

```
:RU,DSLIN,31,-,P
:RU,RMOTE
```

The user enters the commands to schedule RMOTE. It starts in local mode, as indicated by the dollar sign prompt ($).

```
$SW,31
```

The user enters the command to switch to the HP 3000 on LU 31. Note that the prompt character changes to the pound sign (#), which indicates the switch to remote mode.

```
#HELLO MANAGER.RTE
```

Log-on dialogue entered.

Response by HP 3000 when session is initiated:

```
HP3000 / MPE III B.01.0  MON, MAY 19, 1980,  5:56 PM
```

```
#SHOWJOB
```

The user enters an MPE command, (SHOWJOB in this example). The response by MPE is:

```
 JOBNUM  STATE IPRI JIN  JLIST    INTRODUCED  JOB NAME
 #S16    EXEC        70  70       TUE 11:49A  MANAGER.RTE
 #S3     EXEC        31  31       TUE  9:59A  CINDY.DS
 2 JOBS:
     0 INTRO
     0 WAIT; INCL 0 DEFERRED
     2 EXEC; INCL 2 SESSIONS
     0 SUSP
 JOBFENCE= 0; JLIMIT= 4; SLIMIT= 15
```

```
#SW
```

Switch back to local mode.

```
$LU,14
```

Enter an RTE command.

```
LU #14 = E 4
```

Response by RTE.

```
 $EQ,4
```

Enter RTE command.

```
23 DVR67 D 0 U 0
```

Response by RTE.

```
$EX
```

Exit RMOTE (BYE is issued automatically).

End of Session message:

```
CPU = 1  CONNECT = 4    MON, MAY 19, 1980,  5:59 PM

END RMOTE
```

Installing the RMOTE MOve Command Slave

If your system generation includes %RMOT1, the following steps must be taken to install the RMOTE MO command. (The MO command is documented in the RMOTE section of the *DS/1000-IV User's Manual.*)

The MO command is implemented as a PTOP program pair. RMOTE is the "master" program at the HP 1000 and a program called COPY3K is the "slave" program at the HP 3000. Because COPY3K is part of the DS/1000-IV software and exists at your HP 1000 node, you must transfer it to the HP 3000. This is done by running the DS/1000-IV program MVCP3. MVCP3 installs COPY3K in the PUB.SYS account at the HP 3000. Its only purpose is to transfer COPY3K to the HP 3000 file, COPY3K.PUB.SYS.

The following modules contain the programs COPY3K and MVCP3:

!COPY3	MPE executable binary file containing COPY3K
%MVCP3	RTE relocatable file containing MVCP3

Once you have installed COPY3K on the HP 3000, MVCP3 is no longer needed and may be deleted from your RTE system. Copies of %MVCP3 and !COPY3 should be kept on your system, in case !COPY3 ever needs to be replaced on the MPE system.

Running MVCP3

You must run MVCP3 from RMOTE with the RU command after logging on at the HP 3000 as MANAGER.SYS. (The MANAGER.SYS account has a password that may be obtained from the HP 3000 System Manager.) An example of how to load and run MVCP3 is shown below. If you do not schedule MVCP3 from RMOTE, an error will occur. You will also receive an error when COPY3K.PUB.SYS is closed at the HP 3000 if you are not logged on as MANAGER.SYS. !COPY3 will be taken from your current working directory if the full path name is not specified.

On RTE-A systems:

```
CI> LINK %MVCP3 #LKDS          Load using DS/1000-IV load file.
CI> RP MVCP3                   Allocate an ID segment.
CI> RU,RMOTE                   Run RMOTE.
```

Now you are ready to log on to the HP 3000 as shown below:

```
$SW                                    SWitch to the HP 3000.
#HELLO MANAGER.SYS/password            Log on as MANAGER.SYS.
#SW                                    SWitch back to your RTE system.
$RU,MVCP3[,loggingLU][,filedesc]       Run MVCP3.
$EX
```

MVCP3 Parameters

password	The password for MANAGER.SYS.
loggingLU	The LU to which MVCP3 will report errors. The default is the local LU 1 (or scheduling terminal).
filedesc	File descriptor of the !COPY3 file.

MVCP3 Errors and Messages

The following is an explanation of the errors and messages that may be returned by MVCP3.

After you have logged on to the HP 3000 and scheduled MVCP3, MVCP3 verifies that it was run from RMOTE by checking the fifth runstring parameter for a negative SMP number. (When a HELLO command is issued within RMOTE, RMOTE passes the negative SMP number in the fifth runstring parameter to any subsequently scheduled programs.) If the fifth parameter does NOT contain a negative SMP number (it is positive or zero), MVCP3 prints the following message and then aborts:

```
MVCP3 MUST BE RUN FROM RMOTE (AFTER LOGON TO MPE)
```

Once the SMP number is verified and the session established at the HP 3000 (via a call to PRCNM), MVCP3 opens !COPY3 with the *filedesc*. If the *filedesc* parameter is not specified, !COPY3K defaults to the current working directory. If an error occurs when !COPY3 is opened, the following message is printed (*n* is the FMP error code):

```
FMP ERROR n OPENING !COPY3
```

If the file type of !COPY3 is not type 1, MVCP3 prints the following error message:

```
!COPY3 IS FILE TYPE n, NOT TYPE 1
```

Once !COPY3 is successfully opened, MVCP3 creates COPY3K.PUB.SYS on the HP 3000.

NOTE

COPY3K.PUB.SYS may not already exist on the HP 3000.

If an error occurs when COPY3K.PUB.SYS is created, it will be displayed in the following format:

```
MPE ERROR n OPENING COPY3K.PUB.SYS
```

After both !COPY3 and COPY3K.PUB.SYS have been successfully opened, MVCP3 prints the following:

```
BEGINNING TRANSFER OF !COPY3 TO COPY3K.PUB.SYS
```

After this message is printed, MVCP3 reads data from !COPY3 and uses Remote File Access (RFA) calls to transfer data to COPY3K.PUB.SYS on the HP 3000. If an error occurs during the transfer, one of the following messages is printed:

```
FMP ERROR n READING !COPY3

MPE ERROR n WRITING COPY3K.PUB.SYS
```

If a record in !COPY3 is not 128 words in length, the following message is printed and MVCP3 aborts:

```
BAD LENGTH IN FILE !COPY3
```

This message indicates that the file named !COPY3 that MVCP3 opened is not the proper file. (This error could occur if you have two files named !COPY3 and you did not specify the correct *filedesc* in the MVCP3 runstring.)

If no errors occur and an end-of-file is read in !COPY3, both !COPY3 and COPY3K.PUB.SYS are closed and COPY3K.PUB.SYS is created at the HP 3000. However, if you are not logged on as MANAGER.SYS, the following error message will be printed when COPY3K.PUB.SYS is created:

```
MPE ERROR n CLOSING COPY3K.PUB.SYS
```

If no errors occur, COPY3K.PUB.SYS is successfully installed at the HP 3000 and you may now use the RMOTE MO command. The MO command is documented in the RMOTE section of the *DS/1000-IV User's Manual.*

TRANSACTION TIMEOUT CONSIDERATIONS

This subsection includes information for the following:

- Transaction Timeout Recommendations
- Line Timeout Recommendations
- Remote-Busy Retries and Quiet Wait
- Maximum Retry Count for PSI Bisync Links

Transaction timeouts allow you to establish the maximum time the system will allow for completion of any transaction in the node. The master timeout limits the transaction time on the master side and should be long enough to include all expected delays in transmission and processing. Similarly, the slave timeout limits the maximum slave-side processing time and need only be longer than the processing time plus expected delays. Delays in processing may be caused by:

- Transmission time for the request and reply. Both contain headers of from 17 to 37 words which control the network routing and these must be included in transmission time calculations. Occasionally, a transmission error will occur. You must allow for the re-transmission retries. (Refer to the *DS/1000-IV Theory of Operation and Troubleshooting* manual for information on retry limits.) It is also possible that a temporary condition blocked the reception of the data (for example, no SAM). You must allow for these retries as well.

- Software processing overhead. Certain functions take longer than others and sometimes a requested function cannot be carried out until something else completes. Both delays must be taken into account.

- Amount of time a request waits in a queue. These are RTE queues, such as the memory unavailable queue, the scheduled program waiting for a partition queue, and so on. System resources such as class I/O numbers, SAM, swap and partition space may not all be available, so a slave monitor may remain in one of the RTE system queues until the resource is available or until the slave timeout expires.

- If the destination node is not a neighbor of the originating node, then each intervening node requires the same time as the transmission time for request and reply, plus the store-and-forward software overhead time.

Hewlett-Packard recommends that you use the default timeouts when you first bring up the system after installing it. If timeout errors occur during testing, or later, these values may be increased as much as desired. The only disadvantage to setting transaction timeouts longer than necessary is that it increases the length of time taken by the system to decide that communication with a given node has failed. With message accounting, the failure is detected much sooner than the master timeout value. However, when the system is working successfully, transactions should not timeout and these values will not affect performance.

The MA timeout value, which determines the interval which MA will send message acknowledgement requests, must be no larger then the master timeout divided by the number of MA retries specified during initialization. For example, if the master timeout is 45 seconds, the MA timeout can be no larger than 3 if the default MA retry count of 15 is used.

Transaction Timeout Recommendations

Use the default timeouts listed in Table 8-1 in bringing up your network links.

Table 8-1. Suggested Transaction Timeout Values

LINE SPEED	MASTER T/O	SLAVE T/O
1 Mbit	25 sec	15 sec
9600 bps	30 sec	20 sec
4800 bps	60 sec	25 sec
2400 bps	65 sec	35 sec
1200 bps	70 sec	45 sec
600 bps	90 sec	60 sec
300 bps	105 sec	85 sec
default	45 sec	30 sec

If the rerouting feature is enabled, and if the best possible routes are out of service, a path may exist such that these recommended timeouts are not sufficient. It may be of value to set your timeouts to the worst case to cover this situation.

Notice that the slave timeout is always less than the master timeout. Besides line speed, other factors that should be taken into account when determining timeout values are:

1. Error re-transmissions,
2. The number of intervening nodes between the central and remote,
3. Maximum request and reply buffer sizes transmitted, and
4. The remote processing time.

The master timeout override values (specified using DINIT) can be used to customize master timeout values for each remote node.

The actual timeout used will be rounded to the next five-second interval. For example, if 19 is specified, 20 seconds will be used. The scheduling of UPLIN, the program which decrements the timeout value, must also be taken into consideration. UPLIN is scheduled every five seconds and may be scheduled such that it decrements your timeout value immediately or one to five seconds later.

Line Timeout Recommendations

Line timeouts are set at generation time or may be overridden with the RTE operator command:

TO,*ee*,*tt*

ee The EQT (RTE-6/VM) or LU (RTE-A) number for the line.

tt The timeout value, in tens of milliseconds.

Suggested initial values are shown in the system generation sections for RTE-A and RTE-6/VM of this manual. Hewlett-Packard recommends that you use these suggested timeouts when the system is first brought up. If the rerouting feature is generated in, line timeouts set too low will cause unnecessary rerouting. If line errors occur then the user should increase the value of the appropriate line timeout.

Remote-Busy Retries and Quiet Wait

Among the timing values displayed by the DSMOD /T (Network Timing Adjustment) command are remote-busy retry and remote-quiet wait. A remote-busy retry is the number of retries that will be performed to transmit a message during a "remote node is busy" condition. A remote-quiet wait is the number of seconds to suspend the master program before resubmitting a master request to the remote node. These two parameters can be used to control the system's response to "system busy rejects" from another node. The remote computer may be unable to accept a request or reply for any of the following reasons:

- Insufficient System Available Memory (SAM).
- QUEUE is busy.
- The monitor for a certain request is in unavailable memory suspend (state 4) or has too many requests to process. This applies to P-to-P slave programs as well.
- The remote system is quiescent.

When a remote busy reject occurs, the system will re-send the message, after a delay, to avoid tying up the system and to give the conditions at the remote a chance to "clear". The limit on the number of retries is

supplied by the user as the reply to the REMOTE BUSY RETRIES? question from DSMOD in response to the /T command. Retries are at one-second intervals.

If the message still cannot be sent after the specified number of retries, then the value specified by the user in response to DINIT's question REMOTE QUIET WAIT? is examined. If zero, the master program receives a DS08(0) error (remote busy or resource unavailable). If non-zero, it is used as the number of seconds to wait before re-trying again, as above, at one-second intervals. If the remote quiet wait parameter is non-zero,the system re-tries "system busy rejects" indefinitely. You should use a zero value for the remote quiet wait parameter until you have used the system long enough to be sure that sufficient resources are available to handle all requests. A non-zero value will cause any request which generates this error to be retried forever, with no error indication.

Maximum Retry Count for PSI Bisync Links

If the HP 3000 is heavily used (80 percent or more CPU usage), you should use the default value for MAXIMUM RETRY COUNT (DSLIN). The default value (16) is often too low for such applications and the BISYNC line drops because the HP 3000 is unable to respond fast enough. Setting the maximum retry count to 20 is usually sufficient.

If you alter the maximum retry count, you may have to alter the line timeout. For every ten milliseconds of line timeout, Driver 66 waits approximately 25 seconds (depending on the speed of the processor) for output buffers from the PSI card before timing out and sending a REMOTE BUSY message to the user. Setting the line timeout to 120 milliseconds (so that the driver waits approximately six minutes for buffers) is usually sufficient.

Refer to the "Line Timeout Recommendations" subsection in this section for information on setting the line timeout.

DATA SECURITY CONSIDERATIONS

This subsection includes information for the following:

- Session Switch Table (RTE-6/VM)
- Unique Cartridge Reference Numbers (RTE-6/VM)
- Security Codes (FMGR)
- Online Program Loading for Security
- Remote File Access Monitor (RFAM)
- Node Security Code
- Data Encryption

You may wish to implement procedures that will increase network security. In any distributed system, data is accessible by users at other nodes. Restricting physical access to a node is not sufficient to restrict access to its data if it is networked. For example, unintentional user errors may destroy valuable data (purge or overwrite a file). You may also wish to prevent unauthorized access to data. This section discusses ways in which you can increase network data security.

Session Switch Table (RTE-6/VM)

The SST for a session created from a remote node will have access to any LUs that are available to the local session to which it is attached. Access to accounts can be limited by the use of passwords. The default session for remote access can be given a level of capability and LU access that protects local resources such as printers, mag tapes, and so forth. This does not apply to communication link LUs because SST entries for these are unnecessary.

Unique Cartridge Reference Numbers (RTE-6/VM)

No two cartridges anywhere in the network should have the same cartridge reference numbers. Programmers and operators should always specify cartridge reference numbers when specifying files. This simple procedure reduces the possibility that an operator or programmer may have made an error in specifying the node number, and accessed the wrong data file (purged, listed, overwritten, and so forth).

For example, in some networks, cartridges are assigned numbers between 004 and 326 and nodes are numbered from 1 to 99. The full number of any cartridge could then be a concatenation of its assigned number and node (for example,12267 would be cartridge 122 at node 67).

Security Codes (FMGR)

All important files should have security codes. Files that can be read, listed, or otherwise accessed nondestructively may have positive or alphanumeric security codes (these may be accessed by users who do not know the security code, but not modified or purged). Files that may only be accessed by certain users should be given negative security codes (all access is denied unless the correct security code is given).

The CI files have read and write protection for the owner, group, and others.

Online Program Loading for Security

Security measures can be defeated by running programs that search for security codes, or by running programs that repeatedly attempt to access files with different security code values. The usefulness of this method can be severely restricted by removing the relocating loader from the system or simply generating the system without one. If such protection is required, no node in the system should have any kind of relocating loader.

This restriction also prevents authorized persons from making any program additions to the system. With slightly less protection, you can save the online loader in a file manager file specifying a negative security code. Delete the loader using the following procedure:

- Use the FMGR to create a copy of the LOADR with the command shown below. Enter a negative security code for *sec*.

  ```
  :SP,LOADR:sec
  ```

- Use the online LOADR to create another LOADR. The duplicate will be given the name ..ADR by LOADR. This must be a temporary background addition.

- Patch the ID segments of ..ADR and LOADR, switching their names, respectively, to LOADR and ..ADR.

- Use LOADR to purge ..ADR.
- Enter the command (shown below) to purge the other copy from the system.

  :OF,LOADR,8

- To run the online LOADR from FMGR:

  :RU,LOADR:*sec*

Since programs may be prepared in other systems for execution in RTE-A systems, protection for these systems can only be obtained if no node in the network has the snapshot files of the nodes.

Remote File Access Monitor (RFAM)

Files in a node may be protected from access by remote programs using the RFA subroutines (DOPEN, DREAD, and so on) by excluding RFAM from the generation. Access to the files would then be possible only from local programs making local file access calls.

Node Security Code

Do not rely on the node security code for protection from deliberate unauthorized access. A person can specify another code merely by re-booting the system.

Data Encryption

Encrypting data before writing it on the disc, and then decrypting it after reading it again has the advantage that only those who know the encryption "key" can read the data. Although it is not a feature offered on standard Hewlett-Packard software it is possible to write replacement subroutines which are called, instead of WRITF and READF. These subroutines perform the encryption/decryption before/after calling WRITF/READF.

This method does not encrypt the record length which is freely available in the DCB for type 1, 2, and 6 files, and at the front and rear of each record of file types 3, 4, 5, 7, (and above). Knowing the record length is a useful aid for breaking the code. In applications where extremely sensitive data is present, it may be useful to provide substitutes for the READF and WRITF subroutines at the point where whole blocks (128 words, or more if the extended DCB call is used to open or create the file) are transferred to or from the disc. In WRITF, the encryption algorithm would then be applied before writing the block on the disc. In READF, the decryption algorithm is applied immediately after the block(s) are transferred from the disc. Similar modifications would need to be done to the file-positioning routines.

In order to "crack" the encryption algorithm, a would-be intruder needs sufficient volume of encrypted data using the same key. The sheer volume of data in a computer system, and the ability for the computer to run programs to test various keys, can aid the intruder. Using a number of keys and using algorithms that are difficult to break, are methods which you can use to increase security but at a cost of increased overhead.

MISCELLANEOUS CONSIDERATIONS

This subsection includes information for the following:

- Using the AG Command
- Program schedule with wait
- Replacing DS Slave Monitors

Using the AG Command with DS Monitors

RTE-6/VM provides a system command, AG, which can be useful in a heavily used DS environment. It allows high priority DS monitors which have been inactive for a specified length of time to be swapped from memory. The AG (aging) command is documented in the *RTE-6/VM Terminal User's Reference Manual.*

Program-Schedule with Wait

If a remote-schedule "with wait" is issued, the remotely scheduled program must terminate in 20 minutes or less or the scheduling program will receive a DS05(0) error on the schedule request (the scheduled program may continue running unless the session it was running under is terminated as a result of the DS05 timeout received by the master program. If the master program (remote session owner) terminates the remote session will be logged off and the executing program aborted.

Replacing DS/1000-IV Slave Monitors

The DS/1000-IV software can allow any of its monitors (RFAM, DLIST, PTOPM, and so forth) to be replaced online, subject to restrictions made by the RTE system itself. This feature allows upgrades in software to be installed that do not necessarily require regeneration of the system. There are some restrictions such as:

- The system must be made quiescent, using DINIT or DSMOD, and the monitor must be aborted before replacing it.
- RTE-A systems allow memory-resident programs to be replaced online. Other RTEs only allow disc-residents to be replaced online. Other modules can only be replaced by regeneration.
- Certain monitors maintain tables of information which must be cleared before replacement. For example, RFAM maintains a list of files currently open to users at various nodes. Use REMAT's FL command to close them before replacing RFAM. PTOPM maintains a list of slave programs "open" at the local node. Use REMAT to terminate them (SO command) before replacing PTOPM.
- Be sure to provide each monitor with access to SSGA in RTE-6/VM or labeled System Common in RTE-A.
- Do not load monitors as type 6 (extended background) programs on RTE-6/VM systems.
- Do not schedule the slave monitors. Scheduling will be done by UPLIN.

GENERATION ANSWER FILE EXAMPLES

APPENDIX

A

This appendix contains examples of generation answer files for the following:

- RTE-A with DS and X.25
- RTE-A Memory-based, Terminal-less
- RTE-6/VM with DS and X.25

In addition, a sample command file to BUILD a downloadable memory-based RTE-A system is included.

RTE-A GENERATION WITH DS AND X.25

```
*  Sample generator answer file for RTE-A and DS/1000-IV
*  This answer file is based on the second half of the RTE-A primary
*  system answer file, primary.ans.
*-------------------------------------------------------------------------
*
*                  I/O    D E F I N I T I O N S
*
*  LU         DEVICE                                SELECT CODE        ADDRESS
* ----       --------                              -------------      ---------
*                                  SCSI  #1
*                                  ========
*   5         SCSI 7980S                                33B              3
*  14         DAT tape                                  33B              4
* 12-13       650A                                      33B              5
* 10-11       660S                                      33B              6
*
*                                  HP-IB #1
*                                  ========
*  15     HP-IB #1 controller                           27B             36B
* 18-19   HP-IB disk                                    27B              0
*  24     CS-80 compatible cartridge tape cache         27B              0
*   9     9144/5 standalone CS-80 cartridge tape        27B              1
*   7     7974A/7978A streaming tape drive              27B              3
*
*                      DS NETWORK LINKS AND IO MAPPING
*                      ===============================
*
* 70,71   HDLC or Bisync network link                   24B
* 72,73   HDLC or Bisync network link                   34B
* 74,75   HDLC or Bisync network link                   35B
* 76,77   HDLC or Bisync network link                   36B
* 78-83   Remote I/O mapping
* 84,85   X.25 LAP-B interface                          40B
* 86,87   XNET reserved LUs
* 88-95   X.25 virtual circuit (user) LUs
*
*                                  TERMINALS
*                                  =========
*
*   Terminal configuration (NOTE: The 12005 is configured as system console
*     LU 1.  LUs may be swapped to designate another device as the new
*     system console.  You should have a system console device.)
*
*   1      12005 ASIC #1                                 20B
* 110-113 12100 A400 OBIO 4-channel MUX                 77B
* 120-127 12040D 8-channel MUX                          30B
*
*  Free lus:
*    2-4, 6, 8, 10-13, 14, 16-17, 20-23, 25-69,
*    96-109, 114-119, 128-255
```

```
*
links,cp,,                Use current page links
*
* System Relocation
*
er,,                      Echo errors to the terminal
le,off,                   Do not list the module entry points
re /rte_a/%vctr,,         Entry points
tg 900                    Number of tags required
re /rte_a/%mapos,,        Partitioned OS tag routines
*
re /vcplus/%rpl43,,       RPLs for A400 with CDS and DP floating point
*
re /rte_a/%exec,,         EXEC request processing
re /rte_a/%rtioa,,        Real-Time I/O control
re /rte_a/%iomod,,        I/O module
re /rte_a/%maps,,         Dynamic mapping system routines
re /rte_a/%util,,         System variables and utilities
re /rte_a/%progs,,        Program state processing
re /rte_a/%sam,,          System available memory
re /rte_a/%sched,,        Programmatic program scheduling
re /rte_a/%strng,,        Runstring passing
re /rte_a/%erlog,,        Error logging
re /rte_a/%opmsg,,        Operating system messages
re /rte_a/%sycom,,        Operator commands
re /rte_a/%id*43,,        Power-fail driver
re /rte_a/%$IDRPL,,       System ID dup IDRPL
re /rte_a/%signl,,        Signal processing module
re /vcplus/secos.rel,,    Security/1000 module
re /vcplus/check.rel,,    Security/1000 module
re /vcplus/%spool,,       Spooling module
re /x25/rel/cstb.rel,,    X.25 DDX00 customizing subroutine addr table
re /ds1000/%cx166,,       DDX00 customizing subr. for DS/1000
*
se /rte_a/$syslb,,         Search the system library
*
* define partitionable modules
*
pa perr,xcmnd,stat,dsq,vema,lock,load,memry,iorq
pa time,class,abort,alarm
pa cdsfh,envrn
*
ms /rte_a/$sysa,,     Search the system dummy library
*
end,                      End system relocation phase
*
* OS module/Driver partition phase
*   Modules have been arranged to fill 3 page partitions and
*   minimize base page links.
*
re /rte_a/%memry,,        Memory management module
al
re /rte_a/%xcmnd,,        Operator command extension module
end
```

```
*
re /rte_a/%class,,          Class I/O module
re /rte_a/%iorq,,           I/O request processing
end
*
re /rte_a/%load,,           Program loading and swapping
re /rte_a/%vema,,           Virtual memory module
al
re /rte_a/%time,,           Time scheduling of programs
end
*
re /vcplus/%cdsfh,,         For CDS systems only
re /rte_a/%lock,,           LU locking and resource numbers
re /rte_a/%alarm,,          Timer signal processing module
al
re /vcplus/%envrn,,         EXEC interface to Environment Var Block
end
*
re /rte_a/%perr,,           Parity error handler
re /rte_a/%dsq,,            Required for DS/1000-IV
al
re /rte_a/%abort,,          Abort processing module
al
re /rte_a/%stat,,           Status command module
end
*
* Driver partitions
*
re /rte_a/%dd*33,,          Device driver for CS/80 disks
re /x25/rel/dd*60.rel,,     X.25 LAP-B device driver
end
*
re /rte_a/idq35.rel,,       SCSI interface driver
re /rte_a/%ids00,,          X.25 LAP-B interface driver
end
*
re /rte_a/id400.rel,,       Interface driver for A400 OBIO
re /rte_a/%dd*24,,          Device driver for 7974A/78A streaming tape
end
*
re /rte_a/%id*37,,          HP-IB Interface driver for CS/80 disks
re /rte_a/id800.rel,,       Interface driver for 12040D 8-channel MUX
end
*
re /ds1000/%id*66,,         Interface driver for HDLC and Bisync network links
re /rte_a/ddq24.rel,,       Device driver for SCSI DAT tape
re /rte_a/ddq30.rel,,       Device driver for SCSI disks
end
*
re /ds1000/%adv00,,         Device driver for Remote I/O Mapping
re /rte_a/id100.rel,,       Interface driver for 12005 ASIC card
re /rte_a/ddc00.rel,,       Device driver for 100 series interfaces
end
*
```

```
re /x25/rel/ddx00.rel,,   X.25 pseudo device driver
end
*
end,,                     End OS module/Driver partition phase
*
*
* Table Generation phase - configure I/O tables
*
*
* HP-IB #1 -- High speed disk interface bus          Select Code = 27b
*
ift,/rte_a/%Id*37,SC:27B
*
*  Bus Controller, addr 36b, LU 15
*
dvt,,,LU:15,TO:2000,DT:77B,TX:0,DX:1,DP:1:36B,PR:0
*
*  CS-80 disk, addr 0, LU 18-19
*
dvt,/rte_a/%dd*33,M7908_CF:0,LU:18,DP:1:0,-
  DP:2:0:0:00:0:4096 DP:7:64
dvt,/rte_a/%dd*33,M7908_CF:0,LU:19,DP:1:0,-
  DP:2:0:0:04:0:4096 DP:7:64
*
*  CS-80 integrated CTD, addr 0, LU 24
*
dvt,/rte_a/%dd*33,mtape,lu:24,dp:1:0 dp:3:0
*
*  9144/45 stand alone CTD, addr 1, LU 9
*
dvt,/rte_a/%dd*33,M9144:0,LU:9,DP:1:1
*
*  7974/7978 tape drive, addr 3, LU 7
*
dvt,/rte_a/%dd*24,M7974:0,LU:7,DP:1:3
*
*
* SCSI  #1 -- SCSI disk/DAT tape interface bus   Select Code  = 33b
*
ift,/rte_a/idq35.rel,SC:33B
*
* SCSI DAT tape                                        LU 14
* SCSI 7980S                                           LU 5
*
dvt,/rte_a/ddq24_gen.rel,,lu:14,dp:1:4
dvt,/rte_a/ddq24_gen.rel,M7980,lu:5,dp:1:3
*
* SCSI 660S  hard disk
*
dvt,/rte_a/ddq30_gen.rel,m64mb:0,lu:10,dp:1:6 dp:8:1
dvt,/rte_a/ddq30_gen.rel,m64mb:1,lu:11,dp:1:6 dp:8:1
*
* SCSI 650A MO disk
*
```

```
dvt,/rte_a/ddq30_gen.rel,m64mb:0,lu:12,dp:1:5 dp:8:3
dvt,/rte_a/ddq30_gen.rel,m64mb:1,lu:13,dp:1:5 dp:8:3
*
* HDLC or Bisync network links
*                                       Select code = 24B    LU 70,71
ift,/ds1000/%id*66,SC:24B
dvt,,,LU:70,DT:66B
dvt,,,LU:71,DT:66B
*                                       Select code = 34B    LU 72,73
ift,/ds1000/%id*66,SC:34B
dvt,,,LU:72,DT:66B
dvt,,,LU:73,DT:66B
*                                       Select code = 35B    LU 74,75
ift,/ds1000/%id*66,SC:35B
dvt,,,LU:74,DT:66B
dvt,,,LU:75,DT:66B
*                                       Select code = 36B    LU 76,77
ift,/ds1000/%id*66,SC:36B
dvt,,,LU:76,DT:66B
dvt,,,LU:77,DT:66B

*
* Remote I/O mapping                                    LU 78-83
*
ift,/ds1000/%ADV00,EIDV00,QU:FI,TX:2,AL:DY
dvt,,,LU:78,EddV00,TX:0
dvt,,,LU:79,EddV00,TX:5
dvt,,,LU:80,EddV00,TX:5
dvt,,,LU:81,EddV00,TX:5
dvt,,,LU:82,EddV00,TX:5
dvt,,,LU:83,EddV00,TX:5
*
*  X.25
*                                  LAP-B interface Select Code = 40B
*                                                      LU 84,85
ift,/rte_a/%ids00,SC:40B,EIDS00,QU:PR,TX:12
dvt,/x25/rel/dd*60.rel,,LU:84,TX:24,EDD.60
dvt,/x25/rel/dd*60.rel,,LU:85,TX:24,EDD.60
*                                  XNET reserved DVT    LU 86,87
ift,/x25/rel/ddx00.rel,EIDX00,TX:1
dvt,,,LU:86,EDDX00,TX:2
dvt,,,LU:87,EDDX00,TX:2
*                                  X.25 user DVTs       LU 88-95
dvt,,,LU:88,EDDX00,TX:32
dvt,,,LU:89,EDDX00,TX:32
*
dvt,,,LU:90,EDDX00,TX:32
dvt,,,LU:91,EDDX00,TX:32
*
dvt,,,LU:92,EDDX00,TX:32
dvt,,,LU:93,EDDX00,TX:32
*
dvt,,,LU:94,EDDX00,TX:32
dvt,,,LU:95,EDDX00,TX:32
```

```
*
*
*  Terminal LUs
*
*      ##############################################################
*      #                                                            #
*      # For systems with non-12005 ASIC system consoles:           #
*      #   change the 'lu:1' below to 'lu:yy', where yy is an       #
*      #   unused LU, and change the desired LU:XX to LU:1.         #
*      #                                                            #
*      ##############################################################
*
* ASIC #1 (default system console)                  Select Code = 20B
*                                                     LU 1
*
ift,/rte_a/id100.rel,sc:20B
dvt,/rte_a/ddc00.rel,MHP_Term:A,lu:1
*
*   12100A A400 OBIO 4-MUX portA-D, portB's       Select Code = 77B
*                                                     LU 110-113
*
ift,/rte_a/id400.rel
*
dvt,/rte_a/ddc00.rel,MHP_Term:0,lu:110
dvt,/rte_a/ddc00.rel,MHP_Term:1,lu:111
dvt,/rte_a/ddc00.rel,MHP_Term:2,lu:112
dvt,/rte_a/ddc00.rel,MHP_Term:3,lu:113
*
*   12040D 8-channel MUX, ports 0-7               Select Code = 30B
*                                                     LU 120-127,221-223
*
ift,/rte_a/id800.rel,sc:30B
*
dvt,/rte_a/ddc00.rel,MHP_Term:0,lu:120
dvt,/rte_a/ddc00.rel,MHP_Term:1,lu:121
dvt,/rte_a/ddc00.rel,MHP_Term:2,lu:122
dvt,/rte_a/ddc00.rel,MHP_Term:3,lu:123
dvt,/rte_a/ddc00.rel,MHP_Term:4,lu:124
dvt,/rte_a/ddc00.rel,MHP_Term:5,lu:125
dvt,/rte_a/ddc00.rel,MHP_Term:6,lu:126
dvt,/rte_a/ddc00.rel,MHP_Term:7,lu:127
*
end,,                      End of dvt generation phase
*
end,,                      End of ift generation phase
*
*
* Define Node Lists
*
* SCSI disks
*
node,10,11
node,12,13
*
```

```
* HP-IB disk
*
node,18,19,24
*
end,                        End node list
*
end,                        End interrupt table
*
*
* Memory Allocation
*
*
clas 150,                   Class number allocation
resn 30,5                   Resource number allocation/debug table spec
id 80,                      ID segment allocation
rs -150,                    Memory descriptor allocation
sam 32767,4096              SAM allocation/XSAM
sl 200 1048,                Spool limits
bg 30,                      Background swap priority allocation
qu 300 50,                  Quantum time slice value
sp 30,0                     Shared programs/extended schedule table
*
mb 512,                     Number of memory words for DS/1000 tables
*
us 15,                      Number of concurrent users (1 if no VC+)
lb,,                        LOGOF buffer limit (use defaults)
*
*
* Labeled System Common Relocation
*
*
re /ds1000/%resa,,,             DS/1000 labeled common module
re /ds1000/$ds1b1,#lev1
*
re /x25/rel/#xcom.rel,,,        X.25 labeled common module
*
end,                        End labeled system common relocation
*
*
* Unlabeled (Blank) Common
*
com 0,                      Number of words of memory to use
*
*
* System Messages
*
re /rte_a/%msgtb,,          Message table
end
re /rte_a/%$m000,,          Message module
end
re /vcplus/security.rel
end
*
end,                        End system messages
```

```
*
* System Libraries
*
*    ###################################################################
*    #                                                                 #
*    #   add here any other library routines which you often use       #
*    #                                                                 #
*    ###################################################################
*
lib sec1000.lib,,          Security/1000 library
lib $bigds.lib,,           Merged DS/1000-IV user library
lib $biglb.lib,,
end,                       End system libraries
*
* CDS Libraries
*
*    ###################################################################
*    #                                                                 #
*    #  add here any other CDS library routines which you often use    #
*    #                                                                 #
*    ###################################################################
*
lib sec1000cds.lib,,       Security/1000 CDS library
lib $bigds.lib,,           Merged DS/1000-IV user library
lib $bgcds.lib,,
lib sec1000.lib,,          Security/1000 library
lib $biglb.lib,,
*
end
```

RTE-A MEMORY-BASED, TERMINAL-LESS GENERATION

Use the following sample RTE-A generation answer file for a memory-based, terminal-less system to create your own system generation.

```
*  Sample generator answer file for a memory-based, terminal-less
*  RTE-A and DS/1000-IV system.
*------------------------------------------------------------------------
*
*                    I/O    D E F I N I T I O N S
*
*  LU          DEVICE                          SELECT CODE        ADDRESS
* ----        --------                        -------------      ---------
*                    DS NETWORK LINKS AND IO MAPPING
*                    ===============================
*
* 40,41    HDLC or Bisync network link            24B
* 42,43    HDLC or Bisync network link            34B
* 44,45    HDLC or Bisync network link            35B
* 46,47    HDLC or Bisync network link            36B
* 30-39    Remote I/O mapping
*   1      Remote I/O mapping
*
links,cp,,                  Use current page links
*
* System Relocation
*
er,,                        Echo errors to the terminal
le,off,                     Do not list the module entry points
re /rte_a/%vctr,,           Entry points
re /vcplus/%rpl43,,         RPLs for A400 with CDS and DP floating point
*
re /rte_a/%exec,,           EXEC request processing
re /rte_a/%rtioa,,          Real-Time I/O control
re /rte_a/%iomod,,          I/O module
re /rte_a/%maps,,           Dynamic mapping system routines
re /rte_a/%util,,           System variables and utilities
re /rte_a/%progs,,          Program state processing
re /rte_a/%sam,,            System available memory
re /rte_a/%sched,,          Programmatic program scheduling
re /rte_a/%strng,,          Runstring passing
re /rte_a/%erlog,,          Error logging
re /rte_a/%opmsg,,          Operating system messages
re /rte_a/%sycom,,          Operator commands
re /rte_a/%$mwb1,,          APLDR inter-map data move
*
re /rte_a/%xcmnd,,          Operator command extension module
re /rte_a/%class,,          Class I/O module
re /rte_a/%iorq,,           I/O request processing
re /rte_a/%vema,,           Virtual memory module
re /rte_a/%time,,           Time scheduling of programs
re /rte_a/%lock,,           LU locking and resource numbers
```

```
re /rte_a/%perr,,          Parity error handler
re /rte_a/%dsq,,           Required for DS/1000-IV
re /rte_a/%abort,,         Abort processing module
re /rte_a/%stat,,          Status command module
re /vcplus/%cdsfh,,        For CDS systems only
se /rte_a/$syslb,,         Search the system library
ms /rte_a/$sysa,,          Search the system dummy library
*
re /ds1000/%id*66,,        Interface driver for HDLC and Bisync network links
re /ds1000/%adv00,,        Device driver for Remote I/O Mapping
*
end,,                      End system relocation phase
end,,                      End OS module/Driver partition phase
*
* Table Generation phase - configure I/O tables
*
* HDLC or Bisync network links
*                                    Select code = 24B    LU 40,41
ift,/ds1000/%id*66,SC:24B
dvt,,,LU:40,DT:66B
dvt,,,LU:41,DT:66B
*                                    Select code = 34B    LU 42,43
ift,/ds1000/%id*66,SC:34B
dvt,,,LU:42,DT:66B
dvt,,,LU:43,DT:66B
*                                    Select code = 35B    LU 44,45
ift,/ds1000/%id*66,SC:35B
dvt,,,LU:44,DT:66B
dvt,,,LU:45,DT:66B
*                                    Select code = 36B    LU 46,47
ift,/ds1000/%id*66,SC:36B
dvt,,,LU:46,DT:66B
dvt,,,LU:47,DT:66B
*
* Remote I/O mapping                                  LU 30-39, 1
*
ift,/ds1000/%ADV00,EIDV00,QU:FI,TX:2,AL:DY
dvt,,,LU:30,EddV00,TX:0
dvt,,,LU:31,EddV00,TX:5
dvt,,,LU:32,EddV00,TX:5
dvt,,,LU:33,EddV00,TX:5
dvt,,,LU:34,EddV00,TX:5
dvt,,,LU:35,EddV00,TX:5
dvt,,,LU:36,EddV00,TX:5
dvt,,,LU:37,EddV00,TX:5
dvt,,,LU:38,EddV00,TX:5
dvt,,,LU:39,EddV00,TX:5
dvt,,,LU:1,EddV00,TX:5
*
end,,                      End of dvt generation phase
end,,                      End of ift generation phase
end,                       End node list
end,                       End interrupt table
*
```

```
* Memory Allocation
*
clas 50,                    Class number allocation
resn 20,5                   Resource number allocation/debug table spec
id 40,                      ID segment allocation
rs -80,                     Memory descriptor allocation
sam 32767,0                 SAM allocation/XSAM
sl 200 1048,                Spool limits
bg 30,                      Background swap priority allocation
qu 300 50,                  Quantum time slice value
sp 5,0                      Shared programs/extended schedule table
mb 512,                     Number of memory words for DS/1000 tables
us 1,                       Number of concurrent users (1 if no VC+)
lb,,                        LOGOF buffer limit (use defaults)
*
* Labeled System Common Relocation
*
re /ds1000/%resa,,,             DS/1000 labeled common module
re /ds1000/$dslb1,#lev1
*
end,                        End labeled system common relocation
*
* Unlabeled (Blank) Common
*
com 0,                      Number of words of memory to use
*
* System Messages
*
re /rte_a/%msgtb,,          Message table
end
re /rte_a/%$m000,,          Message module
end
end,                        End system messages
*
* System Libraries
*
*    Add here any other library routines which you often use
*
lib $bigds.lib,,            Merged DS/1000-IV user library
lib $biglb.lib,,
end,                        End system libraries
*
* CDS Libraries
*
*    Add here any other CDS library routines which you often use
*
lib $bigds.lib,,            Merged DS/1000-IV user library
lib $bgcds.lib,,
lib $biglb.lib,,
*
end
```

RTE-6/VM GENERATION WITH DS AND X.25

The following example RTE-6/VM generation answer file has DS/1000-IV and X.25 portions highlighted with pound (##########) signs:

```
* AN652.ANS  rev.5020  <900205.1100>
AN652.LST::::965,R            * LIST FILE
*************************************************************************
*                                                                       *
*  PRIMARY SYSTEM #604   (7908/11/12/14/33 CS80)                        *
*  #an651 has been created from the primary.  X.25 has been added.      *
*************************************************************************
YES                       * ECHO ON
AN652.SYS::::7000,R       * ABSOLUTE SYSTEM FILE
CS80                      * TARGET DISC
12                        * DISC CHANNEL
CTD,0,1,0
7933,0,0,0                * SUBCHANNEL                          LU #
300,48                    *  01 (STARTS AT BLOCK 0)              2
900,48                    *  02 (STARTS AT BLOCK 19200)         10
143,48                    *  03                                 11
CTD,0                     *     (STARTS AT 64464)               12 (CTD)
-30,1                     *     (STARTS AT 64720)
*           END OF 7908
320,48                    * 04  (STARTS AT BLOCK 64750)         13
-18,1                     *     (STARTS AT 80110)
*           END OF 7907
266,48                    * 05  (STARTS AT BLOCK 80128)         14
-32,1                     *     (STARTS AT 94720)
*           END OF 7941
352,48                    * 06  (STARTS AT 94752)               15
*           END OF 7911
2229,48                   * 07  (STARTS AT 109824 BLOCKS)       16
-15,1
*           END OF 7945
821,48                    * 08                                  17
-17,1
*           END OF 7912
5413,48                   * 09  (STARTS AT BLOCK 256256)        18
-16,1                     *
*           END OF 7914
8862,48                   * 10                                  19
13300,48                  * 11  (STARTS AT 941472)              20
-44,1                     *
*           END OF 7933/35
*                         * 12 * EXTRA SPARE FOR SUBCHANNEL SPLITS
*                         * 13 * EXTRA SPARE FOR SUBCHANNEL SPLITS
/E
1                         * SYSTEM SUBCHANNEL
NO                        *    AUX DISC
11                        * TBG
0                         * NO PRIV. INT.
YES                       * MR ACCESS TA II
```

```
YES                     * RT MEMORY LOCK
YES                     * BG MEMORY LOCK
50                      * SWAP DELAY
896                     * MEM SIZE
0                       * NO BOOT FILE
MAP ALL
LINKS IN CURRENT
*
*       RTE-6   OPERATING SYSTEM
*
REL,/RTE_6/%CR6S1       * MEM RES OP SYS 1
REL,/RTE_6/%CR6S2       * MEM RES OP SYS 2
REL,/RTE_6/%CR6S3       * MEM RES OP SYS 3
REL,/RTE_6/%$CNFG       * CONFIGURATOR
*
*
*             I/O DRIVERS
*
REL,/RTE_6/%DVR00       * RS232 TERMINALS
REL,/RTE_6/%DVA05       * 2645/2648 SYSTEM CONSOLE
*REL,%DDT05             *   "   Short form
*REL,%DDV05             *   "
*REL,%DDV12             *   "
*REL,/RTE_6/MPrDv.rel    * new D-mux pre driver
REL,/RTE_6/DV800_0.rel  * new D-mux driver
REL,/RTE_6/%DVM00       * standard backplane driver
REL,/RTE_6/%PVM00       * DVM00 pre-driver
* ########################
rel,/x25/rel/ddx60.rel  * X.25 driver
REL,%$DVTB              * DVM00 device driver addr tbl - modified for x.25
* ########################
*REL,/DS/%DVR07       * MULTIPOINT
REL,/RTE_6/%DVA12       * 2613,2617,2818,2631 LINE PRINTERS
REL,/RTE_6/%DVB12       * 2608 LINE PRINTER
REL,/RTE_6/%DVC12       * 2608S GRAPHICS PRINTER
REL,/RTE_6/%DVD12       * 2608S GRAPHICS PRINTER
REL,/RTE_6/%DVR23       * 7970 MAGNETIC TAPE UNIT
REL,/RTE_6/%DVS23       * 7974A MAGNETIC TAPE UNIT
REL,/RTE_6/%$TB32       * TRACK MAP
REL,/RTE_6/%DVR32       * 7906/7920/7925 (PERIPHERAL DISC)
REL,/RTE_6/%DVA32       * HPIB DISC (PERIPHERAL)
REL,/RTE_6/%$TA32       * TRACK MAP
REL,/RTE_6/%DVM33       * CS80 DISC (SYSTEM DISC)
REL,/RTE_6/%6DV37       * NEW HPIB
REL,/RTE_6/%6DP43       * POWER FAIL
REL,/DS/%DVA65       * (DS) 1000-3000 12771/73 LINK
* ########################
REL,/DS/%DVA66       * (DS) 1000-1000 HDLC & 1000-3000 BISYNC
* ########################
REL,/DS/%DVG67       * (DS) 1000-3000 12889 HSI LINK
* ########################
REL,/DS/%MDV00       * (DS) REMOTE I/O MAP DVR--RTEIVB&RTE-MIII
* ########################
*REL,/RTE_6/%DVY77       * DUMMY DRIVER FOR ON-LINE REPLACEMENT
```

```
*REL,/RET_6/%DVZ77       * DUMMY DRIVER FOR ON-LINE REPLACEMENT
* ########################
rel,/x25/rel/dvx00.rel    * X25 driver
rel,/x25/rel/cstb.rel     * customizing subroutine table
rel,/DS/%csv66        *  custimizing subroutine
* ########################
*
*                 MODULES
*
MAP OFF, MODULES
REL,/RTE_6/%BMPG1         * FMGR
REL,/RTE_6/%BMPG2         * D.RTR
REL,/RTE_6/%BMPG3         * FMP
REL,/DS/%QUEUE        * (DS) INTERRUPT REQUEST HANDLER
*REL,/RTE_6/%DSRTR         * (DS) TRANSPARENCY SOFTWARE (5000)
*rel,/RTE_6/%trfas
*
MAP OFF, ALL
* ######################
REL,/DS/%RESSM        * (DS) ENTRY POINTS IN SSGA FOR RTE-IVB
REL,/DS/%#SPLU        * (DS) ENTRY POINT FOR REMOTE I/O MAPPING
* ######################
*
REL,/RTE_6/%SMON2         * SESSION MONITOR #2
MAP OFF, MODULES
REL,/RTE_6/%SMON1         * SESSION MONITOR #1
REL,/RTE_6/%T5IDM         * SHORT ID SEGMENT HANDLER
*REL,/DS/%IOMAP        * (DS) INTERFACE FOR MAPPED LUS
*REL,/DS/%DSMOD        * (DS) ALTERS DS PARAM SET AT INITIALIZATION
*REL,/DS/%DINIS        * (DS) NETWORK INITIALIZATION WITH SHUTDOWN
* ######################
REL,/DS/%GRPM         * (DS) REQUEST/REPLY PRE-PROCESSOR
* ######################
*REL,/DS/$D3N25       * (DS) SATISFIES D$X25 ENTRY PT.
*REL,/RTE_6/%READT         * READT
*REL,/RTE_6/%WRITT         * WRITT
*
*                LIBRARIES
NOLIB
REL,/RTE_6/%CI            * CI UTILITY
REL,/RTE_6/%CIX           * CIX UTILITY
REL,/RTE_6/%CISU6         * RTE-6 LIBRARY
REL,/RTE_6/%CI000         * CI MESSAGES
REL,/RTE_6/%CR000         * CI LIBRARY MESSAGES
REL,/RTE_6/%CX000         * CIX MESSAGES
REL,/RTE_6/%CKTRM         * CI ROUTINES
REL,/RTE_6/$CRLIB         * CI LIBRARY
LIB
*
* ######################
REL,/DS/$DSMX6        * (DS) LIB FOR RTE-6/VM
* ######################
REL,/RTE_6/$SYLB6         * SYSTEM LIBRARY
REL,/RTE_6/$MATH          * SYSTEM IND. MATH LIBRARY
```

```
REL,/RTE_6/$FLIB          * FORTRAN SYSTEM IND. LIBRARY
REL,/RTE_6/$FMP6,NOLIB    * FMP LIBRARY
REL,/RTE_6/$FOLDF         * FORTRAN FILE I/O (OLD)
* ########################
REL,/DS/$D3KLB         * (DS) HP 1000-3000 BASE LIB
REL,/DS/$D3KBB         * (DS) 1072 WORD COMMUNICATION BUFFER
REL,/DS/$DSLB1         * (DS) REQUIRED IN ALL DS/1000-IV NODES
REL,/DS/$DSLB2         * (DS) REQUIRED IN ALL NODES W/ OTHER RTE LINKS
REL,/DS/$DSRR          * (DS) RE-ROUTING LIBRARY
REL,/DS/$DSSM          * (DS) SESSION MONITOR
                         * NOTE: IF GEN NON-DS SYSTEM, EITHER SESSION OR
                         *       NON-SESSION, A UNDEF .CLGF WILL BE OK
                         *
rel,/DS/$dsma          * (DS) Message Accounting
rel,/x25/rel/x25ds.lib    * X.25 library
rel,/x25/rel/#x25t.rel    * SAM table entry point
rel,/x25/rel/#xcom.rel    * X.25 communication area
rel,/DS/$d3x25         * (DS) X.25 connections
* ########################
*
REL,/RTE_6/$FDSLB         * FTN WITH DS LIB
* REL,/DS/%MPLIB        * MULTIPOINT LIB
REL,/RTE_6/$LDRLN         * LOADER LIB
REL,/RTE_6/$UTLIB,NOLIB   * UTILITY LIB
REL,/RTE_6/$DSCLB         * DSIC LIBRARY
REL,/RTE_6/%CSERR         * CS80 DISC ERROR PROGRAM
REL,/RTE_6/%DBUGR         * DEBUG ROUTINE
REL,/RTE_6/%DECAR         * RTE DEC STRING ARITH
REL,/RTE_6/$MLSLB         * MLS PROG LIB
*
*           ADDITIONAL MODULES
*
REL,/RTE_6/%SPOL1         * SPOOLING
REL,/RTE_6/%SPOL2         * MORE SPOOLING
REL,/RTE_6/%WHZAT         * SYSTEM STATUS PROGRAM
REL,/RTE_6/%LGTAT         * SYSTEM DISC LOG TABLE
REL,/RTE_6/%$LDR          * RELOCATING LOADER
*REL,%AUTO7               * AUTO RESTART (MULTIPOINT)
REL,/RTE_6/%ACCTS         * ACCOUNT MAINTENANCE
REL,/RTE_6/$ACCLB,NOLIB   * ACCOUNTS LIBRARY
*
*
/E                       * TERMINATE RELOCATABLE SPECIFICATIONS
*
*
*
*****************************************************************
*                          PROGRAM PARAMETERS                   *
*****************************************************************
*
* PROGRAM,TYPE,PRIORITY,EXECUTION INTERVAL
*
CI,6                     *BACK GROUND DISC RESIDENT
CIX,6                    *BACK GROUND DISC RESIDENT
```

```
WHZAT,1,2                * MEMORY RESIDENT-PRIORITY OF 2
SMP,19                   * CHANGE FROM RT DISC RES TO BG DISC RES
JOB,19                   * CHANGE FROM RT DISC RES TO BG DISC RES
FMGR,3,50                * BG PRI 50
*AUTOR,4,10               * BG NO TA2, PRI=10
PVM00,13
/E
*
*
TR,/RTE_6/]RT6OS         * E/F OS FIRMWARE ENTRY POINT
TR,/RTE_6/]RT6VM         * E/F EMA/VMA FIRMWARE ENTRY POINT
*                          A MICRO INSTRUCTION IS STORED IN A TRAP CELL
Z$CDS,RP,0               * NON-CDS FOR FORTRAN
Z$INT,RP,1               * 1 WORD INTEGER
Z$DBL,RP,4               * 4 WORD FLOATING POINT
Z$LPP,RP,73              * 59 LINES/PG
Z$F67,RP,7               * FORTRAN 77 DEFAULT
/E
*
/E                       * NO PROGRAM ALIAS
*
*                  EQUIPMENT TABLE ENTRIES
*
12,DVM33,D,T=5000        * EQT 01  7908/12/14/33/35 SYSTEM DISC
15,DVA05,B,X=13,T=30000  * EQT 02  SYSTEM CONSOLE
72,DVB12,B,X=5           * EQT 03  LINE PRINTER (2608B)
64,DVR00,B,T=30000       * EQT 04  TERMINAL
21,DVR32,D               * EQT 05  7906/7920/7925 DISC
*21,DVA37,X=123,T=6000    * EQT 05  HP-IB (14 AUTO ADDRESS DEVICES)
* ########################
16,DVA66,X=12            * EQT 06  DS TRANSMIT \
16,DVA66                 * EQT 07  DS RECEIVE  /
* ########################
*16,DVC12,B,X=10          * EQT 06  LINE PRINTER (2608S)
*24,DVA05,B,X=13,T=30000 * EQT 07  TERMINAL
* ########################
17,DVM00,X=34            * EQT 08  DS/1000 X.25 CARD PART 1
17,DVM00,X=34            * EQT 09  DS/1000 X.25 CARD PART 2
* ########################
*17,DVR23,B,T=500         * EQT 08  7970B/E MAG TAPE
*23,DVR07,X=8             * EQT 09  MULTIPOINT INTERFACE
*71,DVR07,X=8             * EQT 10       "       TERMINAL #1
*71,DVR07,X=8             * EQT 11       "          "     #2
*71,DVR07,X=8             * EQT 12       "          "     #3
*71,DVR07,X=8             * EQT 13       "          "     #4
* ########################
74,DVX00                 * EQT 10  X.25 RESERVED WRITE EQT
74,DVX00                 * EQT 11  X.25 RESERVED READ EQT
75,DVX00,X=24            * EQT 12  X.25 USER WRITE EQT
75,DVX00,X=24            * EQT 13  X.25 USER READ EQT
* ########################
* 22,DVM00,B,X=31          * EQT 14  MULTIPLEXER PORT #1
* 22,DVM00,B,X=31          * EQT 15       "          "  #2
* 22,DVM00,B,X=31          * EQT 16       "          "  #3
```

```
* 22,DVM00,B,X=31          * EQT 17       "          "  #4
* 22,DVM00,B,X=31          * EQT 18       "          "  #5
* 22,DVM00,B,X=31          * EQT 19       "          "  #6
* 22,DVM00,B,X=31          * EQT 20       "          "  #7
* 22,DVM00,B,X=31          * EQT 21       "          "  #8
22,DV800,Gr=Hp_Term:0    * EQT 14  MULTIPLEXER PORT #1
22,DV800,Gr=Hp_Term:1    * EQT 15  MULTIPLEXER PORT #2
22,DV800,Gr=Hp_Term:2    * EQT 16  MULTIPLEXER PORT #3
22,DV800,Gr=Hp_Term:3    * EQT 17  MULTIPLEXER PORT #4
22,DV800,Gr=Hp_Term:4    * EQT 18  MULTIPLEXER PORT #5
22,DV800,Gr=Hp_Term:5    * EQT 19  MULTIPLEXER PORT #6
22,DV800,Gr=Hp_Term:6    * EQT 20  MULTIPLEXER PORT #7
22,DV800,Gr=Hp_Term:7    * EQT 21  MULTIPLEXER PORT #8
60,DVA12,B,T=6000        * EQT 22  LINE PRINTER 2613/17/19/31
61,DVA05,B,X=13,T=30000  * EQT 23  TERMINAL
62,DVA05,B,X=13,T=30000  * EQT 24     "
63,DVA05,B,X=13,T=30000  * EQT 25     "
4,DVP43,M                * EQT 26  POWER FAIL
52,DVS43,M,X=18          * EQT 27  SPOOLING
53,DVS43,M,X=18          * EQT 28     "
54,DVS43,M,X=18          * EQT 29     "
55,DVS43,M,X=18          * EQT 30     "
56,DVS43,M,X=18          * EQT 31     "
57,DVS43,M,X=18          * EQT 32     "
* ######################
73,DVV00                 * EQT 33  REMOTE I/O MAPPING RESERVED EQT
73,DVV00,X=11            * EQT 34    "      "      "  SUBCH. 0,1,2
14,DVA66,X=12            * EQT 35  DS   TRANSMIT   \
14,DVA66                 * EQT 36  DS   RECIEVE    /
* ######################
66,DVA65,X=7,T=3         * EQT 37  DS   12771A
67,DVA65,X=7,T=30        * EQT 38  DS   12773A 12620A
70,DVA65,X=7,T=3         * EQT 39  DS   12771A
65,DVG67,D               * EQT 40  DS   12889A
13,DVA66,X=12            * EQT 41  DS   TRANSMIT \
13,DVA66                 * EQT 42  DS   RECIEVE  /
75,DVX00,X=24            * EQT 43  X.25 USER WRITE
75,DVX00,X=24            * EQT 44  X.25 USER READ
51,DVA32,D,T=100         * EQT 45  PERIPHERAL DISC
50,DVR32,D,T=100         * EQT 46  PERIPHERAL DISC
25,DVS23,D,X=26,T=500    * EQT 47  7974A MAG TAPE UNIT
75,DVX00,X=24            * EQT 48  X.25 USER WRITE EQT
75,DVX00,X=24            * EQT 49  X.25 USER READ EQT
75,DVX00,X=24            * EQT 50  X.25 USER WRITE EQT
75,DVX00,X=24            * EQT 51  X.25 USER READ EQT
75,DVX00,X=24            * EQT 52  X.25 USER WRITE EQT
75,DVX00,X=24            * EQT 53  X.25 USER READ EQT
23,DVA05,B,X=13,T=30000  * EQT 54  TERMINAL
24,DVA05,B,X=13,T=30000  * EQT 55
73,DVV00,X=11            * EQT 56  IOMAPPING
73,DVV00,X=11            * EQT 57  IOMAPPING
/E
*
```

```
*******************************************************
*                                                     *
*              DEVICE REFERENCE TABLE ENTRIES         *
*                                                     *
*******************************************************
*eqt#,subchannel        lu #
2,0                     *001  SYSTEM CONSOLE
1,1                     *002  SYSTEM DISC
0                       *003  AUX DISC
2,1                     *004  L-CTU
2,2                     *005  R-CTU (SYS CONSOLE)
*6                       *006  LINE PRINTER
*0                       *007  RESERVED
6                       *006  DS/1000 TRANSMIT (SC 16)
7                       *007  DS/1000 RECEIVE
*8                       *008  MAG TAPE
*0                       *009  SPARE
8                       *008  X.25 CARD PART 1 (SC 17)
9                       *009  X.25 CARD PART 2
*                       *.....................................
1,2                     *010 <7908>   ^     ^    ^    ^    ^     ^    ^
1,3                     *011          :     :    :    :    :     :    :
1,0                     *012 ( CTD )  :     :    :    :    :     :    :
*                       *.......v  <7907>   :    :    :    :     :    :
1,4                     *013          :     :    :    :    :     :    :
*                       *.............v  <7941>  :    :    :     :    :
1,5                     *014                :    :    :    :     :    :
*                       *...................v  <7911> :    :     :    :
1,6                     *015                     :    :    :     :    :
*                       *.........................v  <7945> :     :    :
1,7                     *016                          :    :     :    :
*                       *..............................v <7912>   :    :
1,8                     *017                                 :  <7914>  :
*                       *....................................v     :    :
1,9                     *018                                       :    :
*                       *.........................................v    :
1,10                    *019                                          <7933/35>
1,11                    *020                                           :
*                       *.............................................v
0                       *021
0                       *022
0                       *023
0                       *024
0                       *025
0                       *026
0                       *027
0                       *028
0                       *029
0                       *030
0                       *031
0                       *032
33                      *033  DS REMOTE IOMAPPING RESERVED LU
34                      *034  DS REMOTE IOMAP
```

```
56                  *035  DS REMOTE IOMAP
57                  *036  DS REMOTE IOMAP
0                   *037
10                  *038  X.25 Reserved Write LU
11                  *039  X.25 Reserved Read LU
43                  *040  X.25 USER WRITE LU
44                  *041  X.25 USER READ LU
0                   *042   (SPARE FOR FUTURE DISC SUBCH. SPLITS)
0                   *043   (SPARE FOR FUTURE DISC SUBCH. SPLITS)
*                   *.....................................
47                  *044   7974A MAG TAPE UNIT
0                   *045   (SPARE)
*                   *.....................................
12                  *046  X.25 USER WRITE LU
13                  *047  X.25 USER READ LU
48                  *048  X.25 USER WRITE LU
49                  *049  X.25 USER READ LU
0                   *050
*                   *.....................................
5,0                 *051  MAC DISK DRIVE
5,1                 *052    "      "    #1
5,2                 *053    "      "    #2
5,3                 *054    "      "    #3
5,4                 *055    "      "    #4
5,5                 *056    "      "    #5
5,6                 *057    "      "    #6
5,7                 *058    "      "    #7
5,8                 *059    "      "    #8
5,9                 *060    "      "    #9
5,10                *061    "      "    #10
5,11                *062    "      "    #11
5,12                *063    "      "    #12
5,13                *064    "      "    #13
5,14                *065    "      "    #14
*                   *.....................................
7                   *066  TERMINAL
7,1                 *067  L-CTU
7,2                 *068  R-CTU
23                  *069  TERMINAL
23,1                *070  L-CTU
23,2                *071  R-CTU
24                  *072  TERMINAL
24,1                *073  L-CTU
24,2                *074  R-CTU
25                  *075  TERMINAL
25,1                *076  L-CTU
25,2                *077  R-CTU
26                  *078  POWER FAIL
*                   *.............................
4                   *079  DVR00 TERMINAL
3                   *080  GRAPHICS LINE PRINTER
3,3                 *081  2608B LINE PRINTER READ BACK
* 14                  *082  MUX   PORT    #0
* 15                  *083   "      "      #1
```

```
* 16                    *084   "      "      #2
* 17                    *085   "      "      #3
* 18                    *086   "      "      #4
* 19                    *087   "      "      #5
* 20                    *088   "      "      #6
* 21                    *089   "      "      #7
14                     *082  New Mux in SC 22 #0
15                     *083   "      "      #1
16                     *084   "      "      #2
17                     *085   "      "      #3
18                     *086   "      "      #4
19                     *087   "      "      #5
20                     *088   "      "      #6
21                     *089   "      "      #7
27                     *090  SPOOLING #1
28                     *091       "    #2
29                     *092       "    #3
30                     *093       "    #4
31                     *094       "    #5
32                     *095       "    #6
35                     *096  DS \ SC14  DVA66
36                     *097  DS /       DVA66
40                     *098  DS         DVG67
37,1                   *099  DS         DVA65  DIRECT CONNECT
38                     *100  DS         DVA65
39,1                   *101  DS         DVA65
0                      *102
0                      *103
41                     *104  DS \  SC13  DVA66
42                     *105  DS /       DVA66
50                     *106  X.25 USER WRITE LU
51                     *107  X.25 USER READ LU
52                     *108  X.25 USER WRITE LU
53                     *109  X.25 USER READ LU
54                     *110  TERMINAL
55                     *111  TERMINAL
0                      *112    "
0                      *113    "
0                      *114    "
0                      *115    "
0                      *116    "
0                      *117    "
0                      *118    "
0                      *119    "
0                      *120    "
43                     * DUMMY DRIVER     121
44                     * DUMMY DRIVER     122
0                      * SPARE            123
0                      * SPARE            124
0                      * SPARE            125
0                      * SPARE            126
0                      * SPARE            127
0                      * SPARE            128
0                      * SPARE            129
```

```
0                       * SPARE             130
/E
*
*                INTERRUPT TABLE ENTRIES

4,ENT,$POWR             *   POWER FAIL
12,EQT,1                *   SYSTEM DISC
13,EQT,41               *   DS
14,EQT,35               *   DS
15,PRG,PRMPT            *   SYSTEM CONSOLE
* ######################
16,EQT,6                *   DS
17,EQT,8                *   X.25
* ######################
20,EQT,54               *   PRINTER
21,EQT,5                *   MAC DISC
* 22,PRG,PRMPT            *   12792A MUX
22,ent,MPrDv            *   new mux
23,PRG,PRMPT            *    TERMINAL
24,PRG,PRMPT            *   TERMINAL
25,EQT,47               * 7974A MAG TAPE UNIT
50,EQT,46               *   PERIPHERAL DISC
51,EQT,45               *   PERIPHERAL DISC
52,EQT,27               *   SPOOLING
53,EQT,28               *      "
54,EQT,29               *      "
55,EQT,30               *      "
56,EQT,31               *      "
57,EQT,32               *      "
60,EQT,22               *   LINE PRINTER 2613/17/19/31
61,PRG,PRMPT            *   TERMINAL
62,PRG,PRMPT            *   TERMINAL
63,PRG,PRMPT            *   TERMINAL
64,PRG,PRMPT            *   TERMINAL
* ######################
65,EQT,40               *   DS
66,EQT,37               *   DS
67,EQT,38               *   DS
70,EQT,39               *   DS
* ######################
71,ABS,0                *   MULTIPOINT TERMINALS
72,EQT,3                *   2608B GRAPHIC PRINTER
* ######################
73,PRG,PRMPT            *   DS
75,EQT,12               *   X.25 HOST TO HOST
* ######################
76,EQT,43               * DUMMY DRIVER
77,EQT,44               * DUMMY DRIVER
/E
*
3                       * CHANGE DP SIZE
0                       * RT COMMON CHANGE
0                       * BG COMMON CHANGE
40                      * # OF I/O CLASSES
```

```
16                      * # OF LU MAPPINGS
30                      * # OF RESOURCE NUMBERS
100,400                 * BUFFER LIMITS
44                      * # OF BLANK ID SEGMENTS
40                      * # OF BLANK SHORT ID SEGMENTS
10                      * # OF BLANK ID EXTENSIONS
48                      * MAX NUMBER OF PARTITIONS
*
77                      * CHANGE 1ST PART PG?
*
*  PARTITION DEFINITIONS
*                  Part  Start
*                  Numb   Page   Program
*                  ----  -----   -------
37,BG,R         *    1     77     D.RTR
NO              *
2,BG            *    2    114     MATIC
2,BG            *    3    116     RTRY
2,BG            *    4    118     #SEND
2,BG            *    5    120     QUEZ
2,BG            *    6    122     VCPMN
2,BG            *    7    124     LUQUE
3,BG            *    8    126     QCLM
3,BG            *    9    129     CNSLM
4,BG            *   10    132     R$PN$
4,BG            *   11    136     RSM
4,BG            *   12    140     OPERM
4,BG            *   13    144     QUEX
4,BG            *   14    148     RPCNV
5,BG            *   15    152     DLIST
5,BG            *   16    157     spare
6,BG            *   17    162     D.ERR
6,BG            *   18    168     IOMAP
8,BG            *   19    174     UPLIN
8,BG            *   20    182     EXECM
9,BG            *   21    190     TRFAS
9,BG            *   22    199     EXECW
9,BG            *   23    208     PTOPM
9,BG            *   24    217     RQCNV
9,BG            *   25    226     PROGL
10,BG           *   26    235     LGOFF
10,BG           *   27    245     RFAM
10,BG           *   28    255     LUMAP
13,BG           *   29    265     LOGON
20,BG           *   30    278     spare
20,BG           *   31    298     spare
23,BG           *   32    318     DSRTR
26,BG           *   33    341     spare
32,BG           *   34    367     spare
32,BG           *   35    399     spare
32,BG           *   36    431     spare
32,BG           *   37    463     spare
32,BG           *   38    495     spare
40,BG           *   39    527     XNET
```

```
NO              *
48,BG           *       40      567     spare
NO              *
281,BGM         *       41      615     PASCOMP - default size
55,S            *       42      615
100,S           *       43      670
126,S           *       44      770     FST1 shareable ema for FST
/E
*
* PROGRAM PAGE MODIFICATIONS
*
FMGR,17
LOADR,26
CI,32
CIX,32
* DSRTR,23
D.RTR,28,8
/E
*
* SHAREABLE EMA PARTITIONS
*
44,FST1
/E
*
* SHAREABLE EMA PROGRAMS
*
/E
*
* PROGRAM PARTITION ASSIGNMENTS
*
D.RTR,1
/E
```

RTE-A MEMORY-BASED BUILD COMMAND FILE

This is a sample BUILD command file for a downloadable memory-based RTE-A system.

```
*
* BUILD command file for memory-based, terminal-less RTE-A
*
*
YES,                    use automatic partition definition
512,                    memory size in pages
RP,CI.RUN
RP,CI.RUN,CM
RP,APLDR.RUN
RP,CIX.RUN
RP,DRTR.RUN,D.RTR
RP,IO.RUN
RP,WH.RUN
RP,SPASS.RUN
ST,,                     SPASS.RUN will be startup program
RP,IOMAP.RUN
RP,DSINF.RUN
RP,DSMOD.RUN
RP,EXECM.RUN
RP,VCPMN.RUN
RP,OPERM.RUN
RP,EXECW.RUN
RP,PTOPM.RUN
RP,RTRY.RUN
RP,UPLIN.RUN
RP,QUEUE.RUN
RP,GRPM.RUN
RP,QCLM.RUN
RP,MATIC.RUN
RP,LUMAP.RUN
RP,LUQUE.RUN
RP,DSRTR.RUN
RP,SYSAT.RUN
RP,#SEND.RUN
RP,DINIT.RUN
/E
```

Glossary

APPENDIX B

Architecture	As used in this manual, it simply refers to the organization of the network and/or its software.
Communication Link	The hardware directly connecting two computers together, including the interface boards, cables, and modems if a telephone line is used.
DCB (Data Control Block)	A buffer used by the file system subroutines, internal to the user program, to contain information about a file. See the *DS/1000-IV User's Manual* and the appropriate operating system Programmer's Reference Manual.
Down-load	The transfer of a system or program, in binary-absolute format, from a disc file at one node to the memory of another computer. Similar to Initial Binary Loading (IBL) from paper tape, mini-cartridge, or other devices, except a communications link and DS/1000-IV software is utilized.
HP 1000	As used in this manual, refers to any HP computer system running an RTE system that supports DS/1000-IV.
HP 3000	The HP 3000 is a 16-bit stack architecture mini-computer used in commercial applications. DS/1000-IV supports a communications link to the HP 3000.
HDLC	High-level Data Link Control is one of the line protocols used with DS/1000-IV. HDLC is a full duplex, bit oriented, synchronous protocol. Details of the HDLC protocol can be found in the hardware manuals describing the DS/1000-IV interfaces.
Local system	The system in which the program under discussion is currently executing, or in which the operator command under discussion is entered.
Master program	Any program which initiates a Distributed System request. It may be a user or HP-supplied program.
Master request	A request made by a master program. These requests are executed by a "slave program" usually executing in another node.
Master reply	A master request sent from node A (to node B) will cause node B to send a reply back to node A. This reply always includes acknowledgement of the request and successful/unsuccessful execution status. It also includes the returned data if any. When the reply arrives back at node A it is called the master reply. While the reply exists at node B (being sent) it is called a slave reply.
Master side	The node which made a master request. This term is usually used when describing data flow and internal organization.
Master timeout	The maximum time limit, in seconds, allowed for a master request to be executed. See the subsection on timeouts for guidelines on setting timeouts. This timeout is running on the master side, and only effects the master

	request if the time limit is exceeded. It performs the function of a watchdog timer; to control the use of RTE resources.
Monitor	Similar to "slave program", but refers to HP-supplied programs which execute master requests for Remote File Access calls, Remote EXEC calls, etc. This type of program normally waits until a master request is received before running. There are several slave monitors, each handling a particular class of requests.
MPE	The Multi-Programming Executive operating system used on the HP 3000.
Neighbor	A remote system connected directly to the local system via a communication link, with no computers in between.
Network	A collection of two or more computers, connected together, either directly or indirectly via DS/1000 or DS/1000-IV.
Nodal Routing Vector (NRV)	A table containing the message routing information used by DS. Each node in the network uses its NRV to determine which interface to use when the incoming message is not for the local node.
Node	A computer in the Network, including its associated operating system and appropriate communication software, and which is, in turn, connected to other nodes by a communication link. The computer and operating system need not be the same in every node, but the communication software in each must be compatible with all the others.
Point-to-Point	Point-to-point provides a direct connection between two computers or a computer and a terminal. This direct connection consists of a communication line and some line interface circuitry on either end.
Port	A communications interface within the local system which is connected to a remote system. A port is addressed by its logical unit number.
Program Download	The process of sending a program's executable binary code to another computer for execution.
Program-to-Program Communication (PTOP)	The means by which data can be sent from one program to another.
Quiesce	To temporarily prevent a node from processing DS transactions.
Reboot	The process of starting the operating system "cold", i.e., storing the operating system code in memory and initializing it. Former contents of memory are lost.
Remote System	A system, consisting of a computer, operating system, and its peripherals, which is accessible from the local system via a communication link.
Remote Busy Retries	The number of retries which can occur when the recipient of a request rejects it, due to temporary lack of resources. See also "Remote Quiet Wait".

Remote Quiet Wait	The time delay before resubmitting a request after it has been rejected by the recipient (for temporary lack of resources). The purpose of the delay interval is to minimize unnecessary communication line transactions. See also "Remote-Busy Retries".
Remote Session	A session created in a Session Monitor node as a result of access from another node. These sessions are given special identifiers and are non-interactive (FMGR is not scheduled and the Configuration Table is not included in the Session Switch Table (SST)).
RTE	Hewlett-Packard Real Time Executive Operating System.
Slave Monitor	HP-supplied monitor program (see "Monitor").
Slave program	In program-to-program communication, the "slave program" responds to requests from its "master program". The term is derived from the fact that the "slave program" does not initiate action, but merely responds to requests.
Slave reply	Acknowledgement of successful or unsuccessful execution of a master request by the slave program; may also include data. Note that when the reply reaches the master side, it is called a "master reply".
Slave side	The node in which the slave program executes. The particular slave program referenced depends upon the master request being discussed, as there may be several slave programs and monitors.
Slave timeout	The maximum time, in seconds, allowed for execution of a request by slave programs. Includes only execution time, not transmission and store-and-forward time. See "Transaction Timeouts" subsection in this manual for further discussion. This timeout affects the slave-side only.
Store-and-Forward	A feature of DS/1000-IV software allowing messages destined for another node to be sent through intervening nodes. Each node receives and examines incoming messages, and if the message is not destined for the local node, the message is sent along, or forwarded, to the proper node. The Nodal Routing Vector is used to determine which communications interface to use for the forwarding operation. This feature is available only in RTE-to-RTE communication.
Transaction Control Block (TCB)	A block of memory allocated by the DS/1000-IV Communications Management software to keep track of each request and reply.
Timeout	A time limit imposed for a given task to be completed. See the "Timeouts" subsection of this manual for further discussion.
Write-retries	Attempts made by the system software to overcome temporary conditions which prevent successful transmission of data.
X.25	DSN/X.25 is a set of programs and drivers. When used in combination with the LAP-B interface card, DSN/X.25 connects an HP 1000 to a Public Packet Switching Network (PSN).

SPECIAL CHARACTERS

A

B

C

D

E

F

G

H

L

M

N

O

P

Q

R

S

T

U

V

W

X

** For HP Internal Reference Only **

Manufacturing Part Number

91750-90021

Customer Order Number

91750-90013

Printed in USA