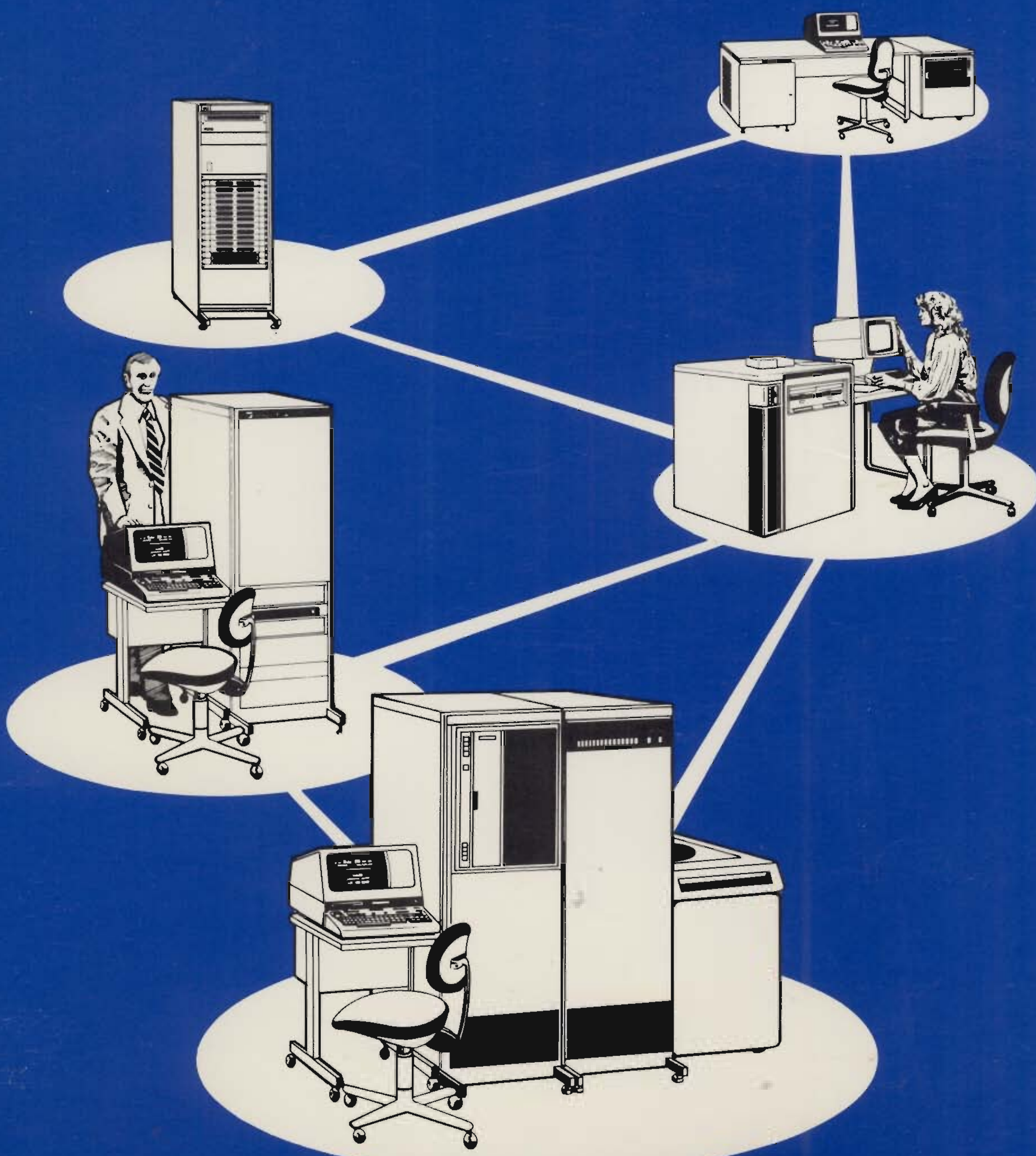
DS/1000-IV Network Manager's Manual

Volume I
Generation and Initialization Information



DS/1000-IV Network Manager's Manual

Volume I
Generation and Initialization Information

HEWLETT PACKARD
19420 Homestead Road, Cupertino, California 95014

Part No. 91750-90010
U1183

Printed in U.S.A. March 1982

PRINTING HISTORY

The Printing History below identifies the Edition of this Manual and any Updates that are included. Periodically, Update packages are distributed which contain replacement pages to be merged into the manual, including an updated copy of this Printing History page. Also, the update may contain write-in instructions.

Each reprinting of this manual will incorporate all past Updates, however, no new information will be added. Thus, the reprinted copy will be identical in content to prior printings of the same edition with its user-inserted update information. New editions of this manual will contain new information, as well as all Updates.

To determine what software manual edition and update is compatible with your current software revision code, refer to the appropriate Software Numbering Catalog, Software Product Catalog, or Diagnostic Configurator Manual.

Second Edition .... Mar 1982
Update 1 .... Jul 1982
Update 2 .... Jan 1983
Update 3 .... Jun 1983
Update 4 .... Nov 1983

Preface

Who needs to use this manual?

Volume I of the DS/1000-IV Network Manager's 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.

What does it cover?

This volume provides the information required to generate and initialize a DS/1000-IV network, which includes the software necessary to generate a network. Also included in this manual is information on the DS/1000-IV initialization program as well as an explanation of the DS/1000-IV modification program.

Volume II of the DS/1000-IV Network Manager's Manual covers the troubleshooting tools and techniques and the internal operation of DS/1000-IV. Also covered are topics such as the utilities available for network monitoring.

It is recommended that both volumes of the DS/1000-IV Network Manager's Manual be read once by all persons assigned any of the responsibilities of the Network Manager.

What does it assume?

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 along with attending the DS/1000-IV Level I and Level II training courses (or equivalent experience). It is also assumed that this person be familiar with the appropriate RTE operating system (RTE-IVB, RTE-IVE, RTE-MIII, RTE-L, RTE-XL, RTE-6/VM, RTE-A.1), including File Manager, FMP routines, and RTE generation procedures.

All references to RTE-L in this manual also apply to RTE-XL/RTE-A.1 unless stated otherwise. Likewise, all references to RTE-MIII also apply to RTE-IVE and all references to RTE-IVB also apply to RTE-6/VM unless stated otherwise.

If HP 3000 computers are to exist in the network, then familiarity with this system is also required.

How is it organized?

Volume I:

Chapter 1: Planning the initial system network. DS/1000-IV requirements are explained, along with outlining suggestions for optimizing the network performance and reliability.

Chapter 2: Generating the network. It discusses system generation, and provides specific generation answers and examples.

Chapter 3: Network initialization. Chapter 3 discusses first-time network initialization, as well as automatic initialization. Verification of the link is also covered.

Appendix A: Example generation files. Sample generation listings are included in this appendix to aid in generating DS/1000-IV.

Appendix B: DS/1000-IV Library Entry Points. This appendix includes the Library Entry Points listed alphabetically by library module.

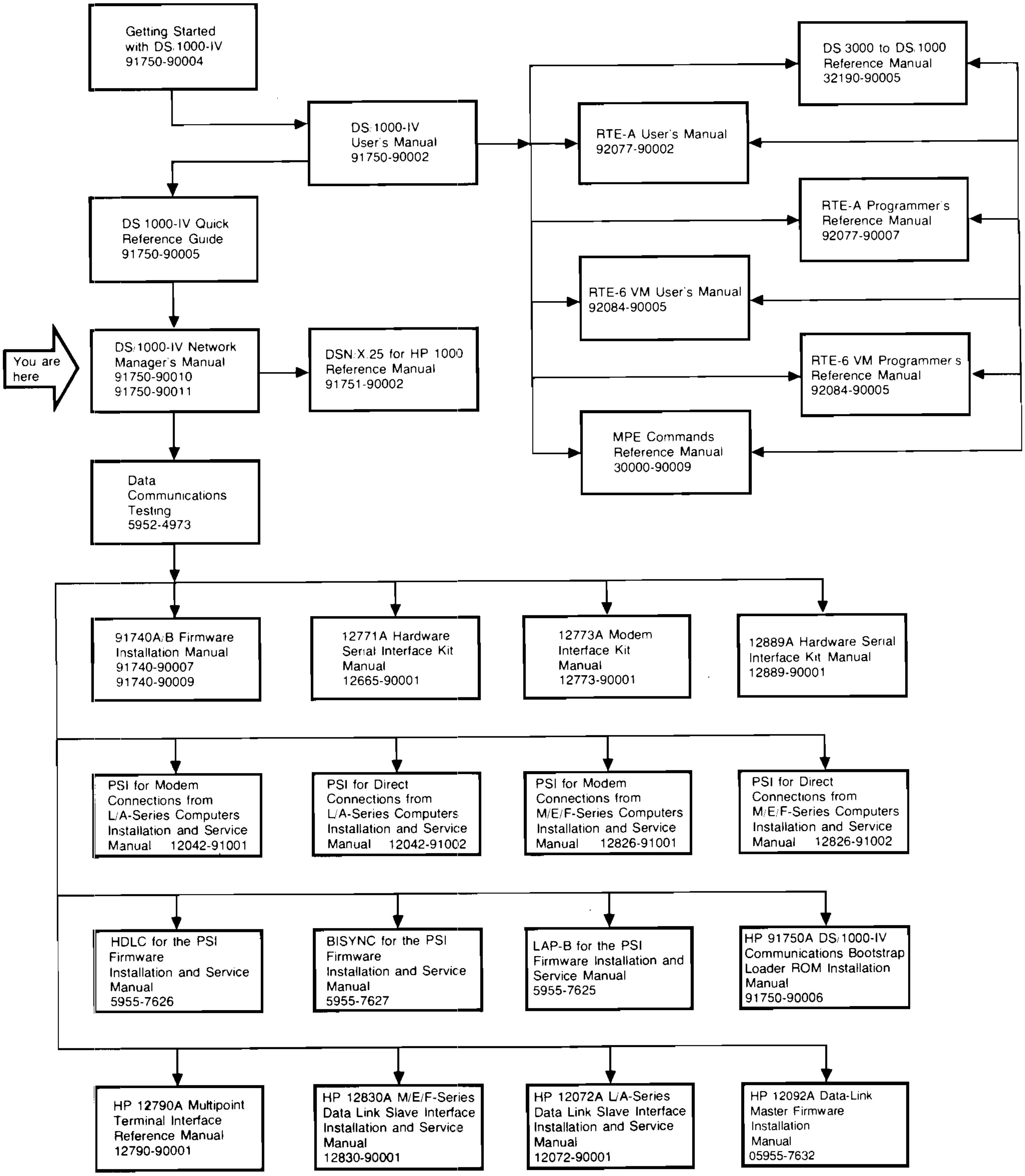
DS/1000-IV versus DS/1000

Throughout this manual, you will find the terms DS/1000 and DS/1000-IV used. Please note that these two terms represent two different products.

DS/1000 refers to the 91740 product which preceeds DS/1000-IV.

DS/1000-IV refers to the 91750 product which includes such utilities as: Automatic Rerouting, Message Accounting, Remote I/O Mapping, Remote Session, HDLC protocol, etc.

DOCUMENTATION MAP
DS/1000-IV



NOTE

All references to RTE-L apply to RTE-XL and RTE-A unless otherwise specified.

All references to RTE-A.1 apply to RTE-A.

DS/1000-IV cannot access non-FMGR files. Files used for CBL, DSVCP, Forced Cold Loads, REMAT, RFA, RMOTE and all other DS/1000-IV utilities must be FMGR files.

Table of Contents

Chapter 3 Network Initialization

Chapter 4 Multidrop DS/1000-IV

Appendix A Example Generation Answer Files

Appendix B DS/1000-IV Library Entry Points

List of Illustrations

List of Tables

Glossary

12771/12665

The HP 12771A product is an interface kit consisting of 2 HP 12665-60001 interface cards and an HP 12665-60002 cable with male connector and an HP 12665-60003 cable with female connector. The product number 12771 is sometimes used interchangeably with the interface part number 12665. In this manual 12771 will be used exclusively.

Architecture

As used in this manual, it simply refers to the organization of the network and/or its software.

Communications Bootstrap Loader (CBL)

A boot-loader residing in Read Only Memory (ROM) which is capable of transferring absolute binary file information from a remote node into memory of the local node. The Virtual Control Panel performs this function for the L-Series computer.

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 RTE-IVB 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. See the chapter on internals for more details.

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. See the chapter on internals for details.

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

Multi-Programming Executive used on the HP 3000.

Multipoint

A low cost connection for multiple devices on a single link. These devices may include terminals, desktop computers, HP 1000s, or data collection devices.

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". See the chapter on internals for details.

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. See the Chapter on internals as well as the appendix describing the internal table layouts.

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.

Chapter 1
Planning a Distributed System Network

Introduction

Many new features have been added to DS/1000-IV which will be described throughout this manual. These features are summarized below. Distributed Systems/1000-IV (DS/1000-IV), a network communications package for the HP 1000 computer family, incorporates all the advantages of HP's previous network products. Also, while completely compatible with its predecessor, DS/1000, many new features have been added to DS/1000-IV....

1) Microprocessor based serial communication cards which 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 1000s and BISYNC for 1000-3000 communication.

   Both links provide full modem support.

2) A single new driver, DVA66, communicates both with the BISYNC card, for traffic to the 3000, and to the HDLC card, for traffic to other 1000s.

3) Automatic Rerouting, which 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.

4) Message accounting; an end-to-end protocol which insures delivery of a message to the destination node before discarding the message in the source node.

5) Remote Session Monitor allows DS-1000-IV programs to access group and private as well as system cartridges on other session nodes in the network. Remote Session also enforces the capability checking associated with the session established for the remote user. Remote access to LUs 2 and 3 is now subject to the same restrictions as is the local session user.

6) Input and output message converters which provide upward compatibility allowing a mixture of DS/1000 and DS/1000-IV nodes in the same network.

7) Remote I/O mapping has been provided to make sharing resources transparent to many standard RTE programs.

   A mag tape, usually LU 8, can be shared by several nodes in the network by mapping LU 8, on nodes where the device does not exist, to LU 8 on the node where the device does exist.

8) Many new diagnostic aids are provided enabling the Network Manager to evaluate communication problems that arise.

9) Initialization of DS is now handled by two programs. One handles DS initialization called DINIT, the other handles modifications to DS parameters after initialization and is called DSMOD.

These and other new DS programs will be discussed in later chapters of this manual. There are many new capabilities and it will be necessary for the Network Manager with previous DS/1000 experience to review this manual carefully to be most efficient in upgrading to DS/1000-IV and to learn to use it most effectively.

The designer must fully understand the problem at hand before planning any network. 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. There are several excellent references in the Bibliography which provide useful techniques. These can help answer such questions as:

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 this information for all of its systems. A list of manuals, including part numbers, is shown in the Documentation Map in this manual. Pay particular attention to those chapters in each dealing with planning and system generation.

Described in the next few sections are the particular aspects of the Distributed System which require planning and careful consideration before the initial network is generated. Chapter II discusses the generation procedures.

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 on performance which a given configuration will have on each node in the system, including the effects of the communication line speeds you plan to use. Consult with your HP Sales Representative for this information.

```
**********************************************************************
*                                                                    *
*              1     2     3     4     5     6     7                 *
*              o-----o-----o-----o-----o-----o-----o                 *
*                                                                    *
*                           A.  String                               *
*                                                                    *
*      7               6                      2         7            *
*      o---------------o                       o       o             *
*     /                 \                       \     /              *
*    /                   \                       \   /               *
*  1/                     \5                      \1/                *
*  o                       o               3 o-----o-----o 6         *
*   \                     /                       / \                *
*    \                   /                       /   \               *
*     \                 /                       /     \              *
*      o-------o-------o                       o       o             *
*      2       3       4                      4         5            *
*                                                                    *
*          B.  Ring                            C.  Star              *
*                                                                    *
*              7                           7               6         *
*              o                           o---------------o         *
*             / \                         /|\             /|\        *
*            /   \                       / | \           / | \       *
*           /     \                     /  |  \         /  |  \      *
*          /       \                 1 o-----------------------o 5   *
*       5 o         o 6                 \  |    \     /    |  /      *
*        / \       / \                   \ |     \   /     | /       *
*       /   \     /   \                   \|      \ /      |/        *
*      o     o   o     o                   o-------o-------o         *
*      1     2   3     4                   2       3       4         *
*                                                                    *
*      D.  Hierarchical              E.  Ring With Alternate Paths   *
*                                                                    *
**********************************************************************
```

Figure 1-1. Network Topologies

```
**********************************************************************
*                                                                    *
*          2       7                             7                   *
*          o-------o                             o                   *
*         / \     / \                           / \                  *
*        /   \   /   \                         /   \                 *
*       /     \1/     \                       /     \                *
*    3 o-------o-------o 6                   /       \               *
*       \     / \     /                   5 o---------o 6            *
*        \   /   \   /                     / \       / \             *
*         \ /     \ /                     /   \     /   \            *
*          o-------o                     o-----o---o-----o           *
*          4       5                     1     2   3     4           *
*                                                                    *
*  F.  Star With Alternate Paths      G.  Hierarchical With Alternate *
*                                               Paths                *
*                                                                    *
*                         1         2         3                      *
*                         o---------o---------o                      *
*                         |         |                                *
*                         |         |                                *
*                         |         |                                *
*                         o---------o---------o 6                    *
*                         4         5\       /                       *
*                                     \     /                        *
*                                      \   /                         *
*                                       \ /                          *
*                                        o                           *
*                                        7                           *
*                                                                    *
*                             H.  Mixture                            *
*                                                                    *
**********************************************************************
```

Figure 1-1. Network Topologies (continued)

String

The "string" topology requires one less communication link than there are computers in the network, and hence is 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 1-1 A, 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 Fig. 1-1B). 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 data bases 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 new rerouting software generated into the system (discussed in Chapter 2) a link failure will automatically cause routing tables to be updated to reflect a new route to the destination if one exists.

Star

The "star" 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 for this purpose. It might also be used where a large data base 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 (Fig. 1-1D) is sometimes used with supervisory-control applications, where large data bases 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 data-base applications. For example, in Figure 1-1D, 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 least vulnerable to failures of any except 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, etc.). Figures 1-1E thru G show the ring, star and hierarchical structures with the addition of redundant communications 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 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 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 chapter on network initialization 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 1-1 H.

Topology Considerations With A Mixed Network

As was mentioned before, DS/1000-IV is fully compatible with DS/1000. However the new features are not available on DS/1000 nodes, and, in particular with rerouting, in a mixed network there are certain situations to avoid. The following diagram will be used to discuss compatibilities and other considerations, as well as rerouting features.

```
      A-----B
     /|\   /|\
    / | \ / | \
   E  |  H  |  F
    \ | / \ | /
     \|/   \|/
      C-----D
```

This is a reasonably complex network with a lot of redundancy. If this network is made up of all DS/1000-IV nodes then it has full rerouting capabilities. When any link anywhere in the network fails there are several alternate routes available. For example, for B to get to H, paths BH, BAH, BACH, BACDH, BDH, etc. exist. With these alternate routing software all but one of these routes can fail and DS/1000-IV will automatically reroute to recover from the failure or failures and B can still communicate with H. However if node B becomes an "island", for example if, paths BA, BH, BD, and BF all go down, no amount of rerouting in node B will allow node B to communicate with node H.

If there are DS/1000 nodes in the network they can degrade some of the rerouting capabilities. This is because DS/1000 nodes do not have the rerouting capabilities and only "know" of one route to use to get information to any other node in the network.

Suppose A is an DS/1000 node and A uses link AB to send a message to B. If link AB goes down A can no longer successfully send data to B.

If B, a DS/1000-IV node, wants to send messages to A and determines that link AB has failed, B can reroute through node H. Unfortunately A only "knows" of one route to send messages to B and that is the failed link AB.

When B reroutes and uses H to store and forward messages to A, A (the DS/1000 node) still attempts to use the failed link AB to send replies to B. The replies fail to get to B and B times out and fails again to communicate with A.

For this reason we recommend that you arrange your network so that DS/1000 nodes will not preclude the use of rerouting capabilities for the rest of the DS/1000-IV nodes in the network.

It is much more desirable to arrange the network so DS/1000 nodes are at the outer ends as are E and F. This way failure of the DS/1000 node or link does not affect rerouting capabilities of the rest of the DS/1000-IV node network.

When upgrading to DS/1000-IV the choice of where to start upgrades should be influenced by the above considerations.

Line Speeds

For information regarding supported line speeds see the following interface manuals.

Interface	Type	Link Type	Manual Part Number
HP 12007	Modem	AL - MEFAL	5955-7626
HP 12044	Direct Connect	AL - MEFAL	5955-7626
HP 12073	Modem	AL - 3000 (SSLC/INP)	5955-7627
HP 12082	Direct Connect	AL - 3000 (INP)	5955-7627
HP 12771	Hardwired	MEF - MEF	12665-90001
HP 12773	Modem	MEF - MEF	12773-90001
HP 12793	Modem	MEF - 3000 (SSLC/INP)	5955-7627
HP 12794	Modem	MEF - MEFAL	5955-7626
HP 12825	Direct Connect	MEF - MEFAL	5955-7626
HP 12834	Direct Connect	MEF - 3000 (INP)	5955-7627
HP 12889	Hardwired	MEF - 3000 (HSI)	12889-90001

Determining the Best Architecture

Once you have determined where you will need to place nodes, you must determine which type of system to place at each. Consult with your HP Sales Representative for assistance.

Addressing

Any HP 1000 node can communicate with any other HP 1000 node if a direct or indirect path exists between them via communication links. If one or more HP 3000 nodes exist in the network, they can communicate only with their neighboring RTEs and vice-versa. Via Remote I/O Mapping features of DS/1000-IV any node in the network may access the HP 3000 using the program RMOTE.

For example, in Figure 1-1 D, 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.

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 Appendix C). When Session is present in any node in the 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 1-1 A, 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 1-1 B, 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 via Automatic Rerouting as a result of link failures, or via the DSMOD "CN" command discussed in the network initialization chapter.

Each DS/1000 and DS/1000-IV 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.

You should assign globally unique node numbers when the interconnection of two or more networks is a possibility. This prevents network down time that would be necessary to reconfigure network node identifiers.

A specific node may be addressed by using the node's number in the node address parameter.

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. (This 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.

Program Transportability

The three ways of addressing nodes provide for three different kinds of "program transportability". A program is defined to be "transportable" if it can be run in two different nodes without changes in the source code. One form of transportability is accomplished by using positive node numbers for nodal address parameters. For example, in Fig. 1-1 A, suppose a program requests file information using 2 as the nodal address. This program could run in nodes 1, 2, 3, 4, 5, 6, or 7 without modification. In this form, a program can be moved to any node, but the requests it makes will always be executed in the same node.

The second form of transportability allows the functions performed to move with the program. This is accomplished by using "neighbor-addresses" (negative of the communications line LU) as the node number parameter. Of course, to use this feature, each node must have communications lines with the same LU numbers. It is also possible to run identical copies of a program in each node, subject to memory limitations, of course. Suppose, for example, a program was written for a network which looks like Fig. 1-1D (the "hierarchical" configuration). The program gathers data, using data acquisition equipment in the local node (each node must have the same LU's assigned to this equipment), reduces it, and prints a report, which is sent to the central by using the negative of the communication line LU connected to the central (node 5 is central to nodes 1 and 2, node 6 is central to nodes 3 and 4). In other words, it is possible to utilize symmetrical relationships in the network to reduce programming effort.

The third form of transportability moves the function performed into the same node as the master program. This feature can be utilized in the early debugging stages of a project, the master and slave programs can be developed together in the same computer, facilitating debugging. Communication line activity is eliminated, speeding up the debugging process.

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; the Bibliography contains references which describe methods to minimize their impact.

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 chapter on troubleshooting, but 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 on-line. 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" chapter of this manual will help to 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

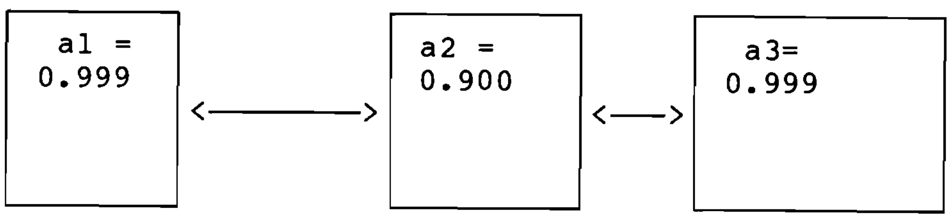
MTTR includes diagnosing the problem and replacing the failed part, module, or subsystem.

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 on-line, 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 sybsystems, 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 1

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: these 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:

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

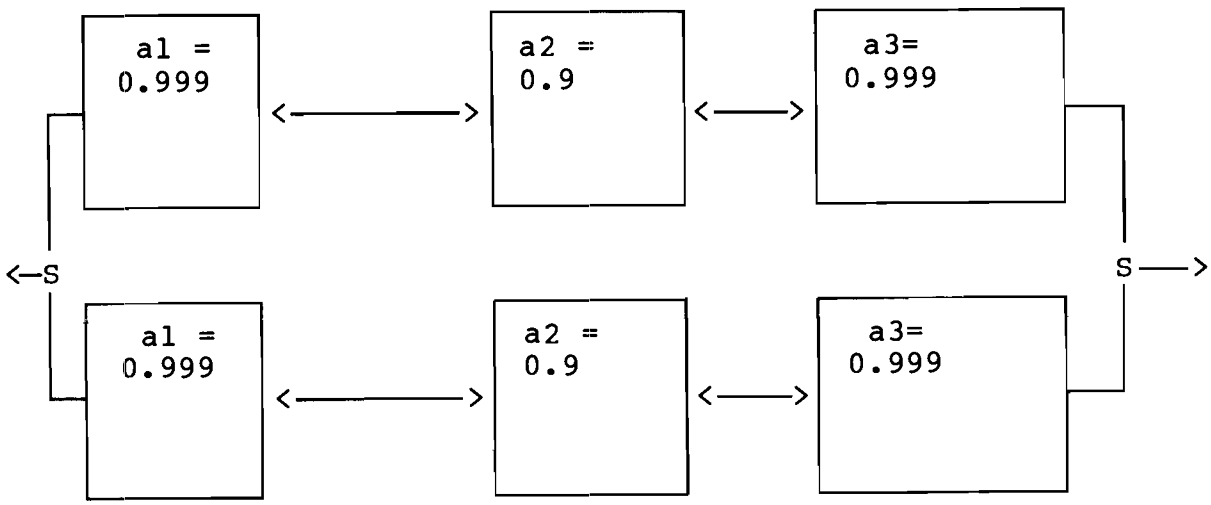
In other words, this subsystem would be available a little less that 90 percent of the time. Note that the overall availability of such a series-connected system is worse than the worst component (a2).

Example 2

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 x a2 x 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 3

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 = availability of one of the two tandem subsystems (a1 x a2 x a3),
a5 = 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 4

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 on-line, 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 on-line would include searching all other nodes for update transactions. This method would guarantee that as long as there was one node on-line, 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".

The interested reader is referred to Chapter 6 of "Design of Real Time Systems" by James Martin, for more information on reliability calculations.

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 specs (temperature, humidity, vibration, etc.); 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 specs. 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.

Message Accounting

What Is 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 opportunity 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.

Message Accounting is not used on the 1000-3000 link.

Why 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 data base 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.

What Price Do I Pay for Message Accounting?

Using the MA software means executing more instructions for each message processed by the node.

MA appends approximately 420 (octal) words to each DS master program and each DS slave monitor.

MA appends approximately 2000 (octal) words to the General Request Reply Processor (GRPM).

Further discussion on what this extra code does is found in the chapter describing DS internals.

Rerouting

What Is Rerouting?

The new Rerouting software in DS/1000-IV provides for automatic communication path switching as a result of a link or node failure. 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.

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. Details on exactly how rerouting works can be found in the chapter describing DS internals.

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 NRV.

When the restored link is a DVA65 link the the DSMOD /L command must be used to enable the link then the CN command must be used to manually change the 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 2 computers in your network with one link between them, certainly 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

What Is Remote Session Monitor?

With the advent of DS/1000-IV, DS programs no longer execute outside the session environment without using special access codes. Remote Session Monitor takes care of establishing a session under which incoming requests are processed.

Which 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.

If all nodes in the network are running under Multi Terminal Monitor (MTM) or simply RTE, then RSM is not needed. If one node runs under Session and all others run under MTM, RSM is only needed in the node running under Session. You need RSM and OPERM in all session nodes.

Non-session nodes wishing to access a session node must have the appropriate Remote Session Libraries included in the generation as described in Chapter 2.

What Does It Do For Me?

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 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 3-page partition. The Operator Request Monitor is fully swappable and occupies a 3-page partition. Since OPERM provides many services in addition to those related to remote session, you may already plan to use it.

Approximately 1000 (octal) words are appended to any DS program when a session node is anywhere in the network.

Remote I/O Mapping

What Is Remote I/O Mapping?

Remote I/O Mapping provides the capability to map or "redirect" output for logical units existing on one node in the network to an logical unit on another 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.

For instance, FMGR can be made to input from and output to, terminals on remote nodes. Remote I/O Mapping also increases the ability to share peripherals in the network. A full discussion of this capability is found in the Remote I/O Mapping Chapter of this 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 could 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. Special sections in the Generation Chapter and the Remote I/O Mapping Chapters of this manual cover this area in detail.

More About Mixing DS/1000 and DS/1000-IV

In DS/1000-IV a large effort has been expended to make upgrading as transparent as possible.

Our goal is that a person should be able to upgrade one node at a time in an existing network or, when adding nodes to a network, add them as DS/1000-IV nodes.

To make this possible, message format converters have been provided, in the DS/1000-IV nodes only, to convert between old and new formats. The Nodal Routing Vector has been expanded to include a field to indicate the DS software upgrade level of all nodes in the net.

You will not have all the capabilities of rerouting and message accounting between every node in the network when your network is mixed but you will also not have the inconvenience of trying to upgrade all nodes in your network simultaneously.

Additional information will appear in the chapter on generations and the chapter on internals.

Using DSN/X.25

DSN/X.25 is a set of programs and drivers. When used with the LAB-B Interface Card, DSN/X.25 connects an HP 1000 system to a Public Packet Switching Network (PSN). DSN/X.25 allows connection via short-haul modem of an HP 1000 system to another HP or non-HP computer using the same X.25 protocol. It also supports connection of asynchronous HP Terminals to an HP 1000 system through a PSN. DSN/X.25 can be used to link an HP 1000 to an HP 3000 using the X.25 interface protocol.

For more information on DSN/X.25, refer to the DSN/X.25 for HP 1000 Computers manuals shown below.

91751-90001 DSN/X.25 for HP 1000 Software Numbering Catalog
91751-90002 DSN/X.25 for HP 1000 Reference Manual
91751-90003 DSN/X.25 for HP 1000 Advanced Design Guide

Chapter 2
Generating a DS/1000-IV Network

This chapter is designed to help you prepare your generation answer file and choose the correct DS software for the generation of an RTE system with DS/1000-IV. Special mention is made of changes from DS/1000. This chapter should be used as a supplement to the appropriate RTE generator manual.

Before generating your system, closely examine the generation listings found in the appendix portion of this manual. Make sure you understand the statements relevant to the DS portion of your generation.

All hardware should be installed and checked using the diagnostics described in the hardware documentation (refer to the documentation map) before the network is used. In DS/1000-IV no special firmware (microcode) is required unless HP 12771 or HP 12773 interface cards are used. In this case DVA65 is required along with its required 91740 microcode installed in both CPUs.

To interface a DS/1000 node to a DS/1000-IV node the DVA65 and the 91740 firmware used in the DS/1000 product (DVA65 microcode) must be properly installed in both the DS/1000-IV and the DS/1000 nodes as described in the appropriate installation manuals. Be sure to use the 91750 version of DVA65 in the DS/1000-IV node.

You will probably find it much easier to use the system at first if all nodes are generated identically, or as much so as possible. Becoming accustomed to the network will be much easier for all users if the capabilities of each node are the same, and generating the RTE systems for each node will be simpler. You can "streamline" the system later, as you determine your needs in terms of response time and memory space. You will find "streamlining" guidelines throughout this section.

NOTE

> You must record the generation listing, either on paper, mini-cartridge, or disc. Should any problems arise in the future, HP field support will require this information.

Assigning Select Code to Communication Interfaces

The select codes you assign to communication interfaces are affected by whether or not the driver is "privileged". Table 2-1 shows the DS/1000-IV communication drivers.

Table 2-1. DS/1000-IV Communication Interfaces

RTE INTERFACE	LINK TYPE	DRIVER	PRIVILEGED
12007	modem HDLC	ID.66	no
12044	direct connect HDLC	ID.66	no
12072	hardwire (Multidrop slave)	IDS64	no
12073	modem BISYNC	ID.66	no
12082	direct connect BISYNC	ID.66	no
12771	hardwire	DVA65	no
12773	modem	DVA65	yes
12790	hardwire/modem (Multidrop)	DVR07	no
12793	modem BISYNC	DVA66	no
12794	modem HDLC	DVA66	no
12825	direct connect HDLC	DVA66	no
12830	hardwire (Multidrop slave)	DVS64	no
12834	direct connect BISYNC	DVA66	no
12889	hardwire	DVG67	no

Note that, even though the same driver (DVA65) is used for modem (HP 12773) and hardwire (HP 12771) communication between RTE systems, it is recommended that hardwire links be installed in non-privileged I/O slots (i.e., in select codes higher in number than the privileged I/O board, if present), and modem interfaces be installed in privileged select codes. DVA65 has a microcoded portion which allows it to be used in either privileged or non-privileged mode.

DVA66 is not a privileged driver! The HDLD and BISYNC interface cards used with DS/1000-IV utilize 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. These new interface cards should not be inserted below the privileged fence.

Remember the only interface card used by DS/1000-IV that must be privileged is the HP 12773 card (DVA65 modem).

All HP 12773 (modem) interface cards for the privileged driver (DVA65) should be installed in the lowest-numbered I/O slots, starting with 10 (octal). Other interfaces with privileged drivers may be installed next (consult the individual driver manuals to determine whether an interface should be privileged). This order can be reversed, but DS/1000-IV line throughput may be degraded since every subsystem which uses a privileged driver requests highest priority. After the last privileged interface, install the privileged-I/O board (HP 12620A); then, following the guidelines in the appropriate RTE generation manual, install the remaining interface cards.

Simple RTE Generation

This section is provided as a guide for those who are unfamilar with RTE generation procedures. Detailed information can be found in the RTE generation manuals. Experienced users may skip to Section 2.3.

Once the equipment has been installed and the hardware diagnostics run, follow the procedures appropriate to your RTE to "boot up" the factory-generated "primary" RTE system.

The test procedures below are meant to be simple and quick to use. They cannot test for all possible generation errors, but they do exercise the software and equipment sufficiently well to test for major hardware failures or generation errors. You may wish to supplement these procedures with some of your own.

Test the factory system using operator commands. For example, enter TI several times (in RTE-L, the command is TM); 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. (On RTE-IVB, you will not even get the system prompt back unless the TBG is ticking. In A/L-Series the TBG is not on a separate card.)

Run the File Manager, list a directory and some of the source files. Create some simple source files using EDITR, preferably a simple FORTRAN program, 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.

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.

Unless you are already quite familiar with RTE generations, we suggest you exclude all non-standard subsystems, including DS/1000-IV, in this first generation because most subsystems require additional generation procedures and are a possible source of confusion for the person unacquainted with the generation of RTE systems. Your first attempt at RTE system generation should be as simple as possible.

Run the RTE Generator program as described in its manual. If there are errors, correct them and re-run the Generator. As a check, you may wish 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). Compare this to what you intended, correct any mistakes, and if necessary, re-run the Generator.

When you are satisfied that the generation is correct,

BACK UP YOUR DISC!!

This is very important. Do it before going any further. You must always be sure you can get back to a working RTE should a mistake have been made and not caught. The disc shipped with your system contains the software you will need to generate all systems in the future, and must not be overwritten by any RTE generation, even an error-free one. Hewlett-Packard provides utility routines for disc backup, verification, and restoration. Consult the RTE Utility Programs manual for disc backup directions.

If you back up your disc by copying it to another disc, be sure that you do not overwrite any part of the factory-generated disc.

There is an alternative to disc backup, which is useful only if your disc drive has a removable platter. Initialize the fixed platter using the FMGR and copy your newly-generated system file to that platter. Then, at the point in the switchover procedure where you are directed to place the proper disc cartridge in the disc drive, remove the factory-generated disc cartridge, and place another one in the drive, waiting for it to come up to speed before proceeding. The switchover will then copy to the new disc, without destroying data on the factory cartridge.

Another technique, which also requires a removable disc surface, is to modify the RTE generation answer file so the system is generated to run on the fixed platter. Then, the switchover process can be used to copy the generated system to the fixed platter.

When you are sure your factory-generated disc has been suitably protected and cannot be destroyed by switching over, follow the switchover procedures described in the RTE generation manual, and then boot up the system.

Set the factory-generated cartridge aside in a safe, clean place, to be used only when generating systems. Place another disc pack into the drive, which can be used for storing data.

When the system is booted up, test it as you did the factory system. It should behave as the previous one did. If you notice anything peculiar, note the specific symptoms, and continue testing until you are satisfied that it has been well tested.

If you noted any errors, consult the RTE generation manual examples and your own factory-generation listing. Pay particular attention to those questions you answered differently than shown in the factory examples. When you've identified 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.

Now that you have successfully generated an RTE system, and are familiar with the use of the Generator and SWTCH, make a copy of your generation answer file (so you can get back to it if you need to) and then modify the original to include the other HP subsystems you want.

You may, if you are unfamiliar with the generation procedures required by these other subsystems, wish to exclude DS/1000-IV from this system generation, in order to concentrate on generating the RTE system correctly for the other subsystems. Consult the manuals for the generation requirements of each subsystem.

Generate another RTE using this answer file and the procedures outlined in the first part of this section. Your new system may overlay your first system, but DO NOT ALLOW YOUR FACTORY-GENERATED DISC TO BE OVERLAID! Boot the new system up, and test it using the procedures described previously and the examples in the subsystem's documentation manuals. When satisfied that the subsystems work, make a copy of your generation answer file, so you can get back to it if necessary.

You are now ready to generate a DS/1000-IV system.

NOTE: (ACCTS)

When DS/1000-IV is generated into a Session System and ACCTS is loaded after the generation, it must be loaded large background with access to SSGA (OP,LBSS).

DS/1000-IV Subsystem RTE Generation Planning

Responses to RTE Generator questions which are governed in any way by DS/1000-IV are described below, in the order the questions are asked by the Generator. You should consult the appropriate RTE Generator Manual for explanation of other questions it asks.

TBG CHNL?

The Time Base Generator must be in a higher-numbered (lower priority) I/O slot than the privileged I/O board (if used). It is recommended that the TBG be in the next slot after the privileged I/O board (HP 12620A).

Priv. Int. Card ADDR?

Supply the select code of the HP 12620A privileged I/O board, or 0 if you are not generating a privileged system. The privileged I/O board is required if any HP 12773 (DVA65 modem) interfaces exist in the node.

Mem. Res. Access Table Area II? (RTE-IVB Only)

You must respond "YES" if RTRY, QUEUE, QCLM, GRPM or any other DS/1000-IV module will be generated as memory resident programs in your system (default case).

Program Input Phase

Consult the DS/1000-IV Software Numbering Catalog for the relocatable file names of the various modules discussed here.

In the following discussion, reference is sometimes made to standard software modules supplied with RTE systems, and replacement versions of the same name, supplied with DS/1000-IV systems. The DS/1000-IV versions offer features useful in a Distributed System environment. You can easily tell the versions apart by the part number. The DS/1000-IV version will have a 91750-series part number.

DS/1000-IV software contains some modules which must be used, some which may be used only if you require the services they perform and some modules which require you to choose one of several versions, depending upon your requirements (or you may exclude modules in this category entirely, if you don't need them). You specify your choices to the system in the Program Input Phase. Certain choices are governed by the operating system you generate, some by whether you have a link to an HP 3000, and/or one or more links to RTE nodes, whether you have a file system at all, and if so, whether it exists on hard disc or flexible disc.

You are encouraged to include as many software modules as possible when generating your first systems, as new users will want to try all the features they read about in the DS/1000-IV User's Manual. Each monitor serves a specific purpose and all are required if all the capabilities described in the reference manual are to be used. Later, when the users have become familiar with the system, you can eliminate modules you do not need in order to save memory space.

DS/1000/IV Libraries

This section will help you determine which DS/1000-IV libraries you need to generate as system libraries.

Choose one of the following libraries:

REL,$DSMX6	(RTE-6/VM generation format) Contains DS subroutines used in RTE-6/VM.
REL,$DSMX4	(RTE-IVB/IVE generation format) Contains DS subroutines used in RTE-IVB and RTE-IVE.
LIB,$DSLCL	(RTE-L generation format) Contains DS subroutines used in RTE-L.
LIB,$DSLXL	(RTE-XL generation format) Contains DS subroutines used in RTE-XL.
LIB,$DSAL	(RTE-A generation format) Contains DS subroutines used in RTE-A.
REL $DSML1	(RTE-MIII generation format) Contains DS subroutines used in RTE-MIII. If the RTE-MIII has no local file system, also REL $DSML2.

NOTE:
All of the following library entries are in RTE-6/VM gen format. That is REL,$XXXXX as opposed to the A/L-Series format of LIB,$XXXXX and MIII format of REL $XXXXX. Special considerations for MIII and A/L-series generations are covered later in this chapter.

WHAT OTHER NODES DO YOU HAVE?

Choose three of the following libraries:

REL,$DSLB1	Required in all DS/1000-IV nodes
REL,$DSLB2	Required if other 1000s in the network
or	
REL,$D3KL2	Required if no other 1000s in the network
REL,$DSLB3	Required if node has no links to 3000s
or	
REL,$D3KLB	Required if node has links to 3000s

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

REL,$D3KRB	for a 304 word communication line buffer.
or	
REL,$D3KBB	for a 1072 word communication line buffer.
or	
REL,$D3KMB	for a 4096 word communication line buffer.

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.

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

If you use X.25 links to communicate with an HP 3000:

REL,%D$X25

NOTE: This subroutine calls the X.25/1000 subroutine ALTAD, which will be an unresolved external reference at generation time. ALTAD is included in $X25LB which is provided in the 91751A DSN/X.25 for HP 1000. $X25LB contains extended records which are not recognized by the generator. When loading any program which accesses an HP 3000 via X.25/1000, $X25LB and $PLIB must be explicitly specified as libraries to satisfy this external reference. On RTE-A systems, %XINXL must also be searched. On RTE-6/VM, you must relocate %XINEF.

If you do not use X.25 links to communicate with an HP 3000:

REL,%D$N25

DO YOU HAVE SESSION MONITOR?

Choose one of the following:

REL,$DSSM	On nodes with Session
or	
REL,$DSLSM	On nodes without Session but Session exists elsewhere in the network.
REL,$DSNSM	When Session does not exist anywhere in the network.

DO YOU WANT MESSAGE ACCOUNTING? (1000-1000 only)

All nodes can use either of the MA Libraries. Choose one of the following:

REL,$DSMA	If you want message accounting on this node.
or	
REL,$DSNMA	If you don't want message accounting on this node.

DO YOU WANT REROUTING? (1000-1000 only)

All nodes can use either of the rerouting libraries. Choose one of the following:

REL,$DSRR	If you want Rerouting on this node.
or	
REL,$DSNRR	If you don't want Rerouting on this node.

DO YOU NEED REMOTE DATABASE ACCESS? (1000-1000 only)

If you need remote database access or have databases at your node that will be accessed remotely, relocate the following library:

REL,$DSDB

Choosing Software Modules

MEMORY RESIDENT PROGRAM CONSIDERATIONS (RTE-6/VM, IVB, IVE AND MIII ONLY):

You may wish to improve system performance by changing the type of some monitors to be memory-resident. All DS monitors require access to SSGA (Labeled System Common on L- and A-Series machines).

In all nodes, QUEUE and QCLM should be memory resident. In nodes with links to other RTE nodes, you should generate GRPM and RTRY as memory resident. In nodes with an HSI (hardwire) link to a 3000, QUEZ should be made memory resident. The PSI version of QUEZ and both the HSI and PSI version of QUEX can be made memory resident for faster response, but appended communications buffers can make these programs quite large. If you want to include both HSI and PSI links to an HP 3000 in your system (to be used at separate times) do not make either QUEZ or QUEX memory resident. In this case, you will want to RP the correct versions before initializing the system with DINIT. An example of this procedure is shown in the section on "USING HSI AND PSI HP 3000 LINKS" in Chapter 3.

REQUIRED DS/1000-IV MODULE CONSIDERATIONS:

DINIT The DS/1000-IV module which initializes the network, and which performs utility functions described in the Network Initialization Chapter. 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 Chapter.) Either version may be generated into the system. You may also replace one with the other on-line, but one is required in order to initialize a node for network communications.

DSMOD Provides a means for altering DS 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, change the non-session password, quiesce the node, schedule additional monitors, adjust timing, change the default session user name, and change the Nodal Routing Vector.

WARNING: DINIT and DSMOD have entry points referenced by appended subroutines. 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. It is recommended that UPLIN be made memory resident.

QCLM Communications Error Logger--Prints most errors on behalf of system modules.

QUEUE The DS/1000-IV program scheduled by DVA66 and DVA65 to allocate a class buffer in SAM to receive incoming messages.

RES Contains SSGA entry points (list heads, class numbers, etc.). For systems with Session use %RESSM; for RTE-L use %RESL; for RTE-XL use %RESXL; for RTE-A use %RESA; for all others use %RESM.

DS/1000-IV I/F DRIVERS:

Drivers for the RTE-RTE and RTE-MPE links must be selected, according to the type of communication interface cards being used. Choose at least one of the following:

DDA66 is used with the HP 12092A Data Link Master Interface Card in A-Series.

DVA65 is used with the HP 12771 (hardwired)/HP 12773 (modem) card. This is the DS/1000-IV version of the DS/1000 driver of the same name and must be used when upgrading from DS/1000. DS/1000 firmware must be installed in any CPU when DVA65 is used.

DVA66 is used with all PSI (BISYNC and HDLC) interface cards on the M/E/F-Series.

DVG67 is used with the HP 12889 card for hardwired BISYNC link to the HP 3000.

ID.66 is used with all PSI (BISYNC and HDLC) interface cards on the A/L-Series.

DVR07 is used with the HP 12790A (Data Link master) in RTE-IVB, -IVE, and -6/VM.

DVS64 is used with the HP 12830A (Data Link slave) in RTE-IVB, -IVE, and -6/VM.

IDS64 is used with the HP 12072A (Data Link slave) in A/L-Series.

IDS00 is used with the HP 12092A Data Link Master Interface Card in A-Series.

There are a number of software modules which may optionally be included in any RTE generation, depending upon the network and operating system used and capabilities desired. Select those modules you need from the description below, and include them in the Program Input Phase.

DS/1000-IV MODULES FOR RTE-RTE COMMUNICATION:

If other RTEs are connected, always include the following modules:

GRPM — RTE-RTE request/reply processor.

RTRY — Communications error retry module. Used mainly in conjunction with DVA65 for communication error retries. With the HDLC cards (HP 12007, HP 12044, HP 12794, HP 12825) retries are performed on the card. Only when a "remote busy" error occurs on transmission over an HDLC link will RTRY be used. It is initially scheduled by DINIT if RTE-RTE links exist, and you will get a warning if it is not present in the system.

Other DS modules that may be necessary are:

APLDR — Absolute program loader. Transfers programs prepared by the appropriate Loader into a remote system for execution. For RTE-MIII use %3APLD; for memory-based RTE-XL and A.1 use %APLDL; for memory-based RTE-L use %APLDX. RPRTL is used in conjunction with %APLDX to download programs into a memory-based RTE-L. When loading APLDR in memory-based RTE-A systems, you must search $DSLDR before searching $CMDLB. Do not search $DSLDR in disc-based systems.

NOTE: APLDR processes REMAT "LO" commands and FLOAD utility calls. In L/A-Series Systems, APLDR also processes the REMAT "IO" and "PL" commands. If you generate in %LOAD and %SWAP or %MEMRY, you can not use the REMAT "LO" command or the FLOAD utility.

COMND — The DS version of the A/L-Series COMND module which works in conjunction with OPERM and APLDR to process system commands. Recommended for use in memory-based L- and XL-nodes.

DLIST — Remote Directory List. %DLIS1 for RTE-IVB/IVE/6. %DLIS2 for all others.

DSINF — DS Information Utility. Prints out table information maintained in SAM and SSGA as well as the class numbers in use by DS, Remote Session, Message Accounting and Rerouting parameters. Use %DSINF in nodes with RTE-RTE and/or RTE-MPE links; %DSIN2 in nodes with only a link to an HP 3000; and %DSINL in the A/L-Series.

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

DVV00 — Remote I/O Mapping driver. Use %XDV00 with RTE-L/XL, %ADV00 with RTE-A and %MDV00 with all others.

EDITR — The DS version of EDITR (%EDITD for RTE-IVB, %EDI6D for RTE-6/VM) may be used in place of the standard version supplied with RTE-IVB systems. It contains all the features of the standard EDITR and also handles remote file editing. It is useful only in RTE-IVB nodes connected to at least one other disc based RTE which has a file system.

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 1000 or 3000 nodes.

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 nodes to run a program from REMAT or to execute the LOad and PL(Program List) commands on memory based nodes.

FCL7 — Data Link Force Cold Load program. Runs at the node where the data link master resides.

INCNV — Converts incoming messages from DS/1000 format to DS/1000-IV format. The message converters provide backward compatibility with the older DS/1000 product.

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

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

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

$MWB — Needed by APLDR in RTE-XL to move words across maps. Use $MWB1 with RTE-A. Must reside in system area.

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

OPERM — Remote RTE operator command capability. Use %OPERL for the A/L-Series (you must search $CMDLB when loading on A/L systems); %OPERM for all others. OPERM is required for all session systems.

OTCNV — Converts outgoing messages from DS/1000-IV format to DS/1000 format. The message converters provide backward compatibility with the older DS/1000 product.

PLOG — Provides a trace capability for RTE-RTE links. Writes incoming messages to a file for later processing by TLOG. This program must be loaded with the DC (Don't copy) option.

PROGL — Slave monitor for remote down-load from Communication Bootstrap Loader (CBL). Can simultaneously handle requests from up to 20 nodes at the same time. %PROGL for neighbor download; %PROGZ for store and forward download. User supplied subroutines enable store and forward and/or LU to file conversion capabilities.

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.

RD.TB — Table space used by the Remote Database Access. Maps a program from a remote node to a local copy of RDBAP.

RDBAM — Remote Database Access Monitor. Provides routing for incoming Remote Database requests. (1000-1000 only)

RDBAP — Provides processing of database access requests routed to it by RDBAM. When each new user comes into the node with a new database open request, a new copy of RDBAP is scheduled to handle all database calls for the particular user. RDBAM matches up the requests with the correct copy of RDBAP and forwards the request for processing. (1000-1000 only). Do not generate in RDBAP; load it on-line. See "Remote Database Access" in this chapter for more information.

REDIT — This module is used only in RTE-MIII nodes. It allows an operator to edit remote files from an RTE-MIII node. REDIT can not edit files itself, but uses DEXEC to schedule the remote EDITR at the node where the file exists. EXECM must be present in both nodes in order to use the editor at another node. The Remote Editor will be issuing DEXEC requests that are processed by EXECM in the local system. (REDIT issues a DEXEC program schedule request, which is processed by EXECM in the remote node to invoke the EDITR. The EDITR in the remote node then issues DEXEC requests processed by EXECM in the local node. EXECM is required in both nodes.)

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 via Remote I/O Mapping software). REMAT requires slave monitors to exist at the remote node for execution of certain commands (see Table 2-2). Use %REMAZ for RTE-MIII nodes. Use %REMAN for all others.

Table 2-2. REMAT Commands and Required Slave Monitors

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	
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)	

NOTE:

OPERM should be included at all nodes in order for remote RTE operator commands to be executed.
RSM required at nodes with Session
INCNV/OTCNV are required at any DS/1000-IV node which is to communicate with or be accessed by any DS/1000 node.

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

RFAM — Remote File Access Monitor. There are two versions of RFAM. %RFAM1 is the single DCB version and %RFAM2 is the multiple DCB version. The single DCB version is designed for memory limited applications and does not support extended file access. The multiple DCB version is recommended in disc based DS/1000-IV nodes. The number of DCBs allocated limits the number of files which can be simultaneously opened from remote nodes.

RMTIO — Module used to resolve DNODE calls in FTN4 programs. This module is used to implement remote FORTRAN I/O only for programs compiled by FTN4.

RPRTL — Program used when downloading application programs to a memory-only RTE-L. Passes the absolute code to the mini-APLDR, APLDX.

RSM — Remote Session Monitor. Used only in Session nodes, RSM associates incoming requests with either a default session or a session previously created by the user program or REMAT.

RTMLG — The Segmented RTE-MIII Generator/Loader, useful only if RTE-MIII nodes exist in the network. Its most convenient location is at an RTE-IVB neighbor to an RTE-MIII node. This allows generated systems to be down-loaded via the Communications Bootstrap Loader (CBL), described in Chapter 3 of this manual. However, this is not required, since the generated system files may be transmitted to any other RTE node by REMAT. RTMLG requires the routines contained in LGLIB.

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

SGPRP — Provides capability of preparing a segmented program for loading by APLDR after it has been relocated using RTMLG. It is similar to the standard RTE-MIII version, except it accepts commands from an answer file or an interactive or non-interactive device and will run in either an RTE-MIII or RTE-IVB system.

#SPLU — Used with Remote I/O Mapping. This module contains one entry point, #SPLU. It must be relocated seperately from the other Remote I/O Mapping modules because of the different construction of RTE-IVB, RTE-MIII, and RTE-L 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 %MSPLU in RTE-MIII; use %#SPLU in all others.

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.

TLOG Allows the user to selectively print trace data recorded by PLOG.

VCPMN Virtual Control Panel Monitor. Use this module in all other nodes (except RTE-MIII nodes) to monitor the Virtual Control Panel of an A/L-Series CPU.

WHZAT DS version of system status module. %WHZDS for RTE-IVB, %WHZ6D for RTE-6/VM.

DS/1000-IV MODULES FOR RTE-MPE COMMUNICATION:

CNSLM HP 3000 $STDLIST Monitor. Reports MPE TELL and WARN commands.

D$N25 Required for RTE-IV/VI/L/XL/A systems that have links to HP 3000s, but no X.25 links to HP 3000s.

DSTES PTOP slave program (master DSTEST on HP 3000). Verifies the PTOP software.

D$X25 Required for RTE-IV/VI/L/XL/A systems with X.25 links to HP 3000s.

LOG3K Provides operator control over recording of DS messages to and from HP 3000s. You must force load LOG3K if you do not have spooling in your system; you must then use a magnetic tape unit as the log device.

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

QUEX HP 3000 communication monitor. %QUEX with HSI (HP 12889 hardwired); %QUEX1 with PSI BISYNC interfaces and HP 12250A/12075A X.25 interfaces.

QUEZ HP 3000 slave request watchdog (HSI) and I/O completion monitor (PSI). %QUEZ with HSI (HP 12889 hardwired); %QUEZ1 with PSI BISYNC interfaces and HP 12250A/12075A X.25 interfaces.

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 MOve file command; %RMOTE does not. %RMOT1 requires 1 to 4 extra pages for its internal buffer. In L/A-series, you must force load %RMOT1 because SPOPN and $SPCR are undefined external references.

NOTE:

Refer to the load file #RMOTE (91750-17002) or #RMOT1 (91750-17003) for special load considerations with X.25 links.

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

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

SLCIN Prints long term statistics and the events trace table for the HSI RTE-MPE links.

TRC3K Prints the data recorded by LOG3K.

DSLIN Establishes PSI BISYNC connection to 3000s. %DSLIM for RTE-MIII; %DSLIN for all others.

OTHER DS/1000-IV MODULES THAT MAY BE NECESSARY:

EXECM Handles DEXEC calls from the HP 3000.

OPERM Handles REMOTE commands from the HP 3000.

PTOPM Handles master PTOP requests from the HP 3000.

RFAM Handles Remote File Access from the HP 3000.

Table 2-3 shows the DS/1000-IV software modules discussed above. It covers when they should be included, default program type, priority and approximate program size.

NOTE:

When loading DS/1000-IV programs on-line in an in an RTE-6/VM, RTE-IVB, RTE-IVE or RTE-MIII system, you must specify access to SSGA. For RTE-L, RTE-XL, and RTE-A systems, you must specify access to Labeled (System) Common.

Table 2-3. DS/1000-IV Software Modules Selection Guide

Note: The legend for the code column is found following the table.

NAME	CODE	PRIORITY	# PGS	TYPE	Generation/Loading Information
					LIBRARIES
D3KRB	E	-	-	L	RTE-MPE 304 word communication buffer
D3KBB	E	-	-	L	RTE-MPE 1072 word communication buffer
D3KMB	E	-	-	L	RTE-MPE 4096 word communication buffer
D3KLB	E	-	-	L	All nodes with links to HP 3000s
D3KL2	F	-	-	L	All nodes with only links to HP 3000s
DSDB	B	-	-	L	Required in all nodes that make Remote Database calls or have a database that is remotely accessed
DSLB1	A	-	-	L	Required in all DS/1000-IV nodes
DSLB2	C	-	-	L	Required in all nodes that have other RTE links
DSLB3	G	-	-	L	Required in all nodes with no link to an HP 3000
DSLCL	H	-	-	L	Required for unmapped RTE-L
DSLXL	J	-	-	L	Required for RTE-XL
DSML1	M	-	-	L	Required on RTE-MIII nodes
DSML2	M	-	-	L	Required on RTE-MIII nodes without a file system
DSMX4	A	-	-	L	Required for RTE-IVB,IVE
DSMX6	A	-	-	L	Required for RTE-6/VM
DSAL	X	-	-	L	Required for RTE-A

NOTE: In the above libraries you must choose between D3KRB/D3KBB/D3KMB depending on what size communication buffer you need.

Table 2-3. DS/1000-IV Software Modules Selection Guide (Cont'd.)

NAME	CODE	PRIORITY	# PGS	TYPE	Generation/Loading Information
DSRR	D	-	-	L	Required when rerouting included
DSNRR	D	-	-	L	Required when rerouting excluded
DSMA	D	-	-	L	Required when Message Accounting is included
DSNMA	D	-	-	L	Required when Message Accounting is excluded
DSSM	A	-	-	L	Required when Session Monitor is present at the node. Never used with the A/L-Series or RTE-MIII.
DSLSM	A	-	-	L	Required when Session is present elsewhere in the network but not at this node
DSNSM	A	-	-	L	Required when no Session nodes exist anywhere in the network
			DRIVERS		
DVA65	Q	0	~1	0	RTE-RTE driver for HP 12771/12773 cards
DVA66	R	0	~1.5	0	Driver for all PSI cards on M/E/F-Series
DVG67	S	0	~2	0	RTE-MPE driver for HP 12889 Hardwired Serial I/F card
ID.66	H,J	0	~1.5	0	Driver for all PSI cards on A/L-Series
DVV00	D	0	~1	0	Remote I/O Mapping driver. Use %XDV00 for RTE-L/XL; %ADV00 for RTE-A; use %MDV00 for all others.
DVR07	V1	0	~2	0	RTE-IVB,IVE,6/VM driver for HP 12790A Multipoint (Data Link Master) card.
DVS64	U	0	~2	0	RTE-IVB,IVE,6/VM driver for HP 12830A Data Link Slave Card.
IDS64	V	0	~1.5	0	A/L-Series driver for HP 12072A Data Link slave card.
IDS00	V2	0	2	0	A-Series driver for HP 12092A Data Link Master Interface Card.
DDA66	V2	0	2	0	A-Series driver for HP 12092A Data Link Master Interface Card

NOTE: In the above libraries you must choose between DSRR/DSNRR if rerouting is desired, you must choose between DSMA/DSNMA if

TABLE 2-3. DS/1000-IV Software Modules Selection Guide (Cont'd.)

NAME	CODE	PRIORITY	# PGS	TYPE	Generation/Loading Information
					1000-1000 MODULES
APLDR	I,K, N	40	8*	1	Absolute Program Loader. For RTE-MIII use %3APLD; for RTE-XL memory based use %APLDL; for RTE-L memory based use %APLDX
COMND	I,K	90	3	1	DS version of RTE-L/XL command module
DINIT	A	26	10*	19	DS initialization program. %DINIT has no "shutdown"; %DINIS provides the "shutdown" capability
DLIST	D	30	5*	19	Required for remote directory-list. %DLIS1 for RTE-IVB systems. %DLIS2 for RTE-MIII and RTE-L/XL systems.
DSINF	D	65	11*	19	DS information utility. Use %DSINF for RTE-IVB, -IVE, -6/VM, and RTE-MIII with links to other RTEs. Use %DSIN2 for RTE-IVB,-IVE,-6/VM, and RTE-MIIIs with only an RTE-MPE link. Use %DSINL for RTE-L/XL/A.
DSMOD	A	26	8	19	DS parameter modification program useful in all RTE nodes
DSVCP	B	90	6	19	Useful if there is an RTE-L/XL/A neighbor node. Provides Remote Virtual Control Panel.
EDITR	B	50	11*	19	Provides remote-editing capability, use %EDITD for RTE-IVB/IVE; %EDI6D for RTE-6/VM instead of the standard EDITR.
EXECM	B	30	4	19	Required for remote DEXEC services.
EXECW	B	30	8	19	Required for remote DEXEC services. (remote schedule-with-wait)
FCL7	W	50	2	3	Required for Force Cold Load over Data Link.
GRPM	C	4	6	17	Required only when other RTEs exist in the network

Table 2-3. DS/1000-IV Software Modules Selection Guide (Cont'd.)

NAME	CODE	PRIORITY	# PGS	TYPE	Generation/Loading Information
INCNV	B	20	3	19	Input message converter. Required when DS/1000 nodes exist in the network
IOMAP	B	90	2	18	Required for Remote I/O Mapping
LUMAP	B	30	6	18	Required for Remote I/O Mapping
LUQUE	B	25	2	18	Required for Remote I/O Mapping
MATIC	B	30	2	19	Required for message accounting
$MWB	K	-	1	0	Used by APLDR to load programs in mapped RTE-XL systems. Must reside in RTE-XL system area.
$MWB1	Y	-	1	0	Used by APLDR to load programs in RTE-A systems. Must reside in the RTE-A system area.
OPERM	B	30	3	19	Required if remote RTE system command services are required of this node or if session is present. Use %OPERL in the A/L-Series; use %OPERM in all others.
OTCNV	B	20	3	19	Output message converter. Required when DS/1000 nodes exists in the network.
PLOG	B	30	6	19	System diagnostic tool. Provides binary log of request/reply buffers. Load w/DC option.
PROGL	B	30	6*	19	Required if remote down-load services are required of this node Use %PROGL for neighbor download. Use %PROGZ for store and forward downloads
PTOPM	B	30	8	19	Required if communication with P-to-P slaves at this node is desired (the REMAT commands SO and SL also require PTOPM)
QCLM	A	28	3	19	Required in all nodes
QUEUE	A	2	2	17	Required in all nodes
RD.TB	B	-	-	30	Required for remote database access
RDBAM	B	148	6	30	Required for remote database access
RDBAP	B	40	11*	20	Required for remote database access Up to 10 extra pages may be necessary for dynamic storage Do not generate it in. Load it on-line.
REDIT	N	50	3	19	Provides RTE-MIIIs with remote editing capabilites. Cannot provide the edit function itself

Table 2-3. DS/1000-IV Software Modules Selection Guide (Cont'd.)

NAME	CODE	PRIORITY	# PGS	TYPE	Generation/Loading Information
REMAT	B	80	11*	19	Required for remote operator command interface. Use %REMAZ for RTE-MIII; %REMAN for all others.
RES	A	-	.5 +base page	30	Subsystem Global Area entry point module. %RESSM required for systems with session; %RESL required for RTE-L; %RESXL required for RTE-XL; RESA for RTE-A; %RESM required for all others.
RFAM	B	30	10*	19	Required for remote file access %RFAM1 for single-DCB; %RFAM2 for multiple DCBs.
RMTIO	N	-	1	7	Required to resolve DNODE calls (FORTRAN 4 only)
RPRTL	B	90	7	19	Used when a memory only RTE-L with APLDX is a neighbor node
RSM	B	20	4	19	Required in nodes when Session is present
RTMLG	B	90	12*	3	Composite RTE-MIII Loader/Generator May be loaded on-line, or generated into the system. Is relocated with the RTE-MIII Loader/ Generator library %LGLIB
RTRY	C	20	2	17	Required if other RTEs exist in the network
SEGLD	IKY	-	0.5	7	Required for remote segment loading Use %SEGLD for RTE-MIII, %SGLDL for RTE-L and %SGLXL for RTE-XL/A.
#SEND	B	3	2	17	Required for Rerouting
SGPRP	B	90	5	3	Required to prepare a segmented program for loading by RTE-MIII APLDR only
#SPLU	B	-	1word	15	Required for the Remote I/O Mapping feature. Use %MSPLU for RTE-MIII; %#SPLU for all others
SYSAT	B	45	5	19	Required for the Remote I/O Mapping
TLOG	B	90	8	19	Required in conjunction with PLOG to provide trace feature for DS/1000-IV messages
UPLIN	A	3	4	17	Required in all DS/1000-IV nodes
VCPMN	B	30	2	19	Virtual Front Panel Monitor. Useful in nodes adjacent to A/L-Series.
WHZAT	B	1	8*	17	Remote WHZAT. %WHZDS for RTE-IVB; %WHZ6D for RTE-6/VM.

Table 2-3. DS/1000-IV Software Modules Selection Guide (Cont'd.)

NAME	CODE	PRIORITY	# PGS	TYPE	Generation/Loading Information
					1000 - 3000 MODULES
CNSLM	D	30	2	19	HP 3000 system $STDLIST monitor
D$EQT	J,X		121 words	30	Must be relocated out of $D3KLB into Labeled Common for RTE-XL/A systems with links to an HP 3000.
DSLIN	E	90	4	19	Communications initialization program for PSI BISYNC links; use %DSLIM for RTE-MIII; %DSLIN for all others.
D$N25	D		11	7	Required for all systems with links to HP 3000s, but no X.25 links to HP 3000s.
DSTES	D	110	3	19	PTOP slave program, works with master on HP 3000 to verify PTOP software
D$X25	D		555 words	7	Required for all systems with X.25 links to HP 3000s.
LOG3K	D	80	3	19	Controls trace data collection on the HP 3000 link
MVCP3	D	90	10*	19	Used to install COPY3K.PUB.SYS on the HP 3000. Needed only when %RMOT1 is used.
QUEX	E	4	4*	19	RTE-MPE request/reply processor. %QUEX for HSI; %QUEX1 for PSI
QUEZ	E	2	2*	17	RTE-MPE request/reply processor. %QUEZ for HSI; %QUEZ1 for PSI
RMOTE	E	80	14**	19	Required for RTE-MPE nodes
RPCNV	E	25	3*	19	RTE-MPE reply converter
RQCNV	E	25	3*	19	MPE-RTE request converter
SLCIN	D	90	3	19	Prints long term statistics on the HP 3000 HSI link
TRC3K	D	90	9	4	Prints HP 3000 trace data

```
+-------------------------------------------------------------------------+
|                                                                         |
|  Legend:                                                                |
|                                                                         |
|  A = Required in all DS/1000-IV systems                                 |
|  B = Optional in all DS/1000-IV systems                                 |
|  C = Required in all DS/1000-IV systems with links to other             |
|       HP 1000s                                                          |
|  D = Optional in all DS/1000-IV systems with links to an HP 3000        |
|  E = Required in all DS/1000-IV systems with links to an HP 3000        |
|  F = Required in all DS/1000-IV nodes with only links to an HP 3000     |
|  G = Required in all DS/1000-IV nodes with no link to an HP 3000        |
|  H = Required in RTE-L                                                  |
|  I = Optional in RTE-L                                                  |
|  J = Required in RTE-XL                                                 |
|  K = Optional in RTE-XL                                                 |
|  L = DS/1000-IV Library                                                 |
|  M = Required in RTE-MIII                                               |
|  N = Optional in RTE-MIII                                               |
|  O = Required in all DS/1000-IV systems except RTE-MIII systems         |
|  Q = Required for all DS/1000-IV systems with 12771/12773 cards         |
|  R = Required for all DS/1000-IV systems with a PSI card                |
|  S = Required for all DS/1000-IV systems with an HSI card link to       |
|       an HP 3000                                                        |
|  U = Required in data link slave that is RTE-IVB,IVE,6/VM               |
|  V = Required in data link slave that is RTE-A,L,XL                     |
|  V1= Required in data link master that is RTE-IVB,IVE,6/VM              |
|  V2= Required in data link master that is RTE-A.                        |
|  W = Optional for data link master                                      |
|  X = Required for RTE-A                                                 |
|  Y = Optional for RTE-A                                                 |
|  * = page size is variable, extra pages may be used for tables,         |
|      DCBs, etc. to improve performance (RMOTE, RFAM, RTMLG, RDBAP)      |
|      or it may depend on your choice of relocatable module              |
| ** = RMOTE with move option (%RMOT1) should be sized to at least        |
|      14 pages.  RMOTE without move option (%RMOTE) should be sized      |
|      to at least 10 pages.  If not sized up properly, RMOTE prints      |
|      the error message  "WARNING: RMOTE BUFFER TOO SMALL!"              |
+-------------------------------------------------------------------------+
```

Table 2-4 shows 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.

Table 2-4. DS/1000-IV Subroutine Calls

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	Required Slave Monitor
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

Table 2-4. DS/1000-IV Subroutine Calls and Slave Monitor Requirements (continued)

The following are PTOP master calls:

POPEN PWRIT PREAD PCONT PCLOS PNRPY

The following are PTOP slave calls:

(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.)

GET ACEPT REJCT FINIS

Remote RTE commands require OPERM at the remote node.

Utility calls:

Subroutine	Slave Monitor Required	
BYE	none	DS/3000 software installed.
DLGOF	RSM	
DLGON	RSM	
DLGNS	RSM	
DNODE	EXECM	
DMESG	EXECM	
DMESS	OPERM	
DSERR	none	
* EDITR	EXECM	At the local node (the Remote EDITR uses DEXEC calls to input commands and print)
FCOPY	RFAM	At both the origination and destination node.
FLOAD	APLDR EXECW	Force-loads a program into a remote RTE-MIII or RTE-L system (scheduled with wait).
HELLO	none	DS/3000 software installed.
PRCNM	none	DS/3000 software installed.
* REDIT	EXECM	EXECM required in both nodes.
SEGLD	APLDR	

* EDITR and REDIT are programs.

Parameter Input Phase

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 can't make them memory-resident. All the modules must be given access to SSGA. Consult the RTE Generator 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 (i.e., 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. Table 2-3 shows the priorities of DS/1000-IV programs.

Be sure that your own programs do not have priorities higher than 30 (29, 28, 27, ...) unless absolutely necessary. Most DS/1000-IV programs have priorities in the range 1 to 30. User programs with unnecessarily high priorities can delay necessary network processing, causing time-out errors. If necessary to do so, however, you may need to increase the master and slave time-outs by an amount sufficient to cover the increased processing time.

Change Ents?

If you want the message logging feature for program download (see EXTENDED MESSAGES FOR PROGRAM DOWNLOAD in the Network Initialization Chapter), you may enter the following in the CHANGE ENTS phase for disc based RTE node:

```
#PRGL,AB,<lu>
```

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

Once this is generated into the system, program download requests will be automatically logged. This feature can be overridden at a later time by a specially written user program (see EXTENDED MESSAGES FOR PROGRAM DOWNLOAD in the Network Initialization Chapter). This feature is useful only when PROGL is part of the node's software.

Blank ID Segments?

If you intend using the Multi-Terminal Monitor, Session Monitor, or plan to load programs on line later (permanently), include enough blank ID segments for these programs, and for each copy of the remote EDITR, REMAT, and RMOTE you will have. (see "Multi-Terminal Monitor" in the Network Initialization Chapter.)

I/O Classes?

You should allocate as many IO class numbers as possible. However, if memory is limited, use Table 2-5 to calculate your DS/1000-IV requirements, and add the number needed for other subsystems (Session Monitor and user application programs). If possible, it is a good idea to add a few extra classes so that if software is added later which makes use of these it will not be necessary to re-gen. If re-generation becomes necessary for other reasons and additional class numbers or RNs are necessary, you won't 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?

Table 2-5 summarizes the resource number requirements of DS/1000-IV. Add as many resource numbers as required by HP-supplied subsystems and your own programs.

Table 2-5. 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 eleven if the default is taken (schedule all monitors: DLIST, EXECM, EXECW, VCPMN, OPERM, PROGL,PTOPM, APLDX (L-Series only), RFAM, RDBAM, plus CNSLM, RPCNV, and RQCNV if a 3000 link exists). EXECM requires a total of 3 classes. 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, etc. requires a class number for the duration of the request only. In RTE-IVB, the remote session monitor (RSM) requires one class I/O number.

Table 2-5. DS/1000-IV Resource Number and Class I/O Requirements (continued)

Type of connection	Resource Numbers	Class-I/O Numbers
RTE-RTE	Remote EDITR (EDITR or one of its copies) locks the output device when listing to a non-interactive device. Therefore one resource number is required for each copy of the EDITR if multiple devices ple devices exist (e.g. line printer). TRC3K, PLOG and Message Accounting require one RN each.	One each for QCLM, RTRY, and GRPM. One is required for each active copy of REMAT. If the format level converters INCNV and OTCNV are used, they require one class number each. 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 RTEs only, 25 would be a practical minimum--one for each of the nine monitors, one for REMAT, one for MTM, one for Session Monitor and four for user programs. MA, Remote Session, 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 2-5. DS/1000-IV Resource Number and Class I/O Requirements (continued)

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.	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.)

Equipment Table?

Each HDLC (12794), HDLC (12825) BISYNC (12834) or BISYNC (12793) link using DVA66 needs two consecutive Equipment Table entries and two consecutive LU entries per link. One EQT entry is for transmit, the other for receive. The format is as follows:

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

A 12 word EQT extension is needed for the first EQT only. The driver always uses DMA transfers to and from the card but do not supply the "D" flag. The device time out processing is done by the processor on the card and the time out value is calculated from switch settings on the card. Providing a non-zero time-out value causes that time-out 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 as simple as attaching the loop back connector anywhere in the link. This subject is covered in detail in the Troubleshooting Chapter.

RTE-RTE links using the 12771 card (hardwire) or the 12773 card (modem), require an Equipment Table entry in the following form:

```
sc,DVA65,X=7,T=yyy
```

where:

yyy=line time-out value.

See Table 2-6 for line time-out recommendations. It does not matter whether the interface is installed above or below the privileged-I/O card, the table entry is the same.

Table 2-6. RTE-RTE Communication Line Timeout Value Recommendations

RTE-RTE Links (12771/12773 Links only)	
Line Speed	Line (EQT) Timeout
1 us/bit to 16 us/bit	2 ticks
9600 bps to 4800 bps	3 ticks
32 us/bit to 2400 bps	4 ticks
1200 bps	5 ticks
600 bps	8 ticks
300 bps	15 ticks
1 tick = 10 milliseconds	

NOTE

You must use the same line timeouts on each end of the line. For modem links utilizing modems that automatically retrain, longer line timeouts may be needed.

For best performance, it is recommended that DVA65 EQT entries be entered immediately after the disc's entry. This will reduce the interrupt processing time. It is not as significant on the DVA66 EQT entries because of the use of DCPC for transfers to and from the cards.

NOTE

In RTE-IV Systems, DS/1000-IV driver DVA65 can reside in a driver partition even though one or more DS/1000-IV interface cards may be operating in privileged mode. Therefore the "S" and "M" Equipment Table parameters which force drivers into the System Driver Area are NOT desirable. Placing DVA65 in a driver partition makes the System Driver Area smaller, thus saving space in the User Map.

NOTE

For RTE-RTE links using DVA65, there is a loop-back testing procedure described in the Troubleshooting Chapter of this manual which can be used to isolate failures. This procedure requires a minimum of two EQT entries, with Device Reference and Interrupt Table entries to match. DVA66 always requires two EQTs and this number is sufficient for loop-back testing on HDLC links. PSI BISYNC CARDS DO NOT HAVE LOOP-BACK TEST CAPABILITIES! All PSI cards provide self-test information via LEDs.

It is recommended that you include a minimum of two EQTs connected to DVA65 to use the self-test feature. If you have only one interface board, you may include the other EQT generated to use the select code following the last I/O slot you plan to use. If all of your I/O slots are filled, you may still include the EQT by using the select code of another interface which you can remove whenever you need to test the link. This can be accomplished by placing a spare DS/1000-IV communication interface temporarily in the slot. Then perform the I/O Reconfiguration Process on bootup to switch in the second DVA65 EQT. The Device Reference Table entry change can be made easily on-line, but the Interrupt Table entry must be "patched". You may obtain assistance for this operation from Hewlett-Packard field support personnel.

RTE-MPE HSI links, using the 12889 (hardwired) card, require an Equipment Table entry of the following form:

```
sc,DVG67,D
```

where sc = interface card select code.

The line protocol provides for different timeouts at different times. The driver establishes the proper timeout values depending upon the context of on-going communication. DO NOT PROVIDE A LINE TIMEOUT VALUE FOR RTE-MPE LINKS.

If you have provided one or more interface cards for redundant links, be sure to provide an EQT entry for each.

Device Reference Table

One DRT entry is needed for each EQT entry, so for the HDLC and BISYNC links, two consecutive DRT entries are needed per link. The lower LU number is associated with the 1st EQT and is the LU used when answering the DINIT initialization questions and when using the DSMOD /L command.

Values for HDLC and BISYNC link LUs can be in the range 4 to 246. Some confusion can be avoided by not using LUs 4, 5, 6 and 8.

For the HP 12771/12773/12889 links, one DRT entry is required for each link. It is unnecessary to supply an LU for each redundant link, but if assigned, these links may be used by applications programs. (See the Network Initialization Chapter.)

RTE-RTE (HP 12771/12773) links require a subchannel assignment. Modem links require an even subchannel. Hardwire links require an odd subchannel. The subchannel assignment is not used for RTE-MPE links. HDLC cards (HP 12794A/12825A/12007A/12044A) do not use subchannel assignments. This is summarized in Table 2-7.

Table 2-7. DS/1000-IV Subchannel Assignments.

Interface Kit	Subchannel
HP 12771	must be odd number
HP 12773	must be even number but not 6. This is a privileged interface card.
HP 12889	not used
HP 12793A	not used
HP 12794A	not used
HP 12825A	not used
HP 12834A	not used
HP 12007A	not used
HP 12044A	not used
HP 12830A	not used
HP 12072A	not used
HP 12790A	must equal 6
HP 12073A	not used
HP 12082A	not used

In Session nodes it is necessary to leave some of the 255 possible LUs undefined. Remote Session uses these undefined (not declared in the generation) LUs for the session numbers it assigns to each Remote Session established. You can not define all 255 LUs and have Remote Session 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.

Interrupt Table

Each link interface card, including any spares, requires one interrupt table entry, regardless of link type or whether they are privileged or non-privileged.

The Interrupt Table entry for all links (HSI, HDLC, HP 12771/12773 modem and hardwire) must be as follows:

```
sc,EQT,yy

where sc = the select code
      yy = the EQT number  (the transmit EQT for links requiring 2
           EQTs)
```

NOTE

> This is a change from 91740 DS generation requirements. The old format was xx,PRG,QUEUE. This change does not affect the format for 91740 software.

Partition Assignments

In RTE-MIII it is suggested that partitions be defined in ascending order by size. Also, if you plan to utilize the multi-terminal monitor, you should define at least one partition for each terminal. The size 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 having DS monitors use many partitions is to either assign them all to the same one or two partitions or to create a program which scans the memory allocation tables and forces a swap of any program which is not in need of that partition at that moment, that is, programs in the general wait state. 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.

NOTE

For mapped-memory RTEs, the generator prints the sizes of the largest addressable partitions with and without COMMON. ALL PROGRAMS CALLING ANY DS/1000-IV SUBROUTINE REQUIRE ACCESS TO SSGA; therefore, the maximum partition size for these programs is the size given for the programs WITH COMMON. Note that this includes the EDITR, if the DS/1000-IV version is used. Other programs (e.g., FMGR, FTN4, LOADR, RT4GN, etc.) may be as large (or assigned as many pages) as the size given for programs WITHOUT COMMON.

System Available Memory (SAM)

SAM is an extremely critical resource. Careful thought should be given to the amount of SAM generated into each node, since user requests can be delayed for lack of it. 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 on-line) by the number of programs which output to buffered devices (some of these may not need to run concurrently). For example, FMGR, ASMB, FTN4, 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 RTE-IVB, MIII, 10 words for RTE-L) 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, plus six words for each Transaction Control Block (TCB). TCBs are allocated by DINIT when the node is initialized, and remain allocated until the next bootup.

On RTE-A systems, allocate space for the following tables in the system memory block (MB).

Transaction Status Table: Fourteen words for each concurrent HP 3000 master user.

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

Remote Session: Seven words times the maximum number of local sessions active concurrently from remote nodes.

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 links in the node times the number of nodes in the NRV. (2 x # of links x # of nodes)

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

IF YOU DON'T 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. For a discussion of techniques for predicting the lengths of these delays, the interested reader is directed to:

Martin, James, Design of Real-Time Systems, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1972.

Basically, however, 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.

Choosing the Correct Version of RFAM

If your node has a file system and remote nodes are to be given access to it, you may choose between two versions of the Remote File Access Monitor (RFAM). Your choice affects the node's operation.

The single-DCB version of RFAM (%RFAM1) is considerably smaller than the other and is intended for memory-limited applications which require no more than one file 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 the single-DCB version is used, there may be at most one program in the network with at most one file open at this node at any one time. This also means you cannot run REMAT in this node using a transfer file if any commands in the transfer file reference other files (e.g. LI, RN, PU, ST). If any attempt is made to open more than one file at a time, the error code -28 will result.

The multiple-DCB version for RFAM (%RFAM2) is used in nodes where several files may be opened at the same time. The extra storage space for DCBs is taken from unused partition space. In the RTE-IVBs, this version of RFAM utilizes the disc as overflow storage if more DCBs are required than it has space for in its partition. Each DCB requires 144 words of partition or 3 sectors of disc space regardless of which RTE is used, plus a 9 word table entry used by RFAM. %RFAM2 is the only version that handles extended-file calls.

Remote Database Access

The remote database access feature is made up of three modules; RDBAM, RDBAP, and RD.TB. RDBAM (Remote Database Access Monitor) serves as the coordinator for incoming database access requests and schedules the appropriate copy of the Remote Database Access program, RDBAP. RDBAM can be loaded either during the generation or on-line.

RDBAP takes the remote database access request and turns it into a local request and returns data to the calling master program. RD.TB should be generated into the system as a type 30 module and provides SSGA resident table space for RDBAM. If RDBAM should be terminated for any reason it can still function properly when rescheduled by UPLIN using information that is still stored in RD.TB.

RDBAP uses 2000 words of local blank common and must be a type 6 file so that it can be renamed. It must be loaded on-line after the generation.

The following loader command file will load the Remote Database Access program on RTE-IVBs:

```
OP,LBSS
SZ,21
LI,%DBMS1
RE,%RDBAP
END
```

RDBAP and its four segments should then be SP'ed and remain as type 6 files on the system cartridge.

Remote I/O Mapping

When generating Remote I/O Mapping into your system, you must choose between three different drivers.

%MDV00	Used in RTE-MIIIs, RTE-IVBs and RTE-6/VMs
%XDV00	Used in RTE-L/XL
%ADV00	Used in RTE-As

There are also two different "reserved LU" entry point modules.

%#SPLU	Used in all RTE systems except RTE-MIIs. Must be loaded into the System Modules Area. In RTE-L this entry point becomes part of the system area, in RTE-IVB the entry point goes in Table Area I.
%MSPLU	Used in RTE-MIIIs. The module must be relocated in the "System Modules" area.

At least two Equipment Table entries are needed to generate Remote I/O Mapping into your system. All Remote I/O Mapping EQTs should be have the same select code. They have the following format:

```
77,DVV00          *EQT 25 - Remote I/O Mapping Reserved EQT
77,DVV00,X=7      *EQT 26 - Remote I/O Mapping EQT (subch 0)
77,DVV00,X=7      *EQT 27 - Remote I/O Mapping EQT (subch 0)
77,DVV00,X=11     *EQT 28 - Remote I/O Mapping EQT
                            (X=11 => subchannels 0,1,2)
```

The first Remote I/O Mapping 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. It is important to note that the reserved EQT must must not include any extension words; otherwise, Remote I/O Mapping will not work.

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. An addition of two words per subchannel allows multiple subchannels for the same EQT. In the example above, EQT 28, with an extension of 11 words, can map into three subchannels. An EQT with eight subchannels would require an extension of 7 + (2 x 7) = 21 words.

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

For L/A-Series generations the IFT must have a two word extension, entry point IDV00 must be declared, and any unused select code specified as follows:

```
IFT,%XDV00,EIDV00,SC:40B,QU:FI,TX:2
   (%ADV00 for RTE-A)
```

Note that there can be only one mapping IFT to which all mapping DVTs must belong. Select code 40B is only used as an example; any unused select code can be used for remote I/O Mapping.

For the RTE-L/XL/A Device Table entries (DVTs), you must supply one DVT with no extension, one LU to be associated uniquely with this DVT and the entry point DDV00 must be declared. The following format is used:

```
DVT,,,LU:27,EDDV00,TX:0      (Reserved DVT/LU)
```

The remaining DVTs are used for mapping and have a five word extension. The concept of subchannels is not used in RTE-L and only one mapping LU can be defined for each DVT entry. The mapping DVT entries have the following format (LU numbers are given as examples; use LUs that are appropriate to your system.):

```
DVT,,,LU:28,EDDV00,TX:5      (Remote I/O Mapping LU)
DVT,,,LU:29,EDDV00,TX:5      (Remote I/O Mapping LU)
```

The Interrupt Table entry for RTE-IVB and RTE-MIII with MTM should use the following format:

```
sc,PRG,PRMPT
```

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

With this Interrupt Table entry, a Remote I/O Mapping can be set up to make the mapped LU respond as a terminal LU. The LU can be mapped to another terminal LU on another system. The program SYSAT can then be used to acquire a LOGON prompt or a system prompt at the remote system. On an RTE-L only a system prompt can be acquired.

If PRMPT is not in the system, 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.

Booting Up The System

Proceed according to the directions in the RTE Generator manual. In RTE-IVBs, you will be asked to initialize system LUs 2 and 3. Note that in disc-based RTEs, 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 which is larger than the number of DCBs which RFAM can store in its partition (and if the system is a RTE-IVB). You should allow extra tracks for this if you require RFAM to handle more files than it can store in its partition. If stored out on the disc, each DCB requires three 64-word sectors, so, for example, a single 7900, 7905 or 7920 disc track can store up to 32 DCBs (containing 96 64-word sectors) (7925: 64 DCB's per track).

If memory availability is a problem, several of the 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 tracks are available to allow the monitors to swap.

NOTE

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

RTE-MIII Generation Considerations

The following paragraphs point out the DS 1000-IV modules required when generating DS/1000-IV into an RTE-MIII system.

Priv. Drivers Access Common?

You must respond "YES" regardless of whether you have any interfaces installed in privileged-I/O slots or not. This "yes" response puts SSGA in the System Map (SSGA in the system map allows access to SAM by DS/1000-IV communications management modules RES, #RQUE, #NRVS, etc.).

Relocate System Modules

Relocate the microcode replacement module $DSML1 with the following command extracting just the Extended Instruction Group replacements (EIG). DS/1000-IV does not refer to EIG instructions directly in order that the same code that runs on M-, E-, and F- Series computers can also run on the L-Series computer. The command is:

```
REL $DSML1 (DSMXI)
```

#SPLU is an entry point necessary for Remote I/O Mapping. The address of the reserved mapping LU is placed in this location for use in later mapping functions. Relocate the following module if you wish to use the Remote I/O Mapping feature:

```
REL %MSPLU
```

DS Drivers are also relocated in this area after the regular system modules. Choose one of the following:

```
REL %DVA65
REL %DVA66
REL %DVG67
```

If the Remote I/O Mapping feature is desired, its driver must be relocated as follows:

```
REL %MDV00
```

# of I/O Classes?

DS uses up to 25 (or 31 if 1000-3000 is included) class I/O numbers and each master program with a pending request uses one. Class numbers only occupy one word each. You will need to add 25/31 to the number of class numbers used in your application.

# of Resource Numbers?

DS uses up to 7 resource numbers. Add the number you'll be using and enter the total. (At least 10 is recommended.)

Resident Library Modules

In RTE-MIII systems, you should include the following modules in the resident library:

```
REL %RLIB3 (.ENTR)      *(Relocate only if .ENTR is not replaced
                        * in microcode.)
REL %MSYLB (MALRN)
REL %MSYLB (MPRTN)
REL %MSYLB (MRNRQ)
```

These routines are written to be re-entrant if included in the system library, so that only one copy of each module need exist in the system. This re-entrant code saves memory but costs speed. When relocated with user programs as utility subroutines, this processing is avoided. If the speed is more important, then do not include these routines in the system library. You must, however, search these libraries when relocating user programs which require them.

Subsystem Global Common Area

Include the following modules in the Subsystem Global Area (SSGA):

```
REL $DSMXL (#RQUE)
REL $DSLB2 (#NRVS)
REL %RESM
REL $DSMXL (PGMAD)
REL $DSRR  (#RR7)      *Relocate only if the Rerouting feature is
                        *desired.
REL $DSRR  (#LVSC)     *Relocate only if the Rerouting feature is
                        *desired.
                        *If rerouting is not desired, the library
                        *$DSNRR should be relocated here in SSGA.
```

Relocate User Programs (Memory Resident)

In RTE-MIII systems, it is suggested that slave monitors be made partition-resident, except those you will need to start the system up.

In all RTE-MIII systems, DINIT, EXECW, UPLIN, and APLDR should be generated in as memory-resident programs.

You will also want to generate in, a start-up program which schedules DINIT and does the initialization on bootup. See the Network Initialization Chapter for an example startup progam, named PASS.

If there are RTE-RTE links also make the following modules memory-resident programs:

QUEUE, RTRY, GRPM, QCLM

If the Rerouting feature is desired, relocate the following module in the memory-resident area:

#SEND

If the RTE-MIII node will be interfacing to old nodes (DS/1000) then the following message converters may be made memory-resident:

INCNV, OTCNV

If these modules can be loaded into partitions either locally or from another RTE node, they don't have to be generated into the memory resident area. If a 3000 link is desired, you may make the following modules memory-resident.

QUEX, QUEZ, RQCNV, RPCNV, CNSLM

If these modules can be loaded into partitions either locally of from another RTE node, they don't have to be generated into the memory resident area.

See the appendix sections for example generation and answer files.

The standard versions of APLDR supplied in RTE-MIII systems may be replaced by DS/1000-IV versions with the same name, which are able to load programs from either remote or local files, or any input device. The node need not be initialized to load from a local input device. The DS/1000-IV versions use Remote File Access calls when loading from files (remote or local), therefore to load from a local file, the node must be initialized and RFAM must be enabled, via DINIT. If RFAM is to be a partition-resident, you must proceed in one of two ways:

1) Prepare an absolute binary version of RFAM and store it on mini-cartridge, magnetic tape, or paper tape. After booting up the RTE-MIII node, use APLDR to load RFAM from this tape, then use DINIT to initialize. This method is the simplest, but does not easily lend itself to automatic initialization at bootup. (Discussed in the Network Initialization Chapter.)

2) Initialize the node at bootup, but do not schedule RFAM. Using APLDR and a previously-prepared absolute binary copy of RFAM stored at a remote node, load RFAM into a partition. Using DSMOD's /S command, schedule RFAM. This method is better suited to automatic initialization.

If you choose the local-only version of APLDR, you can still use REMAT from remote nodes to load programs, but they must all be stored at the node in which APLDR is running. You may not request any APLDR function (e.g., program list) which requires printout at any node other than the local. Doing so will cause the printout to be sent to a device in the local system. The local-only version of APLDR is incapable of performing remote I/O (DEXEC, RFA) operations.

You can generate an RTE-MIII system with the single-DCB version of RFAM and the local-only APLDR generated as memory-resident programs. Utilizing the Loader/Generator, prepare an absolute binary file of the multiple-DCB RFAM. You can switch to the multiple-DCB version by quiescing the system, (see the Network Initialization Chapter), deleting RFAM (OF,RFAM,8), and using APLDR to load the remote version (from the file stored locally). After re-starting, the system will automatically re-initialize the new version of RFAM. Be sure RFAM has no file open before replacing it.

DINIT is usually generated into the system and used for initialization before the remote version of APLDR may be used. However, APLDR can be used to load programs from local input devices before the node is initialized. You can therefore load DINIT on-line from an input device.

You may overlay DINIT by another program after the system has been initialized, if you wish. If you are using the %DINIS version of DINIT you should provide an absolute binary file copy (type 7 file) of it so that you may run it at any time, using APLDR to transfer the file into memory. If this is the case, either prepare an absolute binary copy of DINIT as described previously for RFAM, and run as a partition resident, or be sure DINIT is the last program loaded in the generated system, and that, if you have an absolute binary file copy (type 7 file), it is relocated so as to run as the last program in the system.

Partition Resident Programs

You can set aside partitions for specific programs. Examples are shown below:

```
1,11    *Partition #1 contains 11 pages and is reserved for DSINF

2,8     *Partition #2 contains 8 pages and is reserved for DSMOD
```

NOTE

Relocating $DSML1 and %MSYLIB generates the message "DUPLICATE ENTRY POINT $DSCS." You can ignore this message.

Library Considerations

In order to ensure that all subroutine references from one DS/1000-IV library to another are satisfied in one pass, the libraries must be searched in the following order. Only those libraries chosen as described earlier in this chapter need be included; libraries appearing on the same line may be searched in any order; libraries appearing on higher lines must be searched before libraries appearing on lower lines.

$DSML1, $DSML2

$DSLSM, $DSNSM, $DSMA, $DSNMA, $DSRR, $DSNRR, $DSDB

$D3KLB, $DSLB3

$D3KRB, $D3KBB, $D3KMB, %D$X25, %D$N25

$DSLB2, $D3KL2

$DSLB1

Special Considerations for RTE-IVE

Detailed information concerning generating DS/1000-IV into an RTE-IVE system can be found in the RTE-IVE Operating System Reference Manual (92068-90015). This section will only briefly list the RTE-IVE generation considerations that you should be aware of.

1. The RTE-IVE on-line generator output must be converted to an absolute binary file (type 7) using the program CONVM. It can then be downloaded into RTE-IVE using the Communications Bootstrap Loader (CBL). CONVM defaults the boot file namr to P00000, but the boot file namr can be specified in the run string as long as it follows the 'P' followed by five octal digits naming convention.

2. Automatic partition loading may be accomplished by adding 80 to the program's file type during the parameter input phase of the generation. The startup program must have a memory resident type such as 81. DS can be initialized by specifying a startup program which schedules DINIT and passes it the network initialization information.

3. Standard bootup from the front panel or automatic bootup on power up is described in the RTE-IVE Operating System Reference Manual. Reconfiguration at bootup is also described.

4. RTE-IVE program downloading can be implemented by using the RTE-IVE DS version of APLDR (%APL4D). APLDR is not invoked using the REMAT 'LO' command. It is scheduled from REMAT by switching the RTE-IVE node and issuing the command:

   #RW,APLDR,namr[,part[,node]]

   where:

   namr = The type 6 file

   part = The partition number to load namr into. The default is the first available partition into which the program will fit.

   node = The node number where the type 6 file resides.

Special Considerations for RTE-6/VM

1. If an RTE-6/VM node uses DVA65, an entry in the 'CHANGE ENTS' section of the system generation should be made. The entry is:

   $SIP,RP,0

   Failure to add this to an RTE-6/VM generation will cause a system crash on some accesses to the link.

2. RTE-6/VM has added a new 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.

RTE-L/XL/A Generation Considerations

DS/1000-IV is fully supported to run in RTE-XL systems. On RTE-L (only) systems, HP 1000 to HP 3000 services are not supported. On RTE-A systems, DS/1000-IV services are not supported for the new (non-FMGR) file system. For a complete list of DS/1000-IV services not supported in RTE-A systems, see the section "Special Considerations for RTE-A" at the end of this chapter.

To generate DS into an L/A-Series computer follow the directions in the RTE-L/XL/A generator manual and use the information in this section to make the appropriate changes to the standard L/A-Series generation to produce an L/A-Series generation with DS/1000-IV.

LU 1

DS/1000-IV writes several messages to system lu 1, so you should associate this lu with an unbuffered terminal. You can also associate system lu 1 with other unbuffered log devices, such as tape readers. Do not associate system lu 1 to a buffered device. If you run out of SAM, DS/1000-IV can not post messages to buffered devices.

RTE-L/XL/A System Relocation Phase

Three modules can be relocated in the system area--the DS driver, the Remote I/O Mapping driver, and the Remote I/O Mapping Reserved LU. This can be accomplished by inserting the following relocation statements into the generation command file.

```
REL,%ID.66      *DS/1000-IV HDLC DRIVER
REL,%XDV00      *REMOTE I/O MAPPING DRIVER (%ADV00 for RTE-A)
REL,%#SPLU      *REMOTE I/O MAPPING RESERVED LU
```

ID.66 combines the functions of Interface Driver and Device Driver so only one module is relocated during the RTE-L/XL/A generation (there is no DD.66).

If the Remote I/O Mapping feature is desired, generate in %XDV00 (%ADV00 for RTE-A), the Remote I/O Mapping Driver, and the module %#SPLU, which contains one entry point which will be used to hold the Remote I/O Mapping Reserved LU.

For X.25 links, relocate %$CSTB, the customizing subroutine %CXL66 and driver %DDX00 in the system area or in the same partition.

RTE-L/XL/A Table Generation Phase

In RTE-L/XL/A, up to 22 class numbers are necessary if all monitors are scheduled and Input and Output message converters are needed.

A minimum of two resource numbers are needed by DS, three if MA is included and four if PLOG is used.

One IFT (Interface Table) entry and two consecutive DVT (Device Table) entries, with consecutive LUs, are needed for each DS link. The first LU of each pair is used when interacting with any DS program such as DINIT, DSMOD, or DSINF. They have the following format (LU numbers are given here as an example. You should use LUs appropriate to your system.):

```
IFT,%ID.66,EID.66,SC:24B,QU:FI,TX:18
*TX DVT
DVT,,,LU:21,DT:66B
*RX DVT
DVT,,,LU:22,DT:66B
          ^
          Note the consecutive LUs.
```

The RTE-L/XL/A generator manuals describe these fields in detail. Note that the DVT entries do not define an entry point for the device driver. For the DS interface in RTE-L/XL/A only an interface driver is required. The two DVT entries are used by the interface driver to keep track of activity on the full-duplex communication link.

The Remote I/O Mapping table entries have the following format (for RTE-A, use %ADV00 instead of %XDV00):

```
IFT,%XDV00,EIDV00,SC:40B,QU:FI,TX:2
* RESERVED LU
DVT,,,LU:25,EDDV00,TX:0
* MAPPING LUs
DVT,,,LU:26,EDDV00,TX:5
DVT,,,LU:27,EDDV00,TX:5
```

The IFT entry must have a two word extension, the Remote I/O Mapping reserved LU has no extension, and each mapping LU has a five word extension. I/O mapping uses no interface card or select code. However, you must specify a select code for the I/O mapping IFT entry. Use any select code not utilized elsewhere in the generation.

In the context of RTE-L/XL/A's table generation phase, a "NODE" describes a specific relationship between the devices (DVTs) connected to an interface (IFT). DO NOT link the transmit and receive DVTs to the DS IFTs using the NODE statement or any other DS DVTs with a NODE statement.

Choosing the Correct Version of COMND

COMND is the secondary program which is scheduled when FMGR is busy. The relocatable, %COMND, is provided with the RTE-L/XL/A software and also with the DS/1000-IV software. The two versions are very different and caution should be used so that the correct version is chosen.

The version provided with the RTE software is the standard version which provides information in response to the 'PL', 'IO', 'PS', etc. commands. This version is recommended for use in mapped (RTE-XL and RTE-A) nodes.

The version provided with the DS/1000-IV software is smaller because the standard COMND requests are handled by APLDR, OPERM, and EXECM. This version is recommended for use in unmapped (RTE-L) nodes only.

APLDR vs. LOAD and SWAP/MEMRY

You must use either APLDR or the RTE modules LOAD and SWAP in RTE-L/XLs for memory management, but not all three. For RTE-As, use APLDR or the RTE modules LOAD and MEMRY.

In memory-based RTE-L/XL/A systems, APLDR usually handles memory management since programs are downloaded from remote nodes.

LOAD and SWAP handle memory management in disc-based RTE-L/XL systems. 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, SWAP/MEMRY and APLDR in a disc-based system. If you do this, LOAD and SWAP/MEMRY handle memory management and you cannot use the REMAT LO command or the FLOAD utility.

Choosing the Correct Version of APLDR

For disc based RTE-L/XL or memory based RTE-XL, use %APLDL. For memory based RTE-L use %APLDX. Although %APLDX may be used for disc based RTE-L, some capabilities are lost.

RTE-L/XL/A Memory Allocation Phase

ID SEGMENTS

DS uses up to 35 ID segments. If the message converters and some DS monitor programs are not needed, then the total may be reduced accordingly.

SAM

A minimum of 1024 words of SAM is recommended. See the section on uses of SAM earlier in this chapter.

MEMORY RESIDENT LIBRARY

No DS subroutines are placed in the memory resident library.

UNLABELED COMMON

DS uses no unlabeled common.

LABELED SYSTEM COMMON

The Labeled System Common area, in RTE-L/XL/A, is the equivalent of the Subsystem Global Area (SSGA) in RTE-MIII and RTE-IVB. Relocate the following modules in labeled system common:

For RTE-L only:

```
REL,%RESL::DS
REL,$DSLB2::DS,#NRVS  (or REL,$D3KL2::DS,#NRVS for
REL,$DSLCL::DS,PGMAL   HP 1000 to HP 3000 only links)
REL,$DSLCL::DS,#RQUL
REL,D3KLB,D$EQT  (if you have links to HP 3000s)
REL,$DSLB1,#LEVL
SEA,$SYSLB::LC
SEA,$MXLB::LC
SEA,$MLIB2::LC
SEA,$DSNRR::DS  (or $DSRR for rerouting)
                (Rerouting entry points are called
                 by #NRVS)
```

For RTE-XL only:

```
REL,%RESXL::DS
REL,$DSLB2::DS,#NRVS (or REL,$D3KL2::DS,#NRVS for
REL,$DSLXL::DS,PGMAL   HP 1000 to HP 3000 only links)
REL,$DSLXL::DS,#RQUL
REL,$D3KLIB,D$EQT  (if you have links to HP 3000s)
REL,$DSLB1,#LEVL
*
MS,$DSRR::DS       (or $DSNRR for no rerouting)
MS,$SYSLB::XL
MS,$MLIB2::XL
MS,$MXLB::XL
```

For RTE-A

(Note: Do not relocate PGMAL in LCOM.)

```
REL,%RESA::DS
REL,%DSLB2::DS,#NRVS (or REL,$D3KL2::DS,#NRVS for
REL,$DSAL::DS,#RQUA   HP 1000 to HP 3000 only links)
REL,$D3KLB,D$EQT  (if you have links to HP 3000s)
REL,$DSLB1,#LEVL
*
MS,$DSRR::DS      (or $DSNRR for no rerouting)

MS,$SYSLB::A
MS,$BIGLB::A
```

Labeled Common (LCOM)

All programs which contain DS/1000-IV calls require access to subroutines and data which are found in labeled common.

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-L/XL/A operating system or they may reside at a remote node. Two versions of SEGLD are provided to accomodate 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-L/XL/A software in the library, $SYSLB. The version of SEGLD which is used with remote segments is provided with the DS/1000-IV software as %SGLDL (RTE-L), %SGXL (RTE-XL/A).

Example Loader Command File for a Segmented Program that will execute on RTE-A, and call remote segments:

```
SN,SNAPDS
LCOM
OUT,FILEX
REL,%SGXL
REL,%FILEX
END
```

RTE-L User Program Relocation

Since there is only one background partition in RTE-L, and all the DS monitors must share this area, it is recommended that QUEUE and GRPM be relocated in the Realtime (memory resident) area of RTE-L.

These two programs handle every incoming message. If they must be swapped, in order to perform their function, a very noticeable degradation in system performance will be observed. Note that the Load and Swap modules of RTE-L are required on a disc-based L-Series node. You can not swap QUEUE and GRPM in memory based systems.

Make the following entries just after entering the library specifications.

```
SCOM
REL,%QUEUE
NEXT
SCOM
REL,%GRPM
END
```

If more space is needed in the background partition GRPM can be removed from the real time area (thus making the space available for the background area larger) and run in the background partition. All programs that run in the background partition, except the startup program, are relocated after the generation. The loader command file and a sample RTE-L generation answer file can be found in the appendices of this manual.

Memory Based L-Series Considerations

The DS/1000-IV module APLDR (%APLDL) used in memory based RTE-XLs should be replaced in memory based RTE-Ls by the mini-APLDR (%APLDX). This DS/1000-IV monitor performs a local "RP,<program>" for a program located at a remote node. Its sole purpose is to provide more user-available memory space in an RTE-L which is a DS/1000-IV node.

With the mini-APLDR, program downloads are performed by running the program RPRTL on the master and having %APLDX as a monitor on the slave side. You may initiate program loadings from a disc based node either directly from any system terminal or remotely through Remote I/O Mapping from the RTE-L side. For more information on RPRTL/APLDX see the DS/1000-IV User's Manual.

The standard APLDR features which are not available with the mini-APLDR are:

- REMAT 'LO' command
- FLOAD subroutine
- The 'LO' command entered locally at the RTE-L
- The 'IO' command entered remotely (This command can be entered locally if the RTE-L version of COMND is used.)
- The 'PL' command

NOTE

In memory-based RTE-L gens, D.RTR will remain as an undefined external. This message can be ignored as D.RTR is never referenced by DS/1000-IV software in memory-based gens.

Special Considerations for RTE-XL

%$MWB

The module %$MWB is used by APLDR to move words across maps in RTE-XL. This module is required only when APLDR is needed for downloading programs from remote nodes, which is generally the case in memory-based nodes. If you use %$MWB, you MUST relocate it in the system area during generation.

D$EQT

If you have HP 1000 to HP 3000 links, you must relocate D$EQT (from $D3KLB) to labeled system common.

%LOG3K,%RMOT1

%LOG3K and %RMOT1 must be force loaded (FO) because SPOPN and $SPCR are undefined external references.

Generation Errors

The RTE-XL generator produces the error NT6 (not type 6) because certain DS/1000-IV modules are not type 6. These errors do not cause any problems in the resulting system and snap files; ignore them.

Special Considerations for RTE-A

New DS/1000-IV Parts

For RTE-A systems, the following parts were added to DS/1000-IV.

%ADV00 - Remote I/O mapping driver

$DSAL - DS library. Do not relocate the $DSAL module PGMAL into labeled system common.

%RESA - contains labeled system common entry points. Relocate in labeled system common.

#RQUA - module in $DSAL that requeues DS messages. Relocate in labeled system common.

%$MWB1

The module %$MWB1 is used by APLDR to move words across maps in RTE-A. This module is required only when APLDR is used for downloading programs from remote nodes. If you use %$MWB1 you MUST relocate it in the system area during generation.

Driver Relocation

%ID.66 and %ADV00 may be partition resident drivers. (However, relocate %#SPLU to the system area.)

For X.25 links, relocate the driver %DDX00, the customizing subroutine %CXL66 and the table %$CSTB into the same driver partition.

System Memory Block (MB) and SAM

In RTE-A systems, DS tables (Transaction Status Table, NRV, Remote Session, Link Vector, Cost Matrix and Message Table) are stored in the system memory block. DS user data and headers (Buffered Output, Class I/O, "Mailbox" communication and Request and Reply messages) require SAM. See the earlier section, "System Available Memory" for guidelines on allocating space for DS tables and messages.

LU Assignments

For DS/1000-IV, you can use only lus with numbers less than or equal to 63, with two exceptions.

1. DS communication links (HDLC, BISYNC, X.25, and multidrop) can have lu numbers greater than 63.
2. Because programs can address their scheduling terminals as lu 1, terminals that schedule DS/1000-IV programs can have lu numbers greater than 63. This includes I/O mapping terminals.

For example, you could run REMAT from a terminal that is lu 78 and store data entered at the terminal into a file (by typing "ST,1,FILE"). You could also store the data to a printer or any other device with an lu number less than or equal to 63. However, you could not store the data to a printer or any other device with an lu number greater than 64.

Installing DS/1000-IV Software

Libraries

In order to ensure that all subroutine references from one DS/1000-IV library to another are satisfied in the minimum number of passes, libraries must be searched in the following order. Only those libraries chosen as described earlier in this chapter need be included; libraries appearing on the same line may be searched in any order; libraries appearing on higher lines must be searched before libraries appearing on lower lines.

If you index the libraries, the order that you search them is irrelevant.

$DSAL

$DSLSM, $DSNSM, $DSMA, $DSNMA, $DSRR, $DSNRR, $DSDB

$D3KLB, $DSLB3

$D3KRB, $D3KBB, $D3KMB, %D$X25, %D$N25

$DSLB2, $D3KL2

$DSLB1

You can substantially improve LINK's performance by merging the libraries you need into a single library and indexing it with LINDX.

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 SU in LINK.

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

#SEND

Because of LINK's file naming conventions, you can not use a FMGR namr to designate #SEND as the output file in a run string.

You can designate #SEND.RUN as the output file in a LINK run string.

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

You must force load (FO) %LOG3K and %RMOT1 because SPOPN and $SPCR are undefined external references.

The LOG3K log device must be a magnetic tape.

Unsupported Services

Files

DS/1000-IV can not access non-FMGR files. Files used for CBL, DSVCP, Forced Cold Loads, REMAT, RFA and all other DS/1000-IV utilities must be FMGR files.

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.

RTE-A Multiuser Environment

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

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.

1000-3000 Only Link Network Considerations

The special considerations for networks that consist of a 1000-3000 link only are as follows:

LIBRARIES:

Always gen in the following libraries:

```
$DSAL     for RTE-A only
$DSLXL    for RTE-XL
$DSMX6    for RTE-6/VM
$DSMX4    for RTE-IVB/IVE
$DSLCL    for RTE-L
$DSML1    for RTE-MIII
$DSLB1
$D3KLB
$D3KL2

%D$X25    if X.25/1000 is used
%D$N25    if X.25/1000 is not used
```

COMMUNICATION BUFFER SIZE:

SIZE	LIBRARY
304 words	$D3KRB
1072 words	$D3KBB
4096 words	$D3KMB

If the 1000 has session: $DSSM
If the 1000 has no session: $DSNSM

(Note: These are communication buffers. The PSI card buffer has a maximum of 1072 words.)

DRIVERS:

F=OFF %DVA66 - for 1000-3000 links using the BISYNC PSI interface cards
%DVG67 - for HSI hardwired connections

COMMUNICATION MANAGEMENT MODULES:

```
%QUEX, %QUEZ with DVG67
%QUEX1, %QUEZ1, with DVA66 or X.25
%QUEUE with DVA66 or X.25
%QCLM
%UPLIN
%RESSM for RTE-IVB,IVE,6/VM; %RESM for RTE-MIII, %RESXL for
        RTE-XL, %RESA for RTE-A.
%RQCNV, %RPCNV
%DINIS for shutdown or
%DINIT for non-shutdown
%DSMOD
%DSLIN for RTE-IVB,6/VM, RTE-A, and RTE-XL;
        %DSLIM for RTE-MIII
```

NETWORK INTERFACE MONITORS:

```
     %EXECM - Required to do DEXEC from the 3000.

     %OPERM - Required to handle REMOTE commands from the 3000
              for RTE-MIII,IVB,IVE,6/VM.  %OPERL for RTE-XL/A.

     %PTOPM - Required for master PTOP requests from the 3000.

     %RFAM2 - Required for Remote File Access from the 3000.
 or  %RFAM1

     %RSM   - Required if 1000 node has session monitor.

     %CNSLM - Required for reporting TELL and WARN messages from
              MPE.
```

The following can be loaded on-line:

```
     %LOG3K, %TRC3K, %SLCIN

     %DSINF
  or %DSINL for RTE-XL/A
  or %DSIN2 for RTE-MIII,IVE,6VM with links only to 3000s.

     %RMOT1 and %MVCP3 - for move file capability
       or
     %RMOTE - does not contain 'MO' command.
```

V/PLUS INTRINSICS:

If you are using V/PLUS instrinsics for block mode over a DS/1000 to DS/3000 communications line, the DS/3000 pseudo terminals (IODSTRM0 or IODSTRMX) should be subtype 8.

Chapter 3
Network Initialization

First-Time Network Initialization

This section describes step-by-step techniques which can be used for system initialization.

These one-step-at-a-time procedures may seem awkward, but they are suggested in order to minimize errors. Once the system is working satisfactorily, you may want to provide for automatic node initialization (see "Automatic Network Initialization" section in this chapter).

Boot up the RTE system at each node. Run through the tests described in the GENERATION Chapter to be sure that the RTE generation was correct. DO NOT RUN DINIT UNTIL YOU ARE SURE YOUR RTE OPERATES PROPERLY. This is important! You'll want to be sure that the equipment has been installed properly and the RTE system has been generated correctly before you bring network activity into the picture.

DS Initialization with DINIT

The primary purpose of DINIT is to initialize an RTE node within the DS/1000-IV network. The DINIT program must be executed at each node in order to make the network operational. Node initialization consists of:

- allocating required resources, such as class numbers, transaction lists, pointers and timers.

- establishing the network routing vector for this node, the number of files which 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.

These initialization operations are accomplished via a dialog with the operating system at your node. DINIT issues prompting queries and waits for you to enter an appropriate response.

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

Optionally, you may initialize your system from a transfer file that contains these responses, or in an RTE-MIII or RTE-L system, by a start-up program. In DINIT's transfer file, a comment line may be added to annotate an entry by placing an asterisk in column 1.

The program DSMOD is used to alter DS parameters in a node once it has been initialized. It is used to re-enable a communications line that has become inactive because of a malfunction or quiescence, obtain and modify the Nodal Routing Vector information for the local node, schedule system monitors, adjust transaction timing factors, place your node into the quiescent state to temporarily suspend network operations, etc.

Once your RTE operating system is generated and booted-up, you must schedule DINIT for execution to initialize your node within the DS/1000-IV network. Session Monitor, if installed in the node, must be activated before running DINIT after the node has been initialized. (Session Monitor affects the sequence of questions asked by DINIT.) DINIT allocates system resources, builds the various DS tables and enables the communications ports.

There are two versions of DINIT. DINIT provided by %DINIT is used to initialize the network and is not used again until the system is rebooted. DINIT provided by %DINIS is called the "shutdown" version and makes it possible to shutdown DS and then reinitialize the node interactively or using an alternate DINIT command file, without rebooting the node.

During node initialization, system resources that are not returned to the control of the operating system are allocated. These resources include System Available Memory (SAM), class I/O numbers, and resource numbers. If you should require these resources for other non-DS purposes, you must either shutdown DS via DINIT or halt and then re-boot the operating system without executing DINIT. You must be careful that the DINIT program is not automatically scheduled following the re-boot operation. To avoid this you may need to edit your WELCOM file prior to reboot.

In order to change the resources allocated (e.g., in order to add a node or increase the number of TCBs), you must either shutdown or re-boot, modifying the DINIT answers accordingly.

To schedule DINIT, enter one of the following commands:

From non-RTE-MIII systems:

RU,DINIT [,input device or namr[,error device]]

From RTE-MIII:

RU,DINIT,input LU,error device

or

RU,DINIT,FI,LE,NM[,sc[,cr]]

where:

input device = 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. Specification of this parameter is optional. If this parameter is omitted, DINIT assumes the value returned by LOGLU as the input device.

namr = the name:sc:cr of a transfer file that must contain the responses to DINIT queries in the correct entry sequence. The namr must be specified in three two-character ASCII blocks (i.e., FI,LE,NM,sc,cr) on RTE-MIII systems.

error device = the logical unit number of the device to which DINIT 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.

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

When the DINIT program is executed for the first time after boot-up to initialize your node, you must supply a series of responses. The data may be supplied interactively in response to DINIT prompts or supplied from a transfer file. If supplied in a transfer file, the responses must be specified in the order of the interactive prompt messages.

When you execute the DINIT program with input from a transfer file, DINIT does not display any messages except when an error condition is encountered. In the case of an erroneous response from a transfer file, DINIT reports the error and then, if it is possible to continue without repositioning the transfer file, displays the outstanding query prompt on the error device. After you enter the correct response to this query, DINIT automatically returns to the tranfer 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.

The interactive dialog is described in the following paragraphs. Remember that when using a transfer file for input, the prompt messages are not displayed.

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

NOTE

> It is recommended that you record all DINIT initialization answers on paper, minicartridge, or disc file. Should any problems arise in the future, the HP Field Support personnel may require this information.

DINIT Interactive Dialog

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 no other RTE system is connected to this node.

/DINIT: HP 3000?

Respond YES to indicate that at least one HP 3000 is connected to this node.

Respond NO to indicate that no HP 3000s are 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.

The following question is asked only if the node has Session Monitor included and active (not shut down).

/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 = 1 to 255. 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 DLGOFF, the table entry is not cleared until UPLIN runs. Allow 10 extra local sessions for such applications.

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

Retry limit - The 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, (time-out signaled by Message Accounting), is returned to the user program. The "MA time-out" value, specified in a later DINIT question, provides the time value used to schedule message acknowledge retries.

The next two 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 the DS 1000/3000 communications links (DVG67 for an HSI link or DVA66 for PSI links). This value is used to build the 3000 LU table. Do not include X.25 links.

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

/DINIT: LOCAL ID SEQUENCE?

Enter /E for a null ID sequence. Otherwise enter from 1 to 15 characters. 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 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.

/DINIT: REMOTE ID SEQUENCE?

Enter /E for a null ID sequence. Otherwise enter from 1 to 15 characters. When an incoming call is detected and the two nodes exchange local ID sequences, this is the ID sequence with which a comparison is made on the remote side to validate the request for access. If the sequences don't 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)     ENQ -->
                                                  (Comparison with
                                                   Remote ID Sequence)

                                  <--ACK0         (Local ID Sequence)
     (Comparison with
      Remote ID Sequence)

                            TEXT -->
```

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.

The following question is asked only if Rerouting is generated in.

/DINIT: # OF REROUTING LINKS?

Enter the number of links connected to this node which 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.

Do not declare links to DS/1000 node neighbors as rerouting links, as these nodes can't support the rerouting features. 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.

The next two queries are only for nodes with Session generated in and initialized.

/DINIT: ENTER DEFAULT SESSION USER-NAME:

Enter the account name you want remote users to execute under when they access this node without performing a specific account logon. 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. Consult 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. Non-session access means a remote user can modify system discs and execute any RTE operator command in this Session Monitor node.

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 0 not be used as a node number. Zero is often used as a default value and may cause programming confusion.

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

Respond with one to seven values. This question will be asked for each node specified in response to the DINIT query, '# OF HP 1000 NODES?'

where:

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

LU — is 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 will cause rerouting to automatically find the most efficient path to this node and place that LU into the NRV. This field MUST be left blank (i.e. ,,) for rerouting to occur. Entering zero will cause LU 0 to be assigned to the communications link. Communication link numbers in the range 1-63 are valid for RTE-MIII nodes and RTE-L nodes. On RTE-IVB nodes the range is 1-255. 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. The HP 12771/12773 links require only 1 EQT and LU per link.

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

UPGRADE LEVEL — The software upgrade field has been defined to allow message format conversion between different versions of DS/1000. Enter '0' if the node described by this entry is DS/1000 and '1' if the node is DS/1000-IV. The default value is '1'.

"N" — An indication whether or not this node is a neighbor to the node which generated the query is now reflected in the Nodal Routing Vector. Enter 'N' if the node is a neighbor. If the LU field has been left blank because this is a rerouting link, this field must be left blank (i.e. ,,) and neighboring nodes will be filled into the NRV automatically.

"MA" — If the node has the Message Accounting feature generated in enter 'MA', otherwise leave blank. If the MA 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 an error message that Message Accounting has been turned off will be received.

MA TIME OUT — The MA time-out value is used to schedule the MA acknowledge requests. The default value is 3 seconds. The MA time-out 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, which can carry the acknowledgement is not generated before the idle timer expires (MA timeout /4 or 1 second, whichever is larger) an idle message is generated to return the acknowledgement. MA time-out values between 0 and 255 are accepted. However, the MA time-out should NEVER exceed the "Network" or "Nodal" Master Time-out. Choose your value based on the number of intervening nodes and the link rates. If you experience MA time-out errors (DS05(2), (too many retries by Message Accounting), or DS08(1), (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. /E terminates this question.

The cost value is a value from 1 to 99. A cost of 1 is considered the 'best' link to use in terms of efficiency. 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 trafficed 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 above is greater than the total number of LUs enabled here, DINIT aborts, printing /DINIT: NOT ENOUGH LINKS SPECIFED FOR REROUTING.

The next question is asked only if HP 3000s exist in the network.

/DINIT: LU OF HP 3000?

Respond with the positive value of the 3000 LU(s). This question is asked the number of times specified in response to "# HP 3000 LINKS?"

/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	APLDX

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 GENERATION Chapter.

NOTE:

TRFAS must be scheduled on RTE-A and RTE-6/VM systems using the DS transparency software for remote file access. TRFAS is part of the operating system software.

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 will allow 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 default (/D) the monitors to be scheduled, you will see the following error message indicating APLDX, for the memory only L-Series, is not present in the system.

/DINIT: ERROR: SC05 : APLDX

APLDX is required in memory based RTE-L systems only and this error can be ignored in all other systems.

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, INCNV, OTCNV, RPCNV, RPCNV, RQCNV, etc.) is not available, DINIT will respond with:

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

If you intend to load this program online later, this message can be ignored.

If the Remote File Access Module (RFAM) is scheduled, DINIT expects you to declare the total number of files that may be open from all nodes in the network at one time. The query displayed is:

/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.

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 INPUT # OF FILES request was greater than zero, RFAM allocates:

(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),

plus,

(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.

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

(3) 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.

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 will terminate with the message: END DINIT.

NOTE

It is strongly recommended that DINIT be run at bootup. If Session Monitor is installed, run DINIT immediately after Session Monitor initialization.

DINIT Secondary Execution Mode

The %DINIT version of DINIT provides a smaller module for initializing a DS network. The %DINIS version is larger, but provides the shutdown option. %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:

1) When the resources are required by another job.

2) When, for reasons of security, you want the node to be inaccessible from other nodes for certain periods of time.

3) To add or delete the HP 3000 link or change the link from HSI (hardwire) to PSI (modem).

4) 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:

a) The resources which 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 is logged off, and all allocated SAM are returned to RTE.

b) All communication logical units defined in the NRV are cleared. They will not respond to any incoming messages.

c) All slave monitors are aborted and their class numbers and any buffers outstanding are cleared. (Note: All files currently open to RFAM will be closed without posting current modifications. Files which have been written on but not yet closed or posted will be left corrupt.)

d) All master programs waiting for replies are given master time-out 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.

e) All local sessions created from remote nodes are logged off.

Any attempt to run the non-shutdown version of DINIT (%DINIT) after the node is initialized will result in the following message 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 message will appear.

/DINIT: SHUTDOWN?

Provide a NO answer and DINIT will exit. Provide a YES answer and the following will be displayed:

/DINIT: SHUTDOWN

/DINIT: # ACTIVE TCBS = 0

/DINIT: # ACTIVE REMOTE SESSIONS: 0

/DINIT: NETWORK MANAGEMENT SECURITY CODE?

Enter the correct security code and shutdown will occur. an incorrect security code and DINIT will abort. If the number of active TCBs of active TCBs and active remote sessions are not both zero, there are currently active transactions in the network and issuing the shutdown re quest will terminate 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 will enter the initialization mode

UNTIMELY INITIALIZATION MAY AGGRAVATE "NOT ENOUGH SAM" PROBLEM.

When a node is initialized, a block of SAM is allocated for the DS table areas (Transaction Control Blocks, Nodal Routing Vectors, Link Vectors, Cost Matrices, etc.) and not returned to RTE until DS is shutdown or the system is re-booted. Initializing DS while other programs have SAM blocks allocated, e.g. through uncompleted buffered I/O, REIO, and class I/O, may cause a severe case of SAM fragmentation. 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 for 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 program 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, it is best not to have frequent shutdown and initialization of 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 shutdown is absolutely necessary, initialize DS only after making sure no other programs have SAM blocks allocated.

The next time DINIT is scheduled, it will request initialization.

DINIT Program Operation

If there are two or more RTE nodes in the network, select two which 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. Note that:

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

2) If you are using the multiple-DCB version of RFAM in an RTE-MIII system, you are limited when specifying the number of files by the number of DCBs which RFAM can fit in the remaining memory in its partition. This will be calculated for you if you reply to the

question, "# OF FILES FOR RFAM?" with a -1. The single-DCB version limits you to one DCB, regardless of the answer to this question. The multiple-DCB version, if generated as a memory-resident program, will limit you to two DCBs.

When DINIT has completed successfully in both sides, run REMAT in one of the nodes. Use the SW and TE commands to send messages to the operator console at the other system. (Note: You must be sure that there are no programs waiting for input from the operator's console on the slave side or the request will time-out. 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 (TM in A/L-Series). Verify with an operator at the other system that the message appears. If not, note the error messages printed and consult the Error Messages section of the DS/1000-IV User's Manual for the remedy. 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 suggestions in the GENERATION Chapter of this 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).

DSMOD

Once your node has been initialized, you may schedule DSMOD to make adjustments to parameters set during initialization or to change timing parameters which are not set through DINIT questions.

In an initialized node, enter the scheduling command in the form:

From non-RTE-MIII: RU,DSMOD,input device or namr,error device

From RTE-MIII: RU,DSMOD,FI,LE,NM[,sc[,cr]]

where:

input device = 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:sc:cr of a local transfer file that must contain the response to DSMOD queries in the correct entry sequence.

When you execute DSMOD in a node that has been initialized, the interactive dialog begins with the DSMOD OPERATION query:

```
/DSMOD: OPERATION?
```

You may respond with any of the commands listed in Table 3-1.

NOTE

> Any parameter modifications made via DSMOD remain in effect until changed by running DSMOD again, or the node is re-booted.

NOTE

> If DS is shutdown while DSMOD is running, DSMOD may abort with a request error (RN02).

Running DSMOD with a transfer file may be useful if there are changes that need to be made on boot-up.

Example of DSMOD transfer file:

```
**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
**END DSMOD
/E
```

Table 3-1. DSMOD Operation Commands

Command	Description
??	Display a list of valid DSMOD commands.
/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 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 3000 makes a connection. The local ID sequence is sent to the 3000 and compared with the 3000's remote ID sequence. The 3000 then provides its local ID sequence to the 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. (/L will terminate any ongoing 1000-3000 activity, so it should not be used if anyone is using the link.)
/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.
/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 don't 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
APLDX				

/T	Timing adjustment. DSMOD will display current transaction time-out values and then accept new timeout values. Changing the Network master time-out is effective only for the 3000 link and those nodes which show a 0 time-out value in the NRV listing. (DSMOD operation /N.)
/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 time-out, upgrade level, and neighbor flag can be changed.
DI	Disable Line.

If you respond to the DSMOD OPERATION query with anything other than the commands listed in Table 3-1, DSMOD displays a list of valid commands.

EXAMPLES

The following examples show some typical results in response to your entry of a /DSMOD: OPERATION? command. In these examples, typical user responses are underscored.

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
```

ABORT DSMOD EXECUTION

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

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

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

END DSMOD OPERATION PHASE

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

CHANGE ID SEQUENCES

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

You may enter from 1 to 15 characters or /D which provides no ID sequence. 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 you can insure no accidental connection to the wrong HP 3000 will occur.

LINE RE-ENABLE

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

A /L command may be used to enable a DS/1000 link not previously enabled, recently connected, or recently repaired. 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. /L can also be used to enable the link to an HP 3000.

NODAL ROUTE VECTOR LIST

```
/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?
```

You may use this command to determine whether or not 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.

INTERPRETING THE NRV PRINTOUT

The above NRV printout indicates the following:

LOCAL NODE # IS 33 and presently uses LU 14
to communicate with nodes 1, 8, and 11

The master time-out for communication with Node 11 has been overridden to 60 seconds. From this, we can infer that node 1 (which does not have a time-out 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:

```
   NODE  LU # 14  NODE             NODE            NODE
    33 ----------> 1 ----------> 11 ----------> 8
```

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

The '(N)' indicates neighbor node. This information is used as a check for allowing neighbor node addressing.

CHANGE NON-SESSION PASSWORD

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

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

QUIESCE NODE

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

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

RESTART QUIESCENT NODE

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

This operation and the /T operation are the only requests allowed in a quiescent node. Once entered, the /R operation allows network activity to continue. Note that 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 Chapter 4.

SCHEDULE MONITOR

```
/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?
```

NETWORK TIMING ADJUSTMENT

```
/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
```

If you wish to change some but not all of these values, respond with a space and carriage return to those you wish to leave unchanged.

The /T operation and the /R operation 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. Transaction timing details are discussed in the TRANSACTIONS TIME-OUT section of this chapter.

DSMOD's /T command allows you to modify the "Network" timing values for the master request and slave request, to modify the number of retries for a "remote node is busy" condition, to modify the amount of time for a master program suspension between retries in the case of a "remote node is busy" condition, to adjust the maximum hop count, and the maximum line down count.

The Network Master Time-out value is adjusted with the /T command and is only used with messages originated from nodes which have defaulted (assigned 0) to their Nodal Master Time-out in their NRV. If a value greater than zero was assigned in response to the following question during initialization, that Nodal Master Time-out overrides the Network Master Time-out.

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

When you provide a non-zero value for the Nodal Master Time-out during initialization, the value is then not alterable later with the DSMOD /T command. You must use the DSMOD 'CN' command.

A Master Time-out 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 time-out occurs, system resources allocated for the transaction are returned to the system and the error DS05(0) or DS05(1), request time-out, 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.

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

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.

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 will continue 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. It is recommended that this value be specified as zero (default condition) until you have more experience using your network. If you specify a non-zero value here and error conditions that result in an DS08(0) error message are encountered, 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 which can never be resolved.

The Max 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 which 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 Max Hop Count defaults to the number of nodes in the network.

The Max Line Down Count is the number of times an irrecoverable failure can occur on a line in a 5 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.

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 time-out 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
```

CHANGE DEFAULT SESSION USER NAME

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

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. 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.

CHANGE NRV

```
/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?
```

The 'CN' command allows you to change the LU, Nodal master time-out, 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 Time-out, when specified non-zero, overrides the Network Master Time-out displayed by the DSMOD /T command. It is used for all messages directed to this node.

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
```

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. (50 second timeout on the request.)

See Chapter 3 of the DS/1000-IV User's Manual for more information.

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.

Verifying an HSI DS/1000/3000 Link

If a link to an HP 3000 does not exist you may go on to the next section.

For hardwire (DVG67) links to the HP 3000 the following message should appear:

```
>> HP 3000 COMMUNICATION LINK *UP*
```

should appear as soon as the DINIT initialization questions are answered (if the line has been opened on the HP 3000 side). Consult the Distributed System Network 3000-to-1000 Reference Manual for information on opening the link on the MPE side.

Logging Onto 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 to an MPE node, and log on. If no LU nomber is provided in the SW command, the default of the first entry in the 3000 LU list is used. For X.25 links, use a pound sign (#) followed by the X.25 address of the 3000, e.g., 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 commands, such as LISTF and SHOWJOB. (Consult the appropriate HP 3000 documentation for the description of these commands. Remember, when logged onto a HP 3000, your terminal becomes a "virtual HP 3000 terminal" even though it is connected to an RTE.) Figure 3-1 shows an example of the log-on procedure. Consult the DS/3000 to DS/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 1000 side.

```
{For PSI links, DSLIN must have been run to establish the link}

:RU,DSLIN,31,-,P
:RU,RMOTE                          RMOTE scheduled.
                                   It starts in local mode ($).

$SW,31                             Switch to 3000 on LU 31. Note
                                   that the prompt character changes
                                   (#).

#HELLO MANAGER.RTE                 Log-on dialog entered.

HP3000 / MPE III B.01.0  MON, MAY 19, 1980,  5:56 PM

                                   Response by HP 3000 when session
                                   is initiated.

#SHOWJOB                           Enter an MPE command.

                                   Response by MPE:

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 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)

 CPU = 1  CONNECT = 4    MON, MAY 19, 1980,  5:59 PM
 END RMOTE
                                   End of Session message
```

Figure 3-1. Sample HP 3000 Log-On Procedure

Communications Bootstrap Loader (CBL)

The Communications Bootstrap Loader (CBL) is a simple bootloader contained on the DS/1000-IV Initial Binary Loader Firmware. It may be used to load any absolute binary file into a memory based M, E or F-Series system from another RTE node. The neighbor must have a file system or use the store-and-forward version of PROGL (%PROGZ), the DS/1000-IV software must be initialized, and PROGL must be an active monitor. PROGL can support up to 20 active down-loads at the same time, with up to 28 more down-loads queued up.

There are two CBL loader ROM's; 91750-80018 is used with DS/1000-IV and the HDLC cards, 91740-80048 previously supplied with DS/1000 and used with the 12771/12773 cards. Both ROM's operate as described below.

The primary purpose of the CBL is to boot up a memory-based operating system by down-loading system generation files stored at another node. These files can be created by using the appropriate operating system generator to produce an absolute binary operating system.

Like other HP bootloaders, after the user has selected the CBL loader ROM, the CBL is loaded into memory when the IBL switch on the front panel is pressed. See your computer's Operating and Reference Manual for instructions. The same error-detection capability exists in both CBL-to-RTE and RTE-to-RTE communication.

The requirements for the CBL are:

- The local node must be connected to an RTE node which has been initialized via DINIT.

- On DVA65 links, both nodes must have the DS/1000 Driver Microcode ROMS properly installed.

- The neighbor RTE node must have the program down-load monitor (PROGL) as an activated monitor (DINIT activates all slave monitors, or a subset requested by the user, at initialization time).

- The program or operating system to be down-loaded must be contained in an absolute binary file with a unique name starting with the letter P and containing exactly 5 octal digits (e.g., P00000, P00001, etc.). The file cannot have a negative file security code and it should be uniquely named as a cartridge reference number may not be specified. It must reside on a system cartridge.

When you wish to down-load an RTE-IVE system, you specify the numeric part of the file name via the switch register (the letter "P" is assumed). For example, if the system you wish to boot-up is stored in a file named P12345, you would set the switch register as shown in Figure 3-2.

```
              Example: File name = P12345

                      BIT NUMBER
|15|14|13|12|11|10| 9| 8| 7| 6| 5| 4| 3| 2| 1| 0|
-------------------------------------------------
   |        |        |        |        |
 0  0  0  1  0  1  0  0  1  1  1  0  0  1  0  1

                    SWITCH SETTING
                     0  =  "off"
                     1  =  "on"
```

Figure 3-2. Example File Name Switch Register Setting

NOTE

If the computer has the Remote Program Load (RPL) feature, you must be sure the selection switch is in the OPERATE position. If it is in the LOCK position, you cannot load data into the switch register. (See the section on Remote Program Loading later in this chapter.)

Operation

To Request a program down-load from an RTE node:

1) Halt the computer.

2) Set the switch register as follows:

   bits 14 & 15: address of CBL Firmware loader (See Table 3-2)

   bits 13 thru 6: I/O select code of the communications interface (modem or hardwired)

   bits 5 thru 0: Don't Care. (See the TIMESAVER section below.)

3) Press PRESET and IBL.

4) Clear the Switch Register and STORE the number of the program file in it. The number is the octal representation of the numerical part of the file name. For example, if the file name is P00000 then set the Switch Register to 00000. If the file name is P00400, then set the Switch Register to 00400.

5) Press RUN. The Switch Register lights will blink as the system load takes place. When the down-load is complete, the boot-loader will begin execution at location 2. In the case where an RTE-MIII operating system has been transferred, the operating system will initialize itself and print "SET TIME" on the system console indicating it is running.

In Chapter 2 there is a discussion of how to obtain messages each time a cold-load is begun and the cold-load's completion status.

Table 3-2. CBL Firmware Loader Selection

BITS 15	BITS 14	Loader Selected
0	1	Loader # 1
1	0	Loader # 2
1	1	Loader # 3

\ RPL requires Loader
/ #2 or #3 be selected

When the CBL Firmware is installed, be sure to keep a record of the Loader number, the socket number where the CBL Loader Firmware was installed, the switch register setting for booting up (including the interface select code), and the CBL Switch Register settings and operating instructions by the computer for use by the system operators.

Timesaver

As a time-saving step, you may avoid step 4 above by supplying the program number in bits 5 through 0 of the switch register in Step 2. This can only be done if the CBL Firmware is installed in sockets 2 or 3 (i.e., you select it with bit 15 set in the switch register). The program number must be in the range 0 through 77 (octal) inclusive.

If you wish to use the "time-saving" feature, simply set the switch register as shown below, press PRESET, IBL, and RUN. Your boot-load will begin.

15 14	13 12 11 10 9 8 7 6	5 4 3 2 1 0
Loader ROM	Select Code of Loader ROM	Octal File # (0-77)

If you do not wish to use the "time-saving" feature, set the switch register as described in Step 4 of the previous section on OPERATION.

Table 3-3. Communication Bootstrap Loader Error Codes

Switch Register Contents	Explanation
177777 (-1)	An error occurred when an attempt was made to "open" the file specified. Possibilities include: the file does not exist under the name specified (see the name-forming rules described above), the file has a negative security code, the file is currently being shared by eight programs, the file is used exclusively by an active program, the file may exist only on a private or group cartridge (Session Monitor nodes), or the disc is locked. A more complete description of these restriction may be found in the RTE-IVB Programmer's Reference Manual.
177776 (-2)	File-read error or the checksum word in the record did not match the value computed by PROGL. The file specified exists but is not in binary absolute format or has been corrupted somehow. Existence of a corrupt file can be verified by DUmping the file from the node where it resides to the bit bucket. For RTE-MIII, use binary absolute format, BA. If the file is corrupt File Manager will return an error telling you so. See the error possibilities for the subroutine "READF" in the RTE-IVB Programmer's Reference Manual.
177775 (-3)	An error was detected by the remote system driver. Possibilities include: parity error, line time-out on local side, and improper installation of either DS/1000-IV Communication Firmware or CBL Firmware.

A CBL error is handled in one of two ways depending on whether the CPU has the RPL (Remote Program Loading) feature or not.

Without the RPL feature, the CPU will perform a HLT 55B (102055B). At this point it is necessary to select the S-register to see the error displayed. The Switch Register may contain one of the error codes in Table 3-3, indicating that the CBL request has at least been successfully sent to the other node and it is the other node having trouble in honoring that request. If the Switch Register does not contain any of those error codes, the A-register may contain the last protocol word sent out. This indicates that the CBL node is having problems in sending out the request. Under this condition, the program CBL65 in DS/1000 nodes and the HDLC cards in DS/1000-IV nodes has sent out the request 8 times already before coming to a halt. Check the PROGL extended down load message for an indication of the error.

With the RPL feature, the CPU will not halt. Instead it will automatically repeat the CBL request to the other node. This will continue indefinitely until the cause of the problem is resolved. The download logging option of PROGL (see the GENERATION Chapter, or the "Extended Download Message" section of this chapter) can be invoked to monitor the error retries.

Remote Program Loading

On computers having the Remote Program Loading (RPL) feature, the automatic initialization feature may be used to cause an RTE-MIII or RTE-L operating system to be down-loaded automatically upon application of power to the computer. The Communications Bootstrap Loader (CBL) or the Virtual Control Panel (VCP) on the L-Series is executed whenever power to the computer is turned on. Details of the L-Series procedure are found in the DSVCP Chapter later in this manual. In addition to the CBL requirements, you must have the following:

1) The desired operating system stored in a file at a neighboring computer under the name of P00000 or P00001, because only one bit in the special RPL configuration block is available for selecting the file name. (See the Programming and Operating manual for your computer for the relationship between RPL description block and the switch register. See the Communication Bootstrap Loader section in this chapter for a discussion of the settings of the switch register for the CBL.)

2) The CBL must be in Loader Socket number 2 or 3 because the configuration block "bit" (switch) corresponding to switch register bit 15 must be set in order to enable RPL. The RPL will down-load an operating system. See the following section for a description of the PASS program required to initialize the node automatically.

NOTE

For information on forced cold loads to E-,F-,L- and A-Series machines, see Chapter 4 of the Network Manager's Manual, Vol. II.

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 #RTM1 and #RMT2 (see Figure 3-3 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-IVE or mapped RTE-L systems involves several separate but automatically "chained" downloads from a single file. Each "continuation" download is an RTE-IVE partition or an RTE-XL 32k block. The fallback node will only be tried if an error occurs in downloading the first piece partition of the RTE-IVE operating system or the first 32k of the RTE-XL system. Thereafter, the node number becomes committed, and subsequent errors will result in failure of the download.

Example routine (appended to Store-and-Forward PROGL):

```
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
```

Figure 3-3. Example Routine for Store-and-Forward PROGL.

LU to File Conversion PROGL

In a network where there are 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)
FILE NAME	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. The user can create any algorithm desired to convert the LU and file number to the true system file. (Perhaps make the first two characters "P0", characters 3-4 = link LU, and the last two characters equal the file number or use a simple table look-up scheme). It is highly recommended that if a table look-up scheme is used, the user should 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 (see #PRGL in this chapter). Should an improper name be requested, the user can easily determine what has occurred.

SECOD and CRN 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.

NOTE: Whatever algorithm is implemented by the user, it should always return the same filename 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.

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 (Disc-based Nodes)

Automatic network initialization is accomplished by building a file at each node containing the answers to DINIT for initialization. Create or modify an existing WELCOM file (Note: the RTE File Manager in RTE-IVBs will automatically transfer to the WELCOM file upon bootup, if it exists) which runs DINIT.

```
WELCOM T=00004 IS ON CR00002 USING 00001 BLKS R=0005

                              Comments (not contained in the file)

0001 :SV,1                    Command file will not be printed
0002 :PK,2                    Pack the system disc
0003 :CN,7,20B                Enable LU 7
0004 :SE,0                    Initialize global parameter
0005 :TE,TYPE ':,1' TO INITIALIZE NODE FOR DS/1000 COMMUNICATIONS
                              Print this message to the terminal
0006 :PA,,TYPE 'TR'  TO EXCLUDE INITIALIZATION
                              Print this message to the terminal
0007 :IF,1G,NE,1,1            Test operator response
0008 :RU,DINIT,DSFILE         Initialize  the node if response is :,1
0009 :EX                      End WELCOM
```

Figure 3-4. Sample WELCOM File.

In this example, DSFILE is the name of the file containing the node initialization answers for DINIT. If no operator is present and the system console has a time-out, or the operator misunderstands the directions, no initialization will take place.

If you have modified the time-outs at a node, you should include them in the initialization file commands to adjust the master and/or slave DINIT time-outs. Line time-outs can be set in the WELCOM file as follows:

```
:SYTO,ee,nn
```

where:

ee = EQT number.

nn = new line time-out.

Setting these time-outs should be done before running DINIT and care should be taken to ensure that the time-out values are the same on both sides of the link. A sample WELCOM file is shown in Figure 3-4. The DINIT initialization file is one which contains the answers you gave DINIT (as shown in the section on FIRST TIME NETWORK INITIALIZATION) is used so that the WELCOM file can automatically initialize the node.

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 up to 24 hours later. If it is necessary to reset the system time, be sure to reschedule these programs.

Figure 3-5 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 HP3000 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
```

Figure 3-5. Sample DINIT Initialization File.

```
*
* 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
```

Figure 3-5 Continued. Sample DINIT Initialization File.

Figure 3-6 shows a sample interactive DINIT Initialization execution 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
```

Figure 3-6. Sample Interactive DINIT Initialization (RTE-to-RTE).

If you wish to have control over whether a node is initialized or not at each bootup, you can accomplish that using a WELCOM file. Using the WELCOM file from Figure 3-4, the following will appear on the system console:

```
TYPE ":,1" TO INITIALIZE NODE FOR DS/1000-IV COMMUNICATIONS
TYPE "TR" TO EXCLUDE INITIALIZATION
```

The operator types:

```
:,1
```

and DINIT is scheduled with the command file DSFILE.

The system displays the message:

RFAM: LIMITED DISC SPACE, THE NO. OF FILES HAS BEEN LIMITED TO <nn>

NOTE

> Since the answer to the question "INPUT # FILES?" was given as -1, RFAM uses the number of DCBs available in its partition and prints this number as <nn>.

Automatic Initialization

Automatic initialization is also possible in RTE-IVE, RTE-XL, RTE-L, and RTE-MIII systems which do not have a file system. DINIT is passed the initialization answers via a DS supported subroutine, BFPAS.

Use the start-up program feature in the BUILD program for RTE-XL and in the generation process itself for RTE-IVE, RTE-L, and RTE-MIII 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 shutdown version of DINIT is available), and for 'DSMOD' (used to adjust timing, look at or modify the NRV, enable communications LUs, etc.).

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:

1) The network user and management security codes are not available in a file accessible to any user.

2) The initialization answers can only be modified by someone who knows and has access to the initialization program.

Features of programmatic initialization are:

1) BFPAS is a FORTRAN-callable subroutine, which facilitates writing the initialization program in higher-level languages.

2) 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).

The method described above is not backwards compatible with the programmatic initialization method used before Revision Code 2113. However, initialization via disc files remains the same. It is quite easy to convert to the programmatic initialization procedure required after the 2113 Revision. These changes are only necessary in nodes being upgraded to Revision Code 2113 DS/1000-IV software. Whether or not various nodes elsewhere in the network are upgraded does not affect the decision at the local node. If the node must be upgraded to Revision Code 2113 for other reasons, the 2113 Revision Code of DINIT must be included and the upgrade programmatic initialization is required. Examples are given in this section to show how to use the programmatic initialization method.

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, etc.).

In some RTE systems, such as RTE-4E and RTE-XL, 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 down-loaded 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 EXEC termination call MUST immediately follow the call to MESSS.

Example:

```
FTN4X,L
      PROGRAM PASS
      INTEGER MESSG(14)
      DATA MESSG/28HOF,PASS,8                     /
      ....
      ....
      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 the Programmatic Initialization Method:

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. It is called as follows:

```
CALL BFPAS(IPRGM,IBUF,IBFLN,IRCLN,IERR)
```

where:

```
IPRGM = 0  for DINIT
      = 1  for DSMOD
           anything else results in an error

IBUF  = buffer of responses (see examples)

IBFLN = length of entire buffer (in words)

IRCLN = length of each response (in words)
   ** Each response must be the same length

IERR  = error return code
      = 0  no error
      = 1  invalid value for IPRGM
      = 2  DINIT or DSMOD terminated and all the
           responses had not been used
      = 3  error in command buffer
      = 4  DINIT or DSMOD aborted
      = 5  DINIT or DSMOD scheduling error
           (call ABREG for actual error)
```

No comments are allowed in the buffer of responses when using BFPAS.

Internal Operation of BFPAS:

1) BFPAS schedules DINIT or DSMOD "with wait".

2) DINIT/DSMOD terminates, indicating in its return parameters that it needs another input line.

3) 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".

4) 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.

5) 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.

Example #1--Initialization Method (Assembly Language)

This example shows the use of the BFPAS subroutine call. Note that the answers buffer (BUF) is not restricted to 128 words (the initialization answers have been expanded to illustrate this).

```
                         ASMB,Q
      00000                         NAM PASS,19 NODE 3 INITIALIZATION
*
          THIS EXAMPLE SHOWS HOW EASY IT IS TO INITIALIZE A
          DS/1000-IV NODE WITH REV 2113 SOFTWARE ('BFPAS' SUBROUTINE)
*
                                    EXT EXEC,BFPAS,CNUMD
                                    SUP

      00000              PASS       EQU *
*
      00000 000002X                 JSB BFPAS      SCHEDULE DINIT WITH 3 PARAMS
      00001 000007R                 DEF *+6
      00002 000024R                 DEF D0         CODE FOR DINIT TO BE SCHEDULED
      00003 000030R                 DEF BUF        BUFFER OF RESPONSES
      00004 000361R                 DEF LEN        LENGTH OF BUFFER (IN WORDS)
      00005 000362R                 DEF RLEN       LENGTH OF EACH RESPONSE
      00006 000405R                 DEF IERR       ERROR RETURN
*
          PRINT "NODE # 3 INITIALIZED"
*
      00007 000003X                 JSB CNUMD
      00010 000013R                 DEF *+3
      00011 000405R                 DEF IERR
      00012 000401R                 DEF .ER
*
      00013 000001X                 JSB EXEC
      00014 000021R                 DEF *+5
      00015 000026R                 DEF D2
      00016 000025R                 DEF D1
      00017 000363R                 DEF MSG
      00020 000404R                 DEF MSGL
*
      00021 000001X                 JSB EXEC       TERMINATE.
      00022 000024R                 DEF *+2
      00023 000027R                 DEF D6
```

```
00024 000000  D0     DEC 0
00025 000001  D1     DEC 1
00026 000002  D2     DEC 2
00027 000006  D6     DEC 6

** BUFFER FOR DINIT INITIALIZATION
00030                BUF    EQU *
00030 054505              ASC 7,YES
00037 047117              ASC 7,NO
00046 027504              ASC 7,/D
00055 030040              ASC 7,0
00064 033040              ASC 7,6
00073 032440              ASC 7,5
00102 031440              ASC 7,3
00111 030440              ASC 7,1
00120 031054              ASC 7,2,
00127 031440              ASC 7,3
00136 032040              ASC 7,4
00145 033040              ASC 7,6
00154 030460              ASC 7,10
00163 030465              ASC 7,15
00172 030467              ASC 7,17
00201 030471              ASC 7,19
00210 031061              ASC 7,21
00217 034440              ASC 7,9
00226 030464              ASC 7,14
00235 027505              ASC 7,/E
00244 050124              ASC 7,PTOPM
00253 047520              ASC 7,OPERM
00262 042114              ASC 7,DLIST
00271 042530              ASC 7,EXECM
00300 042530              ASC 7,EXECW
00307 050122              ASC 7,PROGL
00316 051106              ASC 7,RFAM
00325 026461              ASC 7,-1
00334 027505              ASC 7,/E
00343 042123              ASC 7,DS
00352 042123  DS     ASC 7,DS              MANAGEMENT S.C.
00361 000331  LEN    ABS *-BUF        NOTE: NEED NOT BE < OCT 200!!
00362 000007  RLEN   DEC 7            EACH RECORD LENGTH

00363 047117  MSG    ASC 10,NODE #3 INITIALIZED
00375 020111         ASC 4, IERR=
00401 020040  .ER    ASC 3
00404 000021  MSGL   ABS *-MSG

00405 000000  IERR   NOP
00406                BSS 0            LENGTH OF PASS
                     END PASS
**  NO ERRORS *TOTAL **RTE ASMB 92067-16011**
```

Example #2--Initialization Method (FTN4X)

This example shows a FORTRAN-IVX call to BFPAS. It also checks the error return parameter (IERR), and prints either "NODE # 3 INITIALIZED" or "NODE # 3 NOT INITIALIZED,IERR=xxxxxx", where xxxxxx = 6-digit decimal ASCII field.

```
FTN4X,L
      PROGRAM PASS(19), EQUIVALENT FTN4X INITIALIZATION--EXAMPLE
C
C     THIS IS THE EQUIVALENT FORTRAN-IVX PROGRAM TO INITIALIZE
C     A DS/1000-IV NODE WITH REV 2113 SOFTWARE ('BFPAS'
C     SUBROUTINE).

      COMPLEX MSG2X(5)
      INTEGER BUFFER(96),MSG2(20)
      INTEGER RLEN
C
      EQUIVALENCE (MSG2X(1),MSG2(1))
C
      DATA BUFFER/6HYES    ,
     &6HNO    ,
     &6H/D    ,
     &6H0     ,
     &6H6     ,
     &6H5     ,
     &6H3     ,
     &6H1     ,
     &6H2     ,
     &6H3     ,
     &6H4     ,
     &6H6     ,
     &6H10    ,
     &6H15    ,
     &6H17    ,
     &6H19    ,
     &6H21    ,
     &6H9     ,
     &6H14    ,
     &6H/E    ,
     &6HPTOPM ,
     &6HOPERM ,
     &6HDLIST ,
     &6HEXECM ,
     &6HEXECW ,
     &6HPROGL ,
     &6HRFAM  ,
     &6H-1    ,
     &6H/E    ,
```

```
     &6HDS    ,
     &6HDS    /
      DATA LEN/96/
      DATA RLEN/3/
      DATA MSG2X/40HNODE #3 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(2,1,19HNODE #3 INITIALIZED,-19)
      IF(IERR .NE. 0) CALL EXEC(2,1,MSG2,MES3L)
C**************************************************************
C                   TERMINATE
C**************************************************************
      END
```

** NO WARNINGS ** NO ERRORS ** PROGRAM = 00182 COMMON = 00000

Example #3--RTE-L Initialization

In the previous examples, the RTE clock was not set. Thus, any messages which may be printed later would not reflect the correct time. This 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.

```
FTN4X,L
      PROGRAM STIME(19,70),SET TIME AT RTE-L VIA DS * 810210
C*************************************************************
C   SET TIME IN AN RTE-L FROM NODE PASSED AS PARAMETER
C*************************************************************
      IMPLICIT NONE
      INTEGER IA, IB, P(5), NODE, KCVT, ERROR
      INTEGER ERMSG(5), BFERR(13), TIME(15), DTIME(5), DYEAR
      INTEGER OFUPLN(6), OFMATC(6), ONUPLN(6)
      INTEGER MONTH(12), IMONTH, IDAY, MOD
C*************************************************************
C   DINIT ANSWERS TO BRING UP NODE
C*************************************************************
      INTEGER ANSWER(294)
      DATA ANSWER/
     1 'YES          ', 'NO           ', '/D           ',
     2 '34,4         ', '35           ', '2            ',
     3 '6            ', '1,,,1,,MA    ', '2,,,1,,MA    ',
     4 '3,,,1,,MA    ', '4,,,1,,MA    ', '10,,,1,,MA   ',
     5 '20,,,1,,MA   ', '21,,,1,,MA   ', '22,,,1,,MA   ',
     6 '23,,,1,,MA   ', '24,,,1,,MA   ', '30,,,1,,MA   ',
     7 '31,,,1,,MA   ', '32,,,1,,MA   ', '40,,,1,,MA   ',
     8 '41,,,1,,MA   ', '42,,,1,,MA   ', '43,,,1,,MA   ',
     9 '50,,,1,,MA   ', '60,,,1,,MA   ', '61,,,1,,MA   ',
     * '100,,,1,,MA  ', '500,,,1,,MA  ', '600,,,1,,MA  ',
     1 '1001,,,1,,MA', '2000,,,1,,MA', '2001,,,1,,MA',
     2 '2002,,,1,,MA', '2007,,,1,,MA', '2008,,,1,,MA',
     3 '2009,,,1,,MA', '2020,,,1,,MA', '2021,,,1,,MA',
     4 '2022,,,1,,MA', '4000,,,1,,MA', '6            ',
     5 '21           ', '23           ', '/E           ',
     6 '/D           ', '-1           ', 'DS           ',
     7 'DS           '/
C*************************************************************
C   ERROR MESSAGE FOR BFPAS
C*************************************************************
       DATA DBERR/'BFPAS RETURNED ERROR......'/
C*************************************************************
```

```
C   OPERATOR REQUESTS TO TURN OFF UPLIN AND MATIC
C************************************************************
      DATA OFUPLN/'OF,UPLIN,FL '/
      DATA OFMATC/'OF,MATIC,FL '/
C************************************************************
C   TM OPERATOR REQUEST FOR MESSS GOES IN THIS BUFFER
C************************************************************
      DATA TIME/'TM,   ,   ,   ,   ,   ,        '/
C                 1 2 3 4 5 6 7 8 9 * 1 2 3 4 5
C************************************************************
C   OPERATOR REQUEST TO TURN ON UPLIN
C************************************************************
      DATA ONUPLN/'ON,UPLIN,NOW'/
C************************************************************
C   DS ERROR MESSAGE
C************************************************************
      DATA ERMSG/'     ERROR'/
C************************************************************
C   NUMBER OF DAYS IN EACH MONTH OF THE YEAR
C************************************************************
      DATA MONTH/31,28,31,30,31,30,31,31,30,31,30,31/
C************************************************************
C-- BEGINNING OF PROGRAM --
C
C   GET REMOTE NODE NUMBER FROM SCHEDULING PARAMETER
C************************************************************
      CALL RMPAR(P)
      NODE = P(1)
C************************************************************
C   SCHEDULE DINIT AND INITIALIZE NODE
C************************************************************
      CALL BFPAS(0,ANSWER,294,6,ERROR)
      IF(ERROR .NE. 0) THEN
C*********************************************************
C      PRINT ERROR AND RETURN INDICATOR TO FATHER
C*********************************************************
         CALL CNUMD(ERROR,BFERR(11))
         CALL EXEC(2,1,BFERR,13)
         DTIME(1) = -2
         DTIME(2) = ERROR
         DTIME(3) = 0
         GO TO 890
         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
```

```
C*******************************************************
      IF(MOD(DYEAR,4) .EQ. 0)MONTH(2)=29
C*******************************************************
C    COUNT UP MONTHS AND COUNT DOWN DAYS
C*******************************************************
      IMONTH = 1
      IDAY = DTIME(5)
   30 IF(IDAY .GT. MONTH(IMONTH))THEN
         IDAY = IDAY - MONTH(IMONTH)
         IMONTH = IMONTH + 1
         GO TO 30
         ENDIF
C*********************************************************
C   CONVERT TIME TO ASCII AND FORMAT INTO TM REQUEST.
C*********************************************************
      TIME(3) = KCVT(DTIME(4))
      TIME(5) = KCVT(DTIME(3))
      TIME(7) = KCVT(DTIME(2))
      TIME(9) = KCVT(IMONTH)
      TIME(11) = KCVT(IDAY)
      CALL CNUMD(DYEAR,TIME(13))
C*********************************************************
C   TURN OFF UPLIN AND MATIC
C*********************************************************
      CALL MESSS(OFUPLN,12,1)
      CALL MESSS(OFMATC,12,1)
C***************************************************************
C  NOTE: DMESS IS USED FOR "TM" AND "ON" REQUESTS BECAUSE THE
C        RTE-L MESSS CANNOT HANDLE THEM. FOR THESE TO WORK,
C        OPERM MUST BE SCHEDULED IN THE L NODE.
C
C   SEND TIME TO RTE-L AND PRINT RETURNED MESSAGE
C***************************************************************
      CALL DMESS(-1,TIME,30)
      CALL ABREG(IA,IB)
      CALL EXEC(2,1,TIME,IA)
C*********************************************************
C   TURN UPLIN BACK ON. (UPLIN TURNS MATIC ON, IF NEEDED)
C*********************************************************
      CALL DMESS(-1,ONUPLN,12)
      GO TO 900
C*********************************************************
C   ERROR IN DS/1000-IV TIME CALL. REPORT IT.
C*********************************************************
  800 CALL ABREG(IA,IB)
      ERMSG(1) = IA
      ERMSG(2) = IB
      CALL EXEC(2,1,ERMSG,5)
C********************************************************
C   INDICATE ERROR TO FATHER BY RETURN PARAMETERS
C********************************************************
```

```
      DTIME(1) = -1
      DTIME(2) = IA
      DTIME(3) = IB
  890 DTIME(4) = 0
      DTIME(5) = 0
C******************************************************
C   ALL DONE
C******************************************************
  900 CONTINUE
      CALL PRTN(DTIME)
      END

 FTN4X COMPILER: HP92834 REV.2101 (800905)

  **  NO WARNINGS **  NO ERRORS **   PROGRAM:   553    COMMON: (NONE)
```

In memory-based systems, it may be convenient to bring some of the DS monitors across the link after DS has been initialized via FLOAD calls. One advantage of this approach in RTE-MIII is that many applications require more programs than will fit in the 32k memory-image which is first transferred when the node boots up. Another advantage, which applies to other RTE systems as well, is that the monitor may be changed (updated) on-line and replaced without rebooting the node.

To facilitate this, DINIT allows you to specify slave monitors which may not have been loaded into memory. The slave monitor must have one of the following monitor names:

```
CNSLM    EXECM    OPERM    PROGL    RDBAM
DLIST    EXECW    PTOPM    RFAM     VCPMN    APLDX
```

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 time-out error.) Until the monitor is loaded, incoming requests for its services will be rejected with a DS06 error.

It is recommended that only those monitors which are used be named, since each one named causes a class number to be allocated, whether or not it exists.

Installing the RMOTE Move Command Slave Program

The RMOTE MOve command is implemented as a PTOP program pair with RMOTE being the master on the RTE node and a program called COPY3K.PUB.SYS the slave program on the MPE node. The slave program COPY3K must be installed in the PUB.SYS account on the HP 3000. MVCP3 is only to be used for the purpose of transferring the file !COPY3 to the MPE file COPY3K.PUB.SYS.

The parts of DS/1000-IV 91750 product which do the installation are:

!COPY3	MPE executable binary file containing COPY3K
%MVCP3	RTE relocatable file containing MVCP3

The program MVCP3 copies !COPY3 from RTE to the MPE file COPY3K.PUB.SYS. Once the file is installed, MVCP3 is no longer needed and may be deleted from the RTE system. (Copies of %MVCP3 and !COPY3 should be kept, however, in case !COPY3 ever needs to be replaced on the MPE system.) It must be scheduled from RMOTE after logon to the HP 3000 MANAGER.SYS account. If you're not logged on as MANAGER.SYS an error will occur when closing the 3000 file. You should SWitch back to the 1000 node and run MVCP3. The following commands should be entered:

```
:RU,LOADR,,%MVCP3,,SS
:RU,RMOTE
$SW
#HELLO MANAGER.SYS ....
#SW
$RU,MVCP3[,logging LU[,security[,cartridge]]]
```

where all three parameters are optional.

"logging LU" is the LU used to report errors and status. Default is the value returned by LOGLU.

"security" is the security code of the file !COPY3 (default is 0).

"cartridge" is the cartridge reference number (or negative disc LU) of !COPY3 (default is 0).

When MVCP3 is scheduled, it checks the fifth run string parameter to see if it's a negative SMP number. If it is positive or zero, MVCP3 prints:

MVCP3 MUST BE RUN FROM RMOTE (AFTER LOGON TO MPE)

and aborts. Once the SMP number is verified and the session established (via PRCNM), MVCP3 opens !COPY3 with the security and cartridge specified with the run parameters. If an error is encountered the message

```
FMP ERROR n OPENING !COPY3:sc:cr
```

is printed (where "n" is the FMP error code). If the file type of !COPY3 is not type 1, MVCP3 prints the error message

```
!COPY3 IS FILE TYPE     n, NOT TYPE 1
```

MVCP3 creates COPY3K.PUB.SYS on the 3000. If an error occurs it will be displayed in the following format:

```
MPE ERROR n OPENING COPY3K.PUB.SYS
```

After both files have been successfully opened, MVCP3 prints

```
BEGINNING TRANSFER OF !COPY3 TO COPY3K.PUB.SYS
```

and starts reading !COPY3 on the 1000 and transferring it to COPY3K.PUB.SYS on the 3000 using RFA. 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 message

```
BAD LENGTH IN FILE !COPY3
```

is printed and MVCP3 aborts. This indicated the file !COPY3 which MVCP3 opened (you may not have specified the CRN) is not the proper file.

When end-of-file is read at RTE, both files are closed. At MPE this causes the file to be created, and it is possible an error may occur. If there is an error, it is reported with

```
MPE ERROR n CLOSING COPY3K.PUB.SYS
```

This error will occur if you are not logged on as the system manager.

Here is an example of how to load and run MVCP3:

```
:RU,LOADR,,%MVCP3,,SS
:RU,RMOTE
$SW,LU
#HELLO MANAGER.SYS/PASSWORD (See HP 3000 System Manager for
                            password)
```

```
#SW
$RW,MVCP3
$EX
```

If no errors were reported, the slave is installed and the MO command can be used. The MO command is described in the User's Manual.

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.

Increasing Message Converter Buffer Sizes

DS/1000-IV is supplied with two programs INCNV and OTCNV, which are used only for converting messages to and from DS/1000 nodes. These converters have 1024-word buffers in their program space to contain the data portion of any message requiring conversion. If this buffer size is not sufficient, as may be the case in large PTOP transfers, the buffer can be enlarged by reloading INCNV and OTCNV with a new buffer module. This module can be created by entering the following assembly source statements and assembling them to produce an object file. Change the buffer size to meet your requirements, up to 4096 words.

```
ASMB,R,L,C
      NAM #CVBF,7 EXPANSION BUFFER FOR INCNV/OTCNV
      ENT #CVBF
*
*
* EXTERNAL DATA BUFFER FOR INCNV (INCOMING-MESSAGE CONVERTER), AND
*                          OTCNV (OUTGOING-MESSAGE CONVERTER).
*
SIZE  EQU 1024      SIZE OF DATA BUFFER.
*
#CVBF ABS SIZE      DEFINE SIZE OF BUFFER, + WORDS.
*
      BSS SIZE      DEFINE BUFFER.
*
      BSS 0         SIZE OF MODULE.
*
      END
```

When assembled the following commands can be used to replace the current INCNV/OTCNV with the new programs with larger buffers. It is recommended that DS be shutdown during this exchange. The following commands will reload the converters:

```
RU,LOADR:IH,,,,SS          Access to SSGA
   RE,%INCNV
   RE,%#CVBF
   END
```

Repeat the above procedure for loading OTCNV and restart DS.

Multi-Terminal Monitor Operation (MTM)

RTE-MIII MTM

In RTE-MIII systems you will need to use APLDR (%3APLD) to load a copy of REMAT and/or RMOTE into a partition for each terminal. To avoid duplicating disc space, prepare a single absolute (type 7) file for REMAT and/or one for RMOTE, depending upon which one you want to use, using the RTE-MIII Loader/Generator. Use the File Manager to re-name the absolute (type 7) file(s) to any easily-remembered name, and use the REMAT LO command or calls to the FLOAD subroutine to load them into the partition. Re-name the file to another name and load it into another partition. Repeat this for as many terminals as you have, then re-name the last copy back to its original name. If both REMAT and RMOTE are desired, repeat for both.

RTE-IVB MTM

In RTE-IV systems, both REMAT and RMOTE will normally be run from File Manager. If REMAT or RMOTE exist as type 6 files (and are not permanent programs), running them from an MTM terminal will cause File Manager to build a temporary ID segment with the last two characters of the program name set to the LU of the terminal. For example, the following command on terminal 20

```
:RU,REMAT
```

would cause file manager to build a temporary segment for REM20 and give the user his own copy of REMAT.

In order to use the automatic renaming capability of File Manager, type 6 files of REMAT and/or RMOTE must be created by:

```
:SP,REMAT
:SP,RMOTE
```

You may load these two programs on-line (make sure you provide access to SSGA for them) as temporary background programs. After making disc files (:SP,REMAT, etc.), delete them from the list of loaded programs (*OF,REMAT,8 and *OF,RMOTE,8). If these programs have been generated into the system, they must be purged permanently with the on-line LOADR.

Remote EDITR

The remote EDITR has several features which concern the Network Manager. For a description of its features refer to the DS/1000-IV User's Manual. Notice the "node" and "name-suffix" parameters. If an operator specifies the node number when scheduling EDITR, it will compare this parameter to the local node number. If equal, the program runs in the local node and accesses local files. If not equal, EDITR will use a DEXEC remote-program schedule call to schedule the EDITR program in the specified remote node. In the second case, the "remote" copy will have access to files in the remote node, but all dialogue will occur at the operator's console at the local node. The name-suffix parameter is supplied in order to allow multiple copies of the remote EDITR to be used in any node.

Transaction Time-Outs

Transaction time-outs allow you to establish the maximum time the system will allow for completion of any transaction in the node. The master time-out 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 time-out 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:

1) 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 (see the Chapter "Internal Organization and Data Paths" for the retry limits). It is also possible that a temporary condition blocked the reception of the data (e.g., no SAM). You must allow for these retries as well.

2) 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.

3) 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, etc. System resources such as class I/O numbers, SAM, swap tracks, 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 time-out expires.

4) If the destination node is not a neighbor of the originating node, then each intervening node requires the same time as 1) plus the store-and-forward software overhead time.

When the system is first being brought on-line after installation, it is suggested that the default time-outs be used. If time-out errors occur during testing, or later, these values may be increased as much as desired. The only disadvantage to setting transaction time-outs 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 time-out value. However, when the system is working successfully, transactions should not time-out and these values will not affect performance.

The MA time-out value, which determines the interval which MA will send message acknowledgement requests, must be no larger then the Master time-out divided by the number of MA retries specified during initialization. For example if the master time-out is 45 seconds, the MA timeout can be no larger than 3 if the default MA retry count of 15 is used.

Transaction Time-Out Recommendations

Use the default time-outs listed in Table 3-4 in bringing up your network links.

Table 3-4. Suggested Transaction Time-out 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 time-outs are not sufficient. It may be of value to set your time-outs to the worst-case to cover this situation.

Notice that the slave time-out is always less than the master time-out. Besides line speed, other factors that should be taken into account when determining time-out 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 time-out override values (specified via DINIT) can be used to customize master time-out values for each remote node.

The actual time-out used will be rounded to the next 5-second interval. For example, if 19 is specified, 20 seconds will be used. The scheduling of UPLIN, the program which decrements the time-out value, must also be taken into consideration. UPLIN is scheduled every 5 seconds and may be scheduled such that it decrements your time-out value immediately or one to five seconds later.

Line Time-Outs

EQT time-out considerations for the HDLC cards are greatly reduced from the HP 12771/12773 cards using DVA65. The HDLC cards have switch settings on the card to indicate what baud rate is to be used for data transmission and reception. Based on the settings of these switches, the card determines its own time-out values. If the user were to need to override this time-out for any reason, this is accomplished with the system "TO" command.

NOTE

The following discussion pertains to DVA65 links using the 12771/12773 cards.

The line (EQT) time-out protects each node from waiting indefinitely if the computer located at the other node if the communication line fails. The line time-out should reflect the time required to send a protocol word to the remote node and receive an acknowledging word back. Several factors will determine this interval:

1) Line transmission time--The time required to transmit a word on the line. This can be computed by:

   19 bits per word/line speed bps = time per word.

   Due to the characteristics of the HP 12771/12773 cards there is a 13 microsecond delay after the word has been transmitted and before the transmit interrupt is generated.

2) Line propagation delay--The time required for the data to travel down the link. For hardwired links, this time will be negligible. For modem links, where information will be sent longer distances, the propagation delay can be significant.

3) Interrupt service delay--The time interval between the point the DS/1000-IV card generates an interrupt request and the interrupt is acknowledged by the driver (DVA65). For non-privileged cards this will include both operating system overhead and processing time spent servicing higher priority devices (determined by I/O configuration). For privileged cards, the interrupt service delay will be due to processing of higher priority privileged cards (if any). This delay is difficult to quantify since it is so dependent on system activity. In general, as the priority of the DS/1000-IV card decreases with respect to other active cards in the system, the potential interrupt service delay for that card will increase.

4) EQT time-out servicing delay--For priviliged cards, the DS/1000-IV driver requires an EQT time-out to be generated by RTE before the driver will initiate the next stage in the protocol sequence. Once every TBG tic (10 millisecond period), RTE updates the EQT time-out counters and enters the driver when an EQT times out. Due to the nature of the operating system, RTE always starts updating EQT time-outs beginning with EQT 1. This will cause timeouts on low numbered EQTs to be processed first. In very active systems with several privileged cards, processing of higher numbered EQT timeouts may be delayed since RTE will only process one EQT time-out per TBG tic. In general, low numbered DS/1000-IV EQTs (with respect to other DS/1000-IV EQTs for cards operating in priviliged mode) will be less likely to experience EQT timeout servicing delays. The EQT timeout servicing delay is much less a factor in non-priviliged card line timeouts.

5) Modem delays -- The time needed for the modem to retrain if the modem automatically retrains.

Line Time-Out Recommendations

Line time-outs are set at generation time (see the GENERATION Chapter) or may be overridden with the RTE operator command:

```
*TO,ee,tt
```

```
where:   ee = EQT number for the line
         tt = time-out value, in tens of milliseconds
```

Suggested initial values are shown in Chapter 2.

It is recommended that these suggested time-outs be used when the system is first brought up. If the Rerouting feature is generated in, line time-outs set too low will cause unnecessary rerouting. If line errors occur then the user should increase the value of the appropriate line time-out.

Other line time-outs existing in the system are:

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 time-out 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.)

The Remote Busy Retries and Remote Quiet Wait

Two parameters which 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 after the specified number of re-tries the message still cannot be sent, 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.

Replacing DS/1000-IV Slave Monitors

The DS/1000-IV software can allow any of its monitors (RFAM, DLIST, PTOPM, etc.) to be replaced on-line, 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:

1) The system must be made quiescent, via DINIT or DSMOD, and the monitor must be aborted before replacing it.

2) RTE-MIII and RTE-L systems allow memory-resident programs to be replaced on-line. Other RTEs only allow disc-residents to be replaced on-line. Other modules can only be replaced by regeneration.

3) 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.

4) Be sure to provide each monitor with access to SSGA (labeled System Common in RTE-L and RTE-XL).

5) Do not load monitors as type 6 (Extended Background) programs on RTE-6/VM systems.

6) Do NOT schedule the slave monitors. Scheduling will be done by UPLIN.

Data Security

You may wish to implement procedures which 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

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 etc. This does not apply to communication link LUs because SST entries for these are unnecessary.

Unique Cartridge Reference Numbers

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, etc.).

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 concatination of its assigned number and node (e.g., 12267 would be cartridge 122 at node 67).

Security Codes

All important files should have security codes. Files which can be read, listed, or otherwise accessed nondestructively may have positive or alphanumeric security codes (these may be accessed by users who don't know the security code, but not modified or purged). Files which may only be accessed by certain users should be given negative security codes (all access is denied unless the correct security code is given).

On-Line Program Loading for Security

The use of a computer by determined data thieves to defeat security measures often requires programs to search for security codes or to repeatedly attempt access to 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. Since programs may be prepared in any system for execution in an RTE-MIII system, protection for RTE-MIII systems can only be obtained if no node in the network has the Segmented Loader/Generator or the snapshot files of the nodes. 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 on-line 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:

    :SP,LOADR:<enter a negative security code here>

-Use the On-Line 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:

    :OF,LOADR,8

to purge the other copy from the system.

-To run the on-line LOADR from FMGR:

    :RU,LOADR:<security code>

Remote File Access Monitor (RFAM)

Files in a node may be protected from access by remote programs via the RFA subroutines (DOPEN, DREAD, etc.) 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 against 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. This is a much more secure method of data protection than file security code. ALTHOUGH IT IS NOT A FEATURE OFFERED BY 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. The Bibliography contains a reference which describes encryption algorithms.

In order to "crack" the encryption algorithm, a would-be intruder needs a 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 which are difficult to break, are methods which you can use to increase security but at a cost of increased overhead.

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 by either of two methods:

1) Programmatically--write an assembly language program which has #PRLU declared as an external symbol. This symbol is in SubSystem Global Area. Therefore, the program must be relocated with access to SSGA (SCOM in RTE-L) (i.e. OP,SS command in RTE-IVB LOADR, SCOM for RTE-L LOADR). The program should store the 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.

2) At generation time--in the CHANGE ENTS? phase, enter the following:

```
#PRGL,AB,<lu>

Where <lu> = The number of the print logical unit, e.g. 1
             for system console
```

All messages are printed using Class-I/O on PROGL's class.

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>
                               AM
AT DAY nnn <hr>, <min> :<sec>
                               PM
```

Upon successful completion, the following message is printed:

```
DOWNLOAD OF FILE:<file name>::-<lu>:<type>
                             AM
AT DAY nnn <hr>,<min>:<sec>  WAS SUCCESSFUL
                             PM
```

The time-of-day printed will be that at completion of download.

For error messages, see the PROGRAM DOWNLOAD ERROR MESSAGES section in the DS/1000-IV User's Manual.

Using Both HSI (Hardwire) and PSI (Modem) HP 3000 Links

An HP 1000 node can communicate with an HP 3000 over the HSI (driver DVG67) link or over the PSI (DVA66 for MODEM and direct-connect Bisync; CSV66 for X.25) links. Although the 1000 cannot have HSI and PSI links active at the same time, it is possible to generate both into the same system and switch between them by using DINIT to shutdown and reinitialize.

Suppose that a system has both PSI and HSI links to an HP 3000. The two links use different versions of QUEX and QUEZ and require different answers for DINIT initialization. The programs can be "SPed" as type 6 files with alternate names, then renamed to QUEX and QUEZ before being "RPed". The following files rename the programs and DINIT answer file, then transfer to *REDO, which does the shutdown, gets rid of the current QUEX and QUEZ, restores the new programs, and then reinitializes the system. Note that none of the programs can be generated into the system. They must all be loaded on-line and saved in type 6 files.

FILE: /HSI: Restores HSI (hardwire) link

```
:*RENAME MODEM VERSIONS
:RN,QUEX:RT:2,QUEX1
:RN,QUEZ:RT:2,QUEZ1
:RN,DSFILE:RT:2,DSFIL1
:*RENAME HSI VERSIONS
:RN,QUEX2:RT:2,QUEX
:RN,QUEZ2:RT:2,QUEZ
:RN,DSFIL2:RT:2,DSFILE
:TR,*REDO
```

FILE: /MODEM: Restores PSI link

```
:*RENAME HSI VERSIONS
:RN,QUEX:RT:2:QUEX2
:RN,QUEZ:RT:2:QUEZ2
:RN,DSFILE:RT:2,DSFIL2
:*RENAME MODEM VERSIONS
:RN,QUEX1:RT:2:QUEX
:RN,QUEZ1:RT:2:QUEZ
:RN,DSFIL1:RT:2:DSFILE
:TR,*REDO
```

FILE: *REDO

```
:RU,DINIT,SHUTDN::2        * Command file to shutdown DS.
:OF,QUEX
:OF,QUEZ
:RP,QUEX
:RP,QUEZ
:RU,DINIT,DSFILE::2
:TR
```

Note that while the HSI link is enabled, the files associated with the PSI link all end in 1 (QUEX1, QUEZ1, DSFIL1). While the modem link is enabled, the HSI files all end in 2.

MAXIMUM RETRY COUNT for PSI BISYNC Links

If the HP 3000 is heavily used (80 percent or more CPU usage), you should not use the default value for MAXIMUM RETRY COUNT (DSLIN). The default value (8) 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 time-out. For every ten milliseconds of line time-out, 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 time-out to 120 milliseconds (so that the driver waits approximately six minutes for buffers) is usually sufficient.

Refer to the section, "Line Time-Out Recommendations" in this chapter for information on setting the line time-out.

FILE: /HSI: Restores HSI (hardwire) link

```
:*RENAME MODEM VERSIONS
:RN,QUEX:RT:2,QUEX1
:RN,QUEZ:RT:2,QUEZ1
:RN,DSFILE:RT:2,DSFIL1
:*RENAME HSI VERSIONS
:RN,QUEX2:RT:2,QUEX
:RN,QUEZ2:RT:2,QUEZ
:RN,DSFIL2:RT:2,DSFILE
:TR,*REDO
```

FILE: /MODEM: Restores PSI link

```
:*RENAME HSI VERSIONS
:RN,QUEX:RT:2:QUEX2
:RN,QUEZ:RT:2:QUEZ2
:RN,DSFILE:RT:2,DSFIL2
:*RENAME MODEM VERSIONS
:RN,QUEX1:RT:2:QUEX
:RN,QUEZ1:RT:2:QUEZ
:RN,DSFIL1:RT:2:DSFILE
:TR,*REDO
```


FILE: *REDO

```
:RU,DINIT,SHUTDN::2        * Command file to shutdown DS.
:OF,QUEX
:OF,QUEZ
:RP,QUEX
:RP,QUEZ
:RU,DINIT,DSFILE::2
:TR
```

Note that while the HSI link is enabled, the files associated with the PSI link all end in 1 (QUEX1, QUEZ1, DSFIL1). While the modem link is enabled, the HSI files all end in 2.

MAXIMUM RETRY COUNT for PSI BISYNC Links

If the HP 3000 is heavily used (80 percent or more CPU usage), you should not use the default value for MAXIMUM RETRY COUNT (DSLIN). The default value (8) 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 time-out. For every ten milliseconds of line time-out, 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 time-out to 120 milliseconds (so that the driver waits approximately six minutes for buffers) is usually sufficient.

Refer to the section, "Line Time-Out Recommendations" in this chapter for information on setting the line time-out.

Chapter 4
Multidrop DS/1000-IV

Multidrop DS/1000-IV expands the high-level power of DS/1000-IV to a low cost, low speed communications method for applications not requiring the performance of point-to-point connections. It allows communication between HP 1000 computers on the Data Link for the HP 1000.

Besides using a multidrop connection scheme, Multidrop DS/1000-IV also uses a different Communication Access Method (CAM) than Point-to-point DS/1000-IV. For example, Multidrop configurations using M, E or F-Series masters utilize Bisync protocol and the Multipoint Driver, DVR07. Configurations using A-Series masters utilize Bisync protocol, the interface driver, IDS00, and the device driver, DDA66. Multidrop DS/1000-IV combines the features and flexibility of the Data Link with the features of DS/1000-IV (except remote front panel control to A and L-Series computers). For specific information concerning the Data Link, (such as planning, installing, and troubleshooting the link) refer to the Data Link Manager's Manual (91730-90006) for M, E and F-Series masters, or the HP 91732A Data Link and Multipoint Subsystem Reference Manual (91732-90001) for A-Series masters.

A master/slave relationship determines communication flow in a Multidrop DS/1000-IV network. There can be only one master in a Multidrop DS/1000-IV network, but up to 127 physical device connections, (limited by software and response time considerations) can share the same master.

Either an HP 1000 M, E, F or A-Series Computer functions as the master node. M, E and F-Series machines use the 12790A Multipoint Interface Card and the DVR07 Multipoint Driver. Each M, E, or F-Series master may have A, L, M, E, or F-Series HP 1000 computers as slave nodes. The A-Series machines use the HP 12092A Data Link Master Interface Card, the IDS00 interface driver, the DDA66 device driver, and may only have A or L-Series HP 1000 computers as slave nodes (see figure 4-1).

The M, E, and F-Series slave computers use the HP 12830A Slave Interface card along with the DVS64 Driver, while A and L-Series computers use the HP 12072A Slave Interface card along with the IDS64 Driver. Note that Forced Cold Load is not available to HP 1000 M-Series slave nodes.

As shown in Figure 4-1, remote data transmission is also possible over the Data Link through the use of modems and the HP 3074M. With modems, the master HP 1000 computer can be remote from the slave nodes. You must use full-duplex asynchronous modems to avoid line turnaround delays. See the Data Link Manager's Manual (M, E or F-Series masters) or the HP 91732A Data Link and Multipoint Subsystem Reference Manual (A-Series masters) for more information on modems on the Data Link.

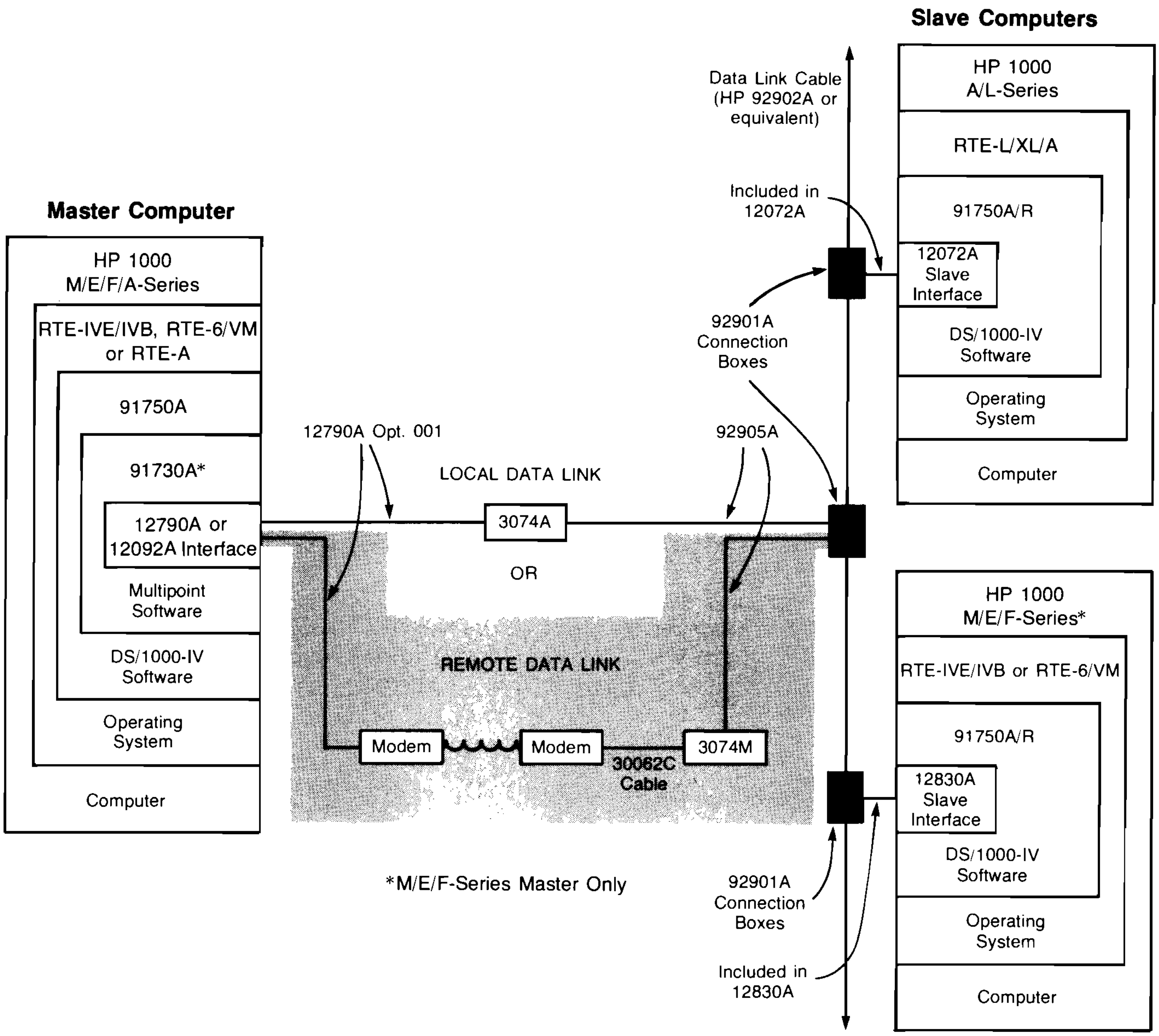


Figure 4-1. Data Link Configurations with Multidrop DS/1000-IV.

Figure 4-2, Multipoint vs Multidrop, indicates the difference between multipoint and multidrop configurations. Multidropped nodes have the advantage of being able to be added or deleted from the Data Link without affecting network operation.

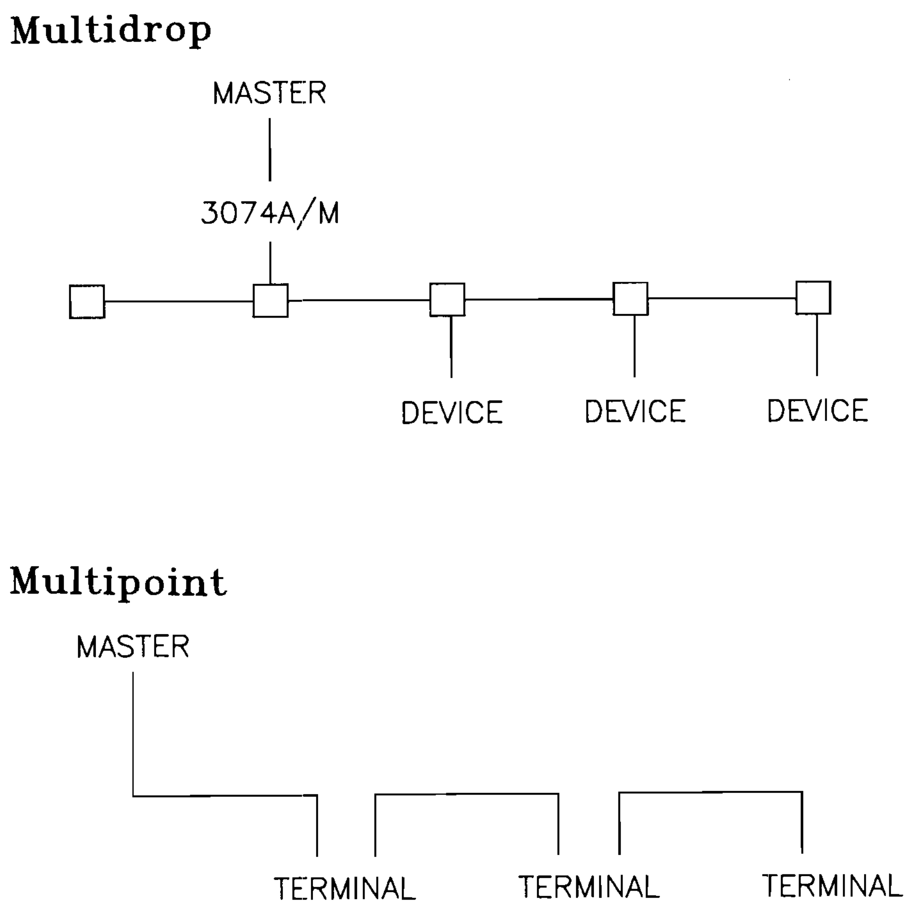


Figure 4-2. Multipoint vs Multidrop.

Physically, the devices are connected in a string configuration. However, since the master controls all communication and slave computers can be multidropped anywhere along the Data Link, the logical connection is actually a "star" configuration. (See Figure 4-3. Multidrop Physical and Logical Configurations.)

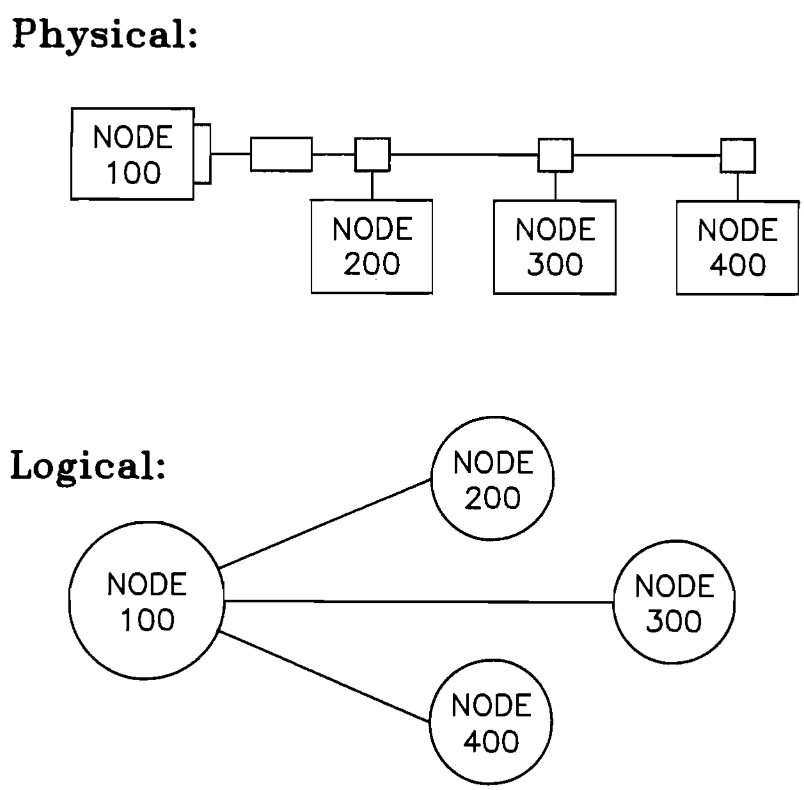


Figure 4-3. Multidrop Physical and Logical Configurations.

The slave computers interface with the Data Link in the same manner as other Data Link devices. The voltage conversion normally accomplished for a slave device by the HP 3074A Data Link Adapter, is built into the 12830A and 12072A slave interface cards, eliminating the need for an HP 3074A for each slave computer, thus lowering the cost for each additional slave connection. Also, Multidrop DS/1000-IV uses only one interface per incremental slave node (versus two for Point-to-point DS/1000-IV), therefore reducing the hardware costs. For example, in a 5 node star network (4 links) using Multidrop DS/1000-IV, only 5 interface cards are required, whereas with Point-to-point DS/1000-IV, 8 HDLC interfaces are required for a 5 node star.

Multidrop DS/1000-IV communication takes place on the Data Link using either the HP 12790A Multipoint interface (M, E and F-Series) or the HP 12092A Data Link Master interface (A-Series) which is installed in the master HP 1000 computer. An efficient polling algorithm polls all the systems connected to the Data Link and provides priority of write and control requests over reads and routine polls to the computers. Data is transmitted using an asynchronous implementation of Binary Synchronous Communication (Bisync) protocol with CRC-16 error checking for data integrity.

Multidrop DS/1000-IV operates at up to 19.2k baud. However, since all systems on the Data Link communicate at the same speed, the slowest system on the line determines the actual data transfer speed set for all devices on the link. Even though it is possible to mix devices and computers on the same link, it is not recommended because when a 9600 bps device (such as a terminal) is added to the Data Link, the line speed of the entire link is reduced to 9600 bps. Since one master M, E, F or A-Series computer can host multiple Data Link lines, it may be more practical to install another link to the network to accommodate the slower devices. Also, terminal response time may become unacceptable (greater than 2 seconds) when several computers transmit large blocks of data at the same time as when a terminal responds to a user.

Multidrop DS/1000-IV Applications

Multidrop DS/1000-IV is best used for infrequent, low speed data transfers between distributed computers in applications with the following requirements:

* Low cost
* Low data volumes
* Flexible node addition and deletion
* Low master CPU overhead to many slaves
* Easy and low cost expansion
* Clustered nodes
* Rugged environment

Some examples of application areas for which Multidrop DS/1000-IV is suited are:

* Dispersed Instrumentation Control
* Production Fab Station Supervision
* Distributed Machine Control
* Facilities Monitoring
* Production Test Station Control
* Supervisory Applications in Industrial Automation Environments

Features and Benefits

Multidrop DS/1000-IV offers many features and benefits as follows:

FEATURES	BENEFITS
Up to 4km long hardwired connections	DS/1000-IV networks can be implemented over a wide geographical area, eliminating the need for modems in some cases.
Multidrop configuration	LOW COST per network node. Each additional node requires only one additional interface, as opposed to two for point-to-point connections. A star configuration with three slave nodes would require 6 point-to-point interface cards, whereas a multidrop configuration requires only 4 interface cards.
Flexible configuration	The flexibility of the Data Link for installation of new nodes or repositioning existing nodes allows multidrop networks to change as the factory changes, without the high cost of recabling. (Assumes the Data Link has been installed near where future nodes are planned.)
Modem configurations possible	Multidrop/DS/1000-IV networks can be installed at locations remote from the master computer. In this manner, a number of remote Data Links can be installed which communicate with one centrally located HP 1000.

Reliability of Data Link

All the features of the Data Link as a RUGGED, FLEXIBLE, and LOW COST connection scheme make Multidrop DS/1000-IV ideally suited for factory and plant automation.

Full DS/1000-IV Network Software capabilities (except A and L-Series VCP)

Full DS/1000-IV capabilities are available in Multidrop configurations including Forced Cold Load to target slave nodes, but Virtual Control Panel functions to A and L-Series are not available over Data Link.

The supported DS/1000-IV capabilities include:

* Remote Operator Commands
* Remote Executive
* Remote File Access
* Program-to-program Communications
* Remote Database Access

The supported DS/1000-IV network facilities include:

* Dynamic Message Rerouting
* Message Accounting
* Remote I/O Mapping
* Remote Session Monitor

Multidrop Versus Point-to-Point DS/1000-IV

Multidrop DS/1000-IV is not meant as a substitute for Point-to-point DS/1000-IV. The cost, speed, and flexibility of Multidrop DS/1000-IV make it well suited for loosely coupled manufacturing networks where high flexibility and infrequent supervisory control is required.

It also offers many advantages over Point-to-point DS/1000-IV provided that the throughput and performance criteria of Multidrop DS/1000-IV are appropriate to the network requirements. The following table provides a comparison of multidrop connections to point-to-point connections.

Table 4-1. Multidrop and Point-to-Point DS/1000-IV Comparison.

	Multidrop DS/1000-IV	Point-to-Point DS/1000-IV
HARDWARE COST	Inexpensive	More Expensive
Interface Cards	One Interface card per additional slave node	Two Interface cards per additional slave node
Cabling	Approx. $.20 per foot (Approx. Beldon price)	Approx. $.40 per foot (Approx. Beldon price)
FLEXIBILITY		
Configuration	Logical star topology	Any topology
	Cost effective for local or remote star cluster configuration	More expensive for local or remote star clusters
Connection method	Plug-in, Plug-out Easy and inexpensive	Dedicated cabling required for each additional node.
Size	High number of slave nodes per master is possible.	Low number of active slave nodes per master is possible.
Growth	Easy to add new slaves to existing Data Link with no increased over-head. Slower response time, however, with each additional slave node.	Dedicated line for each additional node. Over-head increases at master with each additional slave (in star config.), but response time deg-radation is minimal.
DISTANCE	Up to 4 km hardwired. Modem using 3074M. All devices share common line, requiring less wiring for add-ons.	Up to 2.2 km hardwired. Modem capability. Dedicated new cabling for each additional node.

Table 4-1. Multidrop and Point-to-Point DS/1000-IV Comparison (Continued).

	Multidrop DS/1000-IV	Point-to-Point DS/1000-IV
LINE SPEED	19.2k bps max. hardwire or modem line. Speed is set by slowest device on link.	230k bps hardwired 56k bps modem
MAX. THROUGHPUT (4096w transfer)	1650 bytes/second	20,000 bytes/second
MESSAGE TRANSMIT TIME (E/F to L-Series)	5000 msec for 4k words	700 msec for 4k words
MAX. OVERHEAD (4096w transfer)	(at 19.2 Kbps)	(at 230 Kbps)
Master: E/F-Series	<10% up to 12 slaves (10% for each link when no data is being transferred).	15% for one slave 10% for each additional slave (in a star configuration).
Slave: (4096w transfer)		
E/F-Series	5% at each slave	15% at each slave
L-Series	<20% at each slave	55% at each slave
DS/1000-IV CAPABILITIES	Full DS/1000-IV feature set except remote VCP to A/L-Series computers. No DS to HP 3000 over Data Link.	Full DS/1000-IV feature set. Point-to-Point DS to HP 3000 supported.
MARKET SEGMENT	Supervisory functions. Relatively small and infrequent data transmissions.	Fast real-time control and response. Frequent and high data volume transmission.

Installation

For installation guidelines for the Data Link products, refer to the Data Link Manager's Manual (M, E or F-Series masters) or the HP 91732A Data Link and Multipoint Subsystem Reference Manual (A-Series masters), and the appropriate interface manuals.

Multidrop DS/1000-IV Hardware Configuration

After the Data Link hardware has been installed, configure the hardware as directed.

HP 12790A Multipoint Interface Switch (M, E, F-Series Master)

The HP 12790A Multipoint Interface Switch Assignments are:

SWITCH	FUNCTION
1	Typically not used (rate select)
2	Closed to assert Data Terminal Ready
3	Open for baud rate generator (internal) clock source
4	Open for asynchronous mode
5-8	Transmission clock rate (see below)

Set the HP 12790A Multipoint Interface Switches as follows:

SWITCH SETTINGS 5, 6, 7, 8				BAUD RATE (bps)
X	0	X	0	300
X	0	0	X	600
X	0	0	0	1200
0	X	X	X	1800
0	X	X	0	2400
0	X	0	X	3600
0	X	0	0	4800
0	0	X	X	7200
0	0	X	0	9600
0	0	0	0	19200

Note that 9600 and 19200 are the recommended baud rates.

Note: X = closed and 0 = open

For hardwired operation at 19.2kbps, the switches should be set as follows:

```
  1   2   3   4   5   6   7   8
+---+---+---+---+---+---+---+---+
| X | X |   |   |   |   |   |   |
+---+---+---+---+---+---+---+---+
|   |   | X | X | X | X | X | X |
+---+---+---+---+---+---+---+---+
             -open-
```

HP 12092A Data Link Master Interface Switch (A-Series Master)

The HP 12092A Data Link Master Interface Switch Assignments are:

SWITCH	FUNCTION
1	Reserved (should be open)
2	Reserved (should be open)
3	Closed to assert Data Terminal Ready/Low Auto Answer; open to indicate Originate/Auto Answer.
4	Open for asynchronous mode, closed for synchronous mode.
5	Open for internal timing, closed for external timing.
6-8	Baud rate

Set the HP 12092A Data Link Master Interface Switches as follows:

SWITCH SETTINGS 8, 7, 6	BAUD RATE (bps)
0 0 0	19200
0 0 X	9600
0 X 0	4800
0 X X	2400
X 0 0	1800
X 0 X	1200
X X 0	600
X X X	300

Note that 9600 and 19200 are the recommended baud rates.

Note: X = closed and 0 = open

HP 12072A and HP 12830A Slave Interface Switches

The Slave Interface (HP 12072A and HP 12830A) switch assignments are:

SWITCH BLOCK	SWITCH	FUNCTION
2	1-5	Group ID (bits 1-5)
2	6-8	Device ID (bits 1-3)
1	1-2	Device ID (bits 4-5)
1	3-5	Transmission clock rate (see below)
1	6	Closed for asynchronous mode
1	7	Open for Multidrop DS/1000-IV
1	8	Open for internal clock source

The Slave Interface switch settings are as follows:

SWITCH SETTINGS 3, 4, 5	BAUD RATE (bps)
0 0 0	300
X 0 0	600
0 X 0	1200
X X 0	2400
0 0 X	4800
X 0 X	9600
0 X X	19200
X X X	38400

Note: X = closed and 0 = open.

For Group ID = C, Device ID = A, and transmission clock rate = 19.2 kbps, the switches should be set as follows:

```
                +---------------------------------+
                |   GID    |     DID    | BRG | MDE |

                 1 2 3 4 5 6 7 8   1 2 3 4 5 6 7 8
     Switch     +-+-+-+-+-+-+-+-+ +-+-+-+-+-+-+-+-+   Switch
     Block 2    | | |X|X|X| |X|X| |X|X| |X|X|X| | |   Block 1
                +-+-+-+-+-+-+-+-+ +-+-+-+-+-+-+-+-+
                |X|X| | | |X| | | | | |X| | | |X|X|
                +-+-+-+-+-+-+-+-+ +-+-+-+-+-+-+-+-+
                     -open-            -open-
```

where: GID = Group ID
DID = Device ID
BRG = Baud Rate Generator
MDE = Mode (clock source)

Additional Switch Settings for Forced Cold Load Operation

The additional Switch Assignments for the HP 12072A Slave Interface are:

SWITCH	FUNCTION
1	Closed to enable FCL (Forced Cold Load) Open to disable FCL
2	Not used.
3-8	Card select code (octal)

For FCL (Forced Cold Load) capability to be enabled (the select code must be 24B), the switches should be set as follows:

```
   1   2   3   4   5   6   7   8
 +---+---+---+---+---+---+---+---+
 |   |   |   | X |   | X |   |   |
 +---+---+---+---+---+---+---+---+
 | X | X | X |   | X |   | X | X |
 +---+---+---+---+---+---+---+---+
              -closed-
```

For both the HP 12072A and the HP 12830A Slave Interfaces, a lighted LED (after power-up) indicates self-test passed.

The additional slave computer switch settings required to enable Forced Cold Load are:

FOR HP 1000 A AND L-SERIES COMPUTERS:

SWITCHES	POSITION
CPU	For L-Series, all closed except for switches 1 and 5 which must be open. For A-Series, all closed except switch 1, which must be open.
12072A Slave Interface	All closed except for switches 4 and 6 which must be open.
Terminal Interface (if used)	All closed except for switches 1 and 4 which must be open (assumes select code is 20B).

FOR HP 1000 E AND F-SERIES COMPUTERS:

SWITCHES	POSITION
RPL	Set according to CBL ROM location, I/F select code, and file number.
LOCK/OPERATE	LOCK
Auto-restart	Auto-restart enabled.

Multidrop DS/1000-IV Network Generation (M, E, F-Series Master)

The following is an example of how to setup Multidrop DS/1000-IV on an HP 1000 M, E of F-Series with an RTE-IVB operating system:

Link Master Generation Example

First, assuming that the Multipoint Terminal Interface Software has been installed into the master computer, gen the following modules into the master:

RELOCATABLE MODULES

```
REL,%DVR07::2140        * DATA LINK MASTER DRIVER
REL,$MPLIB::2140        * MULTIPOINT LIBRARY
```

EQT TABLE

(Associate the select code and
the device driver with EQT number)

```
20,DVR07,X=8        * EQT 18 - DL LINE 0
77,DVR07,X=8        * EQT 19 - DL NODE 5001
77,DVR07,X=8        * EQT 20 - DL NODE 5002
77,DVR07,X=8        * EQT 21 - DL NODE 5003
77,DVR07,X=8        * EQT 22 - DL NODE 5004
77,DVR07,X=8        * EQT 23 - DL NODE 5005
77,DVR07,X=8        * EQT 24 - DL NODE 5006
21,DVR07,X=8        * EQT 25 - DL LINE 1
77,DVR07,X=8        * EQT 26 - DL NODE 5007
77,DVR07,X=8        * EQT 27 - DL NODE 5008
77,DVR07,X=8        * EQT 28 - DL NODE 5009
77,DVR07,X=8        * EQT 29 - DL NODE 5010
77,DVR07,X=8        * EQT 30 - DL NODE 5011
77,DVR07,X=8        * EQT 31 - DL NODE 5012
```

(Note that the number of EQT extension words has increased from 5 to 8.)

DEVICE REFERENCE TABLE

(Associate LU with EQT)

```
18                  * LU 50 - DL LINE 0
19,6                * LU 51 - DL NODE 5001 - SUBCHANNEL 6
20,6                * LU 52 - DL NODE 5002          "
21,6                * LU 53 - DL NODE 5003          "
22,6                * LU 54 - DL NODE 5004          "
23,6                * LU 55 - DL NODE 5005          "
24,6                * LU 56 - DL NODE 5006          "
25                  * LU 57 - DL LINE 1
26,6                * LU 58 - DL NODE 5007 - SUBCHANNEL 6
27,6                * LU 59 - DL NODE 5008          "
28,6                * LU 60 - DL NODE 5009          "
29,6                * LU 61 - DL NODE 5010          "
30,6                * LU 62 - DL NODE 5011          "
31,6                * LU 63 - DL NODE 5012          "
```

On all generations, nodes (not lines) must be subchannel 6 for Data Link.

By assigning a subchannel 6 to a driver type 7 device, it indicates that this is a DS/1000-IV node on a line. This is essential when setting up a Data Link network which has HP 1000 nodes as link slaves. When a device is assigned subchannel 6, the driver type is changed from 7 to 65 during slave LU initialization.

There are two methods of assigning an LU to an EQT with a subchannel of 6. It can be assigned at generation time in the device reference table phase, or before slave LU initialization with the command:

```
:SYLU,<LU>,<EQT>,6
```

If the link is to be a dedicated HP 1000 network, then the first method is recommended because by assigning it at generation time in the device reference table phase, the link initialization phase is relieved of this task.

INTERRUPT TABLE

(Associate select code with interrupt routine)

```
20,EQT,18         * SC 20 - DL LINE 0
21,EQT,25         * SC 21 - DL LINE 1
77,ABS,0          * SC 77 - DL DEVICES
```

Link Slave Generation Example for RTE-IVE and RTE-IVB

```
PROG INPUT PHASE:

    REL,%DVS64::2140

EQUIPMENT TABLE ENTRY:

    15,DVS64,X=21      * EQT 4 - DL SLAVE WRITE
    77,DVS64           * EQT 5 - DL SLAVE READ

DEVICE REFERENCE TABLE:

    4                  * LU  9 - DL SLAVE WRITE
    5                  * LU 10 - DL SLAVE READ

INTERRUPT TABLE:

    15,EQT,4           * SC 15 - DL SLAVE
    77,ABS,0           * SC 77 - DL SLAVE
```

Link Slave Generation Example for RTE-L, XL, and A

```
PROG INPUT PHASE:

    REL,%IDS64::2140

DEVICE DEFINITION:

    IFT,%IDS64::2140,EIDS64,QU:FI,TX:24,SC:24B,IT:64B
    DVT,,,LU:9,QU:FI,DT:64B        (write LU)
    DVT,,,LU:10,QU:FI,DT:64B       (read LU)
```

Multidrop DS/1000-IV Network Initialization (M, E, F-Series Master)

Before you initialize the network, be sure the RTE system operates properly. Boot up the RTE system at each node. Run through the tests described in the GENERATION chapter to check that the RTE generation is correct. In addition, verify that the equipment has been installed properly.

Before you can run DINIT at the master, you must initialize each line and slave LU.

Line Initialization

Initialize each line with the following control commands which may be issued by programmed EXEC calls or from FMGR:

EXEC Format:

```
    CALL EXEC(3,2000B+ILLU,ICW)

       ILLU = Data Link Line Logical Unit Number

       ICW = 100000B + (ITOVL*256) + LN

            ITOVL - Number of 100 ms intervals allowed for line
                    turnaround.  Ranges from 0 to 31.  A zero
                    implies the 3 second default.
```

LN - Logical line number ranging from 0 to 7.

FMGR Format:

```
:CN,<ILLU>,20B,<ICW>
```

or

```
:CT,<ILLU>,20B,<ICW>
```

Line Performance Control Parameters

The Terminal Blocking Factor (max transmission buffer size), maximum WACK count, maximum received NAK count, and the maximum transmitted NAK count defaults can be changed with the following control commands which may be issued by programmed EXEC calls or from FMGR:

EXEC Format:

```
CALL EXEC(3,2200B+ILLU,ICW)

   ILLU = Data Link Line Logical Unit Number

   ICW = (ITBF*8192) + (ICW*256) + (IRNC*16) + ITNC

        ITBF - Terminal Blocking Factor
                      000 - no change
                      001 - select 256 byte block (default)
                      010 - select 512 byte block
                      100 - select 1024 byte block

        IWC  - WACK count (0-32) default = 16

        IRNC - Received NAK count (0-16) default = 8

        ITNC - Transmitted NAK count (0-16) default = 8
```

FMGR Format:

```
:CN,<ILU>,22B,<ICW>
```

or

```
:CT,<ILU>,22B,<ICW>
```

Most applications do not warrant these line performance control parameters to be changed.

Slave LU Initialization

Initalize each slave LU with the following control commands which may be issued by programmed EXEC calls or from FMGR:

EXEC Format:

```
CALL EXEC(3,2000B+ISLU,ICW)

   ISLU = Slave Logical Unit Number

   ICW = (LN*4096) + (IAND(GID,77B)*64) + (IAND(DID,77B))

         LN  - Logical Line Number (0-7)

         GID - Group ID Character

         DID - Device ID Character
```

FMGR Format:

```
:CN,<ISLU>,20B,<ICW>
```

Slave LU initialization associates a slave LU with a Line Number, Group ID, and Device ID. Note that the FMGR "CT" command cannot be used to initialize a slave LU because the EQT subchannel is non-zero. This requires the slave LU to be less than 64 if initilization is desired in the WELCOM file.

Network Initialization Example

After generation, the following is known about the Link Master from the gen listing:

LINE #	NODE #	LU	EQT
0		50	18
	5001	51	19
	5002	52	20
	5003	53	21
	5004	54	22
	5005	55	23
	5006	56	24
1		57	25
	5007	58	26
	5008	59	27
	5009	60	28
	5010	61	29
	5011	61	30
	5012	63	31

The network to be initialized has the following topology:

```
                               +---------+
                               |  NODE   |
                     LU 50     |  5000   |   LU 57
                  +------------| RTE-IVB |------------+
 +---------+      | Line# 0    +---------+  Line# 1   |    +---------+
 |  5001   |      |                                   |    |  5007   |
 | RTE-IVE |------| LU                             LU |----| RTE-IVE |
 |   AA    |      | 51                             58 |    |   BA    |
 +---------+      |                                   |    +---------+
                  |                                   |
 +---------+      |                                   |    +---------+
 |  5002   |      | LU                             LU |    |  5008   |
 | RTE-XL  |------+ 52                             59 +----| RTE-XL  |
 |   AB    |                                               |   BB    |
 +---------+                                               +---------+
```

Figure 4-4. Sample Multidrop DS/1000-IV Network (M, E, F-Series Master).

It is now possible to initialize the Data Link. Begin by initializing and configuring the master card, and then by adding the four nodes.

Using the example network shown in Figure 4-4, initialize and configure the Data Link.

a. Setup the system switch table (if initialization is not done in the WELCOM file).

```
:SL,50,50      * Session LU 50 is Data Link #0
:SL,51,51      * Session LU 51 is node 5001
:SL,52,52      * Session LU 52 is node 5002
:SL,57,57      * Session LU 57 is Data Link #1
:SL,58,58      * Session LU 58 is node 5007
:SL,59,59      * Session LU 59 is node 5008
```

b. The Data Link slaves must have a subchannel of 6 (if not done in generation).

```
:SYLU,51,19,6
:SYLU,52,20,6
:SYLU,58,26,6
:SYLU,59,27,6
```

c. Initialize the lines.

```
:CN,50,20B,100000B  * initialize line 0 (default timeout to 3 sec)
:CN,57,20B,100001B  * initialize line 1 (default timeout to 3 sec)
```

d. Line performance control parameters are not changed.

e. Initialize the slave LUs.

```
:CN,51,20B,00101B      * LU 51 is line #0 AA
:CN,52,20B,00102B      * LU 52 is line #0 AB
:CN,58,20B,10201B      * LU 58 is line #1 BA
:CN,59,20B,10202B      * LU 59 is line #1 BB
```

f. Initialize DS/1000-IV

```
:RU,DINIT,*DINIT
```

where *DINIT contains at least 5 nodes as follows:

```
5000
5001,51,,,N
5002,52,,,N
5007,58,,,N
5008,59,,,N
```

LUs 51, 52, 58, and 59 should be included in response to "ENABLE LU#[,COST]?".

NOTE: DINIT will automatically enable routine polling during the process of enabling the LU. If DS/1000-IV is shutdown (via DINIT) routine polling of slave LUs will be disabled.

g. Check to confirm the status of the Data Link Lines and Slaves:

```
:RU,DSPMP        * Check the multipoint system to ensure that
                   routine polling has been enabled.

:RU,DSINF        * Check the NRV by using the "/N" command.
```

Multidrop DS/1000-IV Network Generation (A-Series Master)

The following is an example of how to setup Multidrop DS/1000-IV on an HP 1000 A-Series with an RTE-A operating system.

Link Master Generation Example

First, assuming the general DS requirements have been met, gen the following drivers into the master:

RELOCATABLE DRIVERS

```
REL,%IDS00::2140              *DEVICE DRIVER
REL,%DDA66::2140              *INTERFACE DRIVER
```

IFT AND DVT TABLES

The interface driver uses four IFT extent words and one additional word for each LU supported. The number of DVT extent words is fixed at 25.

Two consecutive DS port LUs are required for each device, one for the write operation and another for the read operation. In addition, Multidrop DS/1000-IV requires a secondary communications channel consisting of two LUs to send forced cold load control messages to the slave interface cards. Downloading and retrieving information from the slave interfaces requires addressing them through these secondary channel LUs. You may also use the secondary channel LUs to talk to all of the slaves, one at a time.

The following is an example of a master interface card which has been chosen to support four devices and a secondary communications channel. The total number of IFT extent words is 14 (four for the interface driver plus one additional word for each LU.) The number of DVT extent words is always 25.

```
*DATA LINK LINE 1
*
IFT,%IDS00::22,EIDS00,SC:22B,QU:FI,TX:14
*
*DEVICE 1 (FIRST NODE)
*
DVT,%DDA66::22,,LU:31,TX:25,EDDA66,DT:66B       (write LU)
DVT,%DDA66::22,,LU:32,TX:25,EDDA66,DT:66B       (read LU)
*
*DEVICE 2 (SECOND NODE)
*
DVT,%DDA66::22,,LU:33,TX:25,EDDA66,DT:66B
DVT,%DDA66::22,,LU:34,TX:25,EDDA66,DT:66B
*
*DEVICE 3 (THIRD NODE)
*
DVT,%DDA66::22,,LU:35,TX:25,EDDA66,DT:66B
DVT,%DDA66::22,,LU:36,TX:25,EDDA66,DT:66B
*
*DEVICE 4 (FOURTH NODE)
*
DVT,%DDA66::22,,LU:37,TX:25,EDDA66,DT:66B
DVT,%DDA66::22,,LU:37,TX:25,EDDA66,DT:66B
*
*DEVICE 5 (SECONDARY CHANNEL LUS)
*
DVT,%DDA66::22,,LU:39,TX,25,EDDA66,DT:66B
DVT,%DDA66::22,,LU:40,TX,25,EDDA66,DT:66B
*
```

Link Slave Generation Example

(Note: Multidrop DS/1000-IV networks with A-Series masters can only have A or L-Series slaves.)

PROG INPUT PHASE:

```
   REL,%IDS64::2140
```

DEVICE IDENTIFICATION:

```
IFT,%IDS64::2140,EIDS64,QU:FI,TX:24,SC:24B,IT:64B
DVT,,,LU:9,QU:FI,DT:64B            (write LU)
DVT,,,LU:10,QU:FI,DT:64B           (read LU)
```

Multidrop DS/1000-IV Network Initialization (A-Series Master)

Before you initialize the network, be sure the RTE system operates properly. Boot up the RTE system at each node. Run through the tests described in the GENERATION chapter to check that the RTE generation is correct. In addition, verify that the equipment has been installed properly.

Before you can run DINIT at the master, you must initialize each pair of DS port LUs and configure the line.

DS Port Initialization

Initialize each pair of DS port LUs with the following control commands which may be issued programmatically via XLUEX calls, or interactively from FMGR or CI. (Note: Do not initialize the secondary channel LUs.)

Set DS Port ID

Before issuing any other commands, you must first establish an ID for the port and to all message transactions via the port. Every DS port should be activated by this command.

From FMGR or CI:

:CN,<PORTLU>,26B,<ID>

ID = The Group and Device IDs (one character each) of the port. Both the write and the read ports should be set to the same ID. To deactivate a port, set the ID to zero; this removes the slave device from the firmware's request list.

```
15              8               0
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|   GROUP ID     |  DEVICE ID     |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

XLUEX Format:

```
ECODE = 3
CNTWD(1) = PORTLU
CNTWD(2) = 2600B
CALL XLUEX(ECODE,CNTWD,ID)
```

Configure Master Interface Driver Response

:CN,<PORTLU>,27B,<RESP>

RESP = The octal number which results from the values set in the following fields:

```
15              8               0
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| A | B | C | D | E |           |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

A = device/line down
B = message buffering
C = text available interrupt
D = enter device driver on interrupt
E = send read configuration to card

Configure the read and write ports as follows:

READ/WRITE PORTS

A = 10
B = 10
C = 10
D = 01
E = 10

XLUEX Format:

```
ECODE = 3
CNTWD(1) = PORTLU
CNTWD(2) = 2700B
CALL XLUEX(ECODE,CNTWD,RESP)
```

Configure Master Interface Card Response and Buffer Size

From FMGR or CI:

```
    :CN,<PORTLU>,24B,<CSBS>

         CSBS = The octal number which results from the values
                set in the following fields:

                15              8               0
                +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
                |R|G|A|B| C | D |       E       |
                +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+

                R = Enable routine polling
                G = Group polling enable
                A = ID character stripping
                B = Power fail protection
                C = Device polling priority
                D = Non-responding device handling
                E = Card's buffer size in multiples of 16 bytes

                (Note: Do not set the master interface card's buffer
                size greater than the maximum receive buffer size of
                the slave interface cards.)
```

The fields shown above should be set as follows with the exception of the polling priority (field C) which has four levels, 0 through 3. Slave nodes may be polled at different frequencies, if desired.

	WRITE PORT	READ PORT	
R =	0	1	
G =	0	0	
A =	0	0	
B =	0	0	
C =	(0 to 3 octal)	(0 to 3 octal)	(Note: 0 is the
D =	00	10	highest priority)
E =	00001101	00001101	

XLUEX Format:

```
    ECODE = 3
    CNTWD(1) = PORTLU
    CNTWD(2) = 2400B
    CALL XLUEX(ECODE,CNTWD,CSBS)
```

Line Configuration

The following commands have global effect and therefore need only be issued for one device.

Set Retry Count

From FMGR or CI:

```
:CN,<PORTLU>,56B,<RC>

    RC = The octal number which results from the values set in
         fields A, B and C.

         15            8              0
         +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
         |A|         | B  | |    C       |
         +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

How you set the bits in field B determines whether the NAK, WACK TTD, Select, Poll or RVI retry counts will be changed. Set field C to the new retry count. (Bits 11 through 14 and bit 7 are not used.)

```
       A = 1    Set retry count
    If B = 000  NAK count is set
         = 001  WACK count is set
         = 010  TTD count is set
         = 011  Select count is set
         = 100  Poll count is set
         = 101  RVI count is set
       C =      New value to be set
```

NOTE

The NAK, WACK, TTD, Select, Poll, and RVI retry counts have a default of 7. However, because the slave card is slower than the master interface, you should raise the WACK count to 50.

XLUEX Format:

```
ECODE = 3
CNTWD(1) = PORTLU
CNTWD(2) = 5600B
CALL XLUEX(ECODE,CNTWD,RC)
```

Set Protocol Timeout

From FMGR or CI:

```
:CN,<PORTLU>,55B,<PTO>

      PTO = The octal number which results from the values set
            in fields A, B and C.

            15             8               0
            +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
            |A|B|          C                |
            +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Field B should be 0 if you want to set the protocol timeout, 1 if you want to set the modem connect timeout. Set field C to the timeout value.

```
       A = 1  Set timeout (write)
    If B = 0  Set protocol timeout on slave device response
         = 1  Set modem connect timeout
       C =    Timeout value you assign in tenths of seconds
```

NOTE:

The protocol timeout and modem connect timeout have a default of 5 tenths of a second.

From XLUEX:

```
ECODE = 3
CNTWD(1) = PORTLU
CNTWD(2) = 5500B
CALL XLUEX(ECODE,CNTWD,PTO)
```

Network Initialization Example

The following is an example of a network initialization using the CN command. The network to be initialized has the following topology:

```
                              +---------+
                              | MASTER  |
                              | HP 1000 |
                              |  RTE-A  |
                              +---------+
                                   |
                                   |
                                   |
    LU 31       LU 33       LU 35       LU 37       LU 39
    LU 32       LU 34       LU 36       LU 38       LU 40
     +-----------------------------------------------+
     |           |           |           |           |
     |           |           |           |           |
+--------+  +--------+  +--------+  +--------+  +----+----+
| NODE 1 |  | NODE 2 |  | NODE 3 |  | NODE 4 |  \ SPARE /
| RTE-A  |  | RTE-XL |  | RTE-L  |  | RTE-A  |   \ PORT/
|   AA   |  |   AB   |  |   AC   |  |   AD   |    \   /
+--------+  +--------+  +--------+  +--------+     \ /
                                                    +
```

Figure 4-5. Sample Multidrop DS/1000-IV Network (A-Series Master).

DS PORT LU INITIALIZATION:

The first DS port LU pair shown in Figure 4-5 would be initialized as follows. The three remaining DS ports would be initialized in a similar manner. (Note: The secondary channel LUs are not initialized.)

```
*SET PORT ID
*
CN,31,26B,AA                       (write LU)
CN,32,26B,AA                       (read LU)
*
*CONFIGURE DRIVER
*
CN,31,27B,124600B
CN,32,27B,124600B
*
*SET PORT CONFIGURATION
*
CN,31,24B,15B
CN,32,24B,101015B
*
```

LINE PERFORMANCE PARAMETERS:

The following commands set the protocol timeout, select and WACK counts for the data link. As they have global effect (commands issued for one device affect all devices on the same line), they are not repeated for every device. In this example, the TTD, Poll, RVI, and NAK counts are not changed (the default for each is 7).

```
*ADJUST PROTOCOL TIMEOUT TO .4 SECOND
*
CN,31,55B,100004B
*
*ADJUST SELECT COUNT TO 3
*
CN,31,56B,101403B
*
*SET WACK COUNT TO 50
*
CN,31,56B,100450B
*
```

DS INITIALIZATION:

After the slave ports have been initialized and configured, initialize DS by running DINIT. Timeout and retry count adjustments may be done at any time before or after DS initialization. (Refer to Chapter 3, Network Initialization, for more information on using DINIT.)

Only the write LU should be used in the Nodal Routing Vector (NRV) specification, although both write and read LUs should be enabled. Likewise, to disable a link to a slave node, both write and read LUs should be disabled. The order in which the write and read LUs are enabled or disabled is unimportant. However, if rerouting is present at the master node, the read ports should be placed after the number of rerouting links in the enabling sequence.

Multidrop DS/1000-IV Utilities

The following DS/1000-IV message logging utilities are supported over Multidrop DS/1000-IV:

* HP 1000 to HP 1000 message logger - PLOG
* HP 1000 to HP 1000 message analyzer - TLOG

Because the 12007A or 12044A L-Series HDLC interfaces are required for remote VCP operation, Remote Virtual Control Panel to an A or L-Series computer is not available with Multidrop DS/1000-IV.

However, DSPMP, a Multipoint utility, is available over Multidrop DS/1000-IV with M, E and F-Series masters, and is very useful as a troubleshooting tool. Refer to the Data Link Manager's Manual for information on this utility.

Forced Cold Load Utility (M, E, F-Series Master)

An additional utility available on Multidrop DS/1000-IV networks with M, E and F-Series masters is the Forced Cold Load (FCL7) program. This utility will send a special message to the Data Link slave printed circuit assembly through the secondary channel. The slave firmware will recognize this special message to start the download process.

An EQT attached to the Multipoint Driver, DVR07, is required for this utility. The EQT must be uninitialized but must be accessible through an LU. You will need to know the LU numbers of both the unused EQT and the link to the DS/1000-IV node. Also, it is important to know the security code 29150 in order to prevent inadvertently starting this program.

FCL7 may be run on an M, E, F-Series computer and downloaded on an L-Series computer in order for the L-Series to be able to invoke Forced Cold Load.

To load the utility, FCL7:

```
:RU,LOADR,,%FCL7
```

To run FCL7:

```
:RU,FCL7,unused lu,dslu,29150,file#
```

where,

unused lu	=	LU assigned to an unused DVR07 EQT.
dslu	=	LU assigned to the link to the DS/1000-IV node requiring the Forced Cold Load.
29150	=	Fixed security code to prevent inadvertent downloads.
file#	=	The operating system file number to be downloaded (e.g., if file# = 1, file = P00001).

NOTE

The specified LUs are system LUs, not session LUs.

FCL7 locks the unused LU, and then verifies the correct driver type for both LUs and the availability of the unused EQT. It finds the group ID and device ID of the DS/1000-IV node, in order to generate the code for the secondary channel select. The DS/1000-IV node is then put into the non-DS mode. The unused EQT is then initialized with the secondary channel IDs and the FCL7 message is sent to the DS/1000-IV node through the secondary channel.

In order to use FCL7, the switches on the slave interfaces must be set according to the "Multidrop DS/1000-IV Hardware Configuration" previously presented in this chapter.

Programmatic Forced Cold Load (A-Series Master)

The subroutine D$FCL is supplied by the DS library $DSAL for programmatic downloads in Multidrop DS/1000-IV networks with A-Series masters. Before attempting a forced cold load, you should check for errors by declaring D$FCL. The following routine returns any possible error and source of error in the parameters "ERROR" and "ERRSOURCE." A zero error code indicates a successful initiation, but not necessarily a successful download.

```
FTN,L
  PROGRAM ERROR
  IMPLICIT INTEGER A-Z
  EXTERNAL D$FCL
  INTEGER IPRAM(5)
  *
  *FLCLU IS A SPARE LU USED TO ADDRESS 2ND CHANNELS
  *
       IPRAM(1) = FLCLU
  *
  *SLAVE IS THE TARGET SLAVE NODE # OR NEGATIVE LU
  *
       IPRAM(2) = SLAVE
  *
  *SECURITY IS THE NETWORK MANAGER'S SECURITY CODE
  *
       IPRAM(3) = SECURITY
  *
  *FILENUM IS THE DOWNLOAD SYSTEM'S FILE NUMBER
  *
       IPRAM(4) = FILENUM
  *
  *SELECT CODE IS THE SLAVE INTERFACE IN THE TARGET SLAVE NODE
  *
       IPRAM(5) = SELECTCODE

  CALL D$FCL(IPRAM,ERROR,ERRSOURCE)
```

Possible error conditions returned by this routine could be:

If ERROR =

- -1 A non-DS LU was given as an LU parameter
- -2 A non-multidrop DS LU was used
- 0 No error was found
- 1 Port has not been configured nor initialized

2 An incorrect security word was specified
3 A forced cold load node was not found
4 The DS driver reported an error

Possible sources of the error returned could be:

If ERRSOURCE =

0 Driver, link, card
1 DS port LU
2 Secondary channel LU
3 Security word
4 Node number

MDFCL Utility (A-Series Master)

MDFCL is a general utility program used in Multidrop DS/1000-IV networks with A-Series masters. MDFCL performs the following functions:

- o Initiates a forced cold load operation to a targed DS slave node
- o Displays a given slave interface card's FCL switch settings and its firmware revision code
- o Obtains port configuration information on a data link DS LU, such as the port's Group ID, Device ID and communication buffer size
- o Retrieves the data link master interface's configuration and statistics

MDFCL can be run interactively by scheduling it without parameters in the run string, or non-interactively by scheduling it with parameters.

When running MDFCL non-interactively, you will be prompted for any missing parameters. Therefore, in order to avoid unecessary user intervention, you should supply all five parameters in the run string when non-interactive mode is desired.

Running MDFCL Non-interactively

Non-interactive MDFCL is used for forced cold loads only.

```
:RU,MDFCL,FCLLU,DSLU,SECURITY,FILE#,SLAVESC
```

FCLLU = LU of the secondary channel for forced cold loads.

DSLU = Negative LU of the target slave node or node number.

SECURITY = Network Manager's Security Code.

FILE# = Decimal number of the absolute system file named Pxxxxx where xxxxx is the file number. (Note: RTE-XL systems can only accept two digit file numbers.)

SLAVESC = Select code (octal) of the slave card at the target node.

Running MDFCL Interactively

By running MDFCL interactively, you can read card, DS link and slave information as well as initiate forced cold loads.

From FMGR or CI:

```
:RU,MDFCL
```

MDFCL will return the following list of operations in the form of a menu and prompt you for a command:

```
 Mode of operation is as follows:

(1) EX --- exit the program
(2) FL --- initiate a forced cold load
(3) RE --- read DS link information
(4) SL --- retrieve slave information
(5) CS --- read card information

/MDFCL: Enter mode of operation:
```

CS — Read Card Information

The CS command displays master interface card configuration and statistics. The following is an example of a CS display:

```
/MDFCL: Enter mode of operation: CS

/MDFCL: To exit press CR
/MDFCL: Enter DS port lu: 51

Interface board information:

last error code = 0
board type      = 3
firmware rev.   = 2321
diagnostic hood = 0
board switches  = 54
modem lines     = 0
NAK count       = 7
WACK            = 40
TTD count       = 7
SELECT count    = 0
POLL count      = 7
RVI count       = 7
protocol t.o.   = 5
modem t.o.      = 250

Interface card statistics:

good block transmitted = 26919
good block received    = 4807
transmit block NAKS    = 0
receive block NAKS     = 0
transmit overrun       = 0
# of WACKS received    = 30463
# of TTDS received     = 0
# of RVI transmitted   = 0
# of wrong responses   = 0
```

LAST ERROR CODE - Last error code reported by the master interface card to the driver.

BOARD TYPE - The master interface card identifier (should be 3).

FIRMWARE REV. - The master firmware revision code.

DIAGNOSTIC HOOD - Will be "1" if the diagnostic hood is sensed,"0" if it is not present. If a diagnostic hood is attached to the interface card but it is not sensed, there may be an interface problem.

BOARD SWITCHES - The master interface card's switch settings (decimal).

MODEM LINES - Not used.

NAK COUNT - The maximum number of Negative Acknowledgements (NAKs) the master card will accept. DS will report a line down error if the maximum NAK count is exceeded.

WACK COUNT - The maximum number of Wait Before Transmit Positive Acknowledgements (WACKS) the master card will accept. DS will report a line down error if the maximum WACK count is exceeded.

TTD COUNT - The maximum number of Temporary Text Delays (TTDs) the master card will accept. DS will report a line down error if the maximum TTD count is exceeded.

SELECT COUNT - The maximum number of times the master will attempt to select a slave. DS will report a line down error if the maximum select count is exceeded.

POLL COUNT - The maximum number of times the master will poll a slave. DS will report a line down error if the maximum poll count is exceeded.

RVI COUNT - The maximum number of Reverse Interrupts (RVIs) the master will transmit. DS will report a line down error if the maximum RVI count is exceeded.

PROTOCOL T.O. - The maximum period of time (in tenths of seconds) that the master will wait for a slave's response. DS will report a line down error if the timeout is exceeded.

MODEM T.O. - The maximum period of time (in tenths of seconds) between a request to a modem and the initiation of a connection. DS will report a line down error if the timeout is exceeded.

GOOD BLOCK TRANSMITTED - The number of good blocks transmitted by the master to a slave.

GOOD BLOCK RECEIVED - The number of good blocks received by the master from a slave.

TRANSMIT BLOCK NAKS - The number of negative acknowledgements (NAKS) received by the master from the slave.

RECEIVE BLOCK NAKS - The number of negative acknowledgements (NAKS) sent by the master to the slave.

TRANSMIT OVERRUN - Number of times the master card could not complete a transmission because the slave card did not have enough room in its receive buffer.

RECEIVE OVERRUN - Number of times the master card could not read data from the slave into its receive buffer because the buffer was already full.

OF WACKS RECEIVED - Number of Wait Before Transmit Positive Acknowledgements (WACKS) received by the master card from a slave. A WACK indicates that the slave is temporarily not ready to receive data.

OF TTDS RECEIVED - Number of Temporary Text Delays (TTDS) received by the master card from a slave. A TTD is received when the slave is not ready to transmit but wants to retain the line and avoid the timeout at the master.

OF RVI TRANSMITTED - Number of Reverse Interrupts (RVIs) transmitted by the master card to the slave. The master transmits an RVI to the slave when it wants to send a high-priority message.

OF WRONG RESPONSES - Not used.

EX — Exit Program

Enter the EX command at the MDFLC prompt to terminate the program.

FL — Initiate Forced Cold Load

A forced cold load may be initiated interactively by using the FL command at the MDFLC prompt. (Note: See the "Running MDFLC Non-interactively" section of this chapter for information on how to initiate a non-interactive forced cold load.)

The following example illustrates an interactive forced cold load using the FL command:

```
/MDFCL: Enter mode of operation: FL

/MDFCL: To exit press CR
/MDFCL: Enter 2nd channel LU: 93

/MDFCL: To exit press CR
/MDFCL: Enter node # or negative port lu: -91

/MDFCL: To exit press CR
/MDFCL: Enter DS security: DS

/MDFCL: To exit press CR
/MDFCL: Enter file number: 00

/MDFCL: To exit press CR
/MDFCL: Enter slave card select code: 24

FCL initiated on LU: 91
```

RE — Read DS Link Information

The MDFCL RE command displays Group ID, Device ID, polling priority and other DS information about a specified DS port LU. RE will display more information about transmit LUs than receive LUs.

The following is an example of a RE display for a transmit LU:

```
/MDFCL: Enter mode of operation: RE

/MDFCL: To exit press CR
/MDFCL: Enter DS port LU: 51

Port information for LU: 51

Group ID             = A
Device ID            = A
Polling priority     = 0
Comm. buffer size    = 208
Port initialized     = T      (Note: T = True, F = False)
Link connected       = T
Non DS indication    = F
```

```
VCP indication       = F
Read timer           = F
Write timer          = F
Scheduling timer     = F
Severe error flag    = F
Start of new msg.    = F
Current msg. type    = 1
```

The following is an example of an RE display for a receive LU:

```
/MDFCL: Enter mode of operation: RE

/MDFCL: To exit press CR
/MDFCL: Enter DS port LU: 52

Port information for LU: 52

Group ID            = A
Device ID           = A
Polling priority    = 0
Comm. buffer size   = 208
Port initialized    = T
Link connected      = T
```

GROUP ID - The one character group identifier of the slave node established during port initialization (see the "Network Initialization with A-Series Master" section of this chapter for more information).

DEVICE ID - The one character device identifier of the port established during port initialization (see the "Network Initialization with A-Series Master" section of this chapter for more information).

POLLING PRIORITY - The polling priority of the port established during port initialization (see the "Network Initialization with A-Series Master" section of this chapter for more information). Priority may be 0 to 3 with 0 being the highest priority.

COMM. BUFFER SIZE - The size of the card's communication buffer in bytes. (See "Network Initialization with A-Series Master" section of this chapter for information on how to set the communication buffer size.)

PORT INITIALIZED - True if the port has been configured (see the "Network Initialization with A-Series Master" section of this chapter for more information).

LINK CONNECTED - True if the communication channel is operational.

NON DS INDICATION - Not used.

VCP INDICATION - Not used.

READ TIMER - True if the 15 second read timer is active (a read is in progress).

WRITE TIMER - True if the 15 second write timer is active (a write is in progress).

SCHEDULING TIMER - True if the .1 second scheduling timer is active (a program is currently being scheduled).

SEVERE ERROR FLAG - True if an interface problem occurred.

START OF NEW MSG. - True if a new message frame is expected. (Used by the DS device driver.)

CURRENT MSG. TYPE - "1" indicates that the current message is a forced load; "0" means a regular DS message is being sent.

SL — Retrieve Slave Information

The SL command will cause MDFCL to display a specified slave interface card's FCL switch settings and firmware revision code.

The following is an example of a SL display:

```
/MDFCL: Enter mode of operation: SL

/MDFCL: To exit press CR
/MDFCL: Enter DS port LU: 51

Start retrieving slave configuration

Slave firmware revision is: 2326
PCA enabled
Internal clock
Data Link port type
Asynchronous mode
FCL disabled
No data at 2nd channel
No data at primary channel
```


PCA ENABLED/DISABLED - Printed Ciruit Assembly is enabled if the interace card can interrupt the host, disabled if it can not.

INTERNAL/EXTERNAL CLOCK - Will indicate "Internal Clock" if the slave interface is using its own clock, "External Clock" if it is using another clock. (Note: The slave card must be configured as using an internal clock to operate correctly.)

DATA LINK PORT TYPE/NOT DATA LINK PORT TYPE - Will print "Data Link Port Type" if the port is configured for the data link, "Not Data Link Port Type" if it is not. (Note: The slave card must be configured as a data link port to operate correctly.)

ASYNCHRONOUS/SYNCHRONOUS MODE - Indicates whether the slave is transmitting in synchronous or asynchronous mode (Note: The slave card must be configured as asynchronous to operate correctly.)

FCL DISABLED/ENABLED - Indicates whether forced cold load is enabled or disabled. If disabled, the slave will not receive an unsolicited FCL from the master. (See the "Additional Switch Settings for Forced Cold Load Operation" section for information on how to enable and disable FCL.)

NO/DATA AT 2ND CHANNEL - Indicates whether or not data is present at the node's second channel.

NO/DATA AT PRIMARY CHANNEL - Indicates whether or not data is present at the node's primary channel.

Performance Considerations

The two major areas of concern in regards to Multidrop DS/1000-IV are:

First, the overhead incurred by the system while running the Data Link affects the performance of a Multidrop DS/1000-IV network. In other words, how much of the CPU is used for each link in a Multidrop DS/1000-IV network. By identifying CPU usage, you can determine how much of the CPU is left for other tasks such as computation or database management. As CPU needs approach 100% utilization, lower priority tasks will be affected. If CPU needs exceed 100%, some scheduled process will degrade or not execute at all.

The overhead of the Data Link will actually decrease with usage. During polling and the message start-up process, more driver and system involvement is required (CPU overhead). Whereas, the actual data portion of a message is controlled by the I/O card and uses little CPU overhead. When no data is being transacted and only polling is active, the worst case overhead occurs. The worst case overhead values of 6% for 9600 bps and 11% for 19.2 Kbps should be used for each line. This is a state which will occur frequently, and should be used when configuring a system.

The second area of concern is that performance will also be affected by the response time of the slave systems when responding to the master CPU. Response time is difficult to compute because some of the factors cannot be directly computed and some of them can be. The factors which can be determined directly are:

* the time for the message,
* line turnaround time, and
* individual system delays.

Those that cannot be determined directly are:

* the polling status,
* the number of other devices waiting to be serviced, and
* the length of their messages.

Appendix A
Example Generation Answer Files

Sample Generation Answer File for RTE-6/VM with DS

The following listing is a sample generation answer file for RTE-6/VM with DS. Your generation will differ according to your system configuration and the current software revision.

NOTE

Modules with CRN "06" are included in the RTE-6/VM software.
Modules with CRN "DS" are included in the DS/1000-IV software.

```
LI0616::GN:4:128                * GEN LIST FILE
YES                             * ECHO
*
******************************************************************
* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |*
*-                                                              -*
*-   Generation for System 110 with RTE-6/VM                    -*
*-                                                              -*
*-                                                              -*
*-          Answer file   -- AN0616:DS:GN                        -*
*-          List file     -- LI0616:DS:GN                        -*
*-          System output -- SY0616:DS:GN                        -*
*-                                                              -*
*-          Generated with following software                   -*
*-          - RTE-6/VM Software                                 -*
*-          - DS/1000-IV                                        -*
*-          - FDL for RTE-6/VM                                  -*
*-          - IMAGE                                             -*
*-          - HPIB                                              -*
*-          - RJE                                               -*
*-                                                              -*
*- Comments:                                                    -*
*-     Gen has following configuration;                         -*
*-                                                              -*
*-   Select Code              Device                            -*
*-  ____________    _____________________________________       -*
```

```
*-      10         FEM board for VM/1000 firmware           -*
*-      11         RJE                                      -*
*-      12         RJE                                      -*
*-      13         Priv. Fence                              -*
*-      14         TBG                                      -*
*-      15         DS/1000-IV 12771A Link                   -*
*-      16         7906 System disc                         -*
*-      17         7925 Peripheral disc                     -*
*-      20         26xx System console                      -*
*-      21         Mag. tape 1                              -*
*-      22         Mag. tape 2                              -*
*-      23         2767 LP                                  -*
*-      24         26xx terminal                            -*
*-      25         26xx terminal                            -*
*-      26         26xx terminal                            -*
*-      27         26xx terminal                            -*
*-      30         26xx terminal                            -*
*-      31         26xx terminal                            -*
*-      32         26xx terminal                            -*
*-      33         26xx terminal                            -*
*-      34         26xx terminal                            -*
*-      35         26xx terminal                            -*
*-      36         2607/2613/2617 LP                        -*
*-      37         2608 LP                                  -*
*-      40         DS/1000-IV HDLC Link                     -*
*-      41         DS/1000-IV HDLC Link                     -*
*-      42         DS/1000-IV 12771A link                   -*
*-      43         DS/1000-IV 12771A link                   -*
*-      44         DS/1000-3000 Bisync                      -*
*-      45         DS/1000-3000 HSI                         -*
*-      46         HPIB                                     -*
*-      47         Factory Data Link slave                  -*
*-      50         New Multipoint Line                      -*
*-      51         Dummy Driver #1 SC                       -*
*-      52         Dummy Driver #2 SC                       -*
*-                                                          -*
* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |*
****************************************************************
*
*
******************************
*     INITIALIZATION PHASE   *
******************************
*
SY0615::GN::5500             * OUTPUT FILE
7905                         * SYSTEM DISC TYPE: 7905/06/20
15                           * SYSTEM DISC SELECT CODE
*
******************************
*    SUBCHANNEL DEFINITIONS  *
******************************
```

```
*
* 7905 DISC LAYOUT
*
*
*                              CYLINDERS
* SUBCH   SECT/T   #TRKS    1ST  LAST:OVF   HEAD#   #SURF   UNIT:SUB   #SPARE
*
*  0:       96      300      0    153:0       0       2       0:0        8
*  1:       96      300    154    307:0       0       2       0:0        8
*  2:       96      200    308    410:0       0       2       0:0        6
*  3:       96      100      0    102:0       2       1       0:0        3
*  4:       96      300    103    410:0       2       1       0:0        8
*
*   7925 DISC LAYOUT - %$TP14::GN
*
*                              CYLINDERS
* SUBCH   SECT/T   #TRKS    1ST  LAST:OVF   HEAD#   #SURF   UNIT:SUB   #SPARE
*
*  0:      128       43    623    627:0       0       9       0:0        2
*  1:      128       43    628    632:0       0       9       0:0        2
*  2:      128       43    633    637:0       0       9       0:0        2
*  3:      128       43    638    642:0       0       9       0:0        2
*  4:      128       43    643    647:0       0       9       0:0        2
*  5:      128       43    648    652:0       0       9       0:0        2
*  6:      128       43    653    657:0       0       9       0:0        2
*  7:      128       43    658    662:0       0       9       0:0        2
*  8:      128       43    663    667:0       0       9       0:0        2
*  9:      128       43    668    672:0       0       9       0:0        2
* 10:      128      140    673    688:0       0       9       0:0        4
* 11:      128      140    689    704:0       0       9       0:0        4
* 12:      128      140    705    720:0       0       9       0:0        4
* 13:      128      140    721    736:0       0       9       0:0        4
* 14:      128      140    737    752:0       0       9       0:0        4
* 15:      128      299    753    786:0       0       9       0:0        7
* 16:      128      299    789    822:0       0       9       0:0        7
*
*DISC,TRACKS,STARTING CYLINDER,STARTING HEAD,#SURFACES,UNIT,SPARES
*
7905,300,0,0,2,0,8              * SUBCHANNEL 0
7905,300,154,0,2,0,8            * SUBCHANNEL 1
7905,200,308,0,2,0,6            * SUBCHANNEL 2
7905,100,0,2,1,0,3              * SUBCHANNEL 3
7905,300,103,2,1,0,8            * SUBCHANNEL 4
*
*
/E                              * TERMINATE SUBCHANNEL DEFINITION
0                               * SYSTEM SUBCHANNEL
YES                             * AUXILIARY DISC?
1                               * AUXILIARY DISC SUBCHANNEL
14                              * TBG SELECT CODE
13                              * PRIV. INT. SELECT CODE (NONE)
```

```
YES                               * MEM. RES. PROGS ACCESS TABLE AREA II?
YES                               * RT MEMORY LOCK?
YES                               * BG MEMORY LOCK?
80                                * SWAP DELAY?
512                               * MEMORY SIZE
0                                 * BOOT FILE
MAP ALL                           * MAP MODULES, GLOBALS, AND LINKS
LINKS IN CURRENT                  * CURRENT PAGE LINKAGE
*
*******************************
*    RELOCATABLE MODULES      *
*******************************
*
** RTE-6/VM Operating System
*
REL,%CR6S1::06                    * RTE-6/VM OPERATING SYSTEM PART 1
REL,%CR6S2::06                    * RTE-6/VM OPERATING SYSTEM PART 2
REL,%CR6S3::06                    * RTE-6/VM OPERATING SYSTEM PART 3
REL,%$CNFG::06                    * CONFIGURATOR
*
*******************************
*          DRIVERS            *
*******************************
*
*    DRIVER                                                ~ size in octal
*
REL,%DVR07::RE                    * NEW MULTIPOINT DRIVER FOR FDL  (3441)
REL,%DVG67::DS                    * 1000-3000 12889 HSI LINK       (3245)
REL,%DVA05::06                    * 264X TERMINAL                  (3016)
REL,%DVS65::DS                    * 1000-1000 FDL SLAVE            (2761)
REL,%DVA66::DS                    * 1000-1000 HDLC & 3000 BYSNC    (2714)
REL,%2DV37::06                    * HPIB WITH SRQ                  (2511)
REL,%DVP32::06                    * COPY OF %DVR32; 2ND CONTROLLER (2212)
REL,%$TP14::RE                    * TRACK MAP TABLE FOR DVP32      (0144)
REL,%DVR32::06                    * 7905/05/20/25 MAC DISC         (2212)
REL,%DVB12::RE                    * 2608 LP (ALPHA)                (1570)
REL,%DVA65::DS                    * 1000-3000 12771/73 LINK        (1377)
REL,%MDV00::DS                    * REMOTE I/O MAPPING DRIVER      (1203)
REL,%DVR50::RE                    * RJE/1000 DRIVER                ( 714)
REL,%DVR23::06                    * 7970 800 BPI MAG TAPE          ( 713)
REL,%DVA12::06                    * 2607A /2613A /2617A LP DRIVER  ( 700)
REL,%4DP43::06                    * POWER FAIL DRIVER              ( 637)
REL,%DVR12::06                    * 2767 LINE PRINTER              ( 536)
*
*******************************
*         LIBRARIES           *
*******************************
REL,%6SYLB::06                    * SYSTEM LIBRARY
REL,$FDSLB::06                    * FORTRAN/DS LIBRARY
REL,$MATH ::06                    * SYSTEM INDEPENDENT MATH LIBRARY
REL,$FLIB ::06                    * SYSTEM INDEPENDENT FORTRAN LIBRARY
```

```
REL,$FOLDF::06                    * FORTRAN FILE I/O ROUTINES FOR FMGR FILES
REL,%BMPG3::06                    * FMGR LIBRARY
REL,%DECAR::06                    * DECIMAL STRING LIBRARY
REL,$LDRLN::06                    * LOADR LIBRARY
REL,$MLSLB::06                    * MLS LOADER LIBRARY
REL,%MLSDB::06                    * MLS DEBUGGER
REL,%IB4A ::06                    * HPIB LIBRARY
REL,%DBUGR::06                    * LOADR DEBUGGER
*
*********************************
*       FILE MANAGER            *
*********************************
*
REL,%BMPG1::06                    * FILE MANAGER - PART 1
REL,%BMPG2::06                    * FILE MANAGER - PART 2
*
*********************************
*        SESSION MONITOR        *
*         AND SPOOLING          *
*********************************
*
REL,%SMON1::06                    * SESSION MONITOR #1
REL,%SMON2::06                    * SESSION MONITOR #2
REL,%SPOL1::06                    * SPOOLING
REL,%SPOL2::06                    * SPOOLING
*
*********************************
*       DS/1000-IV FOR          *
*          RTE-6/VM             *
*********************************
*
LINKS IN BASE
*
REL,%QUEUE::DS                 * INTERRUPT REQUEST HANDLER
REL,%GRPM ::DS                 * RTE-RTE REQUEST/REPLY PROCESSOR
REL,%UPLIN::DS                 * COMM. MGT TIMEOUT & RE-ENABLE MODULE
REL,%MATIC::DS                 * TIME PROCESSOR FOR MESSAGE ACCT
REL,%LUQUE::DS                 * PROVIDE BUFFER FOR MAPPED DATA TRANSFER
REL,%LUMAP::DS                 * PERFORM DEXEC REQUEST
REL,%PTOPM::DS                 * PTOP COMMUNICATION SLAVE MONITOR
REL,%EXECM::DS                 * REMOTE EXEC
REL,%RTRY ::DS                 * COMMUNICATION ERROR RETRY MODULE
REL,%QCLM ::DS                 * COMMUNICATION ERROR LOGGER
REL,%RSM  ::DS                 * REMOTE SESSION MONITOR
REL,%RQCNV::DS                 * HP 3000 REQUEST CONVERTER
REL,%RPCNV::DS                 * HP 3000 REPLY CONVERTER
REL,%#SEND::DS                 * NRV UPDATE MESSAGE SENDER
REL,%EXECW::DS                 * REMOTE EXEC WITH WAIT
REL,%VCPMN::DS                 * VIRTUAL CONTROL PANEL
REL,%INCNV::DS                 * INPUT CONVERTER 91740A/B ==> 91750A
REL,%OTCNV::DS                 * OUTPUT CONVERTER 91750A ==> 91740A
```

```
REL,%RFAM2::DS                 * REMOTE FILE ACCESS MONITOR W/ MULTI-DCB
REL,%DLIS1::DS                 * REMOTE DIRECTORY LIST
REL,%SYSAT::DS                 * SYSTEM ATTN MODULE (USED W/ R I/O MAP)
REL,%OPERM::DS                 * REMOTE OPERATOR REQUEST MONITOR
REL,%PROGL::DS                 * REMOTE DOWNLOAD MONITOR
REL,%IOMAP::DS                 * INTERFACE FOR MAPPED LU
REL,%#SPLU::DS                 * ENTRY POINT FOR REMOTE I/O MAPPING
REL,%CNSLM::DS                 * HP 3000 $STDLIST MONITOR
REL,%DSMOD::DS                 * ALTER DS PARAMETERS SET AT INITIALIZATION
REL,%DINIS::DS                 * NETWORK INITIALIZATION WITH SHUTDOWN
REL,%RD.TB::DS                 * REMOTE DATABASE ACCESS TABLE SPACE
REL,%DBCOP::DS                 * IMAGE COORDINATION PROGRAM
*
LINKS IN CURRENT
*
REL,$DSLB1::DS              * REQUIRED BY ALL DS NODE
REL,$DSLB2::DS              * REQUIRED BY ALL DS NODE WITH OTHER RTE LINKS
REL,$DSMX6::DS              * DS SUBROUTINES
REL,$DSRR ::DS              * REROUTING LIBRARY
REL,$DSSM ::DS              * SESSION MONITOR
REL,$DSMA ::DS              * MESSAGE ACCOUNTING
REL,$D3KLB::DS              * REQUIRED WHEN LINKING TO 3000
REL,$D3KBB::DS              * RTE-3000, 1KW BUFFERS
REL,$DBMS2::DS              * NEEDED TO ACCESS REMOTE DATABASE
REL,%MPLIB::RE              * MULTIPOINT LIBRARY
REL,$DSDB::DS               * REMOTE DATABASE LIBRARY
REL,$D$N25::DS              * FOR NON-X.25 3000 LINK
*
LINKS IN BASE
*
REL,%RESSM::DS              * ENTRY POINTS IN SSGA
*
* RJE
*
REL,%#BSC::RE
REL,%#COMN::RE
REL,%RJE::RE
REL,%#DIAL::RE
*
**********************************
*          USER PROGRAMS         *
**********************************
*
LINKS IN CURRENT
*
REL,%$LDR ::06                   * LOADR
REL,%WHZAT::06                   * WHZAT
REL,%LGTAT::06                   * LGTAT UTILITY
REL,%T5IDM::06                   * SHORT ID HANDLER
*
DISPLAY UNDEFS
  /E
```

```
*
******************************
*   PARAMETER INPUT PHASE    *
******************************
*
WHZAT,1,41                  * WHZAT PROGRAM STATUS PROGRAM
LGTAT,2,80                  * SYSTEM TRACK STATUS PROGRAM
CMM6,3,90                   * PATCH RTE UTILITY
PRMPT,1,10                  * TERMINAL MESSAGE QUERY
R$PN$,1,10                  * TERMINAL MESSAGE RESPONSE
LOGON,3,45                  * SYSTEM LOG ON PROGRAM
LGOFF,3,91                  * SYSTEM LOG OFF PROGRAM
RD.TB,30                    * REMOTE DATABASE
SMP,19                      * SPOOL
JOB,19                      * BATCH
#BSC,7
/E
*
******************************
*       CHANGE ENTS          *
******************************
*
******************************
* EAU AND HFP ENTRY POINTS   *
******************************
*
*.FIXD,RP,105104   * REAL TO DOUBLE INTEGER FIX     (IN F SERIES ONLY)
*.FLTD,RP,105124   * REAL TO DOUBLE INTEGER FLOAT   (IN F SERIES ONLY)
*
*
*    CLRIO IS GENERATED BY THE COMPILER, BUT IS NOT USED IN RTE.
*    THEREFORE IT'S ENTRY POINT IS MERELY AN RSS (UNCONDITIONAL SKIP).
*
CLRIO,RP,2001       * DELETE IF USING HP 92063A IMAGE
*
*      Z$DBL IS AN ENTRY POINT USED BY THE FTN4 COMPILER (REV 1901 OR
*      LATER)
*      IF IT CONTAINS 3, THEN DOUBLE PRECISION VALUES WILL BE 3 WORDS
*      IF IT CONTAINS 4, THEN DOUBLE PRECISION VALUES WILL BE 4 WORDS
*
Z$DBL,RP,4
*
*                   * FOR FTN4X
*
Z$INT,RP,1          * DEFAULT INTEGER*2
Z$LPP,RP,73         * DEFAULT 59 LINES PER PAGE
*
*
Z$F67,RP,7          * DEFAULT FORTRAN 77 STANDARD FORTRAN 77
*
*********************
```

```
* FFP ENTRY POINTS  *
*********************
*
DBLE,RP,105201       * CONVERT REAL TO EXTENDED REAL
SNGL,RP,105202       * CONVERT EXTENDED REAL TO REAL
.DFER,RP,105205      * 3 WORD MOVE (EXTENDED REAL TRANSFER)
.XPAK,RP,105206      * NORMALIZE, ROUND AND PACK WITH EXPONENT AN
*                    * EXTENDED REAL MANTISSA
.XCOM,RP,105215      * COMPLEMENT AN EXTENDED REAL UNPACKED MANTISSA IN
*                    * PLACE
..DCM,RP,105216      * COMPLEMENT AN EXTENDED REAL
DDINT,RP,105217      * TRUNCATE AN EXTENDED REAL
.XFER,RP,105220      * 3 WORD MOVE (EXTENDED REAL TRANSFER)
.GOTO,RP,105221      * TRANSFER CONTROL TO LOCATION
..MAP,RP,105222      * COMPUTE THE ADDRESS OF A 2 OR 3D ARRAY ELEMENT
.ENTR,RP,105223      * TRANSFER THE TRUE ADDRESS OF PARAMETERS USED IN
*                    * A SUBROUTINE CALL
.ENTP,RP,105224      * SAME AS .ENTR, EXCEPT MUST BE THIRD INSTRUCTION
*                    * AFTER THE ENTRY POINT
.PWR2,RP,105225      * CALCULATE REAL X AND INTEGER N, Y=X*2**N
.FLUN,RP,105226      * UNPACK REAL (EXPONENT IN A, LOWER PART OF
*                    * MANTISSA IN B)
*
$SETP,RP,105227      * SET UP A LIST OF POINTERS
*                    * NOTE: $SETP REPLACES .SETP AS OF 1913
*
.PACK,RP,105230      * CONVERT SIGNED MANTISSA OF REAL INTO NORMALIZE
*                    * REAL FORMAT
.CFER,RP,105231      * MOVE 4 WORDS (COMPLEX TRANSFER)   (IN F AND SOME
*                    * E SERIES)
*
*                    * ..FCM, ..TCM, .BLE, AND .NGL ARE AS OF REV 1926
*
*..FCM,RP,105232      * COMPLEMENT A REAL              (IN F SERIES ONLY)
*..TCM,RP,105233      * NEGATE A DOUBLE REAL           (IN F SERIES ONLY)
*.BLE,RP,105207       * CONVERT REAL TO DOUBLE REAL    (IN F SERIES ONLY)
*.NGL,RP,105214       * CONVERT DOUBLE REAL TO REAL    (IN F SERIES ONLY)
*
*     ***** 3-WORD ENTRY POINTS (IN F SERIES ONLY) *****
*
*.XADD,RP,105001      * EXTENDED REAL ADDITION
*.XSUB,RP,105021      * EXTENDED REAL SUBTRACTION
*.XMPY,RP,105041      * EXTENDED REAL MULTIPLCATION
*.XDIV,RP,105061      * EXTENDED REAL DIVISION
*.XFXS,RP,105101      * EXTENDED REAL TO INTEGER FIX
*.DINT,RP,105101      * EXTENDED REAL TO INTEGER FIX (NOTE .DINT FOR
*                    * FTN INTERFACE, SAME ENTRY POINT AS .XFXS
*.XFXD,RP,105105      * EXTENDED REAL TO DOUBLE INTEGER FIX
*.XFTS,RP,105121      * INTEGER TO EXTENDED REAL FLOAT
*.IDBL,RP,105121      * INTEGER TO EXTENDED REAL FLOAT  (NOTE: FTN
*                    * INTERFACE SAME ENTRY POINT AS .XFTS)
```

```
*.XFTD,RP,105125      * DOUBLE INTEGER TO EXTENDED REAL FLOAT
*
*     ***** 4-WORD ENTRY POINTS (IF F SERIES ONLY) *****
*
*.TADD,RP,105002      * DOUBLE REAL ADDITION
*.TSUB,RP,105022      * DOUBLE REAL SUBTRACTION
*.TMPY,RP,105042      * DOUBLE REAL MULTIPLY
*.TDIV,RP,105062      * DOUBLE REAL DIVIDE
*.TFXS,RP,105102      * DOUBLE REAL TO INTEGER FIX
*.TINT,RP,105102      * DOUBLE REAL TO INTEGER FIX  (NOTE: FTN
*                    * INTERFACE SAME ENTRY POINT AS .TFXS)
*.TFXD,RP,105106      * DOUBLE REAL TO DOUBLE INTEGER FIX
*.TFTS,RP,105122      * INTEGER TO DOUBLE REAL FLOAT
*.ITBL,RP,105122      * INTEGER TO DOUBLE REAL FLOAT (NOTE: FTN
*                    * INTERFACE SAME ENTRY POINT AS .TFTS)
*.TFTD,RP,105126      * DOUBLE INTEGER TO DOUBLE REAL FLOAT
*
*     ***** DOUBLE INTEGER ENTRY POINTS (FFP) (IN F SERIES ONLY) *****
*
*.DAD,RP,105014       * DOUBLE INTEGER ADDITION
*.DSB,RP,105034       * DOUBLE INTEGER SUBTRACTION
*.DMP,RP,105054       * DOUBLE INTEGER MULTIPLICATION
*.DDI,RP,105074       * DOUBLE INTEGER DIVISION
*.DSBR,RP,105114      * DOUBLE INTEGER SUBTRACTION (REVERSED)
*.DDIR,RP,105134      * DOUBLE INTEGER DIVISION (REVERSED)
*.DNG,RP,105203       * DOUBLE INTEGER NEGATE
*.DIN,RP,105210       * DOUBLE INTEGER INCREMENT
*.DDE,RP,105211       * DOUBLE INTEGER DECREMENT
*.DIS,RP,105212       * DOUBLE INTEGER INCREMENT AND SKIP IF 0
*.DDS,RP,105213       * DOUBLE INTEGER DECREMENT AND SKIP IF 0
*.DCO,RP,105204       * DOUBLE INTEGER COMPARE
*
*     ***** SIS ENTRY POINTS (IN F SERIES ONLY) *****
*
*TAN,RP,105320        * TANGENT
*SQRT,RP,105321       * SQUARE ROOT
*ALOG,RP,105322       * NATURAL LOGARITHM LN(X)
*ATAN,RP,105323       * ARCTANGENT
*COS,RP,105324        * COSINE
*SIN,RP,105325        * SINE
*EXP,RP,105326        * EXPONENTIAL E**X
*ALOGT,RP,105327      * LOGARITHM LOG10(X)
*TANH,RP,105330       * HYPERBOLIC TANGENT
*
*TRNL,RP,105331       * EVALUATE THE QUOTIENT OF 2 POLYNOMIALS IN
                     * DOUBLE PRECISION
*DPOLY,RP,105331      * EVALUATE THE QUOTIENT OF 2 POLYNOMIALS IN
*                    * DOUBLE PRECISION
*                    * NOTE: DPOLY REPLACES TRNL AS OF 1926 (SAME
*                    * ROUTINE) DPOLY IS USED IN OTHER SUBROUTINES
*                    * SUCH AS DCOS AND DSIN
```

```
*
*                       * /CMRT, /ATLG, .FPWR, & .TPWR ARE AS OF REV 1926
*
*/CMRT,RP,105332         * RANGE REDUCTION FUNCTION
*/ATLG,RP,105333         * COMPUTE (1-X)/(1+X) IN DOUBLE PRECISION
*.FPWR,RP,105334         * COMPUTE X**I FOR REAL X AND UNSIGNED INTEGER I
*.TPWR,RP,105335         * COMPUTE X**I FOR DOUBLE REAL X AND UNSIGNED
*                       * INTEGER I
*
*     ***** VIS ENTRY POINTS (IN F SERIES ONLY) *****
*
*.VECT,RP,101460         * FIRST OF TWO WORDS (USED BY SOFTWARE IN %VLIB
*                       * TO GET TO TWO WORD OPCODES)
*VPIV,RP,101461          * PIVOT ROUTINE
*VABS,RP,101462          * ABSOLUTE VALUE ROUTINE
*VSUM,RP,101463          * SUM THE ARRAY ELEMENTS
*VNRM,RP,101464          * SUM THE ABSOLUTE VALUE OF THE ELEMENTS
*VDOT,RP,101465          * DOT PRODUCT ROUTINE
*VMAX,RP,101466          * FIND THE LARGEST ARRAY ELEMENT
*VMAB,RP,101467          * FIND THE LARGEST ARRAY ELEMENT (ABSOLUTE VALUE)
*VMIN,RP,101470          * FIND THE SMALLEST ARRAY ELEMENT
*VMIB,RP,101471          * FIND THE SMALLEST ARRAY ELEMENT (ABSOLUTE
*                       * VALUE)
*VMOV,RP,101472          * COPY AN ARRAY INTO ANOTHER ARRAY
*VSWP,RP,101473          * EXCHANGE ELEMENTS OF TWO ARRAYS
* .ERES NOT USED WITH RTE-6/VM VIS
*.ERES,RP,101474         * CALCULATES 2 WORD OFFSET FOR EMA ARRAY ELEMENTS
*.VSET,RP,101476         * CALCULATES MAP TABLE FORM .ERES INFORMATION
*  .ESEG NOT USED WITH RTE-6/VM VIS
*.ESEG,RP,101475         * PERFORMS THE MAPPING FROM THE MAP TABLE FOUND
*                       * WITH .VSET
*.DVCT,RP,105460         * FIRST OF TWO WORDS (USED BY SOFTWARE IN %VLIB
*                       * TO GET TO TWO WORD OPCODES)
*DVPIV,RP,105461         * PIVOT ROUTINE FOR DOUBLE REAL ARRAYS
*DVABS,RP,105462         * ABSOLUTE VALUE ROUTINE FOR DOUBLE REAL ARRAYS
*DVSUM,RP,105463         * SUM THE ARRAY ELEMENTS FOR DOUBLE REAL ARRAYS
*DVNRM,RP,105464         * SUM THE ABSOLUTE VALUE OF THE ELEMENTS IN A
*                       * DOUBLE REAL ARRAY
*DVDOT,RP,105465         * DOT PRODUCT ROUTINE FOR DOUBLE REAL ARRAYS
*DVMAX,RP,105466         * FIND THE LARGEST ARRAY ELEMENT IN A DOUBLE REAL
*                       * ARRAY
*DVMAB,RP,105467         * FIND THE LARGEST ARRAY ELEMENT IN A DOUBLE REAL
*                       * ARRAY (ABSOLUTE VALUE)
*DVMIN,RP,105470         * FIND THE SMALLEST ARRAY ELEMENT IN A DOUBLE
*                       * REAL ARRAY
*DVMIB,RP,105471         * FIND THE SMALLEST ARRAY ELEMENT IN A DOUBLE
*                       * REAL ARRAY (ABSOLUTE VALUE)
*DVMOV,RP,105472         * COPY A DOUBLE REAL ARRAY INTO ANOTHER DOUBLE
*                       * REAL ARRAY
*DVSWP,RP,105473         * EXCHANGE ELEMENTS OF TWO DOUBLE REAL ARRAYS
*
```

```
*
*     ***** USER CALLABLE OS ENTRY POINTS *****
*
.FNW,RP,105345        * FIND WORD WITH USER INCREMENT
.LLS,RP,105347        * LINKED LIST SEARCH
.CPM,RP,105352        * COMPARE WORDS IN MEMORY
.ENTN,RP,105354       * ENTRY POINT RESOLVER
.ENTC,RP,105356       * ENTRY POINT RESOLVER
$LIBR,RP,105340        * PRIVILEGED SYSTEM ENTRY ROUTINE
$LIBX,RP,105341        * PRIVILEGED SYSTEM ENTRY ROUTINES
*
*
*     ***** VMA/EMA ENTRY POINTS *****
*
.PMAP,RP,105240       * MAP EMA/VMA PAGE IN MAP REGISTER
$LOC,RP,105241        * MEMORY RESIDENT NODES LOAD ON CALL
.IMAP,RP,105250       * SINGLE INT FTN4X ARRAY CALC + MAP
.IMAR,RP,105251       * SINGLE INT SUBSCRIPT ARRAY CALC.
.JMAP,RP,105252       * DOUBLE INT FTN4X ARRAY CALC. + MAP
.JMAR,RP,105253       * DOUBLE INT SUBSCRIPT ARRAY CALC.
.LPXR,RP,105254       * TWO DEF POINTER ADD & MAP
.LPX,RP,105255        * A & B REG POINTER + DEF OFFSET & MAP
.LBPR,RP,105256       * ONE DEF POINTER & MAP
.LBP,RP,105257        * MAP POINTER IN A & B REG
*
*****************************
*  RP FOR DS ON RTE-6/VM    *    * NOTE:  IF THIS RP IS NOT MADE,
$SIP,RP,0                   *    *        ACCESS TO THE DRIVER 65
*****************************    *        LINKS WILL FAIL.
/E
*
*****************************
*  TABLE GENERATION PHASE   *
*****************************
*
*****************************
*     EQUIPMENT TABLE       *
*****************************
*
*  10   FEM
*  13   Priv. Fence
*  14   TBG
*
16,DVR32,D                 * EQT 001 7906 DISC (SYSTEM)
17,DVP32,D                 * EQT 002 7925 DISC (PERIPHERAL)
*
20,DVA05,B,X=13,T=32767    * EQT 003 SYSTEM CONSOLE
*
51,DVD00,X=20              * EQT 004 DUMMY DRIVER DEVICE #1
52,DVD00,X=20              * EQT 005 DUMMY DRIVER DEVICE #2
*
```

```
23,DVR12,B,T=32767           * EQT 006 2767 LINE PRINTER
37,DVB12,B,X=5               * EQT 007 2608A LINE PRINTER
*
21,DVR23,B,D                 * EQT 008 7970 MAG TAPE
*
11,DVR50,S                   * EQT 009 RJE
*
15,DVA65,T=3,X=7             * EQT 010 DS/1000-IV 12771A
40,DVA65,T=3,X=7             * EQT 011 DS/1000-IV 12771A
41,DVA65,T=3,X=7             * EQT 012 DS/1000-IV 12771A
42,DVA66,X=12                * EQT 013 DS/1000-IV HDLC TX
42,DVA66                     * EQT 014 DS/1000-IV HDLC RX
43,DVA66,X=12                * EQT 015 DS/1000-IV HDLC TX
43,DVA66                     * EQT 016 DS/1000-IV HDLC RX
44,DVA66,X=12                * EQT 017 DS/1000-3000 BISYNC TX
44,DVA66                     * EQT 018 DS/1000-3000 BISYNC RX
45,DVG67,D                   * EQT 019 DS/1000-3000 HSI
*
46,DVR37,X=81,T=32767        * EQT 020 HPIB
*
24,DVA05,B,X=13,T=12000      * EQT 021 TERMINAL # 1
25,DVA05,B,X=13,T=12000      * EQT 022 TERMINAL # 2
26,DVA05,B,X=13,T=12000      * EQT 023 TERMINAL # 3
27,DVA05,B,X=13,T=12000      * EQT 024 TERMINAL # 4
30,DVA05,B,X=13,T=12000      * EQT 025 TERMINAL # 5
31,DVA05,B,X=13,T=12000      * EQT 026 TERMINAL # 6
32,DVA05,B,X=13,T=12000      * EQT 027 TERMINAL # 7
33,DVA05,B,X=13,T=12000      * EQT 028 TERMINAL # 8
34,DVA05,B,X=13,T=12000      * EQT 029 TERMINAL # 9
35,DVA05,B,X=13,T=12000      * EQT 030 TERMINAL #10
*
76,DVV00                    * EQT 031 REMOTE I/O MAPPING (RESERVED EQT)
76,DVV00,X=7                * EQT 032 REMOTE I/O MAPPING
76,DVV00,X=7                * EQT 033 REMOTE I/O MAPPING
76,DVV00,X=7                * EQT 034 REMOTE I/O MAPPING
76,DVV00,X=7                * EQT 035 REMOTE I/O MAPPING
76,DVV00,X=7                * EQT 036 REMOTE I/O MAPPING
76,DVV00,X=7                * EQT 037 REMOTE I/O MAPPING
*
47,DVS65,X=21                * EQT 038 FDL SLAVE WRITE
77,DVS65                     * EQT 039 FDL SLAVE READ
50,DVR07,X=8                 * EQT 040 FDL MASTER LINE
77,DVR07,X=8                 * EQT 041 FDL DEVICE #01
77,DVR07,X=8                 * EQT 042 FDL DEVICE #02
77,DVR07,X=8                 * EQT 043 FDL DEVICE #03
77,DVR07,X=8                 * EQT 044 FDL DEVICE #04
77,DVR07,X=8                 * EQT 045 FDL DEVICE #05
77,DVR07,X=8                 * EQT 046 FDL DEVICE #06
77,DVR07,X=8                 * EQT 047 FDL DEVICE #07
77,DVR07,X=8                 * EQT 048 FDL DEVICE #08
77,DVR07,X=8                 * EQT 049 FDL DEVICE #09
```

```
77,DVR07,X=8                 * EQT 050 FDL DEVICE #10
77,DVR07,X=8                 * EQT 051 FDL DEVICE #11
77,DVR07,X=8                 * EQT 052 FDL DEVICE #12
77,DVR07,X=8                 * EQT 053 FDL DEVICE #13
77,DVR07,X=8                 * EQT 054 FDL DEVICE #14
77,DVR07,X=8                 * EQT 055 FDL DEVICE #15
77,DVR07,X=8                 * EQT 056 FDL DEVICE #16
*
70,DVS43,M,X=18              * EQT 057 SPOOLING
71,DVS43,M,X=18              * EQT 058 SPOOLING
72,DVS43,M,X=18              * EQT 059 SPOOLING
73,DVS43,M,X=18              * EQT 060 SPOOLING
74,DVS43,M,X=18              * EQT 061 SPOOLING
75,DVS43,M,X=18              * EQT 062 SPOOLING
*
36,DVA12,B,T=600             * EQT 063 2607/2613/2617 LINE PRINTER
*
4,DVP43,M                    * EQT 064 POWER FAIL
/E
*
******************************
*   DEVICE REFERENCE TABLE   *
******************************
*
3                            * LU 001 SYSTEM CONSOLE
*
1,0                          * LU 002 SYSTEM DISC (SUBCHANNEL 0)
1,1                          * LU 003 SYSTEM DISC (SUBCHANNEL 1)
*
3,1                          * LU 004 LEFT CTU
3,2                          * LU 005 RIGHT CTU
*
6                            * LU 006 2767 LINE PRINTER
7                            * LU 007 2608A LINE PRINTER
8                            * LU 008 7970 MAG TAPE
9                            * LU 009 RJE
*
1,2                          * LU 010 7906 DISC SUBCHANNEL  2
1,3                          * LU 011 7906 DISC SUBCHANNEL  3
1,4                          * LU 012 7906 DISC SUBCHANNEL  4
*
2,0                          * LU 013 7925 DISC SUBCHANNEL  0
2,1                          * LU 014 7925 DISC SUBCHANNEL  1
2,2                          * LU 015 7925 DISC SUBCHANNEL  2
2,3                          * LU 016 7925 DISC SUBCHANNEL  3
2,4                          * LU 017 7925 DISC SUBCHANNEL  4
2,5                          * LU 018 7925 DISC SUBCHANNEL  5
2,6                          * LU 019 7925 DISC SUBCHANNEL  6
2,7                          * LU 020 7925 DISC SUBCHANNEL  7
2,8                          * LU 021 7925 DISC SUBCHANNEL  8
2,9                          * LU 022 7925 DISC SUBCHANNEL  9
```

```
2,10                         * LU 023 7925 DISC SUBCHANNEL 10
2,11                         * LU 024 7925 DISC SUBCHANNEL 11
2,12                         * LU 025 7925 DISC SUBCHANNEL 12
2,13                         * LU 026 7925 DISC SUBCHANNEL 13
2,14                         * LU 027 7925 DISC SUBCHANNEL 14
2,15                         * LU 028 7925 DISC SUBCHANNEL 15
2,16                         * LU 029 7925 DISC SUBCHANNEL 16
*
21                           * LU 030 26XX TERMINAL #1
22                           * LU 031 26XX TERMINAL #2
23                           * LU 032 26XX TERMINAL #3
24                           * LU 033 26XX TERMINAL #4
25                           * LU 034 26XX TERMINAL #5
26                           * LU 035 26XX TERMINAL #6
27                           * LU 036 26XX TERMINAL #7
28                           * LU 037 26XX TERMINAL #8
29                           * LU 038 26XX TERMINAL #9
30                           * LU 039 26XX TERMINAL #10
*
20                           * LU 040 HPIB DIRECT LINK
20,1                         * LU 041 HPIB DEVICE # 1
20,2                         * LU 042 HPIB DEVICE # 2
20,3                         * LU 043 HPIB DEVICE # 3
20,4                         * LU 044 HPIB DEVICE # 4
20,5                         * LU 045 HPIB DEVICE # 5
20,6                         * LU 046 HPIB DEVICE # 6
20,7                         * LU 047 HPIB DEVICE # 7
20,8                         * LU 048 HPIB DEVICE # 8
*
63,0                         * LU 049 2607/2613/2617 LINE PRINTER
*
0                            * LU 050 SPARE
0                            * LU 051 SPARE
*
4                            * LU 052 FOR DUMMY DRIVER #1
5                            * LU 053 FOR DUMMY DRIVER #2
*
31                           * LU 054 REMOTE I/O MAPPING
32                           * LU 055 REMOTE I/O MAPPING
33                           * LU 056 REMOTE I/O MAPPING
34                           * LU 057 REMOTE I/O MAPPING
35                           * LU 058 REMOTE I/O MAPPING
36                           * LU 059 REMOTE I/O MAPPING
37                           * LU 060 REMOTE I/O MAPPING
*
0                            * LU 061 SPARE
0                            * LU 062 SPARE
*
10,1                         * LU 063 DS/1000-IV 12771A
11,1                         * LU 064 DS/1000-IV 12771A
12,1                         * LU 065 DS/1000-IV 12771A
```

```
12,1                     * LU 065 DS/1000-IV 12771A
13                       * LU 066 DS/1000-IV HDLC TX
14                       * LU 067 DS/1000-IV HDLC RX
15                       * LU 068 DS/1000-IV HDLC TX
16                       * LU 069 DS/1000-IV HDLC RX
17                       * LU 070 DS/1000-3000 BISYNC TX
18                       * LU 071 DS/1000-3000 BISYNC RX
19                       * LU 072 DS/1000-3000 HSI
*
38                       * LU 073 FDL SLAVE WRITE
39                       * LU 074 FDL SLAVE READ
40                       * LU 075 FDL MASTER LINE
41                       * LU 076 FDL DEVICE #01
41                       * LU 077 FDL DEVICE #02
43                       * LU 078 FDL DEVICE #03
44                       * LU 079 FDL DEVICE #04
45                       * LU 080 FDL DEVICE #05
46                       * LU 081 FDL DEVICE #06
47                       * LU 082 FDL DEVICE #07
48                       * LU 083 FDL DEVICE #08
49                       * LU 084 FDL DEVICE #09
50                       * LU 085 FDL DEVICE #10
51                       * LU 086 FDL DEVICE #11
52                       * LU 087 FDL DEVICE #12
53                       * LU 088 FDL DEVICE #13
54                       * LU 089 FDL DEVICE #14
55                       * LU 090 FDL DEVICE #15
56                       * LU 091 FDL DEVICE #16
*
0                        * LU 092 SPARE
0                        * LU 093 SPARE
*
56                       * LU 094 SPOOL
57                       * LU 095 SPOOL
58                       * LU 096 SPOOL
59                       * LU 097 SPOOL
60                       * LU 098 SPOOL
61                       * LU 099 SPOOL
*
21,1                     * LU 100 # 1 LCTU
22,1                     * LU 101 # 2 LCTU
23,1                     * LU 102 # 3 LCTU
24,1                     * LU 103 # 4 LCTU
25,1                     * LU 104 # 5 LCTU
26,1                     * LU 105 # 6 LCTU
27,1                     * LU 106 # 7 LCTU
28,1                     * LU 107 # 8 LCTU
29,1                     * LU 108 # 9 LCTU
30,1                     * LU 109 #10 LCTU
*
21,2                     * LU 110 # 1 RCTU
```

```
22,2                        * LU 111 # 1 RCTU
23,2                        * LU 112 # 1 RCTU
24,2                        * LU 113 # 1 RCTU
25,2                        * LU 114 # 1 RCTU
26,2                        * LU 115 # 1 RCTU
27,2                        * LU 116 # 1 RCTU
28,2                        * LU 117 # 1 RCTU
29,2                        * LU 118 # 1 RCTU
30,2                        * LU 119 # 1 RCTU
/E
*
*****************************
*      INTERRUPT TABLE      *
*****************************
*
*10,FEM                     * FEM FOR VMA FIRMWARE
*
11,ENT,P.50                 * RJE/1000
12,ENT,P.50                 * RJE/1000
*
*13 PRIV FENCE              * PRIVILEGED FENCE CARD
*
*14,TBG                     * TIME BASE GENERATOR
*
15,EQT,10                   * DS/1000-IV 12771A LINK TO 105
*
16,EQT,1                    * 7905 DISC
17,EQT,2                    * 7925 DISC
*
20,PRG,PRMPT                * SYSTEM CONSOLE
*
21,EQT,8                    * MAG TAPE #1
22,EQT,8                    * MAG TAPE #2
*
23,EQT,6                    * 2767 LINE PRINTER
*
24,PRG,PRMPT                * TERMINAL # 1
25,PRG,PRMPT                * TERMINAL # 2
26,PRG,PRMPT                * TERMINAL # 3
27,PRG,PRMPT                * TERMINAL # 4
30,PRG,PRMPT                * TERMINAL # 5
31,PRG,PRMPT                * TERMINAL # 6
32,PRG,PRMPT                * TERMINAL # 7
33,PRG,PRMPT                * TERMINAL # 8
34,PRG,PRMPT                * TERMINAL # 9
35,PRG,PRMPT                * TERMINAL #10
*
36,EQT,63                   * 2607/2613/2617 LINE PRINTER
37,EQT,7                    * 2608A LINE PRINTER
*
40,EQT,11                   * DS/1000-IV HDLC
```

```
42,EQT,13                     * DS/1000-IV 12771A LINK
43,EQT,15                     * DS/1000-IV 12771A LINK
44,EQT,17                     * DS/1000-3000 BISYNC
45,EQT,19                     * DS/1000-3000 HSI
*
46,EQT,20                     * HPIB
*
47,EQT,38                     * FDL SLAVE WRITE
50,PRG,PRMPT                  * FDL MASTER LINE
*
51,EQT,4                      * DUMMY DRIVER DEVICE
52,EQT,5                      * DUMMY DRIVER DEVICE
*
70,EQT,57                     * SPOOLING
71,EQT,58                     * SPOOLING
72,EQT,59                     * SPOOLING
73,EQT,60                     * SPOOLING
74,EQT,61                     * SPOOLING
75,EQT,62                     * SPOOLING
*
76,PRG,PRMPT                  * REMOTE I/O MAPPING
*
77,ABS,0                      * FDL DEVICES
/E
*
*****************************
*      SYSTEM BOUNDARIES    *
*****************************
*
0                             * CHANGE DRIVER PART
100                           * CHANGE RT COMMON
2                             * CHANGE BG COMMON
*
*****************************
*      RESOURCES TABLES     *
*****************************
*
64                            * # OF CLASS NUMBERS
10                            * LU MAPPINGS
64                            * # R.N.'S
100,400                       * BUFFER LIMITS
32                            * ADDITIONAL BLANK ID SEGS
32                            * ADDITIONAL SHORT ID SEGS
10                            * ADDITIONAL ID EXTENSIONS
42                            * PARTITIONS
*
*****************************
*    PARTITION DEFINITION   *
*****************************
*
TR,1
```

```
*
*****************************
*    MODIFY PROGRAM REQ.    *
*****************************
*
LOADR,28
/E
D.RTR,1
/E
```

Sample Generation for RTE-IVB

The following listing is a sample generation answer file for RTE-IVB with DS. Your generation will differ according to your system configuration and the current software revision.

NOTE

Modules with CRN "B4" are included in the RTE-IVB software. Modules with CRN "DS" are included in the DS/1000-IV software.

```
START GEN4B
SYSLST::-12::200              * LIST FILE NAME
YES                           * ECHO TO A TERMINAL
*****************************************************************
*                                                               *
*                                                               *
*                   GENERATION FOR RTE-IVB                      *
*                                                               *
*                - ANSWER FILE:  ANSWER                         *
*                - GEN LISTING:  SYSLST                         *
*                - GEN OUTPUT :  SYSBIN                         *
*                - BOOT FILE  :  -NONE-                         *
*                                                               *
*****************************************************************
*                                                               *
* HP 92068A RTE-IVB WITH SESSION MONITOR AND HP 91750A DS/1000-IV*
*                                                               *
*            INCLUDES:                                          *
*                - DS/1000-1000 ** HDLC    **    (3 LINKS)      *
*                - DS/1000-1000 ** 12771   **    (1 LINK)       *
*                - DS/1000-1000 ** FDL     **    (2 LINKS)      *
*                - DS/1000-3000 ** BISYNC **     (1 LINK )      *
*                - DS/1000-3000 ** HSI     **    (1 LINK )      *
*                - MULTIDROP DS                                 *
*                - REMOTE I/O MAPPING                           *
*                - RJE/1000                                     *
*                - MULTIPOINT DATALINK SUBSYSTEM                *
*                - MULTIDROP                                    *
*                - HP-IB                                        *
*                - MUX (12972)                                  *
*                - LOCAL OR REMOTE DATABASE ACCESS              *
*                                                               *
*****************************************************************
*
```

```
SYSBIN::-12::5000      * OUTPUT FILE NAME
7906                   * TARGET SYSTEM DISC
20                     * CONTROLLER SELECT CODE
*
*******************************************************************
* DISC  #TRKS  1ST-CYL  HEAD  #SURFACES  UNIT  #SPARES            *
  7906,  256,     0,     0,        2,      0,      8    *SUBCHANNEL 0
  7906,  256,   132,     0,        2,      0,      8    *SUBCHANNEL 1
  7906,   85,   264,     0,        2,      0,      3    *SUBCHANNEL 2
  7906,  200,   308,     0,        2,      0,      6    *SUBCHANNEL 3
*
  7906,   20,     0,     2,        2,      0,      2    *SUBCHANNEL 4
  7906,   20,    11,     2,        2,      0,      2    *SUBCHANNEL 5
  7906,   20,    22,     2,        2,      0,      2    *SUBCHANNEL 6
  7906,   20,    33,     2,        2,      0,      2    *SUBCHANNEL 7
  7906,  100,    44,     2,        2,      0,      2    *SUBCHANNEL 8
  7906,  150,    95,     2,        2,      0,      4    *SUBCHANNEL 9
  7906,  200,   172,     2,        2,      0,      4    *SUBCHANNEL 10
  7906,  270,   274,     2,        2,      0,      4    *SUBCHANNEL 11
  7906,  450,   172,     2,        2,      0,     10    *SUBCHANNEL 12
/E
*
0                      * SYSTEM SUBCHANNEL
YES                    * AUXILIARY DISC
1                      * AUXILIARY DISC SUBCHANNEL
15                     * TBG SELECT CODE
14                     * PRIV. INT. SELECT CODE
YES                    * MEM. RES. ACCESS TABLE AREA II
YES                    * RT MEMORY LOCK
YES                    * BG MEMORY LOCK
100                    * SWAP DELAY
512                    * MEMORY SIZE
0                      * BOOT FILE NAME
*
MAP ALL                * MAP ALL
LINKS IN CURRENT       * CURRENT PAGE LINKAGE
*
*********************************************************************
*                        RELOCATABLE MODULES                        *
*********************************************************************
*
********************** SYSTEM & DRIVERS
*
REL,%CR4S1::B4         * RTE-IVB OPERATING SYSTEM #1
REL,%CR4S2::B4         * RTE-IVB OPERATING SYSTEM #2
*
REL,%DVR32::B4         * 7905/06/20 DISC DRIVER
REL,%DVR07::B4         * MULTIPOINT DRIVER WITH DATA LINK & DS (2126)
REL,%DVG67::B4         * 1000-3000 HSI DRIVER
REL,%DVA05::B4         * 2645/48 DRIVER (WITH C/U)
REL,%DVS64::B4         * DS ON DATALINK
```

```
REL,%DVA66::B4          * 1000-1000 HDLC & 1000-3000 BISYNC
REL,%2DV37::B4          * HP-IB DRIVER WITH SRQ
REL,%DVR36::B4          * WCS DRIVER
REL,%DVB12::B4          * 2608A LINE PRINTER DRIVER
REL,%MDV00::B4          * REMOTE I/O MAP DVR--RTEIVB & RTE-MIII
REL,%DVM72::B4          * MICRO CIRCUIT INTERFACE (12566)
REL,%DVR23::B4          * 7970 9-TRACK MAG TAPE DRIVER
REL,%DVA12::B4          * 2607A/2613A/2617A LINE PRINTER DRIVER
REL,%DVR12::B4          * 2767A LINE PRINTER DRIVER
REL,%DVR50::B4          * RJE/1000 COMMUNICATIONS DRIVER
REL,%DV65T::B4          * 1000-1000 12771 DS
REL,%DVX77::B4          * DUMMY DRIVER FOR OEM CLASS
REL,%DVX57::B4          * DUMMY DRIVER FOR OEM CLASS
REL,%DVM00::B4          * INTERFACE CARD DRIVER
REL,%PVM00::B4          * PRE DRIVER
REL,%DDV05::B4          * 26XX TERMINAL SCREEN MODE DEVICE DRIVER
REL,%$DVTB::B4          * DEVICE DRIVER ADDRESS TABLE
*
********************** MODULES
*
REL,%BMPG2::B4          * D.RTR
REL,%D.BUF::B4          * D.RTR DIRECTORY BUFFER
REL,%BMPG1::B4          * FMGR
REL,%QUEUE::DS          * INTERRUPT REQUEST HANDLER
REL,%GRPM ::DS          * RTE-RTE REQUEST/REPLY PROCESSOR
REL,%UPLIN::DS          * COMM. MGT TIMEOUT & RE-ENABLE MODULE
REL,%MATIC::DS          * TIMEOUT PROCESSOR FOR MESSAGE ACCT.
REL,%LUQUE::DS          * PROVIDES BUFFER FOR MAPPED DATA TRANSFER
REL,%LUMAP::DS          * PERFORMS DEXEC REQUEST
REL,%PTOPM::DS          * PTOP COMMUNICATION SLAVE MONITOR
REL,%EXECM::DS          * REMOTE EXEC
*
*
REL,%RESSM::DS          * ENTRY POINTS IN SSGA FOR RTE-IVB
*
REL,%SMON1::B4          * SESSION MONITOR #1
REL,%SMON2::B4          * SESSION MONITOR #2
REL,%RTRY ::DS          * COMMUNICATION ERROR RETRY MODULE
REL,%QCLM ::DS          * COMMUNICATIONS ERROR LOGGER
REL,%RSM  ::DS          * REMOTE SESSION MONITOR
REL,%RQCNV::DS          * HP 3000 REQUEST CONVERTER
REL,%RPCNV::DS          * HP 3000 REPLY CONVERTER
REL,%#SEND::DS          * NRV UPDATE MESSAGE SENDER
REL,%EXECW::DS          * REMOTE EXEC WITH WAIT
REL,%VCPMN::DS          * VIRTUAL CONTROL PANEL MONITOR
REL,%INCNV::DS          * INPUT CONVERTER  91740A/B => 91750A
REL,%OTCNV::DS          * OUTPUT CONVERTER 91750A => 91740A/B
REL,%RDBAM::DS          * REMOTE DATABASE ACCESS MONITOR
REL,%RFAM2::DS          * REMOTE FILE ACCESS MONITOR W/ MULTI-DCB
REL,%DLIS1::DS          * REMOTE DIRECTORY LIST
REL,%T5IDM::B4          * SHORT ID SEGMENT HANDLER
```

```
REL,%SYSAT::DS          * SYSTEM ATTN MODULE (USED WITH R I/O MAP)
REL,%OPERM::DS          * REMOTE OPERATOR REQUEST MONITOR
REL,%PROGL::DS          * REMOTE DOWNLOAD MONITOR
REL,%IOMAP::DS          * INTERFACE FOR MAPPED LUS
REL,%#SPLU::DS          * ENTRY POINT FOR REMOTE I/O MAPPING
REL,%CNSLM::DS          * HP 3000 $STDLIST MONITOR
REL,%DSMOD::DS          * ALTERS DS PARAMETERS SET AT INITIALIZATION
REL,%DINIS::DS          * NETWORK INITIALIZATION WITH SHUTDOWN
*
*********************** LIBRARIES
*
REL,%4SYLB::B4          * SYSTEM LIBRARY
REL,%BMPG3::B4          * BATCH LIBRARY
REL,%DECAR::B4          * DECIMAL STRING ARITHMETIC LIBRARY
REL,$MLIB1::B4          * RTE/DOS RELOC. LIBRARY
REL,$FDSLB::B4          * MATH LIBRARY FOR DS
REL,%BAMLB::B4          * BASIC MEMORY-RESIDENT LIBRARY
REL,%IB4A ::B4          * HP-IB SUPPORT
REL,%DBUGR::B4          * USER DEBUG LIBRARY
REL,%MPLIB::B4          * MULTIPOINT LIBRARY
REL,$DSLB1::DS          * REQUIRED IN ALL DS/1000-IV NODES
REL,$DSLB2::DS          * REQUIRED IN ALL NODES W/ OTHER RTE LINKS
REL,$DSMX4::DS          * DS SUBROUTINES
REL,$DSRR ::DS          * RE-ROUTING LIBRARY
REL,$DSSM ::DS          * SESSION MONITOR
REL,$DSMA ::DS          * MESSAGE ACCOUNTING
REL,$DSDB ::DS          * DATABASE LIBRARY
REL,$D3KLB::DS          * REQUIRED WHEN LINKED TO 3000
REL,$D3KBB::DS          * 1000-3000, 1KW BUFFERS
REL,%CLIB ::B4          * COMPILER LIBRARY
REL,$DBMS1::B4          * NEEDED TO ACCESS LOCAL DB'S
REL,$VLIB1::B4          * VIS LIBRARY
REL,$LDRLB::B4          * LOADER LIBRARY
*
*********************** ADDITIONAL MODULES
*
REL,%#BSC ::32767       * RJE/1000 PROTOCOL
REL,%#COMN::32767       * RJE/1000 T/O VALUES AND DATA BUFFERS
REL,%RJE  ::32767       * RJE/1000 EMULATOR
REL,%#DIAL::32767       * RJE/1000 REMOTE DIAL AND DISCONNECT PGM
REL,%SRQ.P::32767       * HP-IB SUPPORT (TRAP UTILITY)
REL,%SP01B::32767       * RTE-IVB SPOOLING #1
REL,%SP02B::32767       * RTE-IVB SPOOLING #2
REL,%DBCOP::B4          * IMAGE COORDINATING PROGRAM
REL,%RD.TB::B4          * TABLE SPACE FOR REMOTE DATABASE ACCESS
REL,%WHZAT::B4          * SYSTEM STATUS PROGRAM
REL,%LGTAT::B4          * SYSTEM TRACK ASSIGN TABLE LOG
REL,%SYSNO::B4          * DETERMINES SYSTEM #(0-7)
REL,%4LDR ::B4          * RELOCATING LOADER
*
*
```

```
REL,%$CNFX::32767     * RTE-IVB CONFIGURATOR EXTENSION
*
/E                    * TERMINATE RELOCATABLE SPECIFICATIONS
*
*********************************************************************
*                          PROGRAM PARAMETERS                       *
*********************************************************************
*
* PROGRAM,TYPE,PRIORITY,EXECUTION INTERVAL
*
D.RTR,3,1             * D.RTR DISC RESIDENT W/ HIGH PRIORITY
WHZAT,1,1             * MEMORY RESIDENT-PRIORITY OF 1
LGTAT,1,2             * MEMORY RESIDENT-PRIORITY OF 2
DBCOP,1,20            * IMAGE MONITOR MEMORY RESIDENT
RD.TB,30              * TYPE 30=> SSGA -- REM. DB TABLES
TRAP,30               * TYPE 30=> SSGA -- BASIC ROUTINE
TTYEV,17              * MEMORY RESIDENT WITH SSGA ACCESS
#BSC,7                * CHANGE FROM MEMORY RES TO DISC RES LIB
SMP,19                * CHANGE FROM RT DISC RES TO BG DISC RES
JOB,19                * CHANGE FROM RT DISC RES TO BG DISC RES
PVM00,13              * CHANGE FROM SYSTEM RESIDENT TO TBA2
/E
*
*********************************************************************
*              ENTRY POINT CHANGES FOR HP 1000 F-SERIES             *
*             WITH RTE-IVB SOFTWARE REV. 2040 OR GREATER            *
*********************************************************************
*
*    ***** EAU AND HFP ENTRY POINTS *****
*
.FIXD,RP,105104      * REAL TO DOUBLE INTEGER FIX    (IN F SERIES ONLY)
.FLTD,RP,105124      * REAL TO DOUBLE INTEGER FLOAT  (IN F SERIES ONLY)
*
*
*      CLRIO IS GENERATED BY THE COMPILER, BUT IS NOT USED IN RTE.
*      THEREFORE IT'S ENTRY POINT IS MERELY AN RSS (UNCONDITIONAL
*      SKIP).
*
CLRIO,RP,2001        * DELETE IF USING HP 92063A IMAGE
*
*      Z$DBL IS AN ENTRY POINT USED BY THE FTN4 COMPILER (REV 1901 OR
*      LATER)
*      IF IT CONTAINS 3, THEN DOUBLE PRECISION VALUES WILL BE 3 WORDS
*      IF IT CONTAINS 4, THEN DOUBLE PRECISION VALUES WILL BE 4 WORDS
*
Z$DBL,RP,4
*
*                    * FOR FTN4X
*
Z$INT,RP,1           * DEFAULT INTEGER*2
Z$LPP,RP,73          * DEFAULT 59 LINES PER PAGE
```

```
*
*      ***** FFP ENTRY POINTS *****
*
DBLE,RP,105201       * CONVERT REAL TO EXTENDED REAL
SNGL,RP,105202       * CONVERT EXTENDED REAL TO REAL
.DFER,RP,105205      * 3 WORD MOVE (EXTENDED REAL TRANSFER)
.XPAK,RP,105206      * NORMALIZE, ROUND AND PACK WITH EXPONENT AN
*                    * EXTENDED REAL MANTISSA
.XCOM,RP,105215      * COMPLEMENT AN EXTENDED REAL UNPACKED MANTISSA
*                    * IN PLACE
..DCM,RP,105216      * COMPLEMENT AN EXTENDED REAL
DDINT,RP,105217      * TRUNCATE AN EXTENDED REAL
.XFER,RP,105220      * 3 WORD MOVE (EXTENDED REAL TRANSFER)
.GOTO,RP,105221      * TRANSFER CONTROL TO LOCATION
..MAP,RP,105222      * COMPUTE THE ADDRESS OF A 2 OR 3D ARRAY ELEMENT
.ENTR,RP,105223      * TRANSFER THE TRUE ADDRESS OF PARAMETERS USED IN
*                    * A SUBROUTINE CALL
.ENTP,RP,105224      * SAME AS .ENTR, EXCEPT MUST BE THIRD INSTRUCTION
*                    * AFTER THE ENTRY POINT
.PWR2,RP,105225      * CALCULATE REAL X AND INTEGER N, Y=X*2**N
.FLUN,RP,105226      * UNPACK REAL (EXPONENT IN A, LOWER PART OF
*                    * MANTISSA IN B)
*
$SETP,RP,105227      * SET UP A LIST OF POINTERS
*                    * NOTE: $SETP REPLACES .SETP AS OF 1913
*
.PACK,RP,105230      * CONVERT SIGNED MANTISSA OF REAL INTO NORMALIZE
*                    * REAL FORMAT
.CFER,RP,105231      * MOVE 4 WORDS (COMPLEX TRANSFER)   (IN F AND
*                    * SOME E SERIES)
*
*                    * ..FCM, ..TCM, .BLE, AND .NGL ARE AS OF REV 1926
*
..FCM,RP,105232      * COMPLEMENT A REAL               (IN F SERIES ONLY)
..TCM,RP,105233      * NEGATE A DOUBLE REAL            (IN F SERIES ONLY)
.BLE,RP,105207       * CONVERT REAL TO DOUBLE REAL     (IN F SERIES ONLY)
.NGL,RP,105214       * CONVERT DOUBLE REAL TO REAL     (IN F SERIES ONLY)
*
*      ***** EMA ENTRY POINTS (F AND E SERIES ONLY) *****
*
.EMAP,RP,105257      * RESOLVE REFERENCES TO EMA ELEMENTS
.EMIO,RP,105240      * USED FOR I/O FROM EMA ARRAYS
MMAP,RP,105241       * MAPS PHYSICAL PAGES INTO LOGICAL ADDRESS SPACE
*
*      ***** 3-WORD ENTRY POINTS (IN F SERIES ONLY) *****
*
.XADD,RP,105001      * EXTENDED REAL ADDITION
.XSUB,RP,105021      * EXTENDED REAL SUBTRACTION
.XMPY,RP,105041      * EXTENDED REAL MULTIPLCATION
.XDIV,RP,105061      * EXTENDED REAL DIVISION
.XFXS,RP,105101      * EXTENDED REAL TO INTEGER FIX
```

```
.DINT,RP,105101      * EXTENDED REAL TO INTEGER FIX (NOTE .DINT FOR
*                    * FTN INTERFACE, SAME ENTRY POINT AS .XFXS
.XFXD,RP,105105      * EXTENDED REAL TO DOUBLE INTEGER FIX
.XFTS,RP,105121      * INTEGER TO EXTENDED REAL FLOAT
.IDBL,RP,105121      * INTEGER TO EXTENDED REAL FLOAT  (NOTE: FTN
*                    * INTERFACE SAME ENTRY POINT AS .XFTS)
.XFTD,RP,105125      * DOUBLE INTEGER TO EXTENDED REAL FLOAT
*
*     ***** 4-WORD ENTRY POINTS (IF F SERIES ONLY) *****
*
.TADD,RP,105002      * DOUBLE REAL ADDITION
.TSUB,RP,105022      * DOUBLE REAL SUBTRACTION
.TMPY,RP,105042      * DOUBLE REAL MULTIPLY
.TDIV,RP,105062      * DOUBLE REAL DIVIDE
.TFXS,RP,105102      * DOUBLE REAL TO INTEGER FIX
.TINT,RP,105102      * DOUBLE REAL TO INTEGER FIX  (NOTE: FTN
*                    * INTERFACE, SAME ENTRY POINT AS .TFXS)
.TFXD,RP,105106      * DOUBLE REAL TO DOUBLE INTEGER FIX
.TFTS,RP,105122      * INTEGER TO DOUBLE REAL FLOAT
.ITBL,RP,105122      * INTEGER TO DOUBLE REAL FLOAT (NOTE: FTN
*                    * INTERFACE, SAME ENTRY POINT AS .TFTS)
.TFTD,RP,105126      * DOUBLE INTEGER TO DOUBLE REAL FLOAT
*
*     ***** DOUBLE INTEGER ENTRY POINTS (FFP) (IN F SERIES ONLY) *****
*
.DAD,RP,105014       * DOUBLE INTEGER ADDITION
.DSB,RP,105034       * DOUBLE INTEGER SUBTRACTION
.DMP,RP,105054       * DOUBLE INTEGER MULTIPLICATION
.DDI,RP,105074       * DOUBLE INTEGER DIVISION
.DSBR,RP,105114      * DOUBLE INTEGER SUBTRACTION (REVERSED)
.DDIR,RP,105134      * DOUBLE INTEGER DIVISION (REVERSED)
.DNG,RP,105203       * DOUBLE INTEGER NEGATE
.DIN,RP,105210       * DOUBLE INTEGER INCREMENT
.DDE,RP,105211       * DOUBLE INTEGER DECREMENT
.DIS,RP,105212       * DOUBLE INTEGER INCREMENT AND SKIP IF 0
.DDS,RP,105213       * DOUBLE INTEGER DECREMENT AND SKIP IF 0
.DCO,RP,105204       * DOUBLE INTEGER COMPARE
*
*     ***** SIS ENTRY POINTS (IN F SERIES ONLY) *****
*
TAN,RP,105320        * TANGENT
SQRT,RP,105321       * SQUARE ROOT
ALOG,RP,105322       * NATURAL LOGARITHM LN(X)
ATAN,RP,105323       * ARCTANGENT
COS,RP,105324        * COSINE
SIN,RP,105325        * SINE
EXP,RP,105326        * EXPONENTIAL E**X
ALOGT,RP,105327      * LOGARITHM LOG10(X)
TANH,RP,105330       * HYPERBOLIC TANGENT
*
TRNL,RP,105331       * EVALUATE THE QUOTIENT OF 2 POLYNOMIALS IN DOUBLE
```

```
                         * PRECISION
DPOLY,RP,105331          * EVALUATE THE QUOTIENT OF 2 POLYNOMIALS IN DOUBLE
*                        * PRECISION
*                        * NOTE: DPOLY REPLACES TRNL AS OF 1926 (SAME
*                        * ROUTINE) DPOLY IS USED IN OTHER SUBROUTINES SUCH
*                        * AS DCOS AND DSIN
*
*                        * /CMRT, /ATLG, .FPWR, AND .TPWR ARE AS OF REV
*                        * 1926
*
/CMRT,RP,105332          * RANGE REDUCTION FUNCTION
/ATLG,RP,105333          * COMPUTE (1-X)/(1+X) IN DOUBLE PRECISION
.FPWR,RP,105334          * COMPUTE X**I FOR REAL X AND UNSIGNED INTEGER I
.TPWR,RP,105335          * COMPUTE X**I FOR DOUBLE REAL X AND UNSIGNED
*                        * INTEGER I
*
*      ***** VIS ENTRY POINTS (IN F SERIES ONLY) *****
*
.VECT,RP,101460          * FIRST OF TWO WORDS (USED BY SOFTWARE IN %VLIB TO
*                        * GET TO TWO WORD OPCODES)
VPIV,RP,101461           * PIVOT ROUTINE
VABS,RP,101462           * ABSOLUTE VALUE ROUTINE
VSUM,RP,101463           * SUM THE ARRAY ELEMENTS
VNRM,RP,101464           * SUM THE ABSOLUTE VALUE OF THE ELEMENTS
VDOT,RP,101465           * DOT PRODUCT ROUTINE
VMAX,RP,101466           * FIND THE LARGEST ARRAY ELEMENT
VMAB,RP,101467           * FIND THE LARGEST ARRAY ELEMENT (ABSOLUTE VALUE)
VMIN,RP,101470           * FIND THE SMALLEST ARRAY ELEMENT
VMIB,RP,101471           * FIND THE SMALLEST ARRAY ELEMENT (ABSOLUTE VALUE)
VMOV,RP,101472           * COPY AN ARRAY INTO AN OTHER ARRAY
VSWP,RP,101473           * EXCHANGE ELEMENTS OF TWO ARRAYS
.ERES,RP,101474          * CALCULATES 2 WORD OFFSET FOR EMA ARRAY ELEMENTS
.VSET,RP,101476          * CALCULATES MAP TABLE FORM .ERES INFORMATION
.ESEG,RP,101475          * PREFORMS THE MAPPING FROM THE MAP TABLE FOUND
*                        * WITH .VSET
.DVCT,RP,105460          * FIRST OF TWO WORDS (USED BY SOFTWARE IN %VLIB TO
*                        * GET TO TWO WORD OPCODES)
DVPIV,RP,105461          * PIVOT ROUTINE FOR DOUBLE REAL ARRAYS
DVABS,RP,105462          * ABSOLUTE VALUE ROUTINE FOR DOUBLE REAL ARRAYS
DVSUM,RP,105463          * SUM THE ARRAY ELEMENTS FOR DOUBLE REAL ARRAYS
DVNRM,RP,105464          * SUM THE ABSOLUTE VALUE OF THE ELEMENTS IN A
*                        * DOUBLE REAL ARRAY
DVDOT,RP,105465          * DOT PRODUCT ROUTINE FOR DOUBLE REAL ARRAYS
DVMAX,RP,105466          * FIND THE LARGEST ARRAY ELEMENT IN A DOUBLE REAL
*                        * ARRAY
DVMAB,RP,105467          * FIND THE LARGEST ARRAY ELEMENT IN A DOUBLE REAL
*                        * ARRAY (ABSOLUTE VALUE)
DVMIN,RP,105470          * FIND THE SMALLEST ARRAY ELEMENT IN A DOUBLE REAL
*                        * ARRAY
DVMIB,RP,105471          * FIND THE SMALLEST ARRAY ELEMENT IN A DOUBLE REAL
*                        * ARRAY (ABSOLUTE VALUE)
```

```
DVMOV,RP,105472      * COPY A DOUBLE REAL ARRAY INTO ANOTHER DOUBLE
*                    * REAL ARRAY
DVSWP,RP,105473      * EXCHANGE ELEMENTS OF TWO DOUBLE REAL ARRAYS
*
/E
*
******************************************************************
*     TABLE GENERATION PHASE   -   EQUIPMENT TABLE               *
******************************************************************
*
* SELECT CODE,DRIVER,OPTIONS
*
16,DVR32,D                 * EQT  1 - 7906 DISC
*
17,DVA05,B,X=13,T=32767    * EQT  2 - SYSTEM CONSOLE (26XX)
*
47,DVR77                   * EQT  3 - DUMMY FOR OEM CLASS
*
11,DVR36,D                 * EQT  4 - WCS
*
36,DVR37,X=81,T=32767      * EQT  5 - HPIB (X=25+7N, WHERE N = #DEVICES)
*
35,DVB12,B,X=5             * EQT  6 - 2607 LINE PRINTER (REPLACE DRIVER)
*
50,DVR57                   * EQT  7 - DUMMY DRIVER FOR OEM CLASS
*
33,DVR23,D,B               * EQT  8 - 7970 MAG TAPE UNIT
*
44,DVM72                   * EQT  9 - 12566 MICROCIRCUIT INTERFACE
45,DVM72                   * EQT 10 - 12566 MICROCIRCUIT INTERFACE
*
25,DVA66,X=12              * EQT 11 - DS/1000-IV HDLC LINK TX
25,DVA66                   * EQT 12 - DS/1000-IV HDLC LINK RX
26,DVA66,X=12              * EQT 13 - DS/1000-IV HDLC LINK TX
26,DVA66                   * EQT 14 - DS/1000-IV HDLC LINK RX
27,DVA66,X=12              * EQT 15 - DS/1000-IV HDLC LINK TX
27,DVA66                   * EQT 16 - DS/1000-IV HDLC LINK RX
30,DVA66,X=12              * EQT 17 - DS/1000-IV HDLC/BISYNC LINK TX
30,DVA66                   * EQT 18 - DS/1000-IV HDLC/BISYNC LINK RX
*
20,DVA65,X=7,T=3           * EQT 19 - DS/1000-IV WASP LINK
*
31,DVG67,D                 * EQT 20 - DS/1000-IV HSI LINK RTE-MPE
*
*
32,DVS64,X=21              * EQT 21 - DS ON DATALINK
75,DVS64                   * EQT 22 - DS ON DATALINK
*
76,DVV00,X=7               * EQT 23 - REMOTE I/O MAPPING
76,DVV00,X=7               * EQT 24 - REMOTE I/O MAPPING
76,DVV00,X=7               * EQT 25 - REMOTE I/O MAPPING
```

```
76,DVV00,X=7              * EQT 26 - REMOTE I/O MAPPING
76,DVV00,X=7              * EQT 27 - REMOTE I/O MAPPING
76,DVV00,X=7              * EQT 28 - REMOTE I/O MAPPING
76,DVV00,X=7              * EQT 29 - REMOTE I/O MAPPING
*
42,DVA05,B,X=13,T=32767   * EQT 30 - 26XX AUX. TERMINAL (BACI)
*
41,DVM00,B,X=21,T=32767   * EQT 31 - 26XX AUX. TERMINAL (MUX)
41,DVM00,B,X=21,T=32767   * EQT 32 - 26XX AUX. TERMINAL (MUX)
41,DVM00,B,X=21,T=32767   * EQT 33 - 26XX AUX. TERMINAL (MUX)
41,DVM00,B,X=21,T=32767   * EQT 34 - 26XX AUX. TERMINAL (MUX)
41,DVM00,B,X=21,T=32767   * EQT 35 - 26XX AUX. TERMINAL (MUX)
41,DVM00,B,X=21,T=32767   * EQT 36 - 26XX AUX. TERMINAL (MUX)
41,DVM00,B,X=21,T=32767   * EQT 37 - 26XX AUX. TERMINAL (MUX)
41,DVM00,B,X=21,T=32767   * EQT 38 - 26XX AUX. TERMINAL (MUX)
*
12,DVR50,S                * EQT 39 - RJE/1000
*
37,DVR07,X=8              * EQT 40 - MULTIPOINT LINE CONTROL
77,DVR07,X=8              * EQT 41 - MULTIPOINT TERMINAL #1
77,DVR07,X=8              * EQT 42 - MULTIPOINT TERMINAL #2
77,DVR07,X=8              * EQT 43 - MULTIPOINT TERMINAL #3
77,DVR07,X=8              * EQT 44 - MULTIPOINT TERMINAL #4
77,DVR07,X=8              * EQT 45 - MULTIPOINT TERMINAL #5
77,DVR07,X=8              * EQT 46 - MULTIPOINT TERMINAL #6
*
40,DVR07,X=8              * EQT 47 - MULTIPOINT LINE CONTROL
77,DVR07,X=8              * EQT 48 - MULTIPOINT TERMINAL #1
77,DVR07,X=8              * EQT 49 - MULTIPOINT TERMINAL #2
*
66,DVR12,B                * EQT 50 - 2767A LINE PRINTER
*
67,DVA12,B,X=5,T=600      * EQT 51 - 2607A/2613A/2617A LINE PRINTER
*
76,DVV00                  * EQT 52 - REMOTE I/O MAP RESERVED EQT
*
62,DVS43,M,X=18           * EQT 53 - SPOOLING
63,DVS43,M,X=18           * EQT 54 - SPOOLING
64,DVS43,M,X=18           * EQT 55 - SPOOLING
65,DVS43,M,X=18           * EQT 56 - SPOOLING
*
/E
*
*********************************** DEVICE REFERENCE TABLE
*
* EQT #, SUBCHANNEL
*
2,0                       * LU 1   - 264X SYSTEM CONSOLE
*
1,0                       * LU 2   - 7906 DISC (SUB 0) REMOVABLE (256)
1,1                       * LU 3   - 7906 DISC (SUB 1) REMOVABLE (256)
```

```
*
2,1                        * LU 4   - 264X LCTU (SYSTEM CONSOLE)
2,2                        * LU 5   - 264X RCTU (SYSTEM CONSOLE)
*
6,0                        * LU 6   - 2608A LINE PRINTER
7,0                        * LU 7   - DUMMY DRIVER FOR REPLACEMENT
*
8,0                        * LU 8   - 7970 MAG TAPE  UNIT 0
*
9,0                        * LU 9   - 12566 MICROCIRCUIT CARD
10,0                       * LU 10  - 12566 MICROCIRCUIT CARD
*
1,2                        * LU 11  - 7906 DISC (SUB 2) REMOVABLE (85)
1,3                        * LU 12  - 7906 DISC (SUB 3) REMOVABLE (200)
*
1,4                        * LU 13  - 7906 DISC (SUB 4) FIXED (20)
1,5                        * LU 14  - 7906 DISC (SUB 5) FIXED (20)
1,6                        * LU 15  - 7906 DISC (SUB 6) FIXED (20)
1,7                        * LU 16  - 7906 DISC (SUB 7) FIXED (20)
1,8                        * LU 17  - 7906 DISC (SUB 8) FIXED (100)
1,9                        * LU 18  - 7906 DISC (SUB 9) FIXED (150)
1,10                       * LU 19  - 7906 DISC (SUB 10) FIXED (200)
1,11                       * LU 20  - 7906 DISC (SUB 11) FIXED (270)
*
3,0                        * LU 26  - DUMMY
0                          * LU 26  - RESERVED
0                          * LU 26  - RESERVED
0                          * LU 26  - RESERVED
0                          * LU 26  - RESERVED
0                          * LU 26  - RESERVED
0                          * LU 27  - RESERVED
0                          * LU 28  - RESERVED
0                          * LU 29  - RESERVED
*
30,0                       * LU 30  - 26XX AUX. TERMINAL (BACI)
*
31,0                       * LU 31  - 26XX AUX. TERMINAL (MUX)
32,0                       * LU 32  - 26XX AUX. TERMINAL (MUX)
33,0                       * LU 33  - 26XX AUX. TERMINAL (MUX)
34,0                       * LU 34  - 26XX AUX. TERMINAL (MUX)
35,0                       * LU 35  - 26XX AUX. TERMINAL (MUX)
36,0                       * LU 36  - 26XX AUX. TERMINAL (MUX)
37,0                       * LU 37  - 26XX AUX. TERMINAL (MUX)
38,0                       * LU 38  - 26XX AUX. TERMINAL (MUX)
*
39,0                       * LU 39  - RJE/1000
*
40,0                       * LU 40  - MULTIPOINT LINE CONTROL
41,0                       * LU 41  - MULTIPOINT TERMINAL #1
42,0                       * LU 42  - MULTIPOINT TERMINAL #2
43,0                       * LU 43  - MULTIPOINT TERMINAL #3
```

```
44,0                         * LU 44  - MULTIPOINT TERMINAL #4
45,0                         * LU 45  - MULTIPOINT TERMINAL #5
46,0                         * LU 46  - MULTIPOINT TERMINAL #6
*
47,0                         * LU 47  - MULTIPOINT LINE CONTROL
48,0                         * LU 48  - MULTIPOINT TERMINAL #1
49,0                         * LU 49  - MULTIPOINT TERMINAL #2
*
5,0                          * LU 50  - HP-IB DIRECT LINK
5,1                          * LU 51  - HP-IB DEVICE #1
5,2                          * LU 52  - HP-IB DEVICE #2
5,3                          * LU 53  - HP-IB DEVICE #3
5,4                          * LU 54  - HP-IB DEVICE #4
5,5                          * LU 55  - HP-IB DEVICE #5
5,6                          * LU 56  - HP-IB DEVICE #6
5,7                          * LU 57  - HP-IB DEVICE #7
5,8                          * LU 58  - HP-IB DEVICE #8
*
4,0                          * LU 59  - WCS FIRST 512 WDS
4,1                          * LU 60  - WCS LAST  512 WDS
*
0                            * LU 61  - UNASSIGNED
*
52,0                         * LU 62  - REMOTE I/O MAP RESERVED LU
*
0                            * LU 63  - POWER FAIL(RESERVED)
*
30,1                         * LU 64  - 26XX TERMINAL LEFT  CTU (BACI)
30,2                         * LU 65  - 26XX TERMINAL RIGHT CTU (BACI)
*
53,0                         * LU 66  - SPOOLING
54,0                         * LU 67  - SPOOLING
55,0                         * LU 68  - SPOOLING
56,0                         * LU 69  - SPOOLING
*
0                            * LU 70  - UNASSIGNED
*
11,0                         * LU 71  - DS/1000-IV HDLC LINK TX
12,0                         * LU 72  - DS/1000-IV HDLC LINK RX
13,0                         * LU 73  - DS/1000-IV HDLC LINK TX
14,0                         * LU 74  - DS/1000-IV HDLC LINK RX
15,0                         * LU 75  - DS/1000-IV HDLC LINK TX
16,0                         * LU 76  - DS/1000-IV HDLC LINK RX
17,0                         * LU 77  - DS/1000-IV HDLC/BISYNC LINK TX
18,0                         * LU 78  - DS/1000-IV HDLC/BISYNC LINK RX
*
19,1                         * LU 79  - WASP LINK
*
20,0                         * LU 80  - DS/1000-IV HSI LINK
*
21,0                         * LU 81  - DS ON DATALINK
```

```
22,0                          * LU 82  - DS ON DATALINK
*
23,0                          * LU 83  - REMOTE I/O MAPPING
24,0                          * LU 84  - REMOTE I/O MAPPING
25,0                          * LU 85  - REMOTE I/O MAPPING
26,0                          * LU 86  - REMOTE I/O MAPPING
27,0                          * LU 87  - REMOTE I/O MAPPING
28,0                          * LU 88  - REMOTE I/O MAPPING
29,0                          * LU 89  - REMOTE I/O MAPPING
*
50,0                          * LU 90  - 2767A LINE PRINTER
51,0                          * LU 91  - 2607A LINE PRINTER
*
*
/E
*
*************************** INTERRUPT TABLE
*
* SELECT CODE,ENTRY TYPE,PARAMETER
*
4,ABS,102004                  * POWER FAIL
*
*10,FEM                       * FEM
*
11,EQT,4                      * WCS
*
12,ENT,P.50                   * RJE/1000
13,ENT,P.50                   * RJE/1000
*
*14,PRIV. INT.                * PRIV. INTERRUPTS
*
*15,TBG                       * TIME BASE GENERATOR
*
16,EQT,1                      * 7906 DISC
*
17,EQT,2                      * SYSTEM CONSOLE (26XX)
*
20,EQT,19                     * OLD DS
*
25,EQT,11                     * DS/1000-IV HDLC LINK
26,EQT,13                     * DS/1000-IV HDLC LINK
27,EQT,15                     * DS/1000-IV HDLC LINK
30,EQT,17                     * DS/1000-IV HDLC/BISYNC LINK
*
31,EQT,20                     * DS/1000-IV HSI LINK
*
32,EQT,21                     * DS ON DATALINK
*
33,EQT,8                      * 7970 MAG TAPE UNIT
34,EQT,8                      * 7970 MAG TAPE UNIT
*
```

```
35,EQT,6                  * 2607 LINE PRINTER
*
36,EQT,5                  * HP - IB
*
37,PRG,PRMPT              * MULTIPOINT
*
40,PRG,PRMPT              * MULTIPOINT
*
41,PRG,PRMPT              * MUX
*
42,PRG,PRMPT              * 264X AUX. TERMINAL (BACI)
*
44,EQT,9                  * 12566 MICROCIRCUIT INTERFACE
45,EQT,10                 * 12566 MICROCIRCUIT INTERFACE
*
47,EQT,3                  * DUMMY DRIVER FOR REPLACEMENT
50,EQT,7                  * DUMMY DRIVER FOR REPLACEMENT
*
62,EQT,53                 * SPOOLING
63,EQT,54                 * SPOOLING
64,EQT,55                 * SPOOLING
65,EQT,56                 * SPOOLING
*
*                         * 2672A LINE PRINTER ** IF USE IS DESIRED
66,EQT,50                 * RE-CONFIGURE SC 66 TO 36 AND 36 TO 66
*
*                         * 2607A LINE PRINTER ** IF USE IS DESIRED
67,EQT,51                 * RE-CONFIGURE SC 67 TO 36 AND 36 TO 67
*
75,EQT,22                 * DS ON DATALINK
*
76,PRG,PRMPT              * REMOTE I/O MAPPING
*
77,ABS,0                  * MULTIPOINT & DATACAP TERMINALS
*
/E
*
0                         * CHANGE DRIVER PART
0                         * CHANGE RT COMMON
0                         * CHANGE BG COMMON (IN # OF PAGES)
64                        * # OF I/O CLASSES
6                         * # OF LU MAPPINGS
50                        * # OF RESOURCE NUMBERS
100,400                   * BUFFER LIMITS
38                        * # OF BLANK LONG ID SEGMENTS
50                        * # OF BLANK SHORT ID SEGMENTS
8                         * # OF BLANK ID EXTENSIONS
43                        * MAX. # OF PARTITIONS
*
TR,1
*
```

```
10,BG,R
2,BG
2,BG
2,BG
2,BG
3,BG
3,BG
4,BG
4,BG
4,BG
4,BG
4,BG
5,BG
6,BG
6,BG
6,BG
10,BG
14,BG
17,BG
17,BG
20,BG
20,BG
128,BG
YES
20,S
20,S
20,S
20,S
20,S
28,S
28,BG
125,BG
YES
20,S
20,S
20,S
20,S
20,S
25,S
/E
*
LOADR,20
/E
*
D.RTR,1
/E
```

Sample Generation for Network with HP 1000-HP 3000 Link Only

The following listing is a sample RTE-IVB generation answer file with an HP 1000 to HP 3000 link only. Your generation will differ according to your system configuration and the current software revision.

NOTE

Modules with CRN "DS" are DS/1000-IV software.
Modules with CRN "B4" are RTE-IVB software.

```
SYSLST::DS::200               * LIST FILE NAME
YES                            * ECHO TO A TERMINAL
*********************************************************************
*                                                                   *
*                                                                   *
*             SAMPLE GENERATION FOR AN RTE-IVB NODE                 *
*                                                                   *
*             WITH ONLY DS/1000-IV TO DS/3000 LINK                  *
*                                                                   *
*                       - ANSWER FILE:  ANSWER::DS                  *
*                       - GEN LISTING:  SYSLST::DS                  *
*                       - GEN OUTPUT :  SYSBIN::DS                  *
*                       - BOOT FILE  :  -NONE-                      *
*                                                                   *
*********************************************************************
*                                                                   *
*   HP 92068A RTE-IVB WITH SESSION MONITOR AND HP 91750A DS/1000-IV *
*                                                                   *
*                 INCLUDES:                                         *
*                       - DS/1000-3000 **  BISYNC **   (1 LINK )    *
*                           FOR EITHER MODEM LINK (12793A CARD)     *
*                           OR DIRECT CONNECT (12834A CARD)         *
*                       - MULTIPOINT SUBSYSTEM                      *
*                       - HP-IB                                     *
*                                                                   *
*********************************************************************
*
SYSBIN::DS::5000               * OUTPUT FILE NAME
7906                            * TARGET SYSTEM DISC
12                              * CONTROLLER SELECT CODE
```

```
*
*********************************************************************
* DISC   #TRKS  1ST-CYL  HEAD  #SURFACES  UNIT  #SPARES           *
  7906,  256,      0,     0,        2,      0,      8    *SUBCHANNEL 0
  7906,  256,    132,     0,        2,      0,      8    *SUBCHANNEL 1
  7906,   50,    264,     0,        2,      0,      2    *SUBCHANNEL 2
  7906,   30,    290,     0,        2,      0,      2    *SUBCHANNEL 3
  7906,   30,    306,     0,        2,      0,      2    *SUBCHANNEL 4
  7906,   30,    322,     0,        2,      0,      2    *SUBCHANNEL 5
  7906,   30,    338,     0,        2,      0,      2    *SUBCHANNEL 6
  7906,   30,    354,     0,        2,      0,      2    *SUBCHANNEL 7
  7906,   30,    370,     0,        2,      0,      2    *SUBCHANNEL 8
  7906,   48,    386,     0,        2,      0,      2    *SUBCHANNEL 9
*
  7906,  100,      0,     2,        2,      0,      4    *SUBCHANNEL 10
  7906,  100,     52,     2,        2,      0,      4    *SUBCHANNEL 11
  7906,  150,    104,     2,        2,      0,      4    *SUBCHANNEL 12
  7906,  150,    181,     2,        2,      0,      4    *SUBCHANNEL 13
  7906,  300,    258,     2,        2,      0,      6    *SUBCHANNEL 14
/E
*
0                             * SYSTEM SUBCHANNEL
YES                           * AUXILIARY DISC
1                             * AUXILIARY DISC SUBCHANNEL
11                            * TBG SELECT CODE
0                             * NOT A PRIVELEDGED SYSTEM
YES                           * MEM. RES. ACCESS TABLE AREA II
YES                           * RT MEMORY LOCK
YES                           * BG MEMORY LOCK
100                           * SWAP DELAY
384                           * MEMORY SIZE
0                             * BOOT FILE NAME
*
MAP ALL                       * MAP ALL
LINKS IN CURRENT              * CURRENT PAGE LINKAGE
*
*********************************************************************
*                     RELOCATABLE MODULES                           *
*********************************************************************
*
****************************** SYSTEM & DRIVERS
*
REL,%CR4S1::B4            * RTE-IVB OPERATING SYSTEM #1
REL,%CR4S2::B4            * RTE-IVB OPERATING SYSTEM #2
*
LINKS IN BASE
*
REL,%BMPG2::B4            * D.RTR (WILL BECOME DISC RESIDENT)
REL,%D.BUF::B4            * D.RTR TRANSFER BUFFER
REL,%BMPG1::B4            * FMGR
REL,%SMON1::B4            * SESSION MONITOR #1
```

```
REL,%SMON2::B4              * SESSION MONITOR #2
REL,%SP01B::B4              * RTE-IVB SPOOLING #1
REL,%SP02B::B4              * RTE-IVB SPOOLING #2
*
LINKS IN CURRENT
*
REL,%DVR32::B4              * 7905/06/20 DISC DRIVER
REL,%DVA66::DS              * 1000-1000 HDLC & 1000-3000 BISYNC
REL,%DVA12::B4              * 2607A/2613A/2617A LINE PRINTER DRIVER
REL,%DVR07::DS              * MULTIPOINT DRIVER
REL,%DVA05::B4              * 2645/48 DRIVER (WITH C/U)
REL,%2DV37::B4              * HP-IB DRIVER WITH SRQ
REL,%DVR23::B4              * 7970 9-TRACK MAG TAPE DRIVER
*
*********************DS/1000-IV MODULES
*
*
LINKS IN BASE                  * BASE PAGE LINKAGE
*
REL,%UPLIN::DS              * COMM. MGT TIMEOUT & RE-ENABLE MODULE
REL,%QUEUE::DS              * MESSAGE HANDLER
REL,%QCLM::DS               * ERROR HANDLER
*
*  QUEX AND QUEZ CAN BE LOADED ON LINE, BUT DS PERFORMANCE WILL SUFFER
*   SIGNIFICANTLY.
*
REL,%QUEX1::DS              * DS COMMUNICATION MANAGEMENT MODULES
REL,%QUEZ1::DS              * (REQUIRED FOR PSI CARDS, EITHER MODEM OR
*                           *  DIRECT CONNECT)
*
LINKS IN CURRENT               * CURRENT PAGE LINKAGE
*
REL,%RESSM::DS              * ENTRY POINTS IN SSGA FOR DS/1000-IV
*
LINKS IN BASE                  * BASE PAGE LINKAGE
*
REL,%RQCNV::DS              * HP 3000 REQUEST CONVERTER
REL,%RPCNV::DS              * HP 3000 REPLY CONVERTER
REL,%DSMOD::DS              * ALTERS DS PARAMETERS SET AT INITIALIZATION
REL,%DINIS::DS              * NETWORK INITIALIZATION WITH SHUTDOWN
*
* THE NETWORK INTERFACE MONITORS CAN BE LOADED ON LINE IF SPACE
* AND TIME ARE AT A PREMIUM.
*
REL,%RSM::DS                * REMOTE SESSION MONITOR
REL,%RFAM2::DS              * REMOTE FILE ACCESS MONITOR W/ MULTI-DCB
REL,%PTOPM::DS              * PTOP COMMUNICATION SLAVE MONITOR
REL,%EXECM::DS              * REMOTE EXEC
REL,%OPERM::DS              * REMOTE OPERATOR REQUEST MONITOR
REL,%CNSLM::DS              * HP 3000 $STDLIST MONITOR
*
```

```
*  RMOTE SHOULD BE LOADED ON LINE, BUT CAN BE GENNED IN IF SPACE
*   AND TIME ARE PLENTIFUL
*
REL,%RMOT1::DS              * 3000 ACCESS PROGRAM
******************************* LIBRARIES
*
LINKS IN CURRENT               * CURRENT PAGE LINKAGE
*
REL,%4SYLB::B4              * SYSTEM LIBRARY
REL,$DSLB1::DS              * REQUIRED IN ALL DS/1000-IV NODES
REL,$D3KL2::DS              * REQUIRED IN NODES WITH NO RTE LINKS
REL,$D3KLB::DS              * REQUIRED WHEN LINKED TO 3000
REL,$DSMX4::DS              * DS SUBROUTINES
REL,$DSNRR::DS              * NON-RE-ROUTING LIBRARY
REL,$DSSM::DS               * SESSION MONITOR
REL,$DSNMA::DS              * NO MESSAGE ACCOUNTING
REL,$D3KBB::DS              * 1000-3000, 1KW BUFFERS
REL,%BMPG3::B4              * BATCH LIBRARY
REL,%CLIB::B4               * COMPILER LIBRARY
REL,%DECAR::B4              * DECIMAL STRING ARITHMETIC LIBRARY
REL,$MLIB1::B4              * RTE/DOS RELOC. LIBRARY (PART 1 OF 2)
REL,$MLIB2::B4              * RTE/DOS RELOC. LIBRARY (PART 2 OF 2)
REL,%D$N25::DS              * FOR NON-X.25 3000 LINK
REL,$VLIB1::DS              * VIS LIBRARY
REL,%IB4A::B4               * HP-IB SUPPORT
REL,%DBUGR::B4              * USER DEBUG LIBRARY
REL,$MPLIB::DS              * MULTIPOINT LIBRARY
REL,$LDRLB::B4              * LOADER LIBRARY
REL,$FNDLB                  * FORTRAN LIBRARY FOR NO RTE LINKS
*
******************************* ADDITIONAL MODULES
*
LINKS IN BASE                  * BASE PAGE LINKAGE
*
REL,%T5IDM::B4              * SHORT ID SEGMENT HANDLER
REL,%WHZAT::B4              * SYSTEM STATUS PROGRAM
REL,%LGTAT::B4              * SYSTEM TRACK ASSIGN TABLE LOG
REL,%4LDR::B4               * RELOCATING LOADER
*
LINKS IN CURRENT               * CURRENT PAGE LINKAGE
*
REL,%$CNFX::B4              * RTE-IVB CONFIGURATOR EXTENSION
*
/E                             * TERMINATE RELOCATABLE SPECIFICATIONS
*
*******************************************************************
*                         PROGRAM PARAMETERS                      *
*******************************************************************
*
* PROGRAM,TYPE,PRIORITY,EXECUTION INTERVAL
*
```

```
D.RTR,3,1                  * D.RTR DISC RESIDENT W/ HIGH PRIORITY
WHZAT,1,1                  * MEMORY RESIDENT-PRIORITY OF 1
LGTAT,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
/E
*
*********************************************************************
*              ENTRY POINT CHANGES FOR HP 1000 F-SERIES             *
*             WITH RTE-IVB SOFTWARE REV. 2040 OR GREATER            *
*********************************************************************
*
*    ***** EAU AND HFP ENTRY POINTS *****
*
 .FIXD,RP,105104      * REAL TO DOUBLE INTEGER FIX   (IN F SERIES ONLY)
 .FLTD,RP,105124      * REAL TO DOUBLE INTEGER FLOAT (IN F SERIES ONLY)
*
*
*      CLRIO IS GENERATED BY THE COMPILER, BUT IS NOT USED IN RTE.
*      THEREFORE IT'S ENTRY POINT IS MERELY AN RSS (UNCONDITIONAL
*      SKIP).
*
 CLRIO,RP,2001        * DELETE IF USING HP 92063A IMAGE
*
*      Z$DBL IS AN ENTRY POINT USED BY THE FTN4 COMPILER (REV 1901 OR
*      LATER)
*      IF IT CONTAINS 3, THEN DOUBLE PRECISION VALUES WILL BE 3 WORDS
*      IF IT CONTAINS 4, THEN DOUBLE PRECISION VALUES WILL BE 4 WORDS
*
 Z$DBL,RP,3
*
*     ***** FFP ENTRY POINTS *****
*
 DBLE,RP,105201       * CONVERT REAL TO EXTENDED REAL
 SNGL,RP,105202       * CONVERT EXTENDED REAL TO REAL
 .DFER,RP,105205      * 3 WORD MOVE (EXTENDED REAL TRANSFER)
 .XPAK,RP,105206      * NORMALIZE, ROUND AND PACK WITH EXPONENT AN
*                     * EXTENDED REAL MANTISSA
 .XCOM,RP,105215      * COMPLEMENT AN EXTENDED REAL UNPACKED MANTISSA
*                     * IN PLACE
 ..DCM,RP,105216      * COMPLEMENT AN EXTENDED REAL
 DDINT,RP,105217      * TRUNCATE AN EXTENDED REAL
 .XFER,RP,105220      * 3 WORD MOVE (EXTENDED REAL TRANSFER)
 .GOTO,RP,105221      * TRANSFER CONTROL TO LOCATION
 ..MAP,RP,105222      * COMPUTE THE ADDRESS OF A 2 OR 3D ARRAY ELEMENT
 .ENTR,RP,105223      * TRANSFER THE TRUE ADDRESS OF PARAMETERS USED IN
*                     * A SUBROUTINE CALL
 .ENTP,RP,105224      * SAME AS .ENTR, EXCEPT MUST BE THIRD INSTRUCTION
*                     * AFTER THE ENTRY POINT
 .PWR2,RP,105225      * CALCULATE REAL X AND INTEGER N, Y=X*2**N
 .FLUN,RP,105226      * UNPACK REAL (EXPONENT IN A, LOWER PART OF
```

```
*                        * MANTISSA IN B)
*
 $SETP,RP,105227         * SET UP A LIST OF POINTERS
*                        * NOTE: $SETP REPLACES .SETP AS OF 1913
*
 .PACK,RP,105230         * CONVERT SIGNED MANTISSA OF REAL INTO NORMALIZE
*                        * REAL FORMAT
 .CFER,RP,105231         * MOVE 4 WORDS (COMPLEX TRANSFER)  (IN F AND SOME
*                        * E SERIES)
*
*                        * ..FCM, ..TCM, .BLE, AND .NGL ARE AS OF REV 1926
*
 ..FCM,RP,105232         * COMPLEMENT A REAL               (IN F SERIES ONLY)
 ..TCM,RP,105233         * NEGATE A DOUBLE REAL            (IN F SERIES ONLY)
 .BLE,RP,105207          * CONVERT REAL TO DOUBLE REAL     (IN F SERIES ONLY)
 .NGL,RP,105214          * CONVERT DOUBLE REAL TO REAL     (IN F SERIES ONLY)
*
*      ***** EMA ENTRY POINTS (F AND E SERIES ONLY) *****
*
 .EMAP,RP,105257         * RESOLVE REFERENCES TO EMA ELEMENTS
 .EMIO,RP,105240         * USED FOR I/O FROM EMA ARRAYS
 MMAP,RP,105241          * MAPS PHYSICAL PAGES INTO LOGICAL ADDRESS SPACE
*
*      ***** 3-WORD ENTRY POINTS (IN F SERIES ONLY) *****
*
 .XADD,RP,105001         * EXTENDED REAL ADDITION
 .XSUB,RP,105021         * EXTENDED REAL SUBTRACTION
 .XMPY,RP,105041         * EXTENDED REAL MULTIPLCATION
 .XDIV,RP,105061         * EXTENDED REAL DIVISION
 .XFXS,RP,105101         * EXTENDED REAL TO INTEGER FIX
 .DINT,RP,105101         * EXTENDED REAL TO INTEGER FIX (NOTE .DINT FOR
*                        * FTN INTERFACE, SAME ENTRY POINT AS .XFXS
 .XFXD,RP,105105         * EXTENDED REAL TO DOUBLE INTEGER FIX
 .XFTS,RP,105121         * INTEGER TO EXTENDED REAL FLOAT
 .IDBL,RP,105121         * INTEGER TO EXTENDED REAL FLOAT  (NOTE: FTN
*                        * INTERFACE, SAME ENTRY POINT AS .XFTS)
 .XFTD,RP,105125         * DOUBLE INTEGER TO EXTENDED REAL FLOAT
*
*      ***** 4-WORD ENTRY POINTS (IF F SERIES ONLY) *****
*
 .TADD,RP,105002         * DOUBLE REAL ADDITION
 .TSUB,RP,105022         * DOUBLE REAL SUBTRACTION
 .TMPY,RP,105042         * DOUBLE REAL MULTIPLY
 .TDIV,RP,105062         * DOUBLE REAL DIVIDE
 .TFXS,RP,105102         * DOUBLE REAL TO INTEGER FIX
 .TINT,RP,105102         * DOUBLE REAL TO INTEGER FIX  (NOTE: FTN
*                        * INTERFACE, SAME ENTRY POINT AS .TFXS)
 .TFXD,RP,105106         * DOUBLE REAL TO DOUBLE INTEGER FIX
 .TFTS,RP,105122         * INTEGER TO DOUBLE REAL FLOAT
 .ITBL,RP,105122         * INTEGER TO DOUBLE REAL FLOAT (NOTE: FTN
*                        * INTERFACE, SAME ENTRY POINT AS .TFTS)
```

```
 .TFTD,RP,105126      * DOUBLE INTEGER TO DOUBLE REAL FLOAT
*
*     ***** DOUBLE INTEGER ENTRY POINTS (FFP) (IN F SERIES ONLY) *****
*
 .DAD,RP,105014       * DOUBLE INTEGER ADDITION
 .DSB,RP,105034       * DOUBLE INTEGER SUBTRACTION
 .DMP,RP,105054       * DOUBLE INTEGER MULTIPLICATION
 .DDI,RP,105074       * DOUBLE INTEGER DIVISION
 .DSBR,RP,105114      * DOUBLE INTEGER SUBTRACTION (REVERSED)
 .DDIR,RP,105134      * DOUBLE INTEGER DIVISION (REVERSED)
 .DNG,RP,105203       * DOUBLE INTEGER NEGATE
 .DIN,RP,105210       * DOUBLE INTEGER INCREMENT
 .DDE,RP,105211       * DOUBLE INTEGER DECREMENT
 .DIS,RP,105212       * DOUBLE INTEGER INCREMENT AND SKIP IF 0
 .DDS,RP,105213       * DOUBLE INTEGER DECREMENT AND SKIP IF 0
 .DCO,RP,105204       * DOUBLE INTEGER COMPARE
*
*     ***** SIS ENTRY POINTS (IN F SERIES ONLY) *****
*
 TAN,RP,105320        * TANGENT
 SQRT,RP,105321       * SQUARE ROOT
 ALOG,RP,105322       * NATURAL LOGARITHM LN(X)
 ATAN,RP,105323       * ARCTANGENT
 COS,RP,105324        * COSINE
 SIN,RP,105325        * SINE
 EXP,RP,105326        * EXPONENTIAL E**X
 ALOGT,RP,105327      * LOGARITHM LOG10(X)
 TANH,RP,105330       * HYPERBOLIC TANGENT
*
 TRNL,RP,105331       * EVALUATE THE QUOTIENT OF 2 POLYNOMIALS IN
*                     * DOUBLE PRECISION
 DPOLY,RP,105331      * EVALUATE THE QUOTIENT OF 2 POLYNOMIALS IN
*                     * DOUBLE PRECISION
*                     * NOTE: DPOLY REPLACES TRNL AS OF 1926 (SAME
*                     * ROUTINE) DPOLY IS USED IN OTHER SUBROUTINES
*                     * SUCH AS DCOS AND DSIN
*
*                     * /CMRT, /ATLG, .FPWR, AND .TPWR ARE AS OF
*                     * REV 1926
*
 /CMRT,RP,105332      * RANGE REDUCTION FUNCTION
 /ATLG,RP,105333      * COMPUTE (1-X)/(1+X) IN DOUBLE PRECISION
 .FPWR,RP,105334      * COMPUTE X**I FOR REAL X AND UNSIGNED INTEGER I
 .TPWR,RP,105335      * COMPUTE X**I FOR DOUBLE REAL X AND UNSIGNED
*                     * INTEGER I
*
*     ***** VIS ENTRY POINTS (IN F SERIES ONLY) *****
*
 .VECT,RP,101460      * FIRST OF TWO WORDS (USED BY SOFTWARE IN %VLIB
*                     * TO GET TO TWO WORD OPCODES)
 VPIV,RP,101461       * PIVOT ROUTINE
```

```
 VABS,RP,101462        * ABSOLUTE VALUE ROUTINE
 VSUM,RP,101463        * SUM THE ARRAY ELEMENTS
 VNRM,RP,101464        * SUM THE ABSOLUTE VALUE OF THE ELEMENTS
 VDOT,RP,101465        * DOT PRODUCT ROUTINE
 VMAX,RP,101466        * FIND THE LARGEST ARRAY ELEMENT
 VMAB,RP,101467        * FIND THE LARGEST ARRAY ELEMENT (ABSOLUTE VALUE)
 VMIN,RP,101470        * FIND THE SMALLEST ARRAY ELEMENT
 VMIB,RP,101471        * FIND THE SMALLEST ARRAY ELEMENT(ABSOLUTE VALUE)
 VMOV,RP,101472        * COPY AN ARRAY INTO AN OTHER ARRAY
 VSWP,RP,101473        * EXCHANGE ELEMENTS OF TWO ARRAYS
 .ERES,RP,101474       * CALCULATES 2 WORD OFFSET FOR EMA ARRAY ELEMENTS
 .VSET,RP,101476       * CALCULATES MAP TABLE FORM .ERES INFORMATION
 .ESEG,RP,101475       * PERFORMS THE MAPPING FROM THE MAP TABLE FOUND
*                      * WITH .VSET
 .DVCT,RP,105460       * FIRST OF TWO WORDS (USED BY SOFTWARE IN %VLIB
*                      * TO GET TO TWO WORD OPCODES)
 DVPIV,RP,105461       * PIVOT ROUTINE FOR DOUBLE REAL ARRAYS
 DVABS,RP,105462       * ABSOLUTE VALUE ROUTINE FOR DOUBLE REAL ARRAYS
 DVSUM,RP,105463       * SUM THE ARRAY ELEMENTS FOR DOUBLE REAL ARRAYS
 DVNRM,RP,105464       * SUM THE ABSOLUTE VALUE OF THE ELEMENTS IN A
*                      * DOUBLE REAL ARRAY
 DVDOT,RP,105465       * DOT PRODUCT ROUTINE FOR DOUBLE REAL ARRAYS
 DVMAX,RP,105466       * FIND THE LARGEST ARRAY ELEMENT IN A DOUBLE REAL
*                      * ARRAY
 DVMAB,RP,105467       * FIND THE LARGEST ARRAY ELEMENT IN A DOUBLE REAL
*                      * ARRAY (ABSOLUTE VALUE)
 DVMIN,RP,105470       * FIND THE SMALLEST ARRAY ELEMENT IN A DOUBLE
*                      * REAL ARRAY
 DVMIB,RP,105471       * FIND THE SMALLEST ARRAY ELEMENT IN A DOUBLE
*                      * REAL ARRAY (ABSOLUTE VALUE)
 DVMOV,RP,105472       * COPY A DOUBLE REAL ARRAY INTO ANOTHER DOUBLE
*                      * REAL ARRAY
 DVSWP,RP,105473       * EXCHANGE ELEMENTS OF TWO DOUBLE REAL ARRAYS
*
/E
*
*******************************************************************
*     TABLE GENERATION PHASE   -   EQUIPMENT TABLE                *
*******************************************************************
*
* SELECT CODE,DRIVER,OPTIONS
*
12,DVR32,D                 * EQT  1 - 7906 DISC
*
13,DVA05,X=13,T=32767      * EQT  2 - SYSTEM CONSOLE (26XX)
*
17,DVA12,B,T=600           * EQT  3 - 2607A/2613A/2617A LINE PRINTER
*
15,DVR23,D                 * EQT  4 - 7970 MAG TAPE UNIT
*
14,DVA66,X=12              * EQT  5 - DS/1000-IV BISYNC LINK TX RTE-MPE
```

```
14,DVA66                      * EQT  6 - DS/1000-IV BISYNC LINK RX RTE-MPE
*
22,DVA05,B,X=13,T=32767       * EQT  7 - 26XX AUX. TERMINAL (BACI)
23,DVA05,B,X=13,T=32767       * EQT  8 - 26XX AUX. TERMINAL (BACI)
24,DVA05,B,X=13,T=32767       * EQT  9 - 26XX AUX. TERMINAL (BACI)
25,DVA05,B,X=13,T=32767       * EQT 10 - 26XX AUX. TERMINAL (BACI)
26,DVA05,B,X=13,T=32767       * EQT 11 - 26XX AUX. TERMINAL (BACI)
27,DVA05,B,X=13,T=32767       * EQT 12 - 26XX AUX. TERMINAL (BACI)
30,DVA05,B,X=13,T=32767       * EQT 13 - 26XX AUX. TERMINAL (BACI)
*
20,DVR37,X=81,T=32767         * EQT 14 - HPIB (X=18+7N, WHERE N=#DEVICES)
*
21,DVR07,X=5                  * EQT 15 - MULTIPOINT LINE CONTROL
77,DVR07,X=5,T=32767          * EQT 16 - MULTIPOINT TERMINAL #1
77,DVR07,X=5,T=32767          * EQT 17 - MULTIPOINT TERMINAL #2
77,DVR07,X=5,T=32767          * EQT 18 - MULTIPOINT TERMINAL #3
77,DVR07,X=5,T=32767          * EQT 19 - MULTIPOINT TERMINAL #4
*
60,DVS43,M,X=18               * EQT 20 - SPOOLING
61,DVS43,M,X=18               * EQT 21 - SPOOLING
62,DVS43,M,X=18               * EQT 22 - SPOOLING
63,DVS43,M,X=18               * EQT 23 - SPOOLING
64,DVS43,M,X=18               * EQT 24 - SPOOLING
65,DVS43,M,X=18               * EQT 25 - SPOOLING
*
/E
*
********************************* DEVICE REFERENCE TABLE
*
* EQT #, SUBCHANNEL
*
2,0                           * LU 1   - 264X SYSTEM CONSOLE
*
1,0                           * LU 2   - 7906 DISC (SUB 0) REMOVABLE (256)
1,1                           * LU 3   - 7906 DISC (SUB 1) REMOVABLE (256)
*
2,1                           * LU 4   - LCTU (SYSTEM CONSOLE)
2,2                           * LU 5   - RCTU (SYSTEM CONSOLE)
*
3,0                           * LU 6   - 2607A/2613A/2617A LINE PRINTER
0                             * LU 7   - SPARE
*
4,0                           * LU 8   - 7970 MAG TAPE  UNIT 0
4,1                           * LU 9   - 7970 MAG TAPE  UNIT 1
*
15,0                          * LU 10  - MULTIPOINT LINE CONTROL
16,0                          * LU 11  - MULTIPOINT TERMINAL - 1
17,0                          * LU 12  - MULTIPOINT TERMINAL - 2
18,0                          * LU 13  - MULTIPOINT TERMINAL - 3
19,0                          * LU 14  - MULTIPOINT TERMINAL - 4
*
```

```
7,0                    * LU 15  - 26XX AUX. TERMINAL (BACI)
8,0                    * LU 16  - 26XX AUX. TERMINAL (BACI)
9,0                    * LU 17  - 26XX AUX. TERMINAL (BACI)
10,0                   * LU 18  - 26XX AUX. TERMINAL (BACI)
11,0                   * LU 19  - 26XX AUX. TERMINAL (BACI)
12,0                   * LU 20  - 26XX AUX. TERMINAL (BACI)
13,0                   * LU 21  - 26XX AUX. TERMINAL (BACI)
*
14,0                   * LU 22  - HP-IB DIRECT LINK
14,1                   * LU 23  - HP-IB DEVICE #1
14,2                   * LU 24  - HP-IB DEVICE #2
14,3                   * LU 25  - HP-IB DEVICE #3
14,4                   * LU 26  - HP-IB DEVICE #4
14,5                   * LU 27  - HP-IB DEVICE #5
14,6                   * LU 28  - HP-IB DEVICE #6
14,7                   * LU 29  - HP-IB DEVICE #7
14,8                   * LU 30  - HP-IB DEVICE #8
14,9                   * LU 31  - HP-IB DEVICE #9
*
1,2                    * LU 32  - 7906 DISC (SUB 2) REMOVABLE (50)
1,3                    * LU 33  - 7906 DISC (SUB 3) REMOVABLE (30)
1,4                    * LU 34  - 7906 DISC (SUB 4) REMOVABLE (30)
1,5                    * LU 35  - 7906 DISC (SUB 5) REMOVABLE (30)
1,6                    * LU 36  - 7906 DISC (SUB 6) REMOVABLE (30)
1,7                    * LU 37  - 7906 DISC (SUB 7) REMOVABLE (30)
1,8                    * LU 38  - 7906 DISC (SUB 8) REMOVABLE (30)
1,9                    * LU 39  - 7906 DISC (SUB 9) REMOVABLE (48)
*
0                      * LU 40  - SPARE
*
1,10                   * LU 41  - 7906 DISC (SUB 10) FIXED (100)
1,11                   * LU 42  - 7906 DISC (SUB 11) FIXED (100)
1,12                   * LU 43  - 7906 DISC (SUB 12) FIXED (150)
1,13                   * LU 44  - 7906 DISC (SUB 13) FIXED (150)
1,14                   * LU 45  - 7906 DISC (SUB 14) FIXED (300)
*
5,0                    * LU 46  - DS/1000-IV BISYNC LINK TX
6,0                    * LU 47  - DS/1000-IV BISYNC LINK RX
*
20,0                   * LU 48  - SPOOLING
21,0                   * LU 49  - SPOOLING
22,0                   * LU 50  - SPOOLING
23,0                   * LU 51  - SPOOLING
24,0                   * LU 52  - SPOOLING
25,0                   * LU 53  - SPOOLING
*
0                      * LU 54  - SPARE
0                      * LU 55  - SPARE
0                      * LU 56  - SPARE
0                      * LU 57  - SPARE
0                      * LU 58  - SPARE
```

```
0                          * LU 59  - SPARE
0                          * LU 60  - SPARE
0                          * LU 61  - SPARE
0                          * LU 62  - SPARE
0                          * LU 63  - SPARE
*
7,1                        * LU 64  - 26XX TERMINAL LEFT CTU (BACI)
8,1                        * LU 65  - 26XX TERMINAL LEFT CTU (BACI)
9,1                        * LU 66  - 26XX TERMINAL LEFT CTU (BACI)
10,1                       * LU 67  - 26XX TERMINAL LEFT CTU (BACI)
11,1                       * LU 68  - 26XX TERMINAL LEFT CTU (BACI)
12,1                       * LU 69  - 26XX TERMINAL LEFT CTU (BACI)
13,1                       * LU 70  - 26XX TERMINAL LEFT CTU (BACI)
*
0                          * LU 71  - SPARE
*
7,2                        * LU 72  - 26XX TERMINAL RIGHT CTU (BACI)
8,2                        * LU 73  - 26XX TERMINAL RIGHT CTU (BACI)
9,2                        * LU 74  - 26XX TERMINAL RIGHT CTU (BACI)
10,2                       * LU 75  - 26XX TERMINAL RIGHT CTU (BACI)
11,2                       * LU 76  - 26XX TERMINAL RIGHT CTU (BACI)
12,2                       * LU 77  - 26XX TERMINAL RIGHT CTU (BACI)
13,2                       * LU 78  - 26XX TERMINAL RIGHT CTU (BACI)
0                          * LU 79  - SPARE
0                          * LU 80  - SPARE
*
0                          * LU 81  - SPARE
0                          * LU 82  - SPARE
0                          * LU 83  - SPARE
0                          * LU 84  - SPARE
0                          * LU 85  - SPARE
0                          * LU 86  - SPARE
*
/E
*
********************************* INTERRUPT TABLE
*
* SELECT CODE,ENTRY TYPE,PARAMETER
*
*10,FEM                        * FEM FOR VIS
*
*11,TBG                        * TIME BASE GENERATOR
*
12,EQT,1                       * 7906 DISC
*
13,EQT,2                       * SYSTEM CONSOLE (26XX)
*
14,EQT,5                       * DS/1000-IV BISYNC LINK
*
15,EQT,4                       * 7970 MAG TAPE UNIT
16,EQT,4                       * 7970 MAG TAPE UNIT
```

```
*
17,EQT,3                          * 2607A/2613A/2617A LINE PRINTER
*
20,EQT,14                         * HPIB
*
21,PRG,PRMPT                      * MULTIPOINT
*
22,PRG,PRMPT                      * 264X AUX. TERMINAL (BACI)
23,PRG,PRMPT                      * 264X AUX. TERMINAL (BACI)
24,PRG,PRMPT                      * 264X AUX. TERMINAL (BACI)
25,PRG,PRMPT                      * 264X AUX. TERMINAL (BACI)
26,PRG,PRMPT                      * 264X AUX. TERMINAL (BACI)
27,PRG,PRMPT                      * 264X AUX. TERMINAL (BACI)
30,PRG,PRMPT                      * 264X AUX. TERMINAL (BACI)
*
60,EQT,20                         * SPOOLING
61,EQT,21                         * SPOOLING
62,EQT,22                         * SPOOLING
63,EQT,23                         * SPOOLING
64,EQT,24                         * SPOOLING
65,EQT,25                         * SPOOLING
*
77,ABS,0                          * MULTIPOINT & DATACAP TERMINALS
*
/E
*
******************************** SYSTEM BOUNDARIES
*
0                                 * CHANGE DRIVER PART
0                                 * CHANGE RT COMMON
0                                 * CHANGE BG COMMON (IN # OF PAGES)
64                                * # OF I/O CLASSES
1                                 * # OF LU MAPPINGS
25                                * # OF RESOURCE NUMBERS
100,400                           * BUFFER LIMITS
38                                * # OF BLANK LONG ID SEGMENTS
50                                * # OF BLANK SHORT ID SEGMENTS
8                                 * # OF BLANK ID EXTENSIONS
43                                * MAX. # OF PARTITIONS
*
TR,1                              * DO SAM EXTENSION SIZE AND PARTITION
*                                   DEFINITION INTERACTIVELY
*
RFAM,10
LOADR,24
RMOTE,14                          *  RMOTE SHOULD BE SIZED BETWEEN 11 AND
*                                     14 PAGES IF IT IS GENNED IN.
/E
*      REMEMBER TO ASSIGN D.RTR TO A RESERVED PARTITION!!!
/E
```

Sample Generation Answer File for RTE-IVE with DS/1000-IV

The following listing is a sample generation answer file. Your generation will differ according to your system configuration and the current software revision.

NOTE

Modules with CRN "E4" are included in the RTE-IVE software. RTE-IVB software is indicated by CRN "B4". DS/1000-IV modules have CR "DS". Modules which have CRN "E4" are indicated by the symbol ">>" in the left margin and need special attention. Although these modules are also provided in the RTE-IVB and/or DS/1000-IV products, the RTE-IVE version of the module must be chosen when indicated by ">>".

Generation Answer File for RTE-IVE with DS/1000-IV

```
  *
  "LST4E::B4                * LIST FILE
  *
  *  ANSWER FILE FOR RTE-IVB GENERATOR RT4GN
  *
  *                ******************************************
  *                * RTE-IVE EXECUTE-ONLY SYSTEM            *
  *                *                                        *
  *                * INCLUDES:                              *
  *                *    7906H SYSTEM DISC                   *
  *                *    9885M PERIPHERAL DISC               *
  *                *    DS/1000-IV                          *
  *                *    MULTI-TERMINAL MONITOR              *
  *                *    FMP LIBRARY                         *
  *                ******************************************
  *
  *
  **********************************
  ****** INITIALIZATION PHASE ******
  **********************************
  *
  YES                       * ECHO ON
  !OUT4E::B4::2500          * OUTPUT FILE
>>7906H                     * SYSTEM DISC
>>15                        * DISC SELECT CODE
  *                         * TRACK MAP TABLE - ENTRY FOR SYSTEM DISC
  *                         * LU 2 IS REQUIRED BY THE RTE-IVB GENERATOR.
  *
>>*MOD#  #TRKS  CYL HEAD #SRF ADDR #SPR  UNIT
  *
  7906H,  256,   0,  0,   2,   0,    6         * SUBCHANNEL  0  (LU2)
  /E
  0                          * SYSTEM SUBCHANNEL
  NO                         * NO AUX DISC
  12                         * TBG
  0                          * NO PRIVILEGED INTERRUPT CARD
  YES                        * MEM. RES. ACCESS TABLE AREA II
  YES                        * RT MEMORY LOCK
  YES                        * BG MEMORY LOCK
  50                         * SWAP DELAY
  512                        * MEM. SIZE
  0                          * NO BOOT FILE
  *
  *********************************
  ****** PROGRAM INPUT PHASE ******
  *********************************
  *
  LINKS IN CURRENT
  MAP ALL
  *
  *                  RTE-IVE SYSTEM
```

```
  *
>>REL,%CR4S1::E4          * RTE-IVB MEM RES OP SYS (PART 1)
>>REL,%CR4S2::E4          * RTE-IVB MEM RES OP SYS WITHOUT CONFIGURATOR
  *                       * PART 2
  *
  *                     RTE-IVE SOFTWARE
  *
>>REL,%CNF4E::E4          * RTE-IVE CONFIGURATOR AND EXTENSION
>>REL,%APL4D::E4          * ABSOLUTE PROGRAM LOADER (4E VERSION WITH DS
  *                         CAPABILITY)
>>**REL,%APL4E::E4          * ABSOLUTE PROGRAM LOADER (FMP VERSION)
>>REL,%XCNTL::E4          * RTE-IVE I/O CONTROL UTILITY
  *
  *                     SPECIAL SYSTEM SOFTWARE
  *
>>REL,%PASS1::JT          * PASS: USER PROVIDED AUTOMATIC STARTUP
  *                          PROGRAM SCHEDULED BY SYSTEM AT BOOTUP
  *                          (CHANGE TYPE TO 81 DURING PARAMETER
  *                          INPUT PHASE)
  REL,%4AUTR::B4          * AUTO RESTART
  *
  *                     DRIVERS
  *
  REL,%DVR00::B4          * TTY OR 2600 CRT
  REL,%4DV05::B4          * 264X TERMINAL
  REL,%DVA12::B4          * 2631A LINE PRINTER
  REL,%DVR23::B4          * 7970 MAGTAPE
>>REL,%DVA32::B4          * 7906H/20H/25H SYSTEM DISC
  REL,%DVR33::B4          * 9885M FLEXIBLE DISC
  REL,%4DP43::B4          * POWERFAIL DRIVER
  *                     NOTE:  DS/1000-IV DRIVERS ARE RELOCATED BELOW
  *
  *                     USER PROGRAMS
  *
  REL,%DBUGR::B4          * DEBUG
  REL,%WHZAT::B4          * RTE-IVB WHZAT
  *
  *                     LIBRARIES
  *
>>REL,%4SYLB::E4          * RTE-IVB SYSTEM LIBRARY.  NOTE: %4SYLB
  *                          CONTAINS ENTRY POINT CHANGES FOR M/E/F
  *                          COMPUTERS.
>>REL,%4MTM::E4           * RTE-IV MULTI-TERMINAL MONITOR
>>REL,%NSESN::E4          * NON-SESSION LIBRARY
>>REL,$MLIB1::E4          * MATH LIBRARY PART 1
>>REL,$MLIB2::E4          * MATH LIBRARY PART 2
>>REL,$FDSLB::E4          * FORTRAN DS LIBRARY
>>**REL,$FNDLB::E4          * FORTRAN NON-DS LIBRARY
>>REL,$PLIB::B4           * PASCAL AND COMPILER LIBRARIES, USED IN THIS
>>REL,%CLIB::B4           *    GEN FOR STARTUP PROGRAM
  *
```

```
  *                    DS/1000-IV REQUIRED MODULES
  *
  REL,%GRPM::DS          * RTE-RTE REQUEST/REPLY PROCESSOR
  REL,%QCLM::DS          * COMMUNICATIONS ERROR LOGGER
  *                         (MUST BE CHANGED TO MEMORY RESIDENT)
  REL,%QUEUE::DS         * ALLOCATES SAM AND QUEUES MESSAGES TO GRPM
  REL,%RTRY::DS          * COMMUNICATIONS ERROR RETRY PROCESSOR
  REL,%UPLIN::DS         * COMM. MANAG. TIMEOUT AND RE-ENABLE MODULE
  REL,%RESM::DS          * SSGA ENTRY POINTS FOR RTE-IVB W/O SESSION
>>REL,%DINIS::E4         * DINIT: NETWORK INITIALIZATION, SHUTDOWN
  *                         VERSION  (SPECIFY FOR AUTOMATIC
  *                         PARTITION LOAD WHEN RUNNING CONVM,
  *                         DINIT SCHEDULED BY PASS PROGRAM)
>>REL,%DSMOD::E4         * DSMOD: NETWORK MODIFICATION PROGRAM
  *                         (INCLUDED HERE TO SATISFY UNDEFS, LOADED
  *                          ONLINE WITH MLOAD AND APLDR WHEN NEEDED)
  *
  *                    DS/1000-IV DRIVERS
  *
  REL,%DVA66::DS         * DRIVER FOR HDLC/BISYNC CARD
  REL,%DVA65::DS         * DRIVER FOR 12771/12773 CARD
  REL,%MDV00::DS         * DRIVER FOR LU MAPPING
  *
  *                    DATA LINK DRIVERS
  *
  REL,%DVR07::23456      * MULTIPOINT MASTER DRIVER
  REL,%DVS64::MM         * MULTIPOINT SLAVE DRIVER
  *
  *                    DATA LINK LIBRARY
  *
  REL,$MPLIB::23456      * MULTIPOINT LIBRARY
  *
  *                    DS/1000 LIBRARIES
  *
  REL,$DSLB1::DS         * REQUIRED IN ALL DS/1000-IV NODES
  REL,$DSLB2::DS         * REQUIRED IN ALL RTE-RTE NODES
  *
>>* REL,%DEXEC::E4       * REPLACES DEXEC IN %DSLB2.
  *
  REL,$DSLB3::DS         * DS LIBRARY #3 (WITHOUT 3000)
  REL,$DSMX4::DS         * MICROCODE REPLACEMENTS FOR M/E/F COMPUTERS
  REL,$DSLSM::DS         * DS NO LOCAL SESSION LIBRARY
  **REL,$DSMA::DS         * MESSAGE ACCOUNTING LIBRARY
  REL,$DSNMA::DS         * NON MESSAGE ACCOUNTING LIBRARY
>>**REL,$DSRR::E4         * REROUTING LIBRARY
  REL,$DSNRR::DS         * NON REROUTING LIBRARY
>>REL,%#SPLU::E4         * FOR LU MAPPING
  *
  *
  *                    RTE-IVB FILE MANAGER FMGR
  *                    NOTE:  USED ONLY TO BUILD FMP LIBRARY
```

```
  *
  *
>>REL,%BMPG1::E4         * RTE-IVB FMGR PROGRAM AND LIBRARY
>>REL,%BMPG3::E4         * FMP LIBRARY
  *
  *
  *                    RTE-IVE DIRECTORY MANAGER PROGRAM
  *
>>REL,%D.R4E::E4         * RTE-IVE DIRECTORY MANAGER PROGRAM,
  *                         REPLACES RTE-IVB D.RTR
  *
  *                    REQUIRED RTE-IVE LIBRARY $LIB4E
  *                    NOTE: $LIB4E IS RELOCATED AFTER %BMPG1 AND %BMPG3
  *                          $LIB4E WILL CAUSE GEN ERR'S 05 AND 08 FOR
  *                              FSTAT (REPLACES RTE-IVB FSTAT),
  *                              SEGLD (REPLACES RTE-IVB SEGLD), AND
  *                              REIO (REPLACES RTE-IVB REIO).
  *
>>REL,$LIB4E::E4         * RTE-IVE LIBRARY
  *
  DISPLAY UNDEFS
  *
  /E
  *
  ***********************************
  ****** PARAMETER INPUT PHASE ******
  ***********************************
  *
>>QCLM,17                * DEFAULT TYPE IS 19
>>PASS1,81               * MEMORY RESIDENT WITH AUTOMATIC SCHEDULING.
  *
  *                      * TO INDICATE AUTOMATIC SCHEDULING, THE TYPE
  *                      * MUST BE SPECIFIED HERE (EVEN IF THE NAM
  *                      * RECORD ALREADY CONTAINS TYPE 81).
  *
>>*                      NOTE:  TO SAVE TIME, RTE-IVB FMGR AND ALL FMGR
  *                             SEGMENTS CAN NOW BE CHANGED TO TYPE 8
  *                             SO THEY WILL NOT BE LOADED.
  FMGR,8
  FMGR0,8
  FMGR1,8
  FMGR2,8
  FMGR3,8
  FMGR4,8
  FMGR5,8
  FMGR6,8
  FMGR7,8
  FMGR8,8
  FMGR9,8
  FMGRA,8
  FMGRB,8
```

```
*
/E
*
*
****** ENTRY POINT CHANGES
*
*  EMA SUBSTITUTIONS
*
.EMAP,RP,105257
.EMIO,RP,105240
MMAP,RP,105241
*
*          NO OTHER ENTRY POINT CHANGES. %4SYLB CONTAINS STANDARD
*          ENTRY POINT REPLACEMENTS IN RPLIB.
*          (THESE REPLACEMENTS ARE ALSO CONTAINED IN $DSMXL)
*
/E
*
************************************
****** TABLE GENERATION PHASE ******
************************************
*
****** EQUIPMENT TABLE
*
>>15,DVA32,D,T=200                * EQT  1: 7906H SYSTEM DISC
  17,DVR05,B,T=32767,X=13         * EQT  2: 2645A SYSTEM CONSOLE
  22,DVA12,B,T=100                * EQT  3: 2631A LINE PRINTER
  23,DVR23,D,T=20000              * EQT  4: 7970B MAGNETIC TAPE UNIT
  45,DVR00,B,T=32767              * EQT  5: 2600A OR ASR-33 TELETYPE
  33,DVR05,B,T=32767,X=13         * EQT  6: 2645A TERMINAL
  46,DVR33,D                      * EQT  7: 9885M FLEXIBLE DISC
  11,DVA65,X=7                    * EQT  8: DS/1000-IV
  25,DVA66,X=12                   * EQT  9: DS/1000-IV HDLC/BISYNC, PSI TX
  25,DVA66                        * EQT 10: DS/1000-IV HDLC/BISYNC, PSI RX
  41,DVV00                        * EQT 11: DS - MAPPING EQT
  41,DVV00,X=11                   * EQT 12: DS - MAPPING EQT
  41,DVV00,X=11                   * EQT 13: DS - MAPPING EQT
  4,DVP43,M                       * EQT 14: POWER FAIL
*
****** DATA LINK
*
  16,DVR07,X=8                    * EQT 15: MULTIPOINT LINE
  77,DVR07,X=8                    * EQT 16: MULTIPOINT NODE #1
  77,DVR07,X=8                    * EQT 17: MULTIPOINT NODE #2
  77,DVR07,X=8                    * EQT 18: FCL7 EQT
/E
*
****** DEVICE REFERENCE TABLE
*
  2,0                     * LU1 - 2645A SYSTEM CONSOLE
>>1,0                     * LU2 - 7906H DISC - SUBCHANNEL 0
```

```
  0                      * LU3 - SPARE
  2,1                    * LU4 - 2645A SYSTEM CONSOLE - LEFT CTU
  2,2                    * LU5 - 2645A SYSTEM CONSOLE - RIGHT CTU
  3                      * LU6 - 2631A LINE PRINTER
  0                      * LU7 - SPARE
  4                      * LU8 - 7970B MAGNETIC TAPE UNIT
  5                      * LU9 - 2600A OR ASR-33 TELETYPE
  7,0                    * LU10 - 9885M FLEXIBLE DISC
  6,0                    * LU11 - 2645A TERMINAL
  6,1                    * LU12 - 2645A TERMINAL - LEFT CTU
  6,2                    * LU13 - 2645A TERMINAL - RIGHT CTU
  8,1                    * LU14 - DS: 12771/12773 CARD
  9                      * LU15 - DS: HDLC/BISYNC CARD, PSI  TX
  10                     * LU16 - DS: HDLC/BISYNC CARD, PSI  RX
  11                     * LU17 - DS: RESERVED MAPPING LU
  12                     * LU18 - DS: LU MAPPING #1
  13                     * LU19 - DS: LU MAPPING #2
  15                     * LU20 - MULTIPOINT LINE
  16                     * LU21 - MULTIPOINT NODE #1
  17                     * LU22 - MULTIPOINT NODE #2
  18                     * LU23 - FCL7 LU
  0                      * LU24 - SPARE
  0                      * LU25 - SPARE
  0                      * LU26 - SPARE
  0                      * LU27 - SPARE
  14                     * LU28 POWER FAIL
  *
  /E
  *
  ****** INTERRUPT TABLE
  *
  4,ENT,$POWR            * POWER FAIL
  11,EQT,8               * DS/1000
>>15,EQT,1               * SYSTEM DISC
  17,PRG,PRMPT           * 2645A SYSTEM CONSOLE
  22,EQT,3               * 2631A LINE PRINTER
  23,EQT,4               * 7970B MAGNETIC TAPE
  24,EQT,4               * 7970B MAGNETIC TAPE
  26,EQT,15              * MULTIPOINT LINE
  33,PRG,PRMPT           * 2645A TERMINAL
  41,PRG,PRMPT           * DS/1000-IV I/O MAPPING ENTRY
  45,PRG,PRMPT           * 2600A OR ASR-33 TELETYPE
  46,EQT,7               * 9885M FLEXIBLE DISC
  *
  /E
  *
  ****** SYSTEM BOUNDARIES
  *
  0                       * CHANGE DRIVER PARTITION SIZE
  0                       * CHANGE RT COMMON SIZE
  0                       * CHANGE BG COMMON SIZE
```

```
*
****** RESOURCE TABLES
*
48                      * # OF I/O CLASSES
0                       * # OF BATCH/SPOOL LU MAPPINGS
32                      * # OF RESOURCE NUMBERS
100,400                 * BUFFER LIMITS
10                      * # OF BLANK ID SEGMENTS
15                      * # OF BLANK SHORT ID SEGMENTS
5                       * # OF BLANK ID EXTENSIONS
32                      * MAX NUMBER OF PARTITIONS
*
****** PARTITION DEFINITIONS
*
TR,1
```

Generation Answer File with DS/1000 for RTE-A

The following listing is a sample generation answer file for RTE-A with DS. Your generation will differ according to your system configuration and the current software revision.

NOTE

Modules with CRN "A" are included in the RTE-A software.
Modules with CRN "DS" are included in the DS/1000-IV software.

```
************************************************************
* A900 GENERATION WITH NO CDS RPLs AND WITH DS/1000-IV
* FOR RTE-A WITH MULTIUSER ENVIRONMENT AND NEW FILE SYSTEM
************************************************************
LINKS,CP
LE,ON
*
*System modules
*
RE,%RPL90::A
RE,%VCTR::A
RE,%SPOOL::A
RE,%EXEC::A
RE,%MEMRY::A
RE,%SAM::A
RE,%TIME::A
RE,%SCHED::A
RE,%STRNG::A
RE,%LOCK::A
RE,%ERLOG::A
RE,%OPMSG::A
RE,%XCMND::A
RE,%STAT::A
RE,%SYCOM::A
RE,%CLASS::A
RE,%LOAD::A
RE,%RTIOA::A
RE,%IOMOD::A
RE,%PERR::A
*
*  System Driver area--for nonpartitionable drivers and
*                      driver-related software
*
RE,% SPLU::DS,,,,,                    DS I/O MAPPING STORAGE
*
```

```
*   Drivers
*
RE,%ID.43::A,,,,,                        POWERFAIL RECOVERY DRIVER
********************************************************
********************************************************
********************************************************
MS,$SYSA::A
SE,$SYSLB::A
SE,$MLIB1::A
SE,$MLIB2::A
END
*
*   Driver partitions
*
*********************************************************
*
*   Interface drivers
*
RE,%ID.00::A,,,,,                        TERMINAL INTERFACE DIRVER
END
RE,%ID.37::A,,,,,                        HPIB INTERFACE DRIVER
END
RE,%ID.66::DS,,,,,,                        DS/1000-IV PSI DRIVER
END
*
*   Device drivers
*
RE,%ADV00::DS,,,,,                        DS I/O MAPPING DRIVER
END
RE,%DD.00::A,,,,,                        TERMINAL DEVICE DRIVER
END
RE,%DD.12::A,,,,,                        HPIB LINE PRINTER DRIVER
END
RE,%DD.20::A,,,,,                        TERMINAL CARTRIDGE TAPE DRIVER
END
RE,%DD.23::A,,,,,                        HPIB MAG TAPE DRIVER
END
RE,%DD.33::A,,,,,                        CS-80 DISC DRIVER
END
*
*     end driver partitions
*
END
*
* ASIC FOR 2645A SYSTEM CONSOLE WITH VCP
*
IFT,%ID.00::A,SC:20B
*
DVT,%DD.00::A,M26XX,LU:1
*
*
```

```
* ASIC FOR 2645 TERMINAL LU 3 with mini-cart, lus 4 & 5
*
IFT,%ID.00::A,SC:21B
*
DVT,%DD.00::A,M2645,LU:3
DVT,%DD.20::A,M2645:1,LU:4
DVT,%DD.20::A,M2645:2,LU:5
*
*  ASIC for 26xx auxiliary terminal, lu 64
*
IFT,%ID.00::A,SC:22B
DVT,%DD.00::A,M26XX,LU:64
*
* HP-IB  1
*
IFT,%ID.37::A,SC:27B
*
*HP-IB  1 DISC CONTROLLER
*
DVT,,,LU:9,TO:50,DT:77B,TX:0,DX:1,DP:1:36B,PR:0
*
* HP-IB LINE PRINTER LU  6 HPIB ADDRESS 3
*
DVT,%DD.12::A,,LU:6,DT:12B,DP:1:3,PR:6
*
* HP-IB TAPE DRIVE    LU  8  HPIB ADDRESS 4
*
DVT,%DD.23::A,M7970E:0,LU:8,DP:1:4,PR:1
*
* HP .7908./.7912. DISC WITH COMPATIBLE CARTRIDGE TAPE
* LU 11-14  15..22  HPIB ADDRESS 0
*
DVT,%DD.33::A,M7912:0,LU:11,DP:1:0
DVT,%DD.33::A,M7912:1,LU:12,DP:1:0
DVT,%DD.33::A,M7912:2,LU:13,DP:1:0
DVT,%DD.33::A,M7912:3,LU:14,DP:1:0
DVT,%DD.33::A,M7912:4,LU:15,DP:1:0
DVT,%DD.33::A,M7912:5,LU:16,DP:1:0
DVT,%DD.33::A,M7912:6,LU:17,DP:1:0
DVT,%DD.33::A,M7912:7,LU:18,DP:1:0
DVT,%DD.33::A,M7912:8,LU:19,DP:1:0
DVT,%DD.33::A,M7912:9,LU:20,DP:1:0
DVT,%DD.33::A,M7912:10,LU:21,DP:1:0
DVT,%DD.33::A,M7912:11,LU:22,DP:1:0
*
* COMPATIBLE CARTRIDGE TAPE CACHE  LU  10  HPIB ADDRESS 0
*
DVT,%DD.33::A,MTAPE,LU:10,DP:1:0
*
*                                SPARE
* HP .7912. DISC WITH COMPATIBLE CARTRIDGE TAPE
```

```
* LU 51-62   , HPIB ADDRESS 1
*
DVT,%DD.33::A,M7912:0,LU:51,DP:1:1
DVT,%DD.33::A,M7912:1,LU:52,DP:1:1
DVT,%DD.33::A,M7912:2,LU:53,DP:1:1
DVT,%DD.33::A,M7912:3,LU:54,DP:1:1
DVT,%DD.33::A,M7912:4,LU:55,DP:1:1
DVT,%DD.33::A,M7912:5,LU:56,DP:1:1
DVT,%DD.33::A,M7912:6,LU:57,DP:1:1
DVT,%DD.33::A,M7912:7,LU:58,DP:1:1
DVT,%DD.33::A,M7912:8,LU:59,DP:1:1
DVT,%DD.33::A,M7912:9,LU:60,DP:1:1
DVT,%DD.33::A,M7912:10,LU:61,DP:1:1
DVT,%DD.33::A,M7912:11,LU:62,DP:1:1
*
* COMPATIBLE CARTRIDGE TAPE CACHE  LU  50  HPIB ADDRESS 1
*
DVT,%DD.33::A,MTAPE,LU:50,DP:1:1
*
*  >>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>><<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<
*  >>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>><<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<
*  >>>>>>                                                          <<<
*  >>>>>>                    DS links                              <<<
*  >>>>>>                                                          <<<
*  >>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>><<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<
*  >>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>><<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<
*
* REMOTE I/O MAPPING
*
IFT,%ADV00::DS,EIDV00,QU:FI,SC:47B,TX:2
*
DVT,,,LU:32,EDDV00,TX:0
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:65,EDDV00,TX:5
DVT,,,LU:66,EDDV00,TX:5
DVT,,,LU:67,EDDV00,TX:5
DVT,,,LU:68,EDDV00,TX:5
DVT,,,LU:69,EDDV00,TX:5
DVT,,,LU:70,EDDV00,TX:5
*
* NETWORK LINKS
*
IFT,%ID.66::DS,EID.66,SC:24B,QU:FI,TX:18
DVT,,,LU:38,DT:66B
DVT,,,LU:39,DT:66B
*
IFT,%ID.66::DS,EID.66,SC:25B,QU:FI,TX:18
```

```
DVT,,,LU:40,DT:66B
DVT,,,LU:41,DT:66B
*
IFT,%ID.66::DS,EID.66,SC:26B,QU:FI,TX:18
DVT,,,LU:43,DT:66B
DVT,,,LU:44,DT:66B
*
IFT,%ID.66::DS,EID.66,SC:30B,QU:FI,TX:18
DVT,,,LU:71,DT:66B
DVT,,,LU:72,DT:66B
*
IFT,%ID.66::DS,EID.66,SC:31B,QU:FI,TX:18
DVT,,,LU:73,DT:66B
DVT,,,LU:74,DT:66B
*
IFT,%ID.66::DS,EID.66,SC:32B,QU:FI,TX:18
DVT,,,LU:76,DT:66B
DVT,,,LU:77,DT:66B
*
*  >>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>><<<<<<<<<<<<<<<<<<<<<<<<<<<<
*  >>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>><<<<<<<<<<<<<<<<<<<<<<<<<<<<
*  >>>>>>                                              <<<<<<<<
*  >>>>>>             end of DS links                  <<<<<<<<
*  >>>>>>                                              <<<<<<<<
*  >>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>><<<<<<<<<<<<<<<<<<<<<<<<<<<<
*  >>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>><<<<<<<<<<<<<<<<<<<<<<<<<<<<
*
***********************************************************************
*
END
*
END,,,,,,,,                   IFT
*
*  Node listings
*
*  Spare terminal with tape drives
NODE,3,4,5
*
*  Primary CS-80 disc
NODE,10,11,12,13,14,15,16,17,18,19,20,21,22
*
*  Secondary CS-80 disc
NODE,50,51,52,53,54,55,56,57,58,59,60,61,62
END,,,,NODE LIST
*
*
END,,,,INTERRUPT TABLE
*
CLAS,50,,,,,,,,,,,,,                    CLASS NUMBERS
RESN,20,,,,,,,,,,,,,                    RESOURCE NUMBERS
ID,64,,,,,,,,,,,,,,,                    ID SEGMENTS
```

```
RS,2,,,,,,,,,,,,,,,,           RESERVED PARTITIONS
SAM,20000,,,,,,,,,,,           SYSTEM AVAILABLE MEMORY
SL,4080,6100,,,,,,,,           SPOOL LIMITS (LOWER, UPPER)
BG,50,,,,,,,,,,,,,,,           BACKGROUND SWAP PRIORITY
QU,200,50,,,,,,,,,,,           TIME SLICE QUANTUM, PRIORITY
SP,2,,,,,,,,,,,,,,,,           SHARED PROGRAMS
MB,4000,,,,,,,,,,,,,           SYSTEM MEMORY BLOCK
US,10,,,,,,,,,,,,,,,           CONCURRENT USERS
*
*     DS/1000 LABELED COMMON AREA
*
RE,%RESA::DS
RE,$DSLB2::DS, NRVS
RE,$DSAL::DS, RQUA
RE,$DSLB1::DS, LEVL
RE,$D3KLB::DS,D$EQT
*
MS,$DSRR::DS
*
END,,,,LABELED SYSTEM COMMON RELOCATION
COM,50
RE,%MSGS::A
END
*
*   LIBRARIES FOR OPTIONAL DS FEATURES
*
LIB,$DSLSM::DS
LIB,$DSMA::DS
LIB,$DSRR::DS
*
*  DS LIBRARY FOR THE SPECIFIC OPERATING SYSTEM
*
LIB,$DSAL::DS
*
*     LIBS FOR NODES WITH LINKS TO HP 3000
*
LIB,$D3KLB::DS
LIB,$D3KRB::DS
*
*     LIB FOR ALL DS/1000 NODES W/ RTE-RTE LINKS
LIB,$DSLB2::DS
*
*     LIB FOR ALL DS/1000 NODES
LIB,$DSLB1::DS
*
LIB,$FNDLB::A
LIB,$BIGLB::A
END
```

Sample Generation Answer File for Disc Based RTE-XL

The following listing is a sample generation answer file for disc based RTE-XL. Your generation will differ according to your system configuration and the current software revision.

NOTE

Modules with CRN "XL" are included in the RTE-XL software.
Modules with CRN "DS" are included in the DS/1000-IV software.

```
******ANSWER FILE FOR GENERATING AN RTE-XL  DS/1000-IV SYSTEM******
*
*
*
*  GEN ANSWER FILE:  GENXL
*  GEN LISTING:      'XDLST
*  GEN SYSTEM:       'XDSYS
*  SNAP FILE:        'XDSNP
*
LINK,BP,          OPTION BASE-PAGE
*
*
*  RELOCATE MAPPED RTE-L SYSTEM MODULES
*
REL,%EXEC::XL
REL,%SAM::XL
REL,%TIME::XL
REL,%SCHED::XL
REL,%STRNG::XL
REL,%LOCK::XL
REL,%ERLOG::XL
REL,%OPMSG::XL
REL,%XCMND::XL
REL,%SYCOM::XL
REL,%STAT::XL
REL,%LOAD::XL
REL,%SWAP::XL
REL,%RTIOL::XL
REL,%CLASS::XL
*
*  RELOCATE MAPPED RTE-L DRIVERS
*
REL,%ID.00::XL
REL,%DD.00::XL
```

```
REL,%ID.37::XL
REL,%DD.30::XL
REL,%DD.20::XL
*
*  RELOCATE DATA LINK SLAVE DRIVER
*
REL,%IDS64::DS
*
*
*  RELOCATE MAPPED RTE-L DS MODULES
*
REL,%ID.66::DS,,,,,,      DS INTERFACE DRIVER
REL,%XDV00::DS,,,,,,      REMOTE I/O MAPPING DRIVER
REL,%#SPLU::DS,,,,,,      REMOTE I/O MAPPING RESERVED LU MODULE
*
*  DO A MULTIPLE SEARCH ON THESE LIBRARIES
*
MS,$SYS..::XL
MS,$SYSLB::XL
MS,$MLIB2::XL
MS,$MXLB::XL
*
END,,,,,,SYSTEM MODULE RELOCATION
*
*
*  BEGIN TABLE GENERATION
*  CONFIGURE IO TABLES
*
*     TERMINAL FRONT PANEL WITH VCP AND MINI-CARTRIDGES
*
IFT,%ID.00::XL,SC:20B
*
DVT,%DD.00::XL,M2645,LU:1
DVT,%DD.20::XL,M2645:1,LU:4
DVT,%DD.20::XL,M2645:2,LU:5
*
*     HPIB FOR DISC DRIVE
*
IFT,%ID.37::XL,SC:27B
*
*     HPIB DISC CONTROLLER
*
DVT,,,LU:7,TO:50,DT:37B,TX:0,DX:1,DP:1:36B,PR:0
*
*     8" FLEXIBLE DISC
*
DVT,%DD.30,M7902:0,LU:10,DP:1:2
DVT,%DD.30,M7902:1,LU:11,DP:1:2
*
*     7906H HARD DISC
*
```

```
DVT,%DD.30::XL,M7906:0,LU:12,DP:1:1
DVT,%DD.30::XL,M7906:1,LU:13,DP:1:1
DVT,%DD.30::XL,M7906:2,LU:14,DP:1:1
DVT,%DD.30::XL,M7906:3,LU:15,DP:1:1
*
*     7910H FIXED DISC
*
DVT,%DD.30,M7910:0,LU:16,DP:1:3
DVT,%DD.30,M7910:1,LU:17,DP:1:3
DVT,%DD.30,M7910:2,LU:18,DP:1:3
DVT,%DD.30,M7910:3,LU:19,DP:1:3
*
*     DATA LINK
*
IFT,%IDS64,EIDS64,QU:FI,TX:24,SC:30B,IT:64B
DVT,,,LU:25,QU:FI,DT:64B
DVT,,,LU:26,QU:FI,DT:64B
*
*     NETWORK LINKS
*
IFT,%ID.66::DS,EID.66,SC:24B,QU:FI,TX:18
*
DVT,,,LU:21,DT:66B
DVT,,,LU:22,DT:66B
*
IFT,%ID.66::DS,EID.66,SC:25B,QU:FI,TX:18
*
DVT,,,LU:23,DT:66B
DVT,,,LU:24,DT:66B
*
*     REMOTE I/O MAPPING
*
IFT,%XDV00::DS,EIDV00,SC:40B,QU:FI,TX:2
*
DVT,,,LU:27,EDDV00,TX:0
DVT,,,LU:28,EDDV00,TX:5
DVT,,,LU:29,EDDV00,TX:5
*
END,,,,,LAST IFT/DVT ENTRY
*
END,,,,,TABLE GENERATION
*
NODE,1,4,5
NODE,10,11
NODE,12,13,14,15
NODE,16,17,18,19
*
END,,,,,NODE LIST
*
END,,,,,INTERRUPT TABLE
*
```

```
*     MEMORY ALLOCATION
*
CLAS,50,,,,,,CLASS NUMBERS
RESN,20,,,,,,RESOURCE NUMBERS
ID,40,,,,,,,,ID SEGMENTS
PART,40,,,,,,PARTITIONS
CD,6,,,,,,,,,MAX CARTRIDGES MOUNTED
SA,2048,,,,,,SAM
BG,50,,,,,,,,BACKGROUND/REAL TIME FENCE
QU,1000,50,,,TIME-SLICING
*
*     DS/1000-IV LABELLED COMMON AREA
*
REL,%RESXL::DS
REL,$DSLB2::DS,#NRVS
REL,$DSLXL::DS,PGMAL
REL,$DSLXL::DS,#RQUL
REL,$DSLB1,#LEVL
REL,$D3KLB::DS,D$EQT
*
*   DO A MULTIPLE SEARCH OF THESE LIBRARIES
*
MS,$DSRR::DS
MS,$SYSLB::XL
MS,$MLIB2::XL
MS,$MXLB::XL
*
END,,,,,LABELLED SYSTEM COMMON RELOCATION
*
*    AMOUNT OF UNLABELLED SYSTEM COMMON
*
COM,0
*
*       MAPPED RTE-L SYSTEM LIBRARIES
*
LIB,$FMP::XL
LIB,$MLIB1::XL
LIB,$MLIB2::XL
LIB,$SYSLB::XL
LIB,$MXLB::XL
*
*       DS/1000-IV LIBRARIES
*
LIB,$DSLB1::DS,,,,,,FOR ALL DS/1000-IV NODES
LIB,$DSLB2::DS,,,,,,FOR DS/1000-IV NODES WITH RTE-RTE LINKS
LIB,$DSLB3::DS,,,,,,FOR DS/1000-IV NODES WITHOUT LINKS TO AN HP 3000
LIB,$DSLXL::DS,,,,,,FOR ALL MAPPED RTE-L NODES
LIB,$DSRR::DS,,,,,,,FOR ALL NODES WITH REROUTING LINKS
LIB,$DSMA::DS,,,,,,,FOR ALL NODES USING MESSAGE ACCOUNTING
LIB,$DSLSM::DS,,,,,,FOR ALL NODES WITHOUT SESSION LOCALLY
*                   BUT SESSION ELSEWHERE IN THE NETWORK
```

```
*
END,,,,,,GENERATION
```

NOTE

This generation will produce three generation errors [NT6]. These errors can be ignored.

Sample Generation Answer File for Memory Based RTE-XL

The following listing is a sample generation answer file for Memory Based RTE-XL. Your generation will differ according to your system configuration and the current software revision.

NOTE

Modules with CRN "XL" are included in the RTE-XL software.
Modules with CRN "DS" are included in the DS/1000-IV software.

```
**GENERATION ANSWER FILE FOR MEMORY BASED RTE-XL WITH DS/1000-IV
*
*
*
*  GEN ANSWER FILE:  MEMXL
*  GEN LISTING:      'XDLST
*  GEN SYSTEM:       'XDSYS
*  SNAP FILE:        'XDSNP
*
LINK,BP,        OPTION BASE-PAGE
*
*
*  RELOCATE MAPPED RTE-L SYSTEM MODULES
*
*                      LOAD AND SWAP HAVE BEEN REMOVED; APLDR WILL
*                      HANDLE MEMORY MANAGEMENT.  OTHER SYSTEM MODULES
*                      MAY BE REMOVED IF NOT NEEDED.  SEE THE RTE-XL
*                      SYSTEM DESIGN MANUAL.
REL,%EXEC::XL
REL,%SAM::XL
REL,%TIME::XL
REL,%SCHED::XL
REL,%STRNG::XL
REL,%LOCK::XL
REL,%ERLOG::XL
REL,%OPMSG::XL
REL,%XCMND::XL
REL,%SYCOM::XL
REL,%STAT::XL
REL,%RTIOL::XL
REL,%CLASS::XL
*
*  RELOCATE MAPPED RTE-L DRIVERS
*
```

```
REL,%ID.00::XL
REL,%DD.00::XL
REL,%DD.20::XL
*
*  RELOCATE DATA LINK SLAVE DRIVER
*
REL,%IDS64::DS
*
*  RELOCATE MAPPED RTE-L DS MODULES
*
REL,%ID.66::DS,,,,,,        DS INTERFACE DRIVER
REL,%XDV00::DS,,,,,,        REMOTE I/O MAPPING DRIVER
REL,%#SPLU::DS,,,,,,        REMOTE I/O MAPPING RESERVED LU MODULE
*
REL,%$MWB::DS,,,,,,,        MODULE USED BY APLDR TO LOAD PROGRAMS
*
*  DO A MULTIPLE SEARCH ON THESE LIBRARIES
*
MS,$SYS..::XL
MS,$SYSLB::XL
MS,$MLIB2::XL
MS,$MXLB::XL
*
END,,,,,,SYSTEM MODULE RELOCATION
*
*
*  BEGIN TABLE GENERATION
*  CONFIGURE IO TABLES
*
*     TERMINAL FRONT PANEL WITH VCP CAPABILITIES AND MINI-CARTRIDGES
*
IFT,%ID.00::XL,SC:20B
*
DVT,%DD.00::XL,M2645,LU:1
DVT,%DD.20::XL,M2645:1,LU:4
DVT,%DD.20::XL,M2645:2,LU:5
*
*     DATA LINK
*
IFT,%IDS64,EIDS64,QU:FI,TX:24,SC:30B,IT,64B
DVT,,,LU:25,QU:FI,DT:64B
DVT,,,LU:26,QU:FI,DT:64B
*
*     NETWORK LINKS
*
IFT,%ID.66::DS,EID.66,SC:24B,QU:FI,TX:18
*
DVT,,,LU:21,DT:66B
DVT,,,LU:22,DT:66B
*
IFT,%ID.66::DS,EID.66,SC:25B,QU:FI,TX:18
```

```
*
DVT,,,LU:23,DT:66B
DVT,,,LU:24,DT:66B
*
*     REMOTE I/O MAPPING
*
IFT,%XDV00::DS,EIDV00,SC:40B,QU:FI,TX:2
*
DVT,,,LU:27,EDDV00,TX:0
DVT,,,LU:28,EDDV00,TX:5
DVT,,,LU:29,EDDV00,TX:5
*
END,,,,,,LAST IFT/DVT ENTRY
*
END,,,,,,TABLE GENERATION
*
NODE,1,4,5
*
END,,,,,,NODE LIST
*
END,,,,,,INTERRUPT TABLE
*
*     MEMORY ALLOCATION
*
CLAS,50,,,,,,CLASS NUMBERS
RESN,20,,,,,,RESOURCE NUMBERS
ID,40,,,,,,,,ID SEGMENTS
PART,40,,,,,,PARTITIONS
CD,6,,,,,,,,,MAX CARTRIDGES MOUNTED
SA,2048,,,,,,SAM
BG,50,,,,,,,,BACKGROUND/REAL TIME FENCE
QU,1000,50,,,TIME-SLICING
*
*     DS/1000-IV LABELLED COMMON AREA
*
REL,%RESXL::DS
REL,$DSLB2::DS,#NRVS
REL,$DSLXL::DS,PGMAL
REL,$DSLXL::DS,#RQUL
*
*   DO A MULTIPLE SEARCH OF THESE LIBRARIES
*
MS,$DSRR::DS
MS,$SYSLB::XL
MS,$MLIB2::XL
MS,$MXLB::XL
*
END,,,,,LABELLED SYSTEM COMMON RELOCATION
*
*    AMOUNT OF UNLABELLED SYSTEM COMMON
*
```

```
COM,0
*
*       MAPPED RTE-L SYSTEM LIBRARIES
*
LIB,$FMP::XL
LIB,$MLIB1::XL
LIB,$MLIB2::XL
LIB,$SYSLB::XL
LIB,$MXLB::XL
*
*       DS/1000-IV LIBRARIES
*
LIB,$DSLB1::DS,,,,,,FOR ALL DS/1000-IV NODES
LIB,$DSLB2::DS,,,,,,FOR DS/1000-IV NODES WITH RTE-RTE LINKS
LIB,$DSLB3::DS,,,,,,FOR DS/1000-IV NODES WITHOUT LINKS TO AN HP 3000
LIB,$DSLXL::DS,,,,,,FOR ALL MAPPED RTE-L NODES
LIB,$DSRR::DS,,,,,,,FOR ALL NODES WITH REROUTING LINKS
LIB,$DSMA::DS,,,,,,,FOR ALL NODES USING MESSAGE ACCOUNTING
LIB,$DSLSM::DS,,,,,,FOR ALL NODES WITHOUT SESSION LOCALLY
*                   BUT WITH SESSION ELSEWHERE IN THE NETWORK
*
END,,,,,,GENERATION
```

NOTE

This generation will produce 3 generation errors [NT6]. These errors can be ignored.

Generation Answer File for Memory Based RTE-XL

This is a sample command file for BUILDing a downloadable memory based RTE-XL system. Your command file will differ according to your system configuration, the current software revision, and the needs of your specific node.

```
******BUILD COMMAND FILE FOR MEMORY BASED RTE-XL
**
**
P00000,,,,,                 * BOOTABLE SYSTEM FILE NAME
SNAPDS,,,,,                 * SNAPSHOT FILE
DSYSTM,,,,,                 * ORIGINAL SYSTEM FILE NAME
YES,,,,,                    * AUTOMATIC PARTITION CONSTRUCTION
256,,,,,                    * MEMORY SIZE IN K WORDS
**
**                          * DESCRIBE PROGRAMS YOU WANT LOADED
**                          * INTO MEMORY
**
RP,START,,,,,
ST,START,,,,,               * DESIGNATE START AS THE START-UP PROGRAM
**
RP,DINIT::DS,,,,,           * USER PROGRAMS SHOULD
RP,DSMOD::DS,,,,,           * BE RP'ED AS NECESSARY
RP,QUEUE::DS,,,,,
RP,GRPM::DS,,,,,
RP,QCLM::DS,,,,,            * OTHER OPERATIONS WHICH MAY
RP,RTRY::DS,,,,,            * BE SPECIFIED HERE ARE:
RP,UPLIN::DS,,,,,
RP,MATIC::DS,,,,,           *   CHANGE PRIORITY     PR,N
RP,OPERM::DS,,,,,           *   SIZE UP             SZ,N
RP,EXECM::DS,,,,,           *   MAKE A COPY         RP,FILEX,FIL01
RP,EXECW::DS,,,,,
RP,APLDR::DS,,,,,           * SEGMENTED PROGRAMS CANNOT BE INCLUDED
RP,DLIST::DS,,,,,           * IN BUILD
RP,RFAM::DS,,,,,
RP,PTOPM::DS,,,,,
RP,COMND::DS,,,,,           * USE THE DS VERSION OF COMND
**
PT,,,,,                     * SHOW THE CURRENT PARTITION TABLE
**
/E                          * END BUILD
```

Sample LOADR Command File for RTE-L/XL DS Modules

This LOADR command file for an RTE-L/XL system is a sample only. Your LOADR command file will differ according to your specific needs and the current revision code. The command file for RTE-L is the same except the LCOM parameter is replaced by SCOM.

```
*  LOAD FILE FOR RTE-XL  DS/1000-IV SYSTEM
*
*
*   DS/1000-IV GENERAL REQUEST PRE-PROCESSOR LOAD FILE
*
ECHO
SNAP,SNAPDS::DS
LCOM
OUTPUT,GRPM::DS
RE,%GRPM::DS
SEA
*
NEXT
*
*   DS/1000-IV MESSAGE QUEUING LOAD FILE
*
ECHO
SNAP,SNAPDS::DS
LCOM
OUTPUT,QUEUE::DS
RE,%QUEUE::DS
SEA
*
NEXT
*
*   DS/1000-IV ERROR LOGGING PROGRAM LOAD FILE
*
ECHO
SNAP,SNAPDS::DS
LCOM
OUTPUT,QCLM::DS
REL,%QCLM::DS
SEA
*
NEXT
*
*   DS/1000-IV MESSAGE RETRY LOAD FILE
*
ECHO
```

Sample LOADR Command File for RTE-L/XL DS Modules

```
SNAP,SNAPDS::DS
LCOM
OUTPUT,RTRY::DS
REL,%RTRY::DS
SEA
*
NEXT
*
*   DS/1000-IV "UPLIN" LOAD FILE
*
ECHO
SNAP,SNAPDS::DS
LCOM
OUTPUT,UPLIN::DS
REL,%UPLIN::DS
SEA
*
NEXT
*
*  *   DS/1000-IV INITIALIZATION LOAD FILE
*
ECHO
SNAP,SNAPDS::DS
LCOM
OUTPUT,DINIT::DS
REL,%DINIS::DS
SEA
*
NEXT
*
*   DS/1000-IV MODIFICATION PROGRAM LOAD FILE
*
ECHO
SNAP,SNAPDS::DS
LCOM
OUTPUT,DSMOD::DS
REL,%DSMOD::DS
SEA
*
NEXT
*
*   DS/1000-IV EXEC MONITOR LOAD FILE
*
ECHO
SNAP,SNAPDS::DS
LCOM
OUTPUT,EXECM::DS
REL,%EXECM::DS
SEA
*
NEXT
```

Sample LOADR Command File for RTE-L/XL DS Modules

```
*
*   DS/1000-IV EXEC WITH WAIT MONITOR LOAD FILE
*
ECHO
SNAP,SNAPDS::DS
LCOM
OUTPUT,EXECW::DS
REL,%EXECW::DS
SEA
*
NEXT
*
*   DS/1000-IV REMOTE FILE ACCESS MONITOR LOAD FILE
*
ECHO
SNAP,SNAPDS::DS
LCOM
OUTPUT,RFAM::DS
REL,%RFAM2::DS
SEA
*
NEXT
*
*   DS/1000-IV PROGRAM TO PROGRAM LOAD FILE
*
ECHO
SNAP,SNAPDS::DS
LCOM
OUTPUT,PTOPM::DS
REL,%PTOPM::DS
SEA
*
NEXT
*
*   DS/1000-IV OPERATOR COMMAND MONITOR LOAD FILE
*
ECHO
SNAP,SNAPDS::DS
LCOM
OUTPUT,OPERM::DS
LIB,$CMDLB::20
REL,%OPERL::DS
SEA
*
NEXT
*
*   DS/1000-IV "REMAT" LOAD FILE
*
ECHO
SNAP,SNAPDS::DS
LCOM
```

Sample LOADR Command File for RTE-L/XL DS Modules

```
OUTPUT,REMAT::DS
REL,%REMAN::DS
SEA
*
NEXT
*
*   DS/1000-IV INFORMATION PROGRAM LOAD FILE
*
SNAP,SNAPDS::DS
OUTPUT,DSINF::DS
*
LCOM
REL,%DSINL::DS
SEA
*
NEXT
*
*  *   DS/1000-IV DIRECTORY LIST LOAD FILE
*
ECHO
SNAP,SNAPDS::DS
LCOM
OUTPUT,DLIST::DS
REL,%DLIS2::DS
SEA
*
NEXT
*
*  *   DS/1000-IV REMOTE I/O MAPPING PROGRAM LOAD FILE
*
ECHO
SNAP,SNAPDS::DS
LCOM
OUTPUT,IOMAP::DS
REL,%IOMAP::DS
SEA
*
NEXT
*
*  *   DS/1000-IV REMOTE I/O MAPPING MODULE LOAD FILE
*
ECHO
SNAP,SNAPDS::DS
LCOM
OUTPUT,LUMAP::DS
REL,%LUMAP::DS
SEA
*
NEXT
*
*  *   DS/1000-IV REMOTE I/O MAPPING MODULE LOAD FILE
```

Sample LOADR Command File for RTE-L/XL DS Modules

```
*
ECHO
SNAP,SNAPDS::DS
LCOM
OUTPUT,LUQUE::DS
REL,%LUQUE::DS
SEA
*
NEXT
*
*  *   DS/1000-IV SYSTEM ATTENTION LOAD FILE
*
ECHO
SNAP,SNAPDS::DS
LCOM
OUTPUT,SYSAT::DS
REL,%SYSAT::DS
SEA
*
NEXT
*
*      DS/1000-IV ABSOLUTE PROGRAM LOADER
*
ECHO
SNAP,SNAPDS::DS
LCOM
OUTPUT,APLDR::DS
REL,%APLDL::DS
SEA
*
NEXT
*
*  *  COMND LOAD FILE
*
ECHO
SNAP,SNAPDS::DS
LCOM
OUTPUT,COMND::DS
REL,%COMND::(DS or XL)
SEA
*
NEXT
*
*  *   DS/1000-IV REROUTING NRV UPDATE PROGRAM LOAD FILE
*
ECHO
SNAP,SNAPDS::DS
LCOM
OUTPUT,#SEND::DS
REL,%#SEND::DS
SEA
```

NOTE

for memory based nodes use the DS version
for disc based nodes use the XL version

Sample LOADR Command File for RTE-L/XL DS Modules

```
*
NEXT
*
*  *   DS/1000-IV MESSAGE ACCOUNTING TIMER LOAD FILE
*
ECHO
SNAP,SNAPDS::DS
LCOM
OUTPUT,MATIC::DS
REL,%MATIC::DS
SEA
*
NEXT
*
*  *   DS/1000-IV MESSAGE LOGGING PROGRAM LOAD FILE
*
ECHO
SNAP,SNAPDS::DS
LCOM
OUTPUT,PLOG::DS
REL,%PLOG::DS
SEA
*
NEXT
*
*  *   DS/1000-IV TRANSLATION PROGRAM FOR PLOG LOAD FILE
*
ECHO
SNAP,SNAPDS::DS
LCOM
OUTPUT,TLOG::DS
REL,%TLOG::DS
SEA
*
NEXT
*
END
END
```

Memory Only Terminal-Less L-Series Example

The following list is an example of the memory-only and terminal-less L-Series generation. In this generation, DINIT (the non-shutdown version) is generated into the real time partition along with the program PASS. For the memory only application no background partition is allocated and an effort is made to make the real time partition take up what ever space remains of the 32K of memory.

Programs such as DINIT and Pass, in the real time partition, can be overlayed after the system is downloaded by APLDX/RPRTL. The procedure is described in the Users Manual for DS/1000-IV.

```
*  RTE-L-DS/1000-IV  DS/DEMO   MEMORY-BASED SYSTEM GEN
*     MEMORY-BASED, TERMINAL-LESS, MINIMAL RTE-L SYSTEM
*
* GEN ANSWER FILE:  ANDSLC::LC
* GEN LISTING:      LIDSLC::LC
* GEN SYSTEM:       BIDSLC::LC
* SNAP FILE:        SNAPLC::LC
*
LINK,CPAGE,         OPTION CURRENT- PAGE
*
MSIZ,32
*
*        SYSTEM RELOCATION PHASE
*
REL,%EXEC::LC
REL,%SAM::LC
REL,%TIME::LC
REL,%SCHED::LC
REL,%STRNG::LC
REL,%LOCK::LC
REL,%ERLOG::LC
REL,%OPMSG::LC
REL,%XCMND::LC
REL,%SYCOM::LC
REL,%STAT::LC
REL,%RTIOL::LC
REL,%CLASS::LC
*
*           REMOTE I/O MAPPING DRIVER
*
REL,%XDV00::DS
REL,%#SPLU::DS
*
```

```
*              HP-IB INTERFACE DRIVER
*
*REL,%ID.37::LC
*
*              DS/1000-IV INTERFACE DRIVER
*
REL,%ID.66::DS
*
*                PARALLEL INTERFACE CARD DRIVER
*
REL,%ID.50::LC
*
*
SE,$SYS..::LC
SE,$MXLB::LC
*
END
*
*                TABLE GENERATION PHASE
*
CLAS,15
RESN,10
*
*
*     NETWORK LINK
*
IFT,%ID.66::DS,EID.66,SC:24B,QU:FI,TX:18
DVT,,,LU:8,DT:66B
DVT,,,LU:9,DT:66B
*
*     REMOTE I/O MAPPING
*
IFT,%XDV00::DS,EIDV00,SC:26B,QU:FI,TX:2
*
*     LU 2 IS THE "RESERVED" LU
*
DVT,,,LU:2,EDDV00,TX:0
*
*     LUS 1 AND 3 ARE "MAPPABLE" LUS
*
DVT,,,LU:1,EDDV00,TX:5
DVT,,,LU:3,EDDV00,TX:5
*
*     HP-IB CLOCK
*
*IFT,%ID.37,SC:27B
*DVT,,,LU:10,DT:77B,TO:50,DX:1,DP:1:36B
*DVT,,,LU:11,DT:77B,TO:500,DX:1,DP:1:1
*
*     PARALLEL INTERFACE CARD
*
```

Memory Only Terminal-less L-Series Generation Example

```
IFT,%ID.50::LC,SC:22B
DVT,,,LU:12,TO:5000,DX:2,DP:1:1:2,DT:45B
*
*
END
*
END
*
END
*
END
*
*          MEMORY ALLOCATION
*
ID,12
SA,1024
CD,6
MC,0
SS,0
*
*
*       MEMORY-RESIDENT LIBRARY ROUTINES
*
RE,$SYSLB::LC,CLRQ
RE,$SYSLB::LC,RNRQ
RE,$MLIB2::LC,.ENTR
*
END
*
*       DS/1000 LABELLED COMMON AREA
*
REL,%RESL::DS
REL,$DSLB2::DS,#NRVS
REL,$DSLCL::DS,PGMAL
REL,$DSLCL::DS,#RQUL
*
*
SEA,$SYSLB::LC
SEA,$MXLB::LC
SEA,$DSNRR::DS
*
END
*
*       RELOCATE SYSTEM COMMON
*
COM,30
*
*       ADDITIONAL LIBRARIES
*
*       LIBRARY FOR ALL DS/1000-IV NODES
*
```

```
LIB,$DSLB1::DS
*      LIBRARY FOR ALL DS/1000-IV NODES W/ RTE-RTE LINKS
LIB,$DSLB2::DS
*      LIBRARY FOR NODES W/O LINKS TO HP 3000
LIB,$DSLB3::DS
*      LIBRARY FOR RTE-L NODES
LIB,$DSLCL::DS
LIB,$DSNRR::DS
LIB,$DSNMA::DS
LIB,$DSLSM::DS                * NO LOCAL SESSION
*
LIB,$FMP::LC
LIB,$MLIB1::LC
*
LIB,$SYSLB::LC
*
LIB,$MLIB2::LC
LIB,$MXLB::LC
*
END
*
SCOM
*
*                    DS/1000 MODULES
*
*
************************** QUEUE
SCOM
REL,%QUEUE::DS
NEXT
************************** GRPM
SCOM
REL,%GRPM::DS
NEXT
*** REMOTE I/O MAPPING MODULES
SCOM
REL,%LUQUE::DS
NEXT
SCOM
REL,%LUMAP::DS
NEXT
SCOM
REL,%IOMAP::DS
NEXT
******************************** QCLM
SCOM
REL,%QCLM::DS
NEXT
******************************** UPLIN
```

```
SCOM
REL,%UPLIN::DS
NEXT
*
****************OPERATOR REQUESTS PROCESSOR
*
SCOM
REL,%OPERL::DS
SE,$CMDLB::LC
NEXT
******************APLDX
*
SCOM
REL,%APLDX::DS
NEXT
*
*******************START-UP PROGRAM  (OVERLAYABLE)
*
STARTUP
*      USE THE VERSION OF "PASS" WHICH SETS UP I/O MAPS
*
REL,%PASSL::LC
NEXT
*
*****************  DS/1000 INITIALIZATION PROGRAM (OVERLAYABLE)
SCOM
REL,%DINIT::DS
NEXT
*      PUT THIS ONE IN TO MOVE UP BACKGROUND BOUNDARY
*      LAST 100 OCTAL WORDS USED BY VCP.
LO,77677B
*      MOVE BASE PAGE LINKS UP TO MAX ALLOWED FOR REAL TIME
*      PROGRAMS.
BL,1260B
 END
END
```

Sample Answer File for RTE-MIII

```
***** ANSWER FILE TO GENERATE AN RTE-M3 SYSTEM ****
** THE SYSTEM INCLUDES THE FOLLOWING:
**   91750 DS/1000-IV SOFTWARE  (1000 LINKS)
GEN
MAP MODULES, GLOBALS, LINKS ON 'GENM3::M3
ECHO ON 'GENM3::M3
OUTPUT ON P00005::M3
END
* TYPE OF SYSTEM
3
* TBG CHANNEL
12
* PRIV INTERRUPT CARD
11
YES   * PRIV DRIVERS ACCESS COMMON
* MEMORY SIZE
128
* FIRST WORD OF BASE PAGE
26
** EXTENDED INSTRUCTION SET **
.MVW,RP,105777
.LBT,RP,105763
.SBT,RP,105764
.MPY,RP,100200
.DIV,RP,100400
.DLD,RP,104200
.DST,RP,104400
** FLOATING POINT INSTRUCTIONS **
.FAD,RP,105000
.FSB,RP,105020
.FMP,RP,105040
.FDV,RP,105060
IFIX,RP,105100
FLOAT,RP,105120
.DFER,RP,105205
.ENTR,RP,105223
.ENTP,RP,105224
$SECM,AB,042123
END
LINKS IN CURRENT
** MICROCODE RP MODULE **
REL $DSML1::DS      (DSMXI)
** SYSTEM MODULES **
REL %MSY3::M3
REL %MTI::M3
```

Sample Answer file for RTE-MIII

```
REL %MTS::M3
REL %MOP::M3
REL %MCL3::M3
REL %MRN::M3
* LU MAPPING SYSTEM MODULE
REL %MSPLU::DS
SEARCH %MDMLB::M3
* DRIVERS:
REL %DVR00::M3
REL %DVR33::M3
REL %MDV00::DS
REL %DVA66::DS
REL %DVA65::DS
END
* NO OF I/O CLASSES
30
* NO OF RESOURCE NUMBERS
10
* BUFFER LIMITS
0,0
** EQUIPMENT TABLE (EQT) ENTRIES **
*     PHYSICAL CONFIGURATION
*
*     SELECT
*     CODE      CARD         COMMENTS            EQT   DRIVER   LU
*
*     25        SPARE
*     24        PSI          NODE 2              9     DVA66    17
*                                                10    DVA66    18
*     23        PSI          NODE 3              7     DVA66    15
*                                                8     DVA66    16
*     22        PSI          PSI TO 3000         5     DVA66    19
*                                                6     DVA66    20
*     21        HARD DISK    IGNORE
*     20        FLOPPY 2     IGNORE
*     17        FLOPPY 1     IGNORE              4     DVR00    2
*     16        TERMINAL     CONSOLE             3     DVR00    1
*     15        SPARE        "SPARE TERMINAL"    2     DVR00    26
*     14        WASP         NODE 1              1     DVA65    21
*     13        SPARE
*     12        TBG
*     11        SPARE
*     10        FEM
*     --        ----         RESERVED MAP LU     11    DVV00    11
*     --        ----         MAPPING LU          12    DVV00
*     --        ----         MAPPING LU          13    DVV00    12
*     --        ----         MAPPING LU          14    DVV00    6
*
* EQT 1 = OCTOPUTER
14,DVA65,X=7,T=10
* EQT 2 = 2640 SYSTEM CONSOLE
```

```
15,DVR00,X=10
* EQT 3 = SPARE CONSOLE
16,DVR00,X=10
* EQT 4 =
17,DVR00
* EQT 5 = DS/1000 PSI LINK
22,DVA66,X=12
* EQT 6 = SECOND EQT
22,DVA66
* EQT 7 = DS/1000 PSI LINK
23,DVA66,X=12
* EQT 8 = SECOND EQT
23,DVA66
* EQT 9 = DS/1000 PSI LINK
24,DVA66,X=12
* EQT 10= SECOND EQT
24,DVA66
* EQT 11= RESERVED MAPPING EQT
77,DVV00
* EQT 12= MAPPING EQU
77,DVV00,X=10
* EQT 13= MAPPING EQT
77,DVV00,X=10
* EQT 14= MAPPING EQT
77,DVV00,X=10
END
** DEVICE REFERENCE TABLE (DRT) ENTRIES **
* LU 1 = 2640 SYSTEM CONSOLE
3,5
* LU 2 = SPARE CONSOLE
4,5
* LU 3 = NONE
0
* LU 4 = NONE
0
* LU 5 = NONE
0
* LU 6 = MAPPED PRINTER
12
* LU 7 = NONE
0
* LU 8 = NONE
0
* LU 9 = NONE
0
* LU 10= NONE
0
* LU 11 = RESERVED MAPPED LU
11
* LU 12 = MAPPED LU
13
```

```
* LU 13 = NONE
0
* LU 14 = NONE
0
* LU 15 = DS/1000-IV PSI
7
* LU 16   SECOND LU
8
* LU 17 = SPARE
9
* LU 18   SECOND LU
10
* LU 19 = SPARE
5
* LU 20   SECOND LU
6
* LU 21 = DS/1000-IV TO WASP
1,1
* LU 22 = NONE
0
* LU 23 = NONE
0
* LU 24 = NONE
0
* LU 25 = NONE
0
* LU 26 = SPARE TERMINAL
2,5
END
** INTERRUPT TABLE ENTRIES **
14,EQT,1
15,EQT,2
16,EQT,3
17,EQT,4
20,EQT,4
22,EQT,5
23,EQT,7
24,EQT,9
END
* MAXIMUM NUMBER OF PARTITIONS
30
* NUMBER OF ID SEGMENTS
40
* START UP PROGRAM
PASS
** RESIDENT LIBRARY MODULES **
REL %TBLFP::M3
REL %MSYLB::M3     (MALRN)
REL %MSYLB::M3     (MRNRQ)
REL %MSYLB::M3     (MPRTN)
END
```

```
** SUBSYSTEM GLOBAL AREA (SSGA) MODULES
REL $DSLB2::DS    (#NRVS)
REL $DSML1::DS    (#RQUE)
REL %RESM::DS
REL $DSML1::DS    (PGMAD)
REL $D3KLB::DS    (D$EQT)
SEARCH $DSNRR::DS
SEARCH %RLIB1::M3
END
* NUMBERS OF WORDS IN COMMON
100
* ALIGN AT NEXT PAGE?
NO
** "MEMORY RESIDENT" PROGRAMS (NOT IN PARTITIONS)
REL %GRPM::DS
SEARCH $DSNMA::DS
SEARCH $DSNRR::DS
SEARCH $DSLSM::DS
SEARCH $DSLB2::DS
SEARCH $DSLB1::DS
SEARCH %MSYLB::M3
END
0
* REL %#SEND::DS        MAKE PARTITION RESIDENT
* SEARCH $DSNRR::DS
* SEARCH $DSLSM::DS
* SEARCH $DSLB1::DS
* SEARCH %MSYLB::M3
* SEARCH %RLIB2::M3
* END
* 0
* REL %RTRY::DS             MAKE PARTITION-RESIDENT
* SEARCH $DSLB2::DS
* SEARCH $DSLB1::DS
* SEARCH %MSYLB::M3
* END
* 0
REL %QCLM::DS
SEARCH $DSLB2::DS
SEARCH $DSLB1::DS
SEARCH %MSYLB::M3
SEARCH %RLIB3::M3
END
0
REL %EXECW::DS
SEARCH $DSLSM::DS
SEARCH $DSLB2::DS
SEARCH $DSLB1::DS
SEARCH $DSNMA::DS
SEARCH %MSYLB::M3
SEARCH %RLIB2::M3
```

```
END
0
REL $DSLB1::DS (#GETR)
REL $DSMXL::DS (CLRQ)
REL %3APLD::DS
SEARCH $DSLSM::DS
SEARCH $DSLB2::DS
SEARCH $DSLB1::DS
SEARCH $DSNMA::DS
SEARCH $DSML1::DS
SEARCH %FMPC::M3
SEARCH %MSYLB::M3
SEARCH %RLIB1::M3
END
0
REL %UPLIN::DS
SEARCH $D3KLB::DS
SEARCH $D3KRB::DS
SEARCH $DSNRR::DS
SEARCH $DSLSM::DS
SEARCH $DSLB2::DS
SEARCH $DSLB1::DS
SEARCH $DSML1::DS
SEARCH %MSYLB::M3
SEARCH %RLIB1::M3
END
0
REL %QUEUE::DS
SEARCH %MSYLB::M3
SEARCH %RLIB2::M3
END
0
REL %PASS::M3
END
0
REL $DSLB1::DS (#GET)
REL %DINIT::DS
* ADDED FOR PASS
REL %FMPF::M3 (READF)
* ADDED FOR PASS
REL %FMPF::M3 (RW$UB)
* ADDED FOR PASS
REL %FMPF::M3 (RWND$)
* ADDED FOR PASS
REL %FMPF::M3 (P.PAS)
* ADDED FOR PASS
REL %FMPF::M3 (LIMEM)
SEARCH $D3KLB::DS
SEARCH $D3KRB::DS
SEARCH $DSLB2::DS
SEARCH $DSLSM::DS
```

Sample Answer file for RTE-MIII

```
SEARCH $DSLB1::DS
SEARCH $DSNMA::DS
SEARCH $DSNRR::DS
SEARCH $DSML1::DS
* ADDED FOR PASS
SEARCH %FMPC ::M3
SEARCH %MSYLB::M3
SEARCH %RLIB1::M3
SEARCH %RLIB2::M3
SEARCH %RLIB3::M3
END
0
END
0
NO
* NO. OF ADDITIONAL SAM PAGES
14
** PARTITION # AND SIZE:
1,2
2,2
3,3
4,3
5,3
6,3
7,3
8,4
9,4
10,4
11,5
12,6
13,9
14,10
15,10
16,11
END
SNAP ON SNAPM3::M3
END
```

Appendix B
DS/1000-IV Library Entry Points

DS/1000-IV Library Entry Points Listed by Module

```
********** FILE NAME:   $DSMX6  :    0:   DX:    5 **********
           ******************************************

MODULE                                     ENTRY PTS
------                                     ---------
1  DSMX6 ,  0,    0,0,   0, 0, 0, 0, 0
         91750-12023 REV.2340 830711 RTE-6


2  #GTPX ,  7,   99,0,   0, 0, 0, 0, 0
         91750-1X012 REV.2013 791129 MEF
        PROGRAM LENGTH (IN WORDS)=    3 *     #GTOP
          * * * * * * * * * * * * * * * * * * * * * *

3  #RQUE , 30,   99,0,   0, 0, 0, 0, 0
         91750-1X027 REV.2113 810130 MEF
        PROGRAM LENGTH (IN WORDS)=  741 *     #CLTA
                                        *     #NQUE
                                        *     #PRGL
                                        *     #QLIM
          * * * * * * * * * * * * * * * * * * * * * *

4  PGMAD , 30,    0,0,   0, 0, 0, 0, 0
         91750-1X145 REV.2340 830429 MEF
        PROGRAM LENGTH (IN WORDS)=  189 *     PGMAD
          * * * * * * * * * * * * * * * * * * * * * *

5  #OFF  ,  7,   99,0,   0, 0, 0, 0, 0
         91750-1X218 REV.2013 800418 MEF
        PROGRAM LENGTH (IN WORDS)=   11 *     #OFF
          * * * * * * * * * * * * * * * * * * * * * *

6  #PBZ? ,  7,   99,0,   0, 0, 0, 0, 0
         91750-1X236 REV.2113 810119 MEF
        PROGRAM LENGTH (IN WORDS)=   15 *     #PBZ?
          * * * * * * * * * * * * * * * * * * * * * *
```

```
 7  #PKUP ,  7,   99,0,   0, 0, 0, 0, 0
          91750-1X023 REV.2013 790516 ALL EXCEPT RTE-M
         PROGRAM LENGTH (IN WORDS)=  195 *    #PKUP
          * * * * * * * * * * * * * * * * * * * * * *

 8  D$XST ,  7,    0,0,   0, 0, 0, 0, 0
          91750-1X280 REV.2326 821209 L,M3,IV,6,A1
         PROGRAM LENGTH (IN WORDS)=    7 *    D$XST
     * * * * * * * * * * * * * * * * * * * * * * *

 9  D$MWI ,  7,    0,0,   0, 0, 0, 0, 0
          91750-1X281 REV.2326 830312 L,M3,IV,6,A1
         PROGRAM LENGTH (IN WORDS)=   15 *    D$MWI
     * * * * * * * * * * * * * * * * * * * * * * *

10  D$MWF ,  7,    0,0,   0, 0, 0, 0, 0
     91750-1X279 REV.2326 830312 L,M3,IV,6,A1
    PROGRAM LENGTH (IN WORDS)=   12 *    D$MWF
     * * * * * * * * * * * * * * * * * * * * * * *

11  D$XLD ,  7,    0,0,   0, 0, 0, 0, 0
     91750-1X278 REV.2326 821209 L,M3,IV,6,A1
    PROGRAM LENGTH (IN WORDS)=    6 *    D$XLD
     * * * * * * * * * * * * * * * * * * * * * * *

12  D$FCM ,  7,    0,0,    0, 0, 0, 0, 0
     91750-1X298 REV. 2340 830913 MEF W/3K
    PROGRAM LENGTH (IN WORDS)=  325 *    CHGTO
                                    *    GETDV
                                    *    RD&ST
                                    *    TODEV
     * * * * * * * * * * * * * * * * * * * * * * *

********** FILE NAME:    $DSMX4  :    0:    DX:    5 **********
          *******************************************

 MODULE                                     ENTRY PTS
 ------                                     ---------
 1  DSMX4 ,  0,    0,0,   0, 0, 0, 0, 0
          91750-12025 REV.2340 830711 RTE-IV

 * * * * * * * * * * * * * * * * * * * * * * * * * *

 2  #GTPX ,  7,   99,0,   0, 0, 0, 0, 0
     91750-1X012 REV.2013 791129 MEF
    PROGRAM LENGTH (IN WORDS)=    3 *    #GTOP
     * * * * * * * * * * * * * * * * * * * * * * *

 3  #RQUE , 30,   99,0,   0, 0, 0, 0, 0
     91750-1X027 REV.2113 810130 MEF
    PROGRAM LENGTH (IN WORDS)=  741 *    #CLTA
```

```
                                          *    #NQUE
                                          *    #PRGL
                                          *    #QLIM
                                          *    #RQUE
   * * * * * * * * * * * * * * * * * * * * * * *

 4  CLRQ  ,  7,   99,0,    0, 0, 0, 0, 0
     91750-1X047 REV.2113 810209 MEF
    PROGRAM LENGTH (IN WORDS)=   83 *    CLRQ
     * * * * * * * * * * * * * * * * * * * * * *

 5  PGMAD , 30,    0,0,    0, 0, 0, 0, 0
          91750-1X145 REV.2340 830429 MEF
         PROGRAM LENGTH (IN WORDS)=  189 *    PGMAD
          * * * * * * * * * * * * * * * * * * * * * *

 6  #OFF  ,  7,   99,0,    0, 0, 0, 0, 0
          91750-1X218 REV.2013 800418 MEF
         PROGRAM LENGTH (IN WORDS)=   11 *    #OFF
          * * * * * * * * * * * * * * * * * * * * * *

 7  #PBZ? ,  7,   99,0,    0, 0, 0, 0, 0
          91750-1X236 REV.2113 810119 MEF
         PROGRAM LENGTH (IN WORDS)=   15 *    #PBZ?
          * * * * * * * * * * * * * * * * * * * * * *

 8  #PKUP ,  7,   99,0,    0, 0, 0, 0, 0
          91750-1X023 REV.2013 790516 ALL EXCEPT RTE-M
         PROGRAM LENGTH (IN WORDS)=  195 *    #PKUP
          * * * * * * * * * * * * * * * * * * * * *
 9  D$XST ,  7,    0,0,    0, 0, 0, 0, 0
          91750-1X280 REV.2326 821209 L,M3,IV,6,A1
         PROGRAM LENGTH (IN WORDS)=    7 *    D$XST
          * * * * * * * * * * * * * * * * * * * * * *

10  D$MWI ,  7,    0,0,    0, 0, 0, 0, 0
     91750-1X281 REV.2326 830312 L,M3,IV,6,A1
         PROGRAM LENGTH (IN WORDS)=   15 *    D$MWI
          * * * * * * * * * * * * * * * * * * * * * *

11  D$MWF ,  7,    0,0,    0, 0, 0, 0, 0
          91750-1X279 REV.2326 830312 L,M3,IV,6,A1
         PROGRAM LENGTH (IN WORDS)=   12 *    D$MWF
          * * * * * * * * * * * * * * * * * * * * * *

12  D$XLD ,  7,    0,0,    0, 0, 0, 0, 0
          91750-1X278 REV.2326 821209 L,M3,IV,6,A1
         PROGRAM LENGTH (IN WORDS)=    4 *    D$XLD
          * * * * * * * * * * * * * * * * * * * * * *
```

```
13  D$FCM ,  7,    0,0,    0, 0, 0, 0, 0
          91750-1X298 REV.2340 830913 MEF W/3K
         PROGRAM LENGTH (IN WORDS)=  325 *    CHGTO
                                         *    GETDV
                                         *    RD&ST
                                         *    TODEV
           * * * * * * * * * * * * * * * * * * * * * *

********** FILE NAME:   $DSAL  :    0:   DX:    5 **********
          *****************************************

 MODULE                                      ENTRY PTS
 ------                                      ---------
 1  DSAL ,  0,    0,0,    0, 0, 0, 0, 0
          91750-12027 REV.2340 830630 A-ONLY


 2  #GTPL ,  7,   99,0,    0, 0, 0, 0, 0
          91750-1X011 REV.2013 791129 L
         PROGRAM LENGTH (IN WORDS)=    4 *    #GTOP
           * * * * * * * * * * * * * * * * * * * * * *

 3  #RQUA ,  6,   99,0,    0, 0, 0, 0, 0
          91750-1X285 REV.2326 821204 A
         PROGRAM LENGTH (IN WORDS)=  481 *    #CLTA
                                         *    #NQUE
                                         *    #PRGL
                                         *    #QLIM
                                         *    #RQUE
           * * * * * * * * * * * * * * * * * * * * * *

 4  PGMAL ,  6,   99,0,    0, 0, 0, 0, 0
          91750-1X146 REV.2326 830330 L
         PROGRAM LENGTH (IN WORDS)=  206 *    PGMAD
           * * * * * * * * * * * * * * * * * * * * * *

 5  IDADL ,  8,   99,0,    0, 0, 0, 0, 0
          91750-1X127 REV.2113 800909 L
         PROGRAM LENGTH (IN WORDS)=   25 *    #IDAD
           * * * * * * * * * * * * * * * * * * * * * *

 6  #OFF  ,  7,   99,0,    0, 0, 0, 0, 0
          91750-1X219 REV.2326 821216 L
         PROGRAM LENGTH (IN WORDS)=   69 *    #OFF
           * * * * * * * * * * * * * * * * * * * * * *

 7  #PBZ? ,  7,   99,0,    0, 0, 0, 0, 0
          91750-1X237 REV.2113 810119 L,M
         PROGRAM LENGTH (IN WORDS)=   12 *    #PBZ?
           * * * * * * * * * * * * * * * * * * * * * *
```

```
 8  #PKUP ,  7,    99,0,    0, 0, 0, 0, 0
         91750-1X023 REV.2013 790516 ALL EXCEPT RTE-M
        PROGRAM LENGTH (IN WORDS)=  195 *    #PKUP
           * * * * * * * * * * * * * * * * * * * * * *

 9  D$XLD ,  7,     0,0,    0, 0, 0, 0, 0
         91750-1X289 REV.2326 821209 RTE-A
        PROGRAM LENGTH (IN WORDS)=   23 *    D$XST
           * * * * * * * * * * * * * * * * * * * * * *

10  D$MWF ,  7,     0,0,    0, 0, 0, 0, 0
         91750-1X287 REV.2326 830312 RTE-A
        PROGRAM LENGTH (IN WORDS)=   28 *    D$MWF
           * * * * * * * * * * * * * * * * * * * * * *

11  D$MWI ,  7,     0,0,    0, 0, 0, 0, 0
         91750-1X288 REV.2326 830312 RTE-A2
        PROGRAM LENGTH (IN WORDS)=   28 *    D$MWI
           * * * * * * * * * * * * * * * * * * * * * *

12  D$XST ,  7,     0,0,    0, 0, 0, 0, 0
         91750-1X290 REV.2326 821209 RTE-A
        PROGRAM LENGTH (IN WORDS)=   23 *    D$XLD
           * * * * * * * * * * * * * * * * * * * * * *

13  D$FCL ,  7,     0,0,    0, 0, 0, 0, 0
         91750-1X294 REV.2340 830913 RT 830913.1502
        PROGRAM LENGTH (IN WORDS)=  548 *    D$FCL
           * * * * * * * * * * * * * * * * * * * * * *

14  D$VFY ,  7,     0,0,    0, 0, 0, 0, 0
         91750-1X296 REV.2340 830913 A-L
        PROGRAM LENGTH (IN WORDS)=   44 *    D$VFY
           * * * * * * * * * * * * * * * * * * * * * *

15  D$DVT ,  7,     0,0,    0, 0, 0, 0, 0
         91750-1X295 REV.2340 830913 RTE-A
        PROGRAM LENGTH (IN WORDS)=   61 *    D$DVT
           * * * * * * * * * * * * * * * * * * * * * *

         91750-1X299 REV.2340 830909 XL/A W/3K
        PROGRAM LENGTH (IN WORDS)=   79 *    CHGTO
                                        *    GETDV
                                        *    RD&ST
                                        *    TODEV
           * * * * * * * * * * * * * * * * * * * * * *
```

```
********** FILE NAME:   $DSLXL   :    0:   DX:    5 **********
           *****************************************

 MODULE                                           ENTRY PTS
 ------                                           ---------
 1  DSLXL ,  0,     0,0,    0, 0, 0, 0, 0
         91750-12022 REV.2340 830913 XL-ONLY


 2  #GTPL ,  7,    99,0,    0, 0, 0, 0, 0
         91750-1X011 REV.2013 791129 L
        PROGRAM LENGTH (IN WORDS)=    4 *     #GTOP
          * * * * * * * * * * * * * * * * * * * * * *

 3  #RQUL ,  6,    99,0,    0, 0, 0, 0, 0
         91750-1X028 REV.2326 821204 L
        PROGRAM LENGTH (IN WORDS)=  518 *     #CLTA
                                        *     #NQUE
                                        *     #PRGL
                                        *     #QLIM
                                        *     #RQUE
          * * * * * * * * * * * * * * * * * * * * * *

 4  PGMAL ,  6,    99,0,    0, 0, 0, 0, 0
         91750-1X146 REV.2326 830330 L
        PROGRAM LENGTH (IN WORDS)=  206 *     PGMAD
          * * * * * * * * * * * * * * * * * * * * * *

 5  IDADL ,  8,    99,0,    0, 0, 0, 0, 0
         91750-1X127 REV.2113 800909 L
        PROGRAM LENGTH (IN WORDS)=   25 *     #IDAD
          * * * * * * * * * * * * * * * * * * * * * *

 6  LO..  ,  7,    99,0,    0, 0, 0, 0, 0
         91750-1X229 REV.2113 801217 XL
        PROGRAM LENGTH (IN WORDS)=  956 *     LO..
          * * * * * * * * * * * * * * * * * * * * * *

 7  DSRPL ,  7,    99,0,    0, 0, 0, 0, 0
         91750-1X230 REV.2113 801017 XL
        PROGRAM LENGTH (IN WORDS)=  159 *     DSRPL
          * * * * * * * * * * * * * * * * * * * * * *

 8  PTFND ,  7,    99,0,    0, 0, 0, 0, 0
         91750-1X231 REV.2113 801020 XL
        PROGRAM LENGTH (IN WORDS)=   85 *     PTFND
          * * * * * * * * * * * * * * * * * * * * * *
```

```
 9  MOVIT , 7,   99,0,   0, 0, 0, 0, 0
          91750-1X232 REV.2113 801024 XL
         PROGRAM LENGTH (IN WORDS)=  131 *    IDPTN
                                         *    MOVIT
                                         *    MPREP
                                         *    SEGFL
          * * * * * * * * * * * * * * * * * * * * * *

10  #OFF  , 7,   99,0,   0, 0, 0, 0, 0
          91750-1X219 REV.2326 821216 L
         PROGRAM LENGTH (IN WORDS)=   69 *    #OFF
          * * * * * * * * * * * * * * * * * * * * * *

11  #PBZ? , 7,   99,0,   0, 0, 0, 0, 0
          91750-1X237 REV.2113 810119 L,M
    PROGRAM LENGTH (IN WORDS)=   12 *    #PBZ?
     * * * * * * * * * * * * * * * * * * * * * *

12  #PKUP , 7,   99,0,   0, 0, 0, 0, 0
          91750-1X023 REV.2013 790516 ALL EXCEPT RTE-M
         PROGRAM LENGTH (IN WORDS)=  195 *    #PKUP
          * * * * * * * * * * * * * * * * * * * * * *

13  D$XLD , 7,    0,0,   0, 0, 0, 0, 0
          91750-1X278 REV.2326 821209 L,M3,IV,6,A1
         PROGRAM LENGTH (IN WORDS)=    4 *    D$XLD
          * * * * * * * * * * * * * * * * * * * * * *

14  D$MWI , 7,    0,0,   0, 0, 0, 0, 0
          91750-1X281 REV.2326 830312 L,M3,IV,6,A1
         PROGRAM LENGTH (IN WORDS)=   15 *    D$MWI
          * * * * * * * * * * * * * * * * * * * * * *

15  D$MWF , 7,    0,0,   0, 0, 0, 0, 0
          91750-1X279 REV.2326 830312 L,M3,IV,6,A1
         PROGRAM LENGTH (IN WORDS)=   12 *    D$MWF
          * * * * * * * * * * * * * * * * * * * * * *

16  D$XST , 7,    0,0,   0, 0, 0, 0, 0
          91750-1X280 REV.2326 821209 L,M3,IV,6,A1
             PROGRAM LENGTH (IN WORDS)=    7 *    D$XST
          * * * * * * * * * * * * * * * * * * * * * *

17  D$FCA , 7,    0,0,   0, 0, 0, 0, 0
          91750-1X299 REV.2340 830909 XL/A W/3K
             PROGRAM LENGTH (IN WORDS)=   79 *    CHGTO
                                             *    GETDV
                                             *    RD&ST
                                             *    TODEV
          * * * * * * * * * * * * * * * * * * * * * *
```

```
********** FILE NAME:   $DSLCL  :    0:   DX:    5 **********
          ******************************************

MODULE                                            ENTRY PTS
------                                            ---------
1  DSLCL ,  0,    0,0,   0, 0, 0, 0, 0
         91750-12007 REV.2301 820916 L-ONLY


2  #GTPL ,  7,   99,0,   0, 0, 0, 0, 0
         91750-1X011 REV.2013 791129 L
        PROGRAM LENGTH (IN WORDS)=    4 *    #GTOP
          * * * * * * * * * * * * * * * * * * * * * *

3  #RQUL ,  6,   99,0,   0, 0, 0, 0, 0
         91750-1X028 REV.2326 821204 L
        PROGRAM LENGTH (IN WORDS)=  518 *    #CLTA
                                        *    #NQUE
                                        *    #PRGL
                                        *    #QLIM
                                        *    #RQUE
          * * * * * * * * * * * * * * * * * * * * * *

4  PGMAL ,  6,   99,0,   0, 0, 0, 0, 0
         91750-1X146 REV.2326 830330 L
        PROGRAM LENGTH (IN WORDS)=  206 *    PGMAD
          * * * * * * * * * * * * * * * * * * * * * *

5  IDADL ,  8,   99,0,   0, 0, 0, 0, 0
         91750-1X127 REV.2113 800909 L
        PROGRAM LENGTH (IN WORDS)=   25 *    #IDAD
          * * * * * * * * * * * * * * * * * * * * * *

6  SEGLD ,  7,   99,0,   0, 0, 0, 0, 0
         91750-1X175 REV 2013 791003 L
   PROGRAM LENGTH (IN WORDS)=  411 *    SEGLD
                                   *    SEGRT
     * * * * * * * * * * * * * * * * * * * * * *

7  LO..  ,  7,   99,0,   0, 0, 0, 0, 0
         91750-1X131 REV.2013 800316 L
        PROGRAM LENGTH (IN WORDS)=  607 *    LO..
          * * * * * * * * * * * * * * * * * * * * * *

8  #OFF  ,  7,   99,0,   0, 0, 0, 0, 0
         91750-1X219 REV.2326 821216 L
        PROGRAM LENGTH (IN WORDS)=   69 *    #OFF
          * * * * * * * * * * * * * * * * * * * * * *
9  #PBZ? ,  7,   99,0,   0, 0, 0, 0, 0
         91750-1X237 REV.2113 810119 L,M
        PROGRAM LENGTH (IN WORDS)=   12 *    #PBZ?
```

```
             * * * * * * * * * * * * * * * * * * * * * *

10  #PKUP ,  7,   99,0,   0, 0, 0, 0, 0
          91750-1X023 REV.2013 790516 ALL EXCEPT RTE-M
         PROGRAM LENGTH (IN WORDS)=  195 *    #PKUP
             * * * * * * * * * * * * * * * * * * * * * *

11  D$XST ,  7,    0,0,   0, 0, 0, 0, 0
              91750-1X280 REV.2326 821209 L,M3,IV,6,A1
             PROGRAM LENGTH (IN WORDS)=    7 *    D$XST
             * * * * * * * * * * * * * * * * * * * * * *

12  D$MWI ,  7,    0,0,   0, 0, 0, 0, 0
         91750-1X281 REV.2326 830312 L,M3,IV,6,A1
        PROGRAM LENGTH (IN WORDS)=   15 *    D$MWI
             * * * * * * * * * * * * * * * * * * * * * *

13  D$MWF ,  7,    0,0,   0, 0, 0, 0, 0
         91750-1X279 REV.2326 830312 L,M3,IV,6,A1
        PROGRAM LENGTH (IN WORDS)=   12 *    D$MWF
             * * * * * * * * * * * * * * * * * * * * * *

14  D$XLD ,  7,    0,0,   0, 0, 0, 0, 0
     91750-1X278 REV.2326 821209 L,M3,IV,6,A1
    PROGRAM LENGTH (IN WORDS)=    4 *    D$XLD
        * * * * * * * * * * * * * * * * * * * * * *

********** FILE NAME:   $DSML1  :    0:   DX:    5 **********
         ****************************************

 MODULE                                       ENTRY PTS
 ------                                       ---------
 1  DSML1 ,  0,    0,0,   0, 0, 0, 0, 0
         91750-12004 REV.2340 830711 RTE-M

 2  MSTAT ,  7,   99,0,   0, 0, 0, 0, 0
         91750-1X137 REV 2013 791119 M
        PROGRAM LENGTH (IN WORDS)=   25 *    FSTAT
             * * * * * * * * * * * * * * * * * * * * * *

 3  SEGLD ,  7,   99,0,   0, 0, 0, 0, 0
         91750-1X174 REV.2013 800130 M
        PROGRAM LENGTH (IN WORDS)=  301 *    SEGLD
        * * * * * * * * * * * * * * * * * * * * * *
 4  #PKUP ,  7,   99,0,   0, 0, 0, 0, 0
          91750-1X023 REV.2013 790516 M
         PROGRAM LENGTH (IN WORDS)=  137 *    #PKUP
              * * * * * * * * * * * * * * * * * * * * * *
```

```
 5  IDADM , 8,   99,0,   0, 0, 0, 0, 0
         91750-1X128 REV 2013 791119 M
                                            *    #IDAD
          * * * * * * * * * * * * * * * * * * * * * * *

 6  #PBZ? , 7,   99,0,   0, 0, 0, 0, 0
         91750-1X237 REV.2113 810119 L,M
        PROGRAM LENGTH (IN WORDS)=   12 *    #PBZ?
          * * * * * * * * * * * * * * * * * * * * * * *

 7  #GTPX , 7,   99,0,   0, 0, 0, 0, 0
         91750-1X012 REV.2013 791129 MEF
        PROGRAM LENGTH (IN WORDS)=    3 *    #GTOP
          * * * * * * * * * * * * * * * * * * * * * * *

 8  #RQUE , 30,  99,0,   0, 0, 0, 0, 0
         91750-1X027 REV.2113 810130 MEF
        PROGRAM LENGTH (IN WORDS)=  741 *    #CLTA
                                        *    #NQUE
                                        *    #PRGL
                                        *    #QLIM
                                        *    #RQUE
          * * * * * * * * * * * * * * * * * * * * * * *

 9  CLRQ  , 7,   99,0,   0, 0, 0, 0, 0
         91750-1X047 REV.2113 810209 MEF
        PROGRAM LENGTH (IN WORDS)=   83 *    CLRQ
          * * * * * * * * * * * * * * * * * * * * * * *

10  PGMAD , 30,   0,0,   0, 0, 0, 0, 0
         91750-1X145 REV.2340 830429 MEF
        PROGRAM LENGTH (IN WORDS)=  189 *    PGMAD
      * * * * * * * * * * * * * * * * * * * * * * *

11  #OFF  , 7,   99,0,   0, 0, 0, 0, 0
         91750-1X218 REV.2013 800418 MEF
        PROGRAM LENGTH (IN WORDS)=   11 *    #OFF
          * * * * * * * * * * * * * * * * * * * * * * *

12  DSMXI , 0,    0,0,   0, 0, 0, 0, 0
         91750-1X093 REV.2113 810201 M
        PROGRAM LENGTH (IN WORDS)=    1 *    $DSCS
                                        *    .ADX
                                        *    .ADY
                                        *    .CAX
                                        *    .CAY
                                        *    .CBS
                                        *    .CBT
                                        *    .CBX
                                        *    .CBY
```

```
                                        *    .CMW
                                        *    .CXA
                                        *    .CXB
                                        *    .CYA
                                        *    .CYB
                                        *    .DSX
                                        *    .DSY
                                        *    .ISX
                                        *    .ISY
                                        *    .JLY
                                        *    .JPY
                                        *    .LAX
                                        *    .LAY
                                        *    .LBX
                                        *    .LBY
                                        *    .LDX
                                        *    .LDY
                                        *    .MBF
                                        *    .MBI
                                        *    .MBT
                                        *    .MBW
                                        *    .MWF
                                        *    .MWI
                                        *    .MWW
                                        *    .SAX
                                        *    .SAY
                                        *    .SBS
                                        *    .SBX
                                        *    .SBY
                                        *    .SFB
                                        *    .STX
                                        *    .STY
                                        *    .TBS
                                        *    .XAX
                                        *    .XAY
                                        *    .XBX
                                        *    .XBY
                                        *    .XCA
                                        *    .XCB
                                        *    .XLA
                                        *    .XLB
                                        *    .XSA
                                        *    .XSB
          * * * * * * * * * * * * * * * * * * * * * *

13  D$XST ,  7,    0,0,   0, 0, 0, 0, 0
          91750-1X280 REV.2326 821209 L,M3,IV,6,A1
          PROGRAM LENGTH (IN WORDS)=    7 *    D$XST
          * * * * * * * * * * * * * * * * * * * * * *
```

```
14  D$XLD ,  7,    0,0,   0, 0, 0, 0, 0
         91750-1X278 REV.2326 821209 L,M3,IV,6,A1
        PROGRAM LENGTH (IN WORDS)=    4 *    D$XLD
          * * * * * * * * * * * * * * * * * * * * * *

15  D$MWF ,  7,    0,0,   0, 0, 0, 0, 0
         91750-1X279 REV.2326 830312 L,M3,IV,6,A1
        PROGRAM LENGTH (IN WORDS)=   12 *    D$MWF
          * * * * * * * * * * * * * * * * * * * * * *

16  D$MWI ,  7,    0,0,   0, 0, 0, 0, 0
         91750-1X281 REV.2326 830312 L,M3,IV,6,A1
        PROGRAM LENGTH (IN WORDS)=   15 *    D$MWI
          * * * * * * * * * * * * * * * * * * * * * *

17  D$FCM ,  7,    0,0,   0, 0, 0, 0, 0
         91750-1X298 REV.2340 830913 MEF W/3K
        PROGRAM LENGTH (IN WORDS)=  325 *    CHGTO
                                        *    GETDV
                                        *    RD&ST
                                        *    TODEV
          * * * * * * * * * * * * * * * * * * * * * *

********** FILE NAME:   $DSML2  :    0:   DX:    5 **********
          ******************************************

 MODULE                                      ENTRY PTS
 ------                                      ---------
 1  DSML2 ,  0,    0,0,   0, 0, 0, 0, 0
         91750-1X091 REV.2113 810119 RTE-M W/O FILE SYS


 2  DUMFM ,  7,   99,0,   0, 0, 0, 0, 0
         91750-1X103 REV 2013 791119 M
        PROGRAM LENGTH (IN WORDS)=   14 *    APOSN
                                        *    CLOSE
                                        *    CREAT
                                        *    FCONT
                                        *    LOCF
                                        *    NAMF
                                        *    OPEN
                                        *    POSNT
                                        *    POST
                                        *    PURGE
                                        *    READF
                                        *    RWNDF
                                        *    WRITF
```

```
              * * * * * * * * * * * * * * * * * * * * * *

********** FILE NAME:   $DSLB1  :    0:   DX:    5 **********
           ****************************************

MODULE                                              ENTRY PTS
------                                              ---------
1  DSLB1 ,  0,     0,0,    0, 0, 0, 0, 0
         91750-12001 REV.2301 820917 ALL


2  GET   ,  7,    99,0,    0, 0, 0, 0, 0
         91750-1X122 REV.2013 800805 ALL
        PROGRAM LENGTH (IN WORDS)=  256 *    ACEPT
                                        *    FINIS
                                        *    GET
                                        *    REJCT
              * * * * * * * * * * * * * * * * * * * * * *

3  DSERR ,  7,    99,0,    0, 0, 0, 0, 0
         91750-1X076 REV 2013 791201 ALL
        PROGRAM LENGTH (IN WORDS)=  158 *    DSERR
              * * * * * * * * * * * * * * * * * * * * * *

4  #GET  ,  7,     0,0,    0, 0, 0, 0, 0
         91750-1X009 REV.2301 820907 ALL
        PROGRAM LENGTH (IN WORDS)=  154 *    #GET
              * * * * * * * * * * * * * * * * * * * * * *

5  #LOGR ,  7,    99,0,    0, 0, 0, 0, 0
         91750-1X013 REV 2013 800110 ALL
        PROGRAM LENGTH (IN WORDS)=   40 *    #LOGR
              * * * * * * * * * * * * * * * * * * * * * *

6  #SLAV ,  7,     0,0,    0, 0, 0, 0, 0
         91750-1X034 REV.2326 821220 ALL
        PROGRAM LENGTH (IN WORDS)=  261 *    #RPB
                                        *    #SKEY
                                        *    #SLAV
              * * * * * * * * * * * * * * * * * * * * * *

7  #GETR ,  7,     0,0,    0, 0, 0, 0, 0
         91750-1X010 REV.2301 820825 ALL
        PROGRAM LENGTH (IN WORDS)=   98 *    #GETR
                                        *    #SBFA
                                        *    #SBFL
                                        *    #SDAL
              * * * * * * * * * * * * * * * * * * * * * *
```

```
 8  #OK?  ,  7,    99,0,    0, 0, 0, 0, 0
          91750-1X227 REV.2113 810525 ALL
         PROGRAM LENGTH (IN WORDS)=   44 *    #OK?
          * * * * * * * * * * * * * * * * * * * * * *

 9  BFPAS ,  7,    99,0,    0, 0, 0, 0, 0
          91750-1X238 REV.2326 820223 ALL
         PROGRAM LENGTH (IN WORDS)=  151 *    BFPAS
          * * * * * * * * * * * * * * * * * * * * * *

10  #PNLS ,  7,    99,0,    0, 0, 0, 0, 0
          91750-1X264 REV.2201 810619 ALL
         PROGRAM LENGTH (IN WORDS)=   89 *    #PNLS
          * * * * * * * * * * * * * * * * * * * * * *

11  D$IN? ,  7,    99,0,    0, 0, 0, 0, 0
          91750-1X246 REV.2201 810617 ALL
         PROGRAM LENGTH (IN WORDS)=    6 *    D$IN?
          * * * * * * * * * * * * * * * * * * * * * *

12  D$GVL ,  7,    99,0,    0, 0, 0, 0, 0
          91750-1X247 REV.2201 810521 ALL
         PROGRAM LENGTH (IN WORDS)=   34 *    D$GVL
          * * * * * * * * * * * * * * * * * * * * * *

13  D$GCL ,  7,    99,0,    0, 0, 0, 0, 0
         91750-1X248 REV.2201 810626 ALL
        PROGRAM LENGTH (IN WORDS)=   33 *    D$GCL
         * * * * * * * * * * * * * * * * * * * * * *

14  D$GRN ,  7,    99,0,    0, 0, 0, 0, 0
         91750-1X249 REV.2201 810515 ALL
        PROGRAM LENGTH (IN WORDS)=   23 *    D$GRN
         * * * * * * * * * * * * * * * * * * * * * *

15  D$FRS ,  7,     0,0,    0, 0, 0, 0, 0
         91750-1X250 REV.2301 820921 ALL
        PROGRAM LENGTH (IN WORDS)=   19 *    D$FRS
         * * * * * * * * * * * * * * * * * * * * * *

16  #LEVL , 30,     0,0,    0, 0, 0, 0, 0
         91750-1X282 REV.2301 820917 ALL
        PROGRAM LENGTH (IN WORDS)=    1 *    #LEVL
         * * * * * * * * * * * * * * * * * * * * * *

17   D$3IN ,  7,     0,0,    0, 0, 0, 0, 0
         91750-1X275 REV.2301 820920 ALL W/3K
        PROGRAM LENGTH (IN WORDS)=   72 *    D$3IN
     * * * * * * * * * * * * * * * * * * * * * *
```

```
********** FILE NAME:   $DSLB2  :    0:   DX:    5 **********
          *******************************************
 MODULE                                           ENTRY PTS
 ------                                           ---------
 1  DSLB2 ,  0,    0,0,    0, 0, 0, 0, 0
         91750-12002 REV.2326 830414 ALL W/ RTE LINKS

 2  DMESG ,  7,   99,0,    0, 0, 0, 0, 0
         91750-1X074 REV.2013 800414 ALL
        PROGRAM LENGTH (IN WORDS)=  117 *    DMESG
          * * * * * * * * * * * * * * * * * * * * * *

 3  DMESS ,  7,   99,0,    0, 0, 0, 0, 0
         91750-1X075 REV.2201 ALL <830915.1218>
        PROGRAM LENGTH (IN WORDS)=  110 *    DMESS
          * * * * * * * * * * * * * * * * * * * * * *

 4  FCOPY ,  7,    0,0,    0, 0, 0, 0, 0
         91750-1X116 REV 2301 820802 ALL
        PROGRAM LENGTH (IN WORDS)=  443 *    FCOPY
          * * * * * * * * * * * * * * * * * * * * * *

 5  FLOAD ,  7,   99,0,    0, 0, 0, 0, 0
         91750-1X118 REV.2013 800430 ALL
        PROGRAM LENGTH (IN WORDS)=  144 *    FLOAD
          * * * * * * * * * * * * * * * * * * * * * *

 6  GNODE ,  7,   99,0,    0, 0, 0, 0, 0
         91750-1X123 REV 2013 800110
        PROGRAM LENGTH (IN WORDS)=    8 *    GNODE
          * * * * * * * * * * * * * * * * * * * * * *

 7  DEXEC ,  7,   99,0,    0, 0, 0, 0, 0
         91750-1X067 REV.2326 830413 ALL
        PROGRAM LENGTH (IN WORDS)= 1218 *    D#OPS
                                        *    DEXEC
                                        *    DLUEX
          * * * * * * * * * * * * * * * * * * * * * *

 8  RFMST ,  7,   99,0,    0, 0, 0, 0, 0
         91750-1X166 REV 2013 800111
        PROGRAM LENGTH (IN WORDS)=  479 *    DAPOS
                                        *    DCLOS
                                        *    DCONT
                                        *    DCRET
                                        *    DLOCF
                                        *    DNAME
                                        *    DOPEN
                                        *    DPOSN
                                        *    DPURG
                                        *    DREAD
```

```
                                                  *    DSTAT
                                                  *    DWIND
                                                  *    DWRIT
                                                  *    DXAPO
                                                  *    DXCLO
                                                  *    DXCRE
                                                  *    DXLOC
                                                  *    DXPOS
                                                  *    DXREA
                                                  *    DXWRI
                    * * * * * * * * * * * * * * * * * * * * * *

 9  DSTIO , 7,   99,0,   0, 0, 0, 0, 0
          91750-1X101 REV.2113 801118 ALL
              PROGRAM LENGTH (IN WORDS)=  223 *    DSTIO
                   * * * * * * * * * * * * * * * * * * * * * *

10  #MAST , 7,    0,0,   0, 0, 0, 0, 0
          91750-1X019 REV.2301 821007 ALL
         PROGRAM LENGTH (IN WORDS)=  464 *    #MAST
                                         *    #MSTC
                                         *    #RQB
                                         *    #TILT
                                         *    #TTOV
                    * * * * * * * * * * * * * * * * * * * * * *

11  #PUTR , 7,    0,0,   0, 0, 0, 0, 0
          91750-1X025 REV.2301 820831 ALL
         PROGRAM LENGTH (IN WORDS)=   18 *    #PUTR
                    * * * * * * * * * * * * * * * * * * * * * *

12  #PUTD , 7,    0,0,   0, 0, 0, 0, 0
          91750-1X211 REV.2301 820921 ALL
         PROGRAM LENGTH (IN WORDS)=   37 *    #PUTD
                    * * * * * * * * * * * * * * * * * * * * * *

13  FCL66 , 7,    0,0,   0, 0, 0, 0, 0
          91750-1X273 REV.2301 820327 ALL
         PROGRAM LENGTH (IN WORDS)=  476 *    FCL66
                    * * * * * * * * * * * * * * * * * * * * * *

14  #NRVS , 30,  99,0,   0, 0, 0, 0, 0
          91750-1X022 .REV.2113 800808 ALL
         PROGRAM LENGTH (IN WORDS)=   94 *    #NRVS
                    * * * * * * * * * * * * * * * * * * * * * *

15  #CVBF , 7,   99,0,   0, 0, 0, 0, 0
          91750-1X003 REV 2013 791129 ALL
         PROGRAM LENGTH (IN WORDS)= 1025 *    #CVBF
                    * * * * * * * * * * * * * * * * * * * * * *
```

```
16  #ICVO ,  7,   99,0,   0, 0, 0, 0, 0
         91750-1X200 REV.2013 800326 ALL
        PROGRAM LENGTH (IN WORDS)=   77 *    #ICVO
          * * * * * * * * * * * * * * * * * * * * * *

17  #OCVO ,  7,   99,0,   0, 0, 0, 0, 0
         91750-1X201 REV.2013 800207 ALL
        PROGRAM LENGTH (IN WORDS)=   91 *    #OCVO
          * * * * * * * * * * * * * * * * * * * * * *

18  #DNFL ,  7,   99,0,   0, 0, 0, 0, 0
         91750-1X245 REV.2140 810807 ALL BKWD CMPT VERS.
        PROGRAM LENGTH (IN WORDS)=   34 *    #DNFL
          * * * * * * * * * * * * * * * * * * * * * *

********** FILE NAME:   $DSLB3  :    0:   DX:    5 **********
          *****************************************

 MODULE                                          ENTRY PTS
 ------                                          ---------
 1  DSLB3 ,  0,    0,0,   0, 0, 0, 0, 0
         91750-12003 REV.2340 831006 ALL W/O 3K LINK


 2  POPEN ,  7,   99,0,   0, 0, 0, 0, 0
         91750-1X148 REV.2201 810629 ALL W/O 3K LINK
        PROGRAM LENGTH (IN WORDS)=  283 *    PCLOS
                                        *    PCONT
                                        *    PNRPY
                                        *    POPEN
                                        *    PREAD
                                        *    PWRIT
          * * * * * * * * * * * * * * * * * * * * * *

 3  D$EQT , 30,   99,0,   0, 0, 0, 0, 0
         91750-1X054 REV.2013 800527 ALL W/O 3K LINK
        PROGRAM LENGTH (IN WORDS)=    1 *    D$EQT
                                        *    D$XS5
          * * * * * * * * * * * * * * * * * * * * * *

 4  D$DN! , 30,   99,0,   0, 0, 0, 0, 0
         91750-1X251 REV.2201 820122 ALL W/O 3K LINK
        PROGRAM LENGTH (IN WORDS)=   23 *    D$3KL
                                        *    D$DN!
                                        *    D$DN?
                                        *    D$LOG
                                        *    D$RLU
                                        *    D$SND
                                        *    D$UP!
          * * * * * * * * * * * * * * * * * * * * * *
```

```
********** FILE NAME:   $D3KL2  :    0:   DX:    5 **********
           ****************************************

 MODULE                                     ENTRY PTS
 ------                                     ---------
 1  D3KL2 ,  0,    0,0,    0, 0, 0, 0, 0
          91750-1X062 REV.2201 791026 ALL W/3K & NO RTE LINKS


 2  #MAST ,  7,    99,0,   0, 0, 0, 0, 0
          91750-1X018 REV.2201 800408 ALL W/3K & NO RTE LINKS
         PROGRAM LENGTH (IN WORDS)=   25 *    #MAST
                                         *    #MSTC
                                         *    #RQB
                                         *    #TTOV
          * * * * * * * * * * * * * * * * * * * * * *

 3  #NRVS , 30,    99,0,   0, 0, 0, 0, 0
      91750-1X209 REV.2201 791228 ALL W/3K & NO RTE LINKS
         PROGRAM LENGTH (IN WORDS)=    5 *    #NRVS
          * * * * * * * * * * * * * * * * * * * * * *

********** FILE NAME:   $D3KLB  :    0:   DX:    5 **********
           ****************************************

 MODULE                                     ENTRY PTS
 ------                                     ---------
 1  D3KLB ,  0,    0,0,    0, 0, 0, 0, 0
          91750-12017 REV.2340 830708 ALL W/3K
 .SET BAR OFF


 2  D$EQT , 30,    99,0,   0, 0, 0, 0, 0
          91750-1X056 REV.2013 790608 ALL W/3K
         PROGRAM LENGTH (IN WORDS)=  121 *    D$EQT
                                         *    D$XS5
          * * * * * * * * * * * * * * * * * * * * * *

 3  FCHEK ,  7,    99,0,   0, 0, 0, 0, 0
          91750-1X113 REV.2013 790326 ALL W/3K
              PROGRAM LENGTH (IN WORDS)=  120 *    FCHEK
               * * * * * * * * * * * * * * * * * * * * * *

 4  FCLOS ,  7,    99,0,   0, 0, 0, 0, 0
          91750-1X114 REV.2013 790326 ALL W/3K
         PROGRAM LENGTH (IN WORDS)=  194 *    FCLOS
                                         *    FCNTL
                                         *    FLOCK
                                         *    FPOIN
```

```
                                             *    FRDSK
                                             *    FRLAB
                                             *    FRLAT
                                             *    FRNAM
                                             *    FSPAC
                                             *    FSTMD
                                             *    FUNLK
                                             *    FWLAB
          * * * * * * * * * * * * * * * * * * * * * *

 5  FINFO ,  7,   99,0,   0, 0, 0, 0, 0
         91750-1X117 REV.2013 790326 ALL W/3K
        PROGRAM LENGTH (IN WORDS)=  133 *    FINFO
         * * * * * * * * * * * * * * * * * * * * * *

 6  FREAD ,  7,   99,0,   0, 0, 0, 0, 0
         91750-1X120 REV.2013 790412 ALL W/3K
        PROGRAM LENGTH (IN WORDS)=   75 *    FRDIR
                                        *    FREAD
          * * * * * * * * * * * * * * * * * * * * * *

 7  FWRIT ,  7,   99,0,   0, 0, 0, 0, 0
         91750-1X121 REV.2013 790328 ALL W/3K
        PROGRAM LENGTH (IN WORDS)=   74 *    FUPDT
                                        *    FWDIR
                                        *    FWRIT
          * * * * * * * * * * * * * * * * * * * * * *

 8  HELLO ,  7,    0,0,   0, 0, 0, 0, 0
         91750-1X125 REV.2326 830418 ALL W/3K
        PROGRAM LENGTH (IN WORDS)=  394 *    BYE
                                        *    HELLO
          * * * * * * * * * * * * * * * * * * * * * *

 9  POPEN ,  7,   99,0,   0, 0, 0, 0, 0
         91750-1X148 REV.2201 811122 ALL W/3K
        PROGRAM LENGTH (IN WORDS)=  595 *    PCLOS
                                        *    PCONT
                                        *    PNRPY
                                        *    POPEN
                                        *    PREAD
                                        *    PWRIT
          * * * * * * * * * * * * * * * * * * * * * *

10  FOPEN ,  7,   99,0,   0, 0, 0, 0, 0
         91750-1X119 REV.2013 790328 ALL W/3K
        PROGRAM LENGTH (IN WORDS)=  172 *    D$RFH
                                        *    FOPEN
          * * * * * * * * * * * * * * * * * * * * * *
```

```
11  D$G3V ,  7,   99,0,    0, 0, 0, 0, 0
          91750-1X252 REV.2201 810709 ALL W/3K
         PROGRAM LENGTH (IN WORDS)=   23 *    D$G3V
           * * * * * * * * * * * * * * * * * * * * * *
12  D3KMS ,  7,    0,0,    0, 0, 0, 0, 0
          91750-1X064 REV.2340 830913 ALL W/3K
         PROGRAM LENGTH (IN WORDS)= 1648 *    BFSZ#
                                         *    CUREB
                                         *    D$3BF
                                         *    D$ABT
                                         *    D$ASC
                                         *    D$BRK
                                         *    D$CTY
                                         *    D$ECH
                                         *    D$ERR
                                         *    D$INI
                                         *    D$INP
                                         *    D$IPM
                                         *    D$LOG
                                         *    D$NPM
                                         *    D$NWD
                                         *    D$PRM
                                         *    D$RQB
                                         *    D$SMP
                                         *    D$SPM
                                         *    D$STW
                                         *    D$XFL
                                         *    D$ZRO
                                         *    D3KMS
                                         *    FC4FL
                                         *    ICC
                                         *    LU3K#
                                         *    MAXEB
                                         *    NWCR#
                                         *    PNSZ#
                                         *    PRCNM
                                         *    SLFLG
                                         *    X.25#
           * * * * * * * * * * * * * * * * * * * * * *
13  D$GET ,  7,    0,0,    0, 0, 0, 0, 0
          91750-1X253 REV.2301 820924 AL 820924.1251
         PROGRAM LENGTH (IN WORDS)=  166 *    D$GET
           * * * * * * * * * * * * * * * * * * * * * *
14  D$TRM ,  7,   99,0,    0, 0, 0, 0, 0
          91750-1X254 REV.2201 810707 ALL W/3K
         PROGRAM LENGTH (IN WORDS)=   47 *    D$TRM
           * * * * * * * * * * * * * * * * * * * * * *
```

```
15  D$SND ,  7,    99,0,    0, 0, 0, 0, 0
         91750-1X255 REV.2201 810706 ALL W/3K
        PROGRAM LENGTH (IN WORDS)=  136 *    D$SND
          * * * * * * * * * * * * * * * * * * * * * *

16  D$WLG ,  7,     0,0,    0, 0, 0, 0, 0
         91750-1X256 REV.2340 830708 AL 821010.1604
        PROGRAM LENGTH (IN WORDS)=  234 *    D$WLG
          * * * * * * * * * * * * * * * * * * * * * *

17  D$LG  ,  7,    99,0,    0, 0, 0, 0, 0
         91750-1X257 REV.2201 810612 ALL W/3K
        PROGRAM LENGTH (IN WORDS)=   17 *    D$DLG
                                        *    D$GLG
          * * * * * * * * * * * * * * * * * * * * * *

18  D$RLU ,  7,    99,0,    0, 0, 0, 0, 0
         91750-1X258 REV.2201 810702 ALL W/3K     811125.1325
        PROGRAM LENGTH (IN WORDS)=  283 *    D$RLU
          * * * * * * * * * * * * * * * * * * * * * *

19  D$DN  ,  7,     0,0,    0, 0, 0, 0, 0
         91750-1X259 REV.2326 821220 ALL W/3K
        PROGRAM LENGTH (IN WORDS)=  194 *    D$3KL
                                        *    D$DN!
                                        *    D$DN?
                                        *    D$UP!
          * * * * * * * * * * * * * * * * * * * * * *

20  D$PS? ,  7,    99,0,    0, 0, 0, 0, 0
         91750-1X260 REV.2201 810617 ALL W/3K
        PROGRAM LENGTH (IN WORDS)=   11 *    D$PS?
          * * * * * * * * * * * * * * * * * * * * * *

21  D$GBD ,  7,    99,0,    0, 0, 0, 0, 0
         91750-1X261 REV.2326 830304 ALL W/3K
        PROGRAM LENGTH (IN WORDS)=  196 *    D$GBD
          * * * * * * * * * * * * * * * * * * * * * *

22  D$MDA ,  7,    99,0,    0, 0, 0, 0, 0
         91750-1X270 REV.2201 811122 ALL W/3K
        PROGRAM LENGTH (IN WORDS)=   16 *    D$MDA
          * * * * * * * * * * * * * * * * * * * * * *

23  LU3K  ,  7,     0,0,    0, 0, 0, 0, 0
         91750-1X274 REV.2301 820309 ALL W/3K
        PROGRAM LENGTH (IN WORDS)=    4 *    LU3K
          * * * * * * * * * * * * * * * * * * * * * *
```

```
24  D$BMV ,  7,     0,0,    0, 0, 0, 0, 0
          91750-1X297 REV.2340 830712 ALL
         PROGRAM LENGTH (IN WORDS)=   17 *    D$BMV
           * * * * * * * * * * * * * * * * * * * * * *

********** FILE NAME:   $D3KBB  :    0:   DX:    5 **********
          ******************************************

 MODULE                                         ENTRY PTS
 ------                                         ---------
 1  D3KBB ,  0,     0,0,    0, 0, 0, 0, 0
           91750-1X061 REV.2201 810707 ALL W/3K: 1072 BUF


 2  D$TST ,  7,    99,0,    0, 0, 0, 0, 0
          91750-1X060 REV.2201 810422 ALL W/3K: 1072 BUF
         PROGRAM LENGTH (IN WORDS)= 1072 *    D$TST
           * * * * * * * * * * * * * * * * * * * * * *

 3  D$CON ,  7,    99,0,    0, 0, 0, 0, 0
          91750-1X053 REV.2201 811123 ALL W/3K: 1072 BUF
         PROGRAM LENGTH (IN WORDS)=    6 *    D$GMR
                                         *    D$MAX
                                         *    D$MXR
           * * * * * * * * * * * * * * * * * * * * * *

 4  D$QBF ,  7,    99,0,    0, 0, 0, 0, 0
          91750-1X058 REV.2201 810427 ALL W/3K HSI: 1072 BUF
         PROGRAM LENGTH (IN WORDS)= 2149 *    D$RAD
                                         *    D$WAD
                                         *    D$WLN
           * * * * * * * * * * * * * * * * * * * * * *

 5  D$3BF ,  7,    99,0,    0, 0, 0, 0, 0
          91750-1X050 REV.2201 810707 ALL W/3K PSI: 1072 BUF
         PROGRAM LENGTH (IN WORDS)= 1075 *    D$PAD
                                         *    D$PBF
           * * * * * * * * * * * * * * * * * * * * * *

********** FILE NAME:   $D3KRB  :    0:   DX:    5 **********
          ******************************************

 MODULE                                         ENTRY PTS
 ------                                         ---------
 1  D3KRB ,  0,     0,0,    0, 0, 0, 0, 0
          91750-1X065 REV.2201 810622 ALL W/3K: 304 BUF
```

```
 2  D$3BF ,  7,    99,0,    0, 0, 0, 0, 0
          91750-1X050 REV.2201 810707 ALL W/3K PSI: 304 BUF
         PROGRAM LENGTH (IN WORDS)=  307 *     D$PAD
                                         *     D$PBF
           * * * * * * * * * * * * * * * * * * * * * *
 3  D$TST ,  7,    99,0,    0, 0, 0, 0, 0
          91750-1X059 REV.2201 810422 ALL W/3K: 304 BUF
         PROGRAM LENGTH (IN WORDS)=  512 *     D$TST
           * * * * * * * * * * * * * * * * * * * * * *

 4  D$CON ,  7,    99,0,    0, 0, 0, 0, 0
          91750-1X052 REV.2201 811123 ALL W/3K: 304 BUF
         PROGRAM LENGTH (IN WORDS)=    6 *     D$GMR
                                         *     D$MAX
                                         *     D$MXR
           * * * * * * * * * * * * * * * * * * * * * *

 5  D$QBF ,  7,    99,0,    0, 0, 0, 0, 0
          91750-1X057 REV.2201 810427 ALL W/3K HSI: 304 BUF
         PROGRAM LENGTH (IN WORDS)=  613 *     D$RAD
                                         *     D$WAD
                                         *     D$WLN
           * * * * * * * * * * * * * * * * * * * * * *

********** FILE NAME:   $D3KMB  :    0:   DX:    5 **********
           ********************************************

 MODULE                                            ENTRY PTS
 ------                                            ---------
 1  D3KMB ,  0,     0,0,    0, 0, 0, 0, 0
          91750-1X190 REV.2201 810707 ALL W/3K: 4096 BUF


 2  D$TST ,  7,    99,0,    0, 0, 0, 0, 0
          91750-1X194 REV.2201 810708 ALL W/3K: 4096 BUF
         PROGRAM LENGTH (IN WORDS)= 4135 *     D$TST
           * * * * * * * * * * * * * * * * * * * * * *

 3  D$CON ,  7,    99,0,    0, 0, 0, 0, 0
          91750-1X192 REV.2201 811123 ALL W/3K: 4096 BUF
         PROGRAM LENGTH (IN WORDS)=    6 *     D$GMR
                                         *     D$MAX
                                         *     D$MXR
           * * * * * * * * * * * * * * * * * * * * * *

 4  D$QBF ,  7,    99,0,    0, 0, 0, 0, 0
          91750-1X193 REV.2201 800201 ALL W/3K HSI: 4096 BUF
         PROGRAM LENGTH (IN WORDS)= 8197 *     D$RAD
                                         *     D$WAD
                                         *     D$WLN
           * * * * * * * * * * * * * * * * * * * * * *
```

```
 5  D$3BF  ,  7,    99,0,    0, 0, 0, 0, 0
          91750-1X191 REV.2201 810707 ALL W/3K PSI: 4096 BUF
         PROGRAM LENGTH (IN WORDS)= 4099 *     D$PAD
                                         *     D$PBF
            * * * * * * * * * * * * * * * * * * * * * *

********** FILE NAME:   $DSSM    :     0:    DX:     5 **********
           ******************************************

 MODULE                                          ENTRY PTS
 ------                                          ---------
 1  DSSM   ,  0,     0,0,    0, 0, 0, 0, 0
         91750-12014 REV.2340 830623 W/S.M.


 2  #ATCH  ,  7,    99,0,    0, 0, 0, 0, 0
          91750-1X043 REV.2340 830510 W/S.M.
         PROGRAM LENGTH (IN WORDS)=  128 *     #ATCH
            * * * * * * * * * * * * * * * * * * * * * *

 3  #RMSM  ,  7,     0,0,    0, 0, 0, 0, 0
          91750-1X026 REV.2340 830510 W/S.M.
         PROGRAM LENGTH (IN WORDS)= 1129 *     #RMSM
            * * * * * * * * * * * * * * * * * * * * * *

 4  DLGON  ,  7,     0,0,    0, 0, 0, 0, 0
          91750-1X066 REV.2301 821022 ALL
         PROGRAM LENGTH (IN WORDS)=  467 *     DLGNS
                                         *     DLGOF
                                         *     DLGON
            * * * * * * * * * * * * * * * * * * * * * *

 5  #DISM  ,  7,     0,0,    0, 0, 0, 0, 0
          91750-1X203 REV.2326 830414 W/S.M.
         PROGRAM LENGTH (IN WORDS)=  677 *     #DISM
            * * * * * * * * * * * * * * * * * * * * * *

 6  #DSSM  ,  7,    99,0,    0, 0, 0, 0, 0
          91750-1X006 REV.2326 830418 W/S.M.
         PROGRAM LENGTH (IN WORDS)=  413 *     #DSSM
            * * * * * * * * * * * * * * * * * * * * * *

 7  #MSSM  ,  7,     0,0,    0, 0, 0, 0, 0
          91750-1X020 REV.2340 830427 W/S.M.
         PROGRAM LENGTH (IN WORDS)= 1071 *     #DFSN
                                         *     #FPRN
                                         *     #MSSM
                                         *     #NASR
                                         *     #NEWX
```

```
                                                 *    #OVR
                                                 *    #RUTZ
                                                 *    D$OVR
          * * * * * * * * * * * * * * * * * * * * * * *
 8  #SCSM ,  7,    0,0,   0, 0, 0, 0, 0
         91750-1X033 REV.2340 830601 ALL
        PROGRAM LENGTH (IN WORDS)=  256 *     #SCSM
          * * * * * * * * * * * * * * * * * * * * * * *

 9  #UPSM ,  7,    0,0,   0, 0, 0, 0, 0
         91750-1X038 REV.2301 821014 ALL
        PROGRAM LENGTH (IN WORDS)=  212 *     #UPSM
          * * * * * * * * * * * * * * * * * * * * * * *

10  #CLON ,  7,   99,0,   0, 0, 0, 0, 0
         91750-1X001 REV.2340 830523 W/S.M.
        PROGRAM LENGTH (IN WORDS)=  423 *     #CLON
          * * * * * * * * * * * * * * * * * * * * * * *

11  #IDSG ,  7,   99,0,   0, 0, 0, 0, 0
         91750-1X225 REV.2201 811028 ALL
        PROGRAM LENGTH (IN WORDS)=   75 *     #IDSG
          * * * * * * * * * * * * * * * * * * * * * * *

12  .CLGF ,  7,   99,0,   0, 0, 0, 0, 0
         91750-1X039 REV.2013 800429 W/S.M.
        PROGRAM LENGTH (IN WORDS)=   73 *     .CLGF
          * * * * * * * * * * * * * * * * * * * * * * *

13  #NAT  ,  7,    0,0,   0, 0, 0, 0, 0
         91750-1X276 REV.2326 830107 ALL
        PROGRAM LENGTH (IN WORDS)=   83 *     #1NAT
                                        *     #NAT
                                        *     NAT#
          * * * * * * * * * * * * * * * * * * * * * * *

14  #POOS ,  7,    0,0,   0, 0, 0, 0, 0
         91750-1X277 REV.2340 830627 ALL W/SM
        PROGRAM LENGTH (IN WORDS)=  163 *     #POOS
          * * * * * * * * * * * * * * * * * * * * * * *

********** FILE NAME:   $DSLSM   :    0:   DX:    5 **********
         ******************************************

 MODULE                                    ENTRY PTS
 ------                                    ---------
 1  DSLSM ,  0,    0,0,   0, 0, 0, 0, 0
         91750-12015 REV.2340 830623 ALL, W/O S.M.
```

```
2  #RMSM  ,  7,    0,0,    0, 0, 0, 0, 0
         91750-1X210 REV.2340 830510 W/O S.M.
        PROGRAM LENGTH (IN WORDS)=  914 *    #RMSM
           * * * * * * * * * * * * * * * * * * * * * *

3  DLGON  ,  7,    0,0,    0, 0, 0, 0, 0
         91750-1X066 REV.2301 821022 ALL
        PROGRAM LENGTH (IN WORDS)=  467 *    DLGNS
                                        *    DLGOF
                                        *    DLGON
           * * * * * * * * * * * * * * * * * * * * * *

4  #DISM  ,  7,    0,0,    0, 0, 0, 0, 0
         91750-1X204 REV.2326 830414 ALL, W/O S.M.
        PROGRAM LENGTH (IN WORDS)=  167 *    #DISM
           * * * * * * * * * * * * * * * * * * * * * *

5  #DSSM  ,  7,   99,0,    0, 0, 0, 0, 0
         91750-1X007 REV.2326 830418 ALL, W/O S.M.
        PROGRAM LENGTH (IN WORDS)=   38 *    #DSSM
           * * * * * * * * * * * * * * * * * * * * * *

6  #MSSM  ,  7,    0,0,    0, 0, 0, 0, 0
         91750-1X021 REV.2340 830427 W/O S.M.
        PROGRAM LENGTH (IN WORDS)= 1099 *    #DFSN
                                        *    #FPRN
                                        *    #MSSM
                                        *    #NASR
                                        *    #NEWX
                                        *    #OVR
                                        *    #RUTZ
                                        *    D$OVR
           * * * * * * * * * * * * * * * * * * * * * *

7  #SCSM  ,  7,    0,0,    0, 0, 0, 0, 0
         91750-1X033 REV.2340 830601 ALL
        PROGRAM LENGTH (IN WORDS)=  256 *    #SCSM
           * * * * * * * * * * * * * * * * * * * * * *

8  #UPSM  ,  7,    0,0,    0, 0, 0, 0, 0
         91750-1X038 REV.2301 821014 ALL
        PROGRAM LENGTH (IN WORDS)=  212 *    #UPSM
           * * * * * * * * * * * * * * * * * * * * * *

9  NCLON  ,  7,   99,0,    0, 0, 0, 0, 0
         91750-1X139 REV.2013 800229 ALL, W/O S.M.
                                        *    #CLON
           * * * * * * * * * * * * * * * * * * * * * *
```

```
10  #IDSG ,  7,   99,0,   0, 0, 0, 0, 0
          91750-1X225 REV.2201 811028 ALL
         PROGRAM LENGTH (IN WORDS)=   75 *    #IDSG
           * * * * * * * * * * * * * * * * * * * * * *

11  NATCH ,  7,   99,0,   0, 0, 0, 0, 0
          91750-1X138 REV.2340 830701 ALL, W/O S.M.
         PROGRAM LENGTH (IN WORDS)=    4 *    #ATCH
                                         *    #RSET
           * * * * * * * * * * * * * * * * * * * * * *

12  #NAT  ,  7,    0,0,   0, 0, 0, 0, 0
          91750-1X276 REV.2326 830107 ALL
         PROGRAM LENGTH (IN WORDS)=   83 *    #1NAT
                                         *    #NAT
                                         *    NAT#
           * * * * * * * * * * * * * * * * * * * * * *

13  #POOS ,  7,    0,0,   0, 0, 0, 0, 0
          91750-1X277 REV.2340 830627 ALL W/SM
         PROGRAM LENGTH (IN WORDS)=  163 *    #POOS
           * * * * * * * * * * * * * * * * * * * * * *

********** FILE NAME:   $DSNSM  :    0:   DX:    5 **********
          *****************************************

 MODULE                                           ENTRY PTS
 ------                                           ---------
 1  DSNSM ,  0,    0,0,   0, 0, 0, 0, 0
          91750-1X097 REV.2340 830705 ALL, W/O S.M.


 2  NONSM ,  7,   99,0,   0, 0, 0, 0, 0
          91750-1X141 REV.2340 830701 ALL, W/O S.M.
         PROGRAM LENGTH (IN WORDS)=   17 *    #ATCH
                                         *    #DISM
                                         *    #DSSM
                                         *    #MSSM
                                         *    #OVR
                                         *    #RMSM
                                         *    #SCSM
                                         *    #UPSM
                                         *    D$OVR
                                         *    DLGNS
                                         *    DLGOF
                                         *    DLGON
           * * * * * * * * * * * * * * * * * * * * * *
```

```
********** FILE NAME:   $DSRR   :    0:   DX:    5 **********
           *****************************************

MODULE                                           ENTRY PTS
------                                           ---------
1  DSRR  ,  0,    0,0,   0, 0, 0, 0, 0
          91750-1X098 REV.2226 820325 ALL W/RR
2  #RRX  ,  7,   99,0,   0, 0, 0, 0, 0
          91750-1X029 REV.2226 820316 ALL W/RR
         PROGRAM LENGTH (IN WORDS)=  236 *     #RR1
                                         *     #RR2
                                         *     #RR3
          * * * * * * * * * * * * * * * * * * * * * *

3  #RR4  ,  7,   99,0,   0, 0, 0, 0, 0
          91750-1X030 REV.2140 810717 ALL W/RR
         PROGRAM LENGTH (IN WORDS)=   44 *     #RR4
          * * * * * * * * * * * * * * * * * * * * * *

4  #RR5  ,  7,   99,0,   0, 0, 0, 0, 0
          91750-1X031 REV.2113 810120 ALL W/RR
         PROGRAM LENGTH (IN WORDS)=   33 *     #RR5
          * * * * * * * * * * * * * * * * * * * * * *

5  #RR6  ,  7,   99,0,   0, 0, 0, 0, 0
          91750-1X032 REV.2140 810617 ALL W/RR
         PROGRAM LENGTH (IN WORDS)=   88 *     #RR6
          * * * * * * * * * * * * * * * * * * * * * *

6  #RR7  , 30,   99,0,   0, 0, 0, 0, 0
          91750-1X199 REV.2113 801124 ALL W/RR
         PROGRAM LENGTH (IN WORDS)=   23 *     #RR7
          * * * * * * * * * * * * * * * * * * * * * *

7  #UP   ,  7,   99,0,   0, 0, 0, 0, 0
          91750-1X036 REV.2140 810717 ALL W/RR
         PROGRAM LENGTH (IN WORDS)=  589 *     #UP
          * * * * * * * * * * * * * * * * * * * * * *

8  #DOWN ,  7,   99,0,   0, 0, 0, 0, 0
          91750-1X005 REV.2140 810717 ALL W/RR
         PROGRAM LENGTH (IN WORDS)=  309 *     #DOWN
          * * * * * * * * * * * * * * * * * * * * * *

9  #UPDA ,  7,   99,0,   0, 0, 0, 0, 0
          91750-1X037 REV.2113 810123 ALL W/RR
         PROGRAM LENGTH (IN WORDS)=  735 *     #UPDA
          * * * * * * * * * * * * * * * * * * * * * *
```

```
10  #FDMN , 7,   99,0,   0, 0, 0, 0, 0
         91750-1X008 REV.2113 800808 ALL W/RR
        PROGRAM LENGTH (IN WORDS)=  126 *    #FDMN
         * * * * * * * * * * * * * * * * * * * * * *

11  #LVSC , 30,  99,0,   0, 0, 0, 0, 0
         91750-1X014 REV.2113 800808 ALL W/RR
        PROGRAM LENGTH (IN WORDS)=   29 *    #LVSC
         * * * * * * * * * * * * * * * * * * * * * *

********** FILE NAME:   $DSNRR  :    0:   DX:    5 **********
         ****************************************

 MODULE                                       ENTRY PTS
 ------                                       ---------
 1  DSNRR ,  0,     0,0,   0, 0, 0, 0, 0
         91750-1X096 REV 2013 791026 ALL W/O RR

 2  DUMRR , 30,   99,0,   0, 0, 0, 0, 0
         91750-1X216 REV.2013 800821 ALL
                                              *    #DOWN
                                              *    #RR1
                                              *    #RR2
                                              *    #RR3
                                              *    #RR4
                                              *    #RR5
                                              *    #RR6
                                              *    #RR7
                                              *    #UP
                                              *    #UPDA
         * * * * * * * * * * * * * * * * * * * * * *

********** FILE NAME:   $DSMA   :    0:   DX:    5 **********
         ****************************************

 MODULE                                       ENTRY PTS
 ------                                       ---------
 1  DSMA  ,  0,     0,0,   0, 0, 0, 0, 0
         91750-1X088 REV.2340 830706 ALL M.A.

 2  #MAAS ,  7,   99,0,   0, 0, 0, 0, 0
         91750-1X015 REV.2113 801120 ALL M.A.
        PROGRAM LENGTH (IN WORDS)=  270 *    #MAAS
         * * * * * * * * * * * * * * * * * * * * * *
```

```
 3  #MAPP ,  7,    0,0,   0, 0, 0, 0, 0
         91750-1X016 REV.2340 830705 ALL M.A.
        PROGRAM LENGTH (IN WORDS)= 1200 *    #MAPP
          * * * * * * * * * * * * * * * * * * * * * *

 4  #MAUP ,  7,    0,0,   0, 0, 0, 0, 0
         91750-1X135 REV.2301 820916 ALL M.A.
        PROGRAM LENGTH (IN WORDS)=  315 *    #MA1
                                        *    #MA2
                                        *    #MA3
          * * * * * * * * * * * * * * * * * * * * * *

 5  #MAQS ,  7,   99,0,   0, 0, 0, 0, 0
         91750-1X207 REV.2113 800808 ALL M.A.
        PROGRAM LENGTH (IN WORDS)=   38 *    #MAQS
          * * * * * * * * * * * * * * * * * * * * * *

********* FILE NAME:   $DSNMA   :    0:   DX:    5 **********
         *****************************************

MODULE                                          ENTRY PTS
------                                          ---------
 1  DSNMA ,  0,    0,0,   0, 0, 0, 0, 0
         91750-1X095 REV 2013 791026 ALL, NON M.A.


 2  NONMA ,  7,   99,0,   0, 0, 0, 0, 0
         91750-1X140 REV 2013 800415 ALL NMA
        PROGRAM LENGTH (IN WORDS)=   15 *    #MA1
                                        *    #MA2
                                        *    #MA3
                                        *    #MAAS
                                        *    #MAPP
                                        *    #MAQS
          * * * * * * * * * * * * * * * * * * * * * *

********** FILE NAME:   $DSDB   :    0:   DX:    5 **********
         *****************************************

MODULE                                          ENTRY PTS
------                                          ---------
 1  $DSDB ,  7,   99,0,   0, 0, 0, 0, 0
         91750-12020 REV.2013 791203


 2  RDEXT ,  7,   99,0,   0, 0, 0, 0, 0
         91750-1X188 REV.2013 791029
        PROGRAM LENGTH (IN WORDS)=   41 *    RDEXT
          * * * * * * * * * * * * * * * * * * * * * *
```

```
3  RMCLN ,  7,   99,0,   0, 0, 0, 0, 0
    91750-1X189 REV.2013 791029
   PROGRAM LENGTH (IN WORDS)=   38 *    RMCLN
     * * * * * * * * * * * * * * * * * * * * * *

4  RBMST ,  7,   99,0,   0, 0, 0, 0, 0
         91750-1X187 REV.2013 791029
        PROGRAM LENGTH (IN WORDS)=  142 *    RBMST
```

B.2 DS/1000-IV LIBRARY ENTRY POINTS LISTED ALPHABETICALLY

ENTRY POINT	LIBRARY
ACEPT	$DSLB1
APOSN	$DSML2
BFPAS	$DSLB1
BFSZ#	$D3KLB
BYE	$D3KLB
CHGTO	$DSMX4,$DSMX6,$DSML1,$DSLXL,$DSAL
CLOSE	$DSML2
CLRQ	$DSMX4,$DSML1
CREAT	$DSML2
CUREB	$D3KLB
DAPOS	$DSLB2
DCLOS	$DSLB2
DCONT	$DSLB2
DCRET	$DSLB2
DEXEC	$DSLB2
DLGNS	$DSSM,$DSLSM,$DSNSM
DLGOF	$DSSM,$DSLSM,$DSNSM
DLGON	$DSSM,$DSLSM,$DSNSM
DLOCF	$DSLB2
DLUEX	$DSLB2
DMESG	$DSLB2
DMESS	$DSLB2
DNAME	$DSLB2
DNODE	$FDSLB,%RMTIO
DOPEN	$DSLB2
DPOSN	$DSLB2
DPURG	$DSLB2
DREAD	$DSLB2
DSERR	$DSLB1
DSRPL	$DSLXL
DSTAT	$DSLB2
DSTIO	$DSLB2
DWIND	$DSLB2
DWRIT	$DSLB2
DXAPO	$DSLB2
DXCRE	$DSLB2
DXCLO	$DSLB2
DXLOC	$DSLB2
DXPOS	$DSLB2
DXREA	$DSLB2
DXWRI	$DSLB2
D3KMS	$D3KLB

```
D#OPS..................$DSLB2
D$ABT..................$D3KLB
D$ASC..................$D3KLB
D$BMV..................$D3KLB
D$BRK..................$D3KLB
D$CTY..................$D3KLB
D$DLG..................$D3KLB
D$DN!..................$DSLB3,$D3KLB
D$DN?..................$DSLB3,$D3KLB
D$DVT..................$DSAL
D$ECH..................$D3KLB
D$EQT..................$DSLB3,$D3KLB
D$ERR..................$D3KLB
D$FCA..................$DSMX4,$DSMX6,$DSML1
D$FCL..................$DSAL
D$FCM..................$DSMX4,$DSMX6,$DSML1
D$FRS..................$DSLB1
D$GBD..................$D3KLB
D$GCL..................$DSLB1
D$GET..................$D3KLB
D$GLG..................$D3KLB
D$GMR..................$DEKBB,$D3KRB,$D3KMB
D$GRN..................$DSLB1
D$GVL..................$DSLB1
D$G3V..................$D3KLB
D$INI..................$D3KLB
D$INP..................$D3KLB
D$IN?..................$DSLB1
D$IPM..................$D3KLB
D$LOG..................$D3KLB,$DSLB3
D$MAX..................$D3KRB,$D3KBB,$D3KMB
D$MDA..................$D3KLB
D$MWF..................$DSMX6,$DSMX4,$DSAL,$DSLXL,$DSLCL,$DSML1
D$MWI..................$DSMX6,$DSMX4,$DSAL,$DSLXL,$DSLCL,$DSML1
D$MXR..................$D3KRB,$D3KBB,$D3KMB
D$NPM..................$D3KLB
D$NWD..................$D3KLB
D$OVR..................$DSSM,$DSLSM,$DSNSM
D$PAD..................$D3KBB,$D3KRB,$D3KMB
D$PBF..................$D3KBB,$D3KRB,$D3KMB
D$PRM..................$D3KLB
D$PS?..................$D3KLB
D$RAD..................$D3KRB,$D3KBB,$D3KMB
D$RFH..................$D3KLB
D$RLU..................$DSLB3,$D3KLB
D$RQB..................$D3KLB
D$SMP..................$D3KLB
D$SND..................$DSLB3,$D3KLB
D$SPM..................$D3KLB
D$STW..................$D3KLB
D$TRM..................$D3KLB
```

```
D$TST.................$D3KRB,$D3KBB,$D3KMB
D$UP?.................$DSLB3,$D3KLB
D$VFY.................$DSAL
D$WAD.................$D3KRB,$D3KBB,$D3KMB
D$WLG.................$D3KLB
D$WLN.................$D3KRB,$D3KBB,$D3KMB
D$XFL.................$D3KLB
D$XLD.................$DSMX6,$DSMX4,$DSAL,$DSLXL,$DSLCL,$DSML1
D$XST.................$DSMX6,$DSMX4,$DSAL,$DSLXL,$DSLCL,$DSML1
D$XS5.................$DSLB3,$D3KLB
D$ZRO.................$D3KLB
D$3BF.................$D3KLB
D$3IN.................$DSLB1
D$3KL.................$DSLB3,$D3KLB
FC4FL.................$D3KLB
FCHEK.................$D3KLB
FCLOS.................$D3KLB
FCL66.................$DSLB2
FCNTL.................$D3KLB
FCONT.................$DSML2
FCOPY.................$DSLB2
FLOAD.................$DSLB2
FLOCK.................$D3KLB
FINFO.................$D3KLB
FINIS.................$DSLB1
FOPEN.................$D3KLB
FPOIN.................$D3KLB
FRDIR.................$D3KLB
FRDSK.................$D3KLB
FREAD.................$D3KLB
FRLAB.................$D3KLB
FRLAT.................$D3KLB
FRNAM.................$D3KLB
FSPAC.................$D3KLB
FSTAT.................$DSML1
FSTMD.................$D3KLB
FUNLK.................$D3KLB
FUPDT.................$D3KLB
FWDIR.................$D3KLB
FWLAB.................$D3KLB
FWRIT.................$D3KLB
GET...................$DSLB1
GETDV.................$DSMX4,$DSMX6,$DSML1,$DSAL,$DSLXL
GNODE.................$DSLB2
HELLO.................$D3KLB
ICC...................$D3KLB
IDPTN.................$DSLXL,$DSAL
LO....................$DSLCL,$DSLXL
LOCF..................$DSML2
LU3K..................$D3KLB
LU3K#.................$D3KLB
```

MAXEB..................$D3KLB
MOVIT..................$DSLXL
MPREP..................$DSLXL,$DSAL
NAMF...................$DSML2
NAT#...................$DSSM,$DSLSM
NWCR#..................$D3KLB
OPEN...................$DSML2
PCLOS..................$DSLB3,$D3KLB
PCONT..................$DSLB3,$D3KLB
PGMAD..................$DSLCL,$DSLXL,$DSMX4,$DSMX6,$DSAL,$DSML1
PNRPY..................$DSLB3,$D3KLB
PNSZ#..................$DSLB3,$D3KLB
POPEN..................$DSLB3,$D3KLB
POSNT..................$DSML2
POST...................$DSML2
PRCNM..................$D3KLB
PREAD..................$DSLB3,$D3KLB
PTFND..................$DSLXL
PURGE..................$DSML2
PWRIT..................$DSLB3,$D3KLB
RDEXT..................$DSDB
RBMST..................$DSDB
RD&ST..................$DSMX4,$DSMX6,$DSML1,$DSAL,$DSLXL
REJCT..................$DSLB1
READF..................$DSML2
RMCLN..................$DSDB
RWNDF..................$DSML2
SEGFL..................$DSLXL,$DSAL
SEGLD..................$DSLCL,$DSML1
SEGRT..................$DSLCL
SLFLG..................$D3KLB
TODEV..................$DSMX4,$DSMX6,$DSML1,$DSAL,$DSLXL
WRITF..................$DSML2
X.25#..................$D3KLB
$DSCS..................$DSML1
#ATCH..................$DSSM,$DSLSM,$DSNSM
#CLON..................$DSSM,$DSLSM
#CLTA..................$DSLCL,$DSLXL,$DSMX4,$DSMX6,$DSAL,$DSML1
#CVBF..................$DSLB2
#DFSN..................$DSSM,$DSLSM
#DISM..................$DSSM,$DSLSM,$DSNSM
#DNFL..................$DSLB2
#DOWN..................$DSRR,$DSNRR
#DSSM..................$DSSM,$DSLSM,$DSNSM
#FDMN..................$DSRR
#FPRN..................$DSLSM,$DSSM
#GET...................$DSLB1
#GETR..................$DSLB1
#GTOP..................$DSLCL,$DSLXL,$DSMX4,$DSMX6,$DSAL,$DSML1
#ICVO..................$DSLB2
#IDAD..................$DSLCL,$DSLXL,$DSML1,$DSAL

```
#IDSG..................$DSSM,$DSLSM
#LEVL..................$DSLB1
#LOGR..................$DSLB1
#LVSC..................$DSRR
#MAAP..................$DSMA,$DSNMA
#MAAS..................$DSMA,$DSNMA
#MAQS..................$DSMA,$DSNMA
#MAST..................$DSLB2,$D3KL2
#MA1...................$DSMA,$DSNMA
#MA2...................$DSMA,$DSNMA
#MA3...................$DSMA,$DSNMA
#MSSM..................$DSSM,$DSLSM,$DSNSM
#MSTC..................$DSLB2,$D3KL2
#NASR..................$DSSM,$DSLSM
#NAT...................$DSSM,$DSLSM
#NEWX..................$DSSM,$DSLSM
#NQUE..................$DSLCL,$DSLXL,$DSMX4,$DSMX6,$DSAL,$DSML1
#NRVS..................$DSLB2,$D3KL2
#OCVO..................$DSLB2
#OFF...................$DSLCL,$DSLXL,$DSMX4,$DSMX6,$DSAL,$DSML1
#OK?...................$DSLB1
#OVR...................$DSSM,$DSLSM,$DSNSM
#PBZ?..................$DSLCL,$DSLXL,$DSMX4,$DSMX6,$DSAL,$DSML1
#PKUP..................$DSML1,$DSMX4,$DSMX6,$DSAL,$DSLXL,$DSLCL
#PNLS..................$DSLB1
#POOS..................$DSSM,$DSLSM
#PRGL..................$DSLCL,$DSLXL,$DSMX4,$DSMX6,$DSAL,$DSML1
#PUTD..................$DSLB2
#PUTR..................$DSLB2
#QLIM..................$DSLCL,$DSLXL,$DSMX4,$DSMX6,$DSAL,$DSML1
#RPB...................$DSLB1
#RQB...................$DSLB2,$D3KL2
#RQUE..................$DSLCL,$DSLXL,$DSMX4,$DSMX6,$DSAL,$DSML1
#RMSM..................$DSSM,$DSLSM,$DSNSM
#RR1...................$DSRR,$DSNRR
#RR2...................$DSRR,$DSNRR
#RR3...................$DSRR,$DSNRR
#RR4...................$DSRR,$DSNRR
#RR5...................$DSRR,$DSNRR
#RR6...................$DSRR,$DSNRR
#RR7...................$DSRR,$DSNRR
#RSET..................$DSLSM,$DSSM,$DSNSM
#RUTZ..................$DSSM,$DSLSM
#SBFA..................$DSLB1
#SBFL..................$DSLB1
#SCSM..................$DSSM,$DSLSM,$DSNSM
#SDAL..................$DSLB1
#SKEY..................$DSLB1
#SLAV..................$DSLB1
#TILT..................$DSLB2
#TTOV..................$DSLB2,$D3KL2
```

```
#UP....................$DSRR,$DSNRR
#UPDA..................$DSRR,$DSNRR
#UPSM..................$DSSM,$DSLSM,$DSNSM
#1NAT..................$DSSM,$DSLSM
.ADX...................$DSML1
.ADY...................$DSML1
.CAX...................$DSML1
.CAY...................$DSML1
.CBS...................$DSML1
.CBT...................$DSML1
.CBX...................$DSML1
.CBY...................$DSML1
.CLGF..................$DSSM
.CMW...................$DSML1
.CXA...................$DSML1
.CXB...................$DSML1
.CYA...................$DSML1
.CYB...................$DSML1
.DSX...................$DSML1
.DSY...................$DSML1
.ISX...................$DSML1
.ISY...................$DSML1
.JLY...................$DSML1
.JPY...................$DSML1
.LAX...................$DSML1
.LAY...................$DSML1
.LBX...................$DSML1
.LBY...................$DSML1
.LDX...................$DSML1
.LDY...................$DSML1
.MBF...................$DSML1
.MBI...................$DSML1
.MBW...................$DSML1
.MBT...................$DSML1
.MWF...................$DSML1
.MWI...................$DSML1
.MWW...................$DSML1
.SAX...................$DSML1
.SAY...................$DSML1
.SBS...................$DSML1
.SBX...................$DSML1
.SBY...................$DSML1
.SFB...................$DSML1
.STX...................$DSML1
.STY...................$DSML1
.TBS...................$DSML1
.XAX...................$DSML1
.XAY...................$DSML1
.XBX...................$DSML1
.XCA...................$DSML1
.XCB...................$DSML1
```

NOTE

DS has many entry points in to SSGA will resolve many entry points beginning with '#'.

Index

I

L

M

N

R

S

T

U

V

W

X

READER COMMENT SHEET

DS/1000-IV
Network Manager's Manual
Volume 1

91750-90010 **March 1982**

Update No. __________

(If Applicable)

We welcome your evaluation of this manual. Your comments and suggestions help us improve our publications. Please use additional pages if necessary.

FROM:

Name ______________________________

Company ______________________________

Address ______________________________

____

____

FOLD

FOLD

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 141 CUPERTINO, CA.

— POSTAGE WILL BE PAID BY —

Hewlett-Packard Company
Data Systems Division
11000 Wolfe Road
Cupertino, California 95014
ATTN: Technical Marketing Dept.

FOLD

FOLD