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Systems

VM/370 Networking (Programming RPQ P09007) Program Reference and Operations Manual

Program Number 5799-ATA

This publication provides the VM/370 system programmer and operator with the information necessary to install the VM/370 Networking PRPQ (VNET) and operate the VNET virtual machine. Use of the VNET facility by the VM/370 terminal user is described.

VNET is a virtual machine subsystem for VM/370. It manages the transmission and reception of data between a VM/370 system and other S/370s operating in a Network Job Interface (NJI) communication network.

Topics covered include:

- Network Job Interface (NJI) concept
- Descriptions of VNET components and the VNET virtual machine
- VNET installations and operation
- VNET commands and messages
- VM/370 terminal user guide
- VNET supported remote terminals and stations

Prerequisite publications:

Network Job Interface, General Information Manual,
order no. (GH20-1941)

Virtual Machine Facility/370: Introduction, order no.
(GC20-1800)

IBM

First Edition (April 1977)

This edition applies to Version 1, Modification Level 0, of the VM/370 Networking Programming RPQ P09007 (S799-ATA) and to all subsequent versions and modifications until otherwise indicated in new editions or Technical Newsletters.

Changes are continually made to the information herein. Therefore, before using this publication, consult the latest System/370 Bibliography (GC20-0370) for the editions that are applicable and current.

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Preface

This publication is for the VM/370 System Programmer installing the VM/370 Networking PRPQ (herein referred to by the contraction, "VNET"), the VNET System Operator, and the VM/370 Terminal user using the VNET facility. It describes:

- The concept of Network Job Interface (NJI).
- The VNET system's features, components, and operation.
- How to install a VNET system.
- How to operate a VNET system.
- How a VM/370 virtual machine user makes use of the VNET facility.

The publication contains four parts and three appendices.

Part 1: Introduction contains three sections:

"Overview of NJI" presents an explanation of the Network Job Interface (NJI) concepts and a description of the characteristics and operation of an NJI network.

"VNET Virtual Machine" describes the features and operation of a VM/370 virtual machine using VNET as the operating system.

"Components of a VNET System" describes the functions and relationships of the major components of a VNET system.

Part 2: VNET Installation discusses installation planning considerations and describes the installation procedure.

Part 3: VNET System Operation contains two sections:

"Operation Description" discusses general operation, the operator commands, and the operator messages.

"Operation Procedures" describes how to start, stop, change, and control the VNET system.

Part 4: VM/370 User Guide explains the commands and messages available to the VM/370 user and their use in working with VNET.

Appendix A: VNET Commands contains detailed descriptions of the commands available to the VNET operator. The subset of those commands available to the remote station operator are also identified.

Appendix B: VNET Messages Summary contains a listing of all the VNET messages and responses tabulated by the command or function that initiated the message. A key to the distribution of each message or response is also included.

Appendix C: Remote Terminals and Stations contains two parts:

The first part on nonprogrammable remote terminals contains a section on each of the nonprogrammable re-

mote terminals supported by VNET. Each section covers the configuration of the terminal, establishing the line connection, terminal operation, and error recovery procedures.

The second part on MULTI-LEAVING remote stations contains a section on each of the programmable remote stations supported by VNET acting as a host, and a section on VNET acting as a job entry station to a remote HASP/ASP batch system or its equivalent. Each section covers the supported configuration of the station, establishing the line connection, station operation, and error recovery procedures.

PREREQUISITE PUBLICATION

Network Job Interface General Information Manual, GH20-1941

IBM Virtual Machine Facility/370: Introduction, GC20-1800

COREQUISITE PUBLICATION

IBM Virtual Machine Facility/370: Planning and System Generation Guide, GC20-1801

IBM Virtual Machine Facility/370: System Programmer's Guide, GC20-1807

IBM Virtual Machine Facility/370: System Messages, GC20-1808

IBM Virtual Machine Facility/370: Terminal User's Guide, GC20-1810

IBM Virtual Machine Facility/370: CP Command Reference for General Users, GC20-1820

IBM Virtual Machine Facility/370: CMS User's Guide, GC20-1819

IBM Virtual Machine Facility/370: CMS Command and Macro Reference, GC20-1818

RELATED PUBLICATIONS

IBM Virtual Machine Facility/370 Networking: Logic Manual, LY20-2342

IBM Virtual Machine Facility/370: Remote Spooling Communications Subsystem (RSCS) User's Guide, GC20-1816

Operator's Library: Network Job Entry Facility for JES2 Commands, SC23-0011

ASP Networking PRPQ: User's Guide, SH20-1978

ASP Networking PRPQ: Program Reference and Operation Guide, SH20-1979

ASP Networking PRPQ: Logic Manual, LY20-2341

HASP Networking PRPQ: User's Guide, SH20-1980

HASP Networking PRPQ: System Programmer's Guide, SH20-1981

HASP Networking PRPQ: Operations Manual, SH20-1982

HASP Networking PRPQ: Logic Manual, LY20-2340

System Programmer's Library: Network Job Entry Facility for JES2, SC23-0003

Installation Reference Material: Network Job Entry Facility for JES2, SC23-0012

Logic: Network Job Entry Facility for JES2, LY24-6001

Note: The operating and error procedures for the VNET supported remote terminals and stations contained in "Appendix C: Remote Terminals and Stations" were obtained from some of the following publications. If conflicts occur, refer to the latest edition of the subject document.

For Nonprogrammable Terminals

System Components: IBM 2770 Data Communication System, GA27-3013

Operating Procedures Guide: IBM 3771 and 3773 Communication Terminals, GA27-3100

Operating Procedures Guide: IBM 3774 and 3775 Communication Terminals, GA27-3094

Operating Procedures Guide: IBM 3776 Communication Terminal, GA27-3107

Operating Procedures Guide: IBM 3777 Communication Terminal, GA27-3124

IBM 2780 Data Transmission Terminal: Component Description, GA27-3005

Component Information for the IBM 3780 Data Communication Terminal, GA27-3063

For Spool MULTI-LEAVING Stations

IBM System/360 and System/370 Attached Support Processor System (ASP) Version 2 Console Operator's Manual, GH20-0321

IBM System/360 and System/370 ASP Version 3 Asymmetric Multiprocessing System Operator's Manual, GH20-1289

OS/VS1 Release 2 RES Work Station User's Guide, GC28-6879

OS/VS2 HASP II Version 4 System Programmer's Guide, GC27-6992

OS/VS2 HASP II Version 4 Operator's Guide, GC27-6993

IBM System/3 Card System Operator's Guide, GC21-7513

IBM System/32 Operator's Guide, GC21-7591

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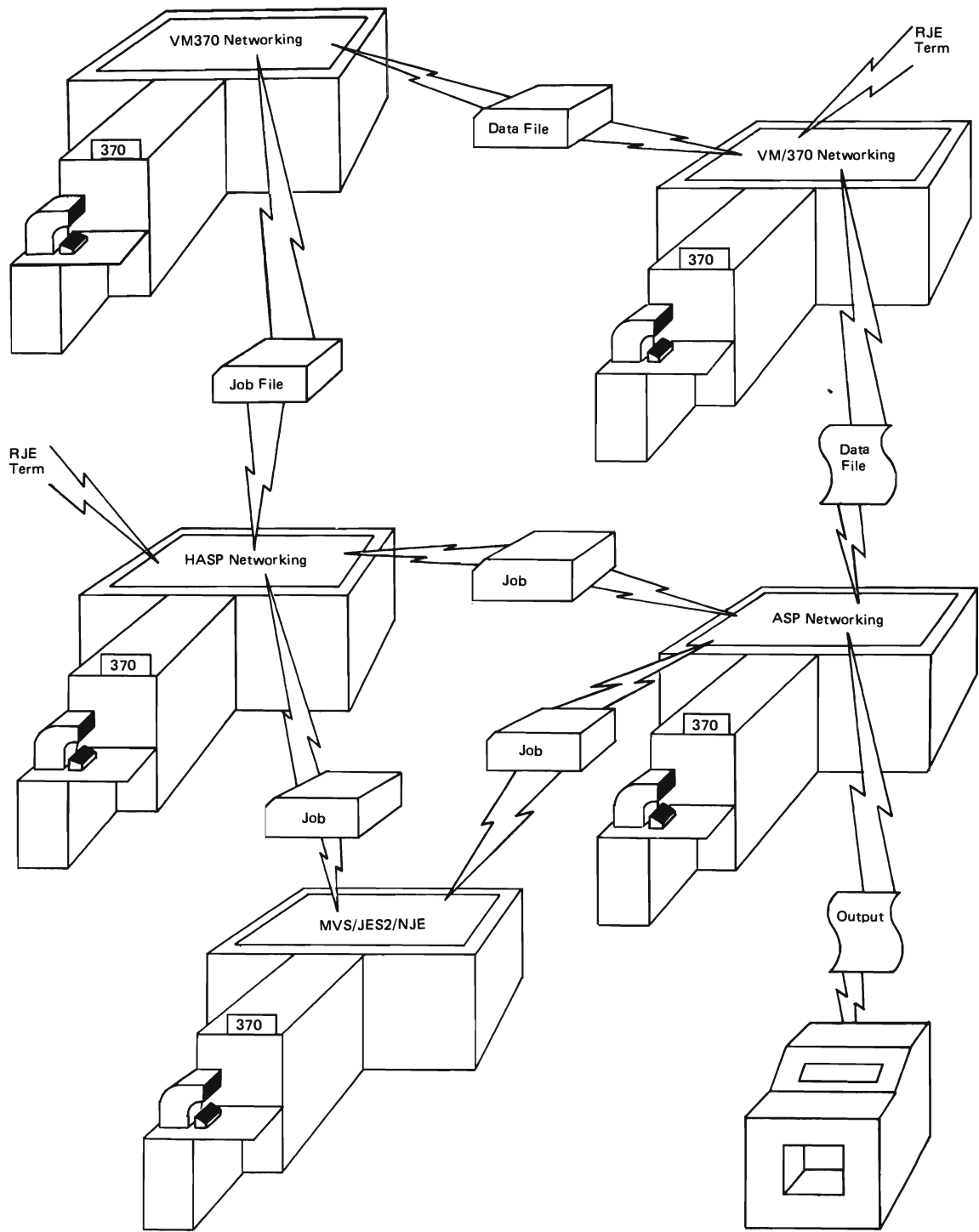
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Frontispiece. Network Job Interface

Part 1 is an introduction to Network Job Interface (NJI) and the VM/370 Networking PRPQ (VNET). The following topics are introduced:

- Overview of NJI
- The VNET Virtual Machine
- Components of a VNET System



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Network Job Interface (NJI) is a method of creating a unified job network. The network consists of a mix of IBM System/370 processors, running applicable operating systems. Any processor on the network can send job or data files through the network to another processor. The receiving location can be the adjacent link in the network or it can be several processors (nodes) removed from the source location.

NJI makes possible the use of all resources in the network by enabling:

1. Input of jobs or data files at any point, including local input devices, remote job entry stations, and time sharing terminals.
2. Automatic transmission of the jobs and data through one or more processors (network nodes) to a particular location for processing.
3. Transmission of batch job output back to the originating point or to other points as requested.

NJI CHARACTERISTICS

All System/370 systems with NJI capability present a common set of interfaces to remotely connected systems. The method in which these common external characteristics are implemented depends upon the particular systems. In general, all NJI compatible systems share the following functions:

- Store and Forward - A system receives and temporarily stores a complete file in its own spooling facility before sending the file on to the next node in the network.
- Symmetric Protocol - Card and printer formatted data streams are transferred from system to system with neither system assuming a subordinate role.
- Automatic Routing - Tables created at system initialization time enable the system to examine a file and determine if the file destination is local or remote. If the destination is remote, the file is passed on without requiring operator intervention.
- Operator Commands - System operators may manually query and control network processing. Dynamic alteration of node status, routing tables, and status or disposition of files are permitted.

The VM/370 Networking PRPQ (VNET) includes the common characteristics listed above in addition to further features. Both are explained in more detail in the discussion of the VNET Virtual Machine.

NJI NETWORK MEMBERS

Four different types of systems can communicate and operate as members or nodes of an NJI network. VM/370 REL. 3, ASP 3.2, HASP II 4.0 and the JES2/NJE (Network Job Entry Facility For JES2).

NJI consists of three components: VM/370 Networking PRPQ (VNET), ASP Networking PRPQ, and HASP Networking PRPQ. Each contains enhancements and modifications to the respective system programs to perform job networking functions. A specific system becomes a member node of an NJI network after installing the appropriate NJI or NJE component and the necessary communications equipment.

Sending, receiving, and intermediate nodes of an NJI network can be any combination of the above mentioned systems. RJE workstations can also be sending or receiving locations.

NETWORK OPERATION

The operation of an NJI unified job network can be explained by following a sample file transmission through a network. Figure 1. shows a simple NJI network. If we assume the teleprocessing link between System B and System D is temporarily unavailable, any file from System B destined for System C must pass through System A.

A user on System B wishes to transfer a file to a user on System C. The sequence of events is as follows:

1. System B user creates a destination record containing the destination location (node) and userid. The user then places the file in the System B spool facility, directing it to the HASP Networking facility.
2. The HASP networking facility then takes the file from the spool facility, reads the destination record, checks its tables, and finds that the only available route to System C is through System A.
3. The HASP networking facility sends the file out through the Networking Interface to System A.
4. System A VNET receives the complete file and stores it in the spool facility. VNET notifies HASP that the file has been completely received.
5. HASP purges the file from the System B spool facility. System A VNET now has responsibility for the file.
6. VNET determines from the file, and its own tables, the next node on the route to the file destination.
7. VNET transmits the file to the next node (System C).
8. System C ASP networking facility receives and stores the file in the system spool facility.
9. ASP then notifies VNET that the file has been completely received.
10. VNET purges the file from the System A spool facility. System C ASP now has responsibility for the file.
11. System C is the destination system in this example, therefore, the ASP networking facility passes the file to the ASP subsystem for processing.

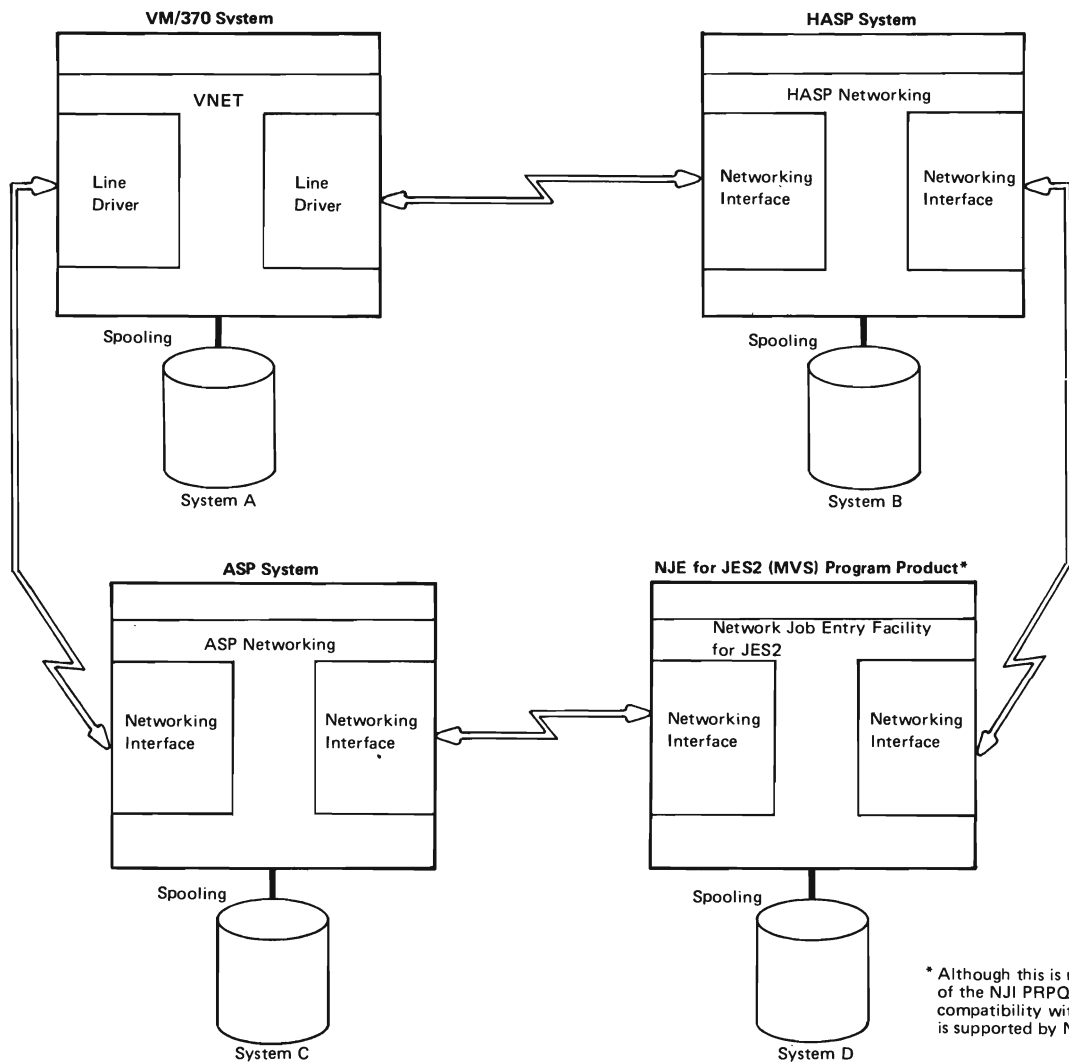


Figure 1. Network Job Interface (NJI) Configuration.

In this example System C was the destination system. If it had not been, the transferral process would have been repeated as often as necessary. Each node on a network need only store the file temporarily until it is passed to the next node. Each node keeps only the information in its tables that is necessary to determine the next node on the route to each destination for which it handles files.

All systems (nodes) in an NJI network operate as independent but cooperating members of the network.



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The VM/370 Networking PRPQ is a virtual machine subsystem for VM/370. Together with the Control Program of VM/370, it controls telecommunication I/O devices and lines used to automatically transfer files between:

- VM/370 users and remote stations or other VM/370 users.
- Remote stations and other remote stations.
- VM/370 users and remote (one or more nodes) HASP, ASP, JES2/NJE systems.
- Remote stations and HASP, ASP, or JES2/NJE systems.
- Remote stations and CMS Batch virtual systems.

VNET runs in a single virtual machine as a telecommunications subsystem under VM/370. It functions as an independent cooperating member node of an NJI Network. The VNET virtual machine, running under VM/370, operates as any other virtual machine.

VNET is a single purpose operating system for a virtual machine, dedicated to processing files spooled to it, and transmitting these files via communication lines to remote nodes or workstations. The telecommunication I/O facilities to be managed by VNET operate in binary synchronous mode and are attached, temporarily or permanently, to the VNET virtual machine. Communications via channel-to-channel adapter are also supported. See Figure 2 for a representative VM/370 installation using VNET.

When no operator intervention is required, the VNET operator may disconnect the VNET console and run in disconnected mode. VNET is designed to operate normally without regular operator intervention. When disconnecting his console, the VNET operator has the option of specifying another virtual machine console (typically the system operator's console) to receive any VNET console output. When not in disconnect mode, the VNET operator can use the console to enter VNET commands to alter normal processing and to monitor network activity.

MAIN FEATURES

The VM/370 Networking PRPQ (VNET) incorporates all of the features included in the Remote Spooling Communications Subsystem (RSCS) component of VM/370 (see Preface for related publication). Significant features have been added that simplify system operation and provide compatibility within an NJI unified job network. These features are explained in this section.

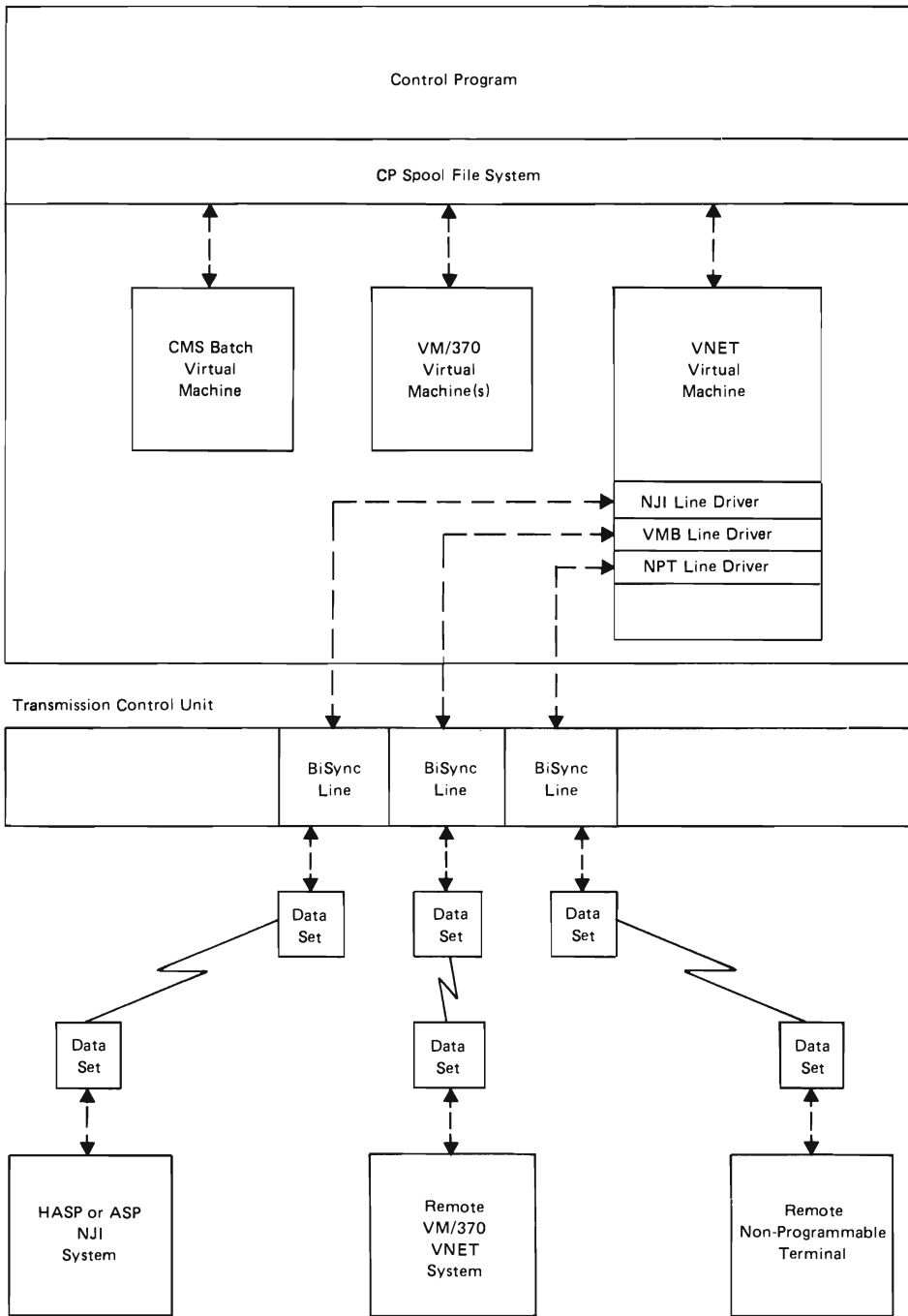


Figure 2. Representative VNET Installation

STORE AND FORWARD

The store and forward function occurs automatically using an output file tag created by VNET at the receiving system. The tag on the incoming file is read by the spool access manager in the local VNET system to

determine the file destination. If the destination is not local the file is spooled and then enqueued on the next destination link by VNET.

Once transmission of a file from one system to another has been completed, the receiving system assumes full responsibility for the integrity and recovery of the file in the event of a network or system failure. This is accomplished by the use of the system's spool file facility, thus utilizing each system's provisions for integrity and recovery.

ALTERNATE PATH FACILITY

VNET automatically (without operator intervention) performs NJI indirect routing. Each file received by VNET includes a destination location (node) name. If the specified destination is local the file is passed to the specified local user virtual machine or to the local system facility for real processing. If the destination is remote the file is queued on the link that is locally specified as the proper route to the destination location. This process is automatic unless overridden by local operator commands.

A further refinement enables VNET to dynamically alter its routing in response to a change in network status. Each time a transmission link is activated or deactivated, defined or deleted, all of the inactive input files are passed through a "selector". This process provides automatic alternate rerouting of the files from a direct to an indirect path in the event of a direct link deactivation.

SYMMETRIC PROTOCOL

VNET conforms to the symmetric protocol, as defined by the Network Job Entry Facility for JES2 program protocol, by communicating with other system nodes on the NJI network on an equal basis. The host-workstation relationship is not required.

Symmetric protocol is implemented in VNET through the design and selection of the line drivers. Each communication link in VNET uses the line driver that is compatible with the protocol used by the remote system. VNET simplifies the establishment of a new communication link by providing a selection of line drivers compatible with all NJI supported system nodes, as well as specialized communication facilities for communication with other VNET systems.

VNET OPERATOR CONTROL

Operator commands are provided to permit manual intervention to control the NJI network. Status and disposition of files can be changed in response to local conditions. Node status and routing tables can be dynamically altered. Operator commands may be entered locally and passed on to any other node for processing. Any response is returned to the local console.

EXEC FACILITY

This facility is similar to the CMS "EXEC" function. It is used by the VNET operator to call out a frequently used series of commands such as

those used to automatically change a network configuration at a particular time of day. It can also be used at VNET IPL time, in conjunction with the auto-logon facility available in VM/370, to automatically start up VNET links operating over leased lines.

ACCOUNTING RECORD PROVISION

An accounting record is generated by the AXS (spool access manager) task each time an input or output spool file is closed. In the case of input spool files, records are generated only if the spool file originated from the local node.

The record contains the following fields:

Originating User ID -----	8 bytes
Time and Date -----	12 bytes
Local Spool File ID-----	2 bytes
Origin Spool File ID-----	2 bytes
Originating Location ID -----	8 bytes
Originating VM/370 Device Type-	1 byte
Destination Location ID -----	8 bytes
Destination Userid -----	8 bytes
Spool File Class -----	1 byte
Number of Records in File -----	4 bytes
Destination Location User ID --	8 bytes

Most of the data is obtained from the spool file tag. Time and date information is obtained from VM/370. This record is processed through the standard VM/370 user accounting interface.

SAMPLE FILE TRANSMISSION

In order to provide an overall understanding of the operation of a VNET virtual machine a sample file transmission is described in this section. Figure 3 is a simple NJI network composed of three VNET virtual machines running under three VM/370 systems. The description refers to AXS (the VNET spool access manager) and VMB and VMC (the line driver tasks). In the following steps a file is followed from submission by a VM/370 CMS terminal user through to arrival at the destination location. The major steps in the operation are keyed to Figure 3 (A,B,C,D,E).

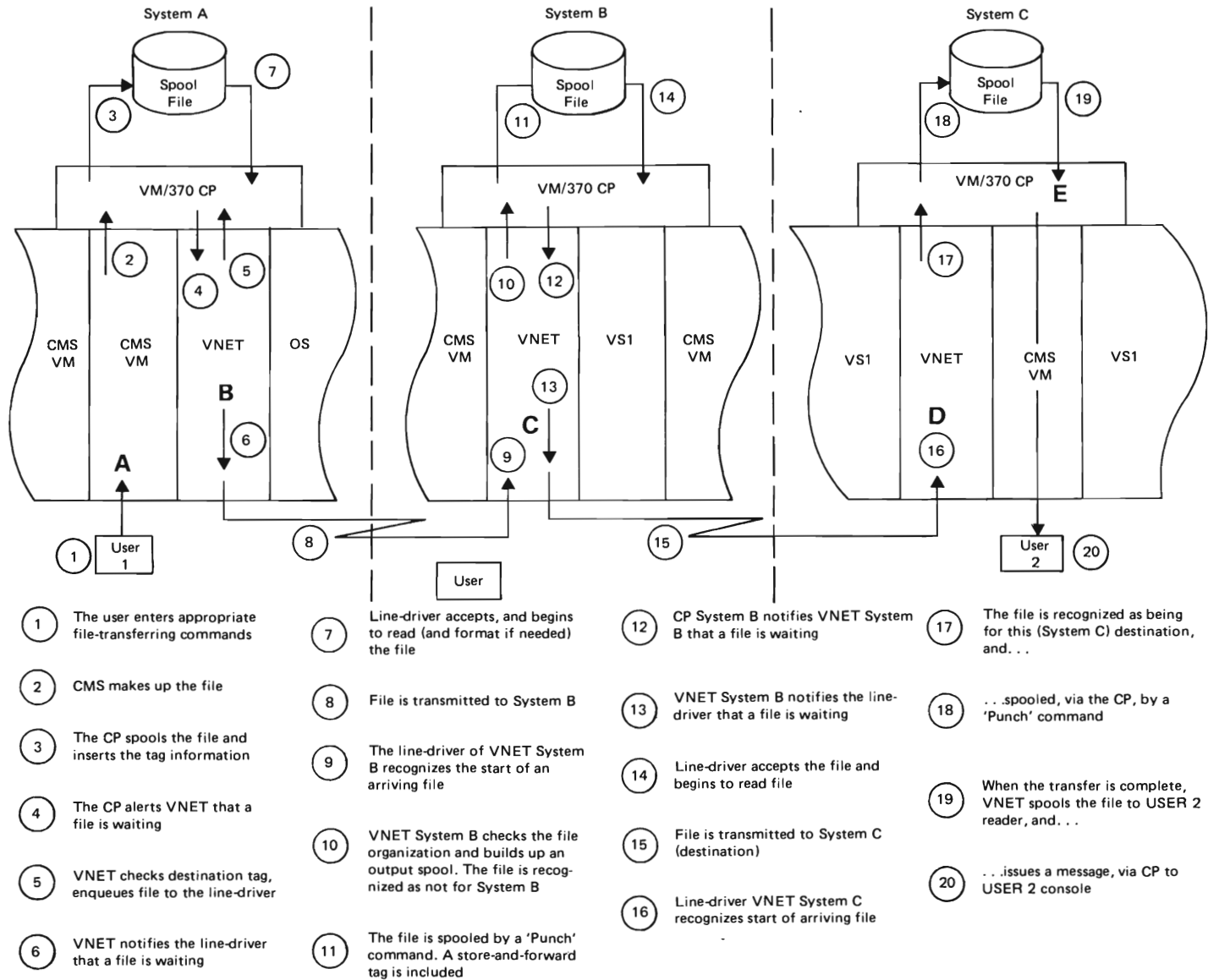
RECEIVING A FILE FROM SOURCE(A)

The CMS virtual machine user (user1) issues two commands to VM/370 CP:

```
SPOOL 00D TO VNET
TAG DEV 00D 370C USER2
```

The user then issues a PUNCH command to CMS. VM/370 CP builds a file of "punched" output for CMS with a tag of 370C USER2. VM/370 CP then notifies its virtual machine, VNET 370A, that a file is waiting via an interrupt to the spool access manager task AXS in VNET 370A. AXS then builds the file tag in a tag slot for reference.

Figure 3. Transferring a File via VNET (Overview) •



SENDING FILE TO NEXT NODE (B)

AXS checks the link table for a link 370C (from the tag of 370C USER2). It finds no link 370C. It checks the route table for a route listing 370C. It finds a route entry of 370C with a link of 370B. AXS enqueues the file on the line driver VMB on the link to 370B. AXS "alerts" VMB of the link to 370B that a file is waiting for transmission. VMB accepts the file by a give/take call to AXS. AXS sets up a virtual reader, tells VM/370 CP to direct the file to that reader, then gives control of the reader to VMB. VMB begins to read, format (if necessary), and transmit the file to VNET 370B.

FILE STORE-AND-FORWARD (C)

The line driver VMB of VNET 370B recognizes the beginning of a file arriving. VMB of VNET 370B issues a give/take call to AXS of VNET 370B. AXS checks the tag on the incoming file and puts it in an incoming tag slot for reference. AXS sets up a virtual punch for VMB to use in building an output spool file. Since the destination tag of 370C did not match the local identification of 370B, an S&F (store and forward) tag is placed on the file. When an "end-of-file" character is received by VMB of VNET 370B, it issues a closing output give/take call to AXS of VNET 370B. AXS closes the file and directs it to VNET 370B (itself). AXS notifies VMB of completion and VMB of 370B sends an "ACK" to VMB of 370A. VMB of 370A issues a close input give/take call to AXS of 370A. AXS then purges its copy of the file. VNET 370B now has responsibility for and the only copy of the file. VM/370 CP of VNET 370B system notifies VNET 370B by an interrupt to AXS of VNET 370B that a file is waiting for transmission. AXS stores the file tag in a slot for reference and checks its link table for a link 370C. It finds a link 370C. AXS enqueues the file on the line driver VMC of the link to VNET 370C. AXS then "alerts" VMC that a file is waiting for transmission. The transmission procedure from this point is the same as steps 7 through 9 in Figure 3.

ACCEPTING FILE AT DESTINATION NODE (D)

The reception of the file at the destination node (VNET 370C) is the same as steps 9 through 11 except that the file is recognized as being for this location and therefore is not tagged for store-and-forward. It is spooled to the end user (USER2) rather than back to VNET.

PASSING FILE TO END USER (E)

AXS of VNET 370C spools the file to the input reader of USER2. VNET 370C issues a message to USER2:

```
DMTAXM104I FILE (1234) SPOOLED TO USER2--  
ORG 370A (USER1) 02/14/77 05:49:11
```


COMPATIBLE NODES

A remote node, in the context of VNET, is any terminal or system on the other end of the link from the VNET virtual machine. The VNET virtual machine is also called the local VNET location. VNET is compatible with three types of remote system nodes and two general types of I/O configurations used as remote stations.

VNET is compatible and can communicate with the following remote system nodes:

- A HASP II Version 4.0 system having the HASP Networking PRPQ modifications and enhancements.
- An ASP 3.2 system having the ASP Networking PRPQ modifications and enhancements.
- A JES2 system with the Networking Job Entry facility for JES2 (NJE) Program Product.

The two types of compatible remote stations are nonprogrammable and programmable.

Nonprogrammable remote terminals, such as the IBM 3770, are I/O configurations that are hard-wired to provide the line protocol necessary for them to function as remote stations. These devices are managed by the Nonprogrammable Terminal (NPT) line driver of VNET.

Programmable remote stations, such as the IBM System/3 and System/370, are IBM processing systems with attached binary synchronous communications adapters. These systems must be programmed to provide the MULTI-LEAVING line protocol necessary for their I/O devices to function as remote stations. This programming support is provided by a Remote Terminal Processor (RTP) program that is generated according to HASP workstation protocol and tailored to the system's hardware configuration. Certain programmable remote stations like the System/3 can only be programmed to function as remote terminals. Others, like the System/360 and System/370, can function either as remote terminals or as host batch systems using VNET as a remote job entry workstation. Both of these types of remote stations are managed by the Spool MULTI-LEAVING (SMI) line driver of VNET.

All stations, remote and local, must be assigned a one- to eight-character (alphabetic) location identification. This identification usually suggests the physical location of the station (HOUSTON, DEPT14, ELDG76, ACCNTNG, FLOOR1 are typical examples).

VNET provides multiple concurrent line management support for a specific number of remote stations of the various supported types, dependent on the virtual storage size of the VNET virtual machine.

VNET LINK ATTRIBUTES

A link is defined as a potential path for data transmission between a VNET virtual machine and an adjacent, uniquely identified remote location. A group of parameters describing the attributes of a link is called a link definition. These attributes include the following:

- linkid - a one- to eight-character (alphabetic) link identifier, identical to the location identifier of the remote station associated with the link.

- type - a one- to eight-character (alphanumeric) name designating the module name of the line driver to be used to manage the transmission.
- line - a virtual device address of a communication adapter port for exclusive use by this link. If not specified, VNET assigns the link a switched telecommunication port when the link is activated.
- class - the designation of the classes of files that may be processed by the active link. The default value of class is 'all classes'.

VNET maintains a table of link definitions that are set up at VNET system generation time. This is called the VNET link table. Link definitions may be temporarily added, deleted, or modified using the VNET operator commands, DEFINE and DELETE. When a link is activated, the optional operands of the START command may also be used to override the link attributes. (For additional information see DEFINE, DELETE, and START under "VNET Operator Commands"). These definitions may be permanently changed through modification of the VNET directory.

VM/370 SPOOL SYSTEM INTERFACE

All VM/370 output spool files contain a 136-byte tag field located in the file's first spool buffer. The format and contents of the tag field vary according to its intended use. Tag information, to be associated with a particular spool output device, is entered by a VM/370 user via the TAG DEV command. The tag data entered via the TAG DEV command is stored in an area associated with the virtual device specified. When the first spool file data record is to be written, a tag field of 136 blank bytes is initialized in the first spool buffer of the file. When a file is closed, the tag is accessed, tag data is retrieved from the storage area and inserted, and the tag is rewritten.

When the TAG command is issued by a VM/370 user to tag a file destined for transmission by VNET, the first tag data entry must be the location identification of the remote station that is to receive the file. For a full description of the TAG command, see "VM/370 User Commands" in Part 4.

All spool files to be transmitted by VNET must be spooled to the VNET virtual machine by the VM/370 user or entered from the real card reader.

VNET consists of a multitasking supervisor, system control tasks, and line driver tasks. Figure 4 shows the major components of a VNET System.

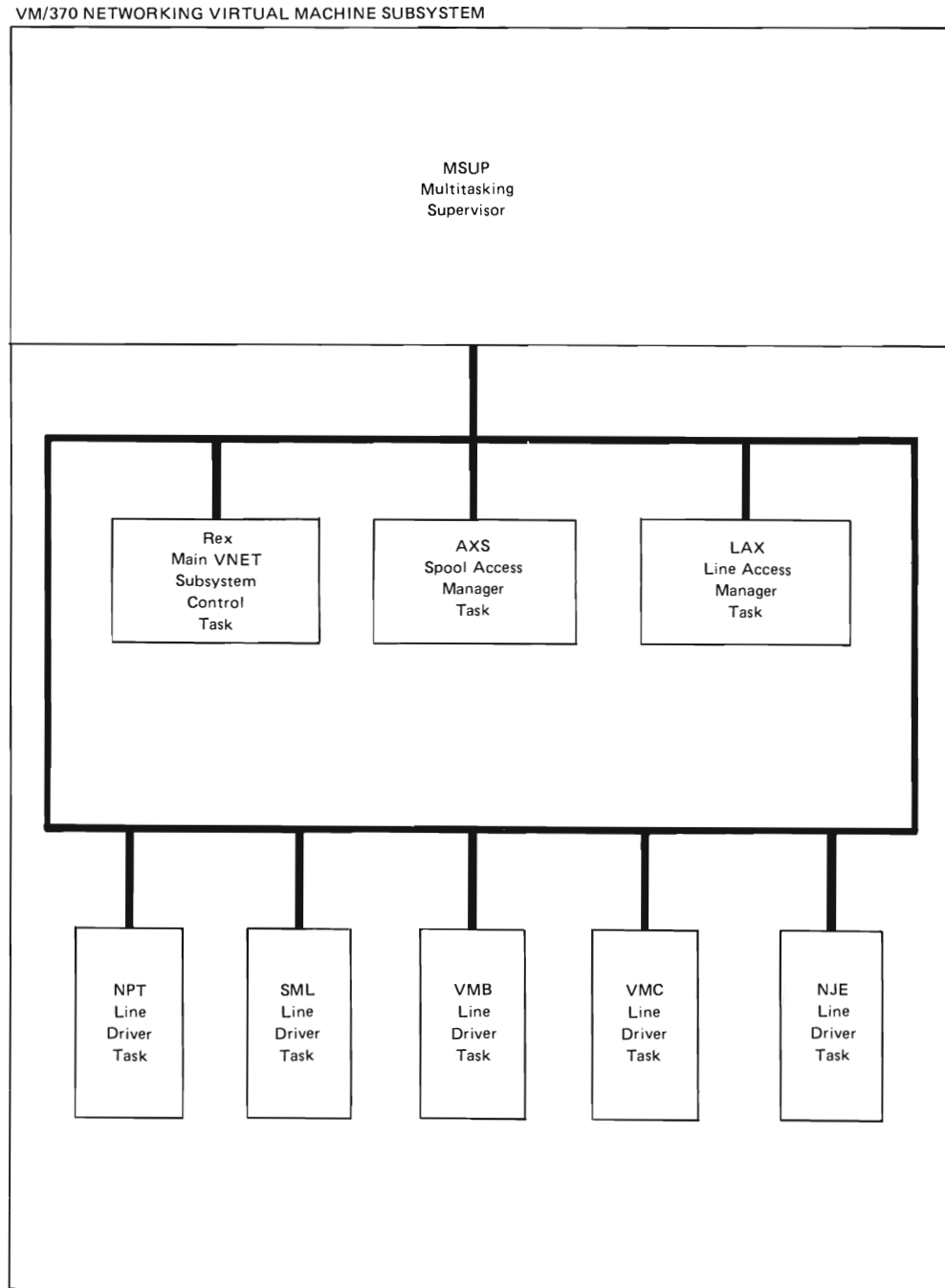


Figure 4. Components Of a VM/370 Networking Virtual Machine Subsystem

SYSTEM SUPERVISOR

The VNET supervisor supports multiple system control and line driver tasks that may be active at any one time. This includes multitask dispatching, the management of virtual I/O devices used by VNET, and the management of virtual storage required by each task.

SYSTEM CONTROL TASKS

The system control tasks provide common services to the line driver tasks and provide communication with the VNET operator. These services include command execution, message distribution, program check handling, VM/370 spool system interface, and communication line allocation.

LINE DRIVERS

Each line driver task manages the transmission of files to and from a single remote node or workstation and provides a communication link for remote operator commands. Due to functional and hardware differences in remote system and terminal equipment, each line driver is written to support a specific class of remote node.

SPOOL MULTI-LEAVING (SML) LINE DRIVER

MULTI-LEAVING is a term used to describe a communication technique used by the SML line driver operating under VNET. Basically, physical records that are input to MULTI-LEAVING are reduced to a series of character strings of two basic types: a variable length non-identical series of characters, and a variable number of identical characters. The segmentation of physical records into these character strings takes advantage of identical character compression. Multiple physical records (now in the form of character strings) are grouped into a single transmission block. The MULTI-LEAVING design provides for a bidirectional interleaved exchange of transmission blocks, each containing multiple data streams. For a detailed description of MULTI-LEAVING see VM/370 Networking PRPQ, Program Logic Manual.

The SML line driver, operating as a task under VNET provides VM/370 with support of MULTI-LEAVING, binary synchronous communications (BSC) line protocol for programmable remote stations. This enables:

- VM/370 users to have remote job entry access to HASP/ASP-type batch processing systems.
- Remote stations to submit source decks, data, and jobs, on cards, into the VM/370 spool system.
- VM/370 to send spooled output of virtual machine sessions to remote card punches and printers.
- Transmission of card decks between two remote stations supported by VNET.

- Remote stations to send job streams to a CMS Batch virtual machine (operating under the same VM/370 as VNET) and have the output returned to the originating or another remote station.
- Remote stations to submit source decks, data, and jobs, on cards, to another remote location running a HASP or ASP type batch processing systems.
- Remote stations to submit data files or a job to any system in the NJI network and receive job output at the remote station.

The following systems support MULTI-LEAVING RJE operation:

HASP II Version 4 (370H-TX-001)
 ASP Version 3.2 (360A-CX-15X)
 JES2 Component of VS2 Release 2 and above
 JES3 Component of VS2
 RES Component of VS1 Release 2 and above

Hardware Products Supported

The following systems are supported by the SML line driver as remote job entry stations into VM/370:

IBM System/360 Models 20, 22, 25, 30, 40, 50, 65, 75, 85, 195
 IBM System/370 Models 115, 125, 135, 135-3, 138, 145, 145-3, 148,
 155, 155 II, 158, 165, 165 II, and 168
 IBM 1130 System
 IBM System 3 Models 6, 8, 10, 12, and 15
 IBM 2922 Programmable Terminal
 IBM 3777 Communication Terminal Model 2 (as a System/360 Model 20
 MULTI-LEAVING Workstation)
 IBM System/32

When the SML line driver is operating as a remote job entry access system to a HASP/ASP-type processor, it communicates with any IBM system that supports the HASP/ASP MULTI-LEAVING transmission protocol.

Supported Functions

The SML line driver, operating under the control of the VNET supervisor, functions in one of two modes, specified at the time the line driver task is initialized:

RJE Mode: where the SML line driver functions as a job entry workstation to a remote HASP/ASP-type processor.

HOST Mode: where the SML line driver functions as the host to a remote MULTI-LEAVING programmable station.

Each SML line driver task controls a single communication line, or link. The task is started by the VNET operator, identified with a destination name, and provided with a leased or switched telephone line. The communication line is identified either by the VNET operator in the START command or derived from a table entry in VNET. On a switched line, a dial-up procedure from either end of the line establishes the connection.

The SML line driver operates with a slightly modified protocol depending on whether it is operating in RJE or HOST mode. In RJE mode, the type of remote host system, as designated in the START command or link parameter information in the VNET directory, determines the protocol to be followed. In HOST mode, the SML line driver follows a common protocol for all remote stations. The functional support is described below in the following categories:

- VNET operator functions
- Remote station operator functions
- Virtual machine user functions
- Input/output control
- Line allocation

VNET Operator Functions

The VNET operator controls the initialization and termination of the SML line driver task. He controls the spool files enqueued on his virtual reader in much the same way as the VM/370 system operator controls the spooling functions of VM/370. He can send or receive messages to and from the remote stations controlled by the SML line driver. Using the TRACE command, he can monitor the activity on the communications line and have that data logged on his operator console.

If the SML line driver is in RJE mode, the VNET operator can use the CMD ccommand to send any allowable workstation commands to the remote host system that is processing the data.

Remote Operator Functions

If the remote station is a HASP/ASP system (SML line driver in RJE mode), its functions with respect to the SML line driver are the same as they would be for any other HASP/ASP remote workstation. It accepts job streams for batch processing or ccommands affecting the processing from the SML line driver and directs job output, in punch or printer format, back to the SML line driver.

When SML is in HOST mode, the remote station operator has the ability to:

- Issue ccommands to the SML line driver to affect changes in the operation of his remote station.
- Provide a batch service, transmitting jobs to and receiving output from a batch virtual machine (OS, CMS BATCH, VM/370).
- Transmit and receive card decks through the SML line driver to and from another remote station supported by VNET and attached to the same VM/370 system.
- Transmit jobs and commands to a remote batch system through VNET using the Network Job Interface (NJI) and direct job output to any node or remote station in the network.

Virtual Machine User Functions

When the SML line driver is in RJE mode, the VM/370 user can submit job streams to a remote HASP/ASP type batch system. Punch and/or printer output, returned to the SML line driver, is directed to the real printer and punch.

When the SML line driver is in HOST mode, the VM/370 user can route the output of his virtual unit record devices to a remote MULTI-LEAVING programmable station. He can also have a card deck entered at a remote station and have it directed to his virtual machine reader.

Input/Output Control

The SML line driver uses the VNET supervisor I/O services to perform input/output operations on the BSC line to the remote terminal and to control the virtual reader and punch. The SML line driver uses the VNET supervisor console support facility to write messages to and receive commands and information from the VNET operator.

SML line driver communications I/O comprises five separate operations:

1. Control of the line when the task is idle. When the SML line driver reads the telecommunications control unit with a three-second timeout, the timeout is used to force periodic checking for the arrival of spool files to send.
2. Transmission procedure for sending files to the remote station.
3. The procedure for receiving files from the remote station.
4. Error analysis and recovery while transmitting to the remote station.
5. Error analysis and recovery while receiving from the remote station.

All input/output operations are executed following the 270x BSC protocol for the type, configuration, and features of the remote station as determined at task initialization time.

Line Allocation

The Line Allocator in the VNET supervisor allocates an appropriate line to the SML line driver during execution of the VNET START command. The line has either been designated by the operator in the START command, found in the VNET link table that contains the valid link definitions, or selected by the Line Allocator from a pool of switched lines set up at VNET system generation. When the SML line driver task requests

termination, the VNET supervisor automatically indicates that the line can be reassigned, effectively deallocating it. It is selected from the table of available lines by the allocator the next time a line is requested.

NPT LINE DRIVER

The NPT line driver, operating as a task under the VNET component of VM/370, provides VM/370 with support of binary synchronous communication (BSC) line protocol for nonprogrammable remote terminals. This allows:

- Remote users of VM/370 to enter source decks, data, and jobs, on cards, into the VM/370 spool system.
- VM/370 to send spooled output of virtual machine sessions to remote card punches and printers.
- Remote VNET stations to transmit card decks to one another.
- Remote stations to send job streams to a CMS Batch virtual machine operating under the same VM/370 and have the output returned to the remote station.
- Remote stations to submit jobs or commands to any node in the job network and direct the output to any node or remote workstation in the network. The default is return to origin.

Hardware Products Supported

The following devices are supported by the NPT line driver as remote nonprogrammable terminals:

IBM 2770 Data Communication System with the 2772 Multipurpose Control Unit

IBM 2780 Data Transmission Terminal, Models 1 and 2

IBM 3770 Data Communication System (nonprogrammable models) operating in 2770 BSC mode

Note: The 3770 is supported only when its communication line terminates in an Integrated Communications Adapter (ICA) on the System/370 Model 135, an IBM 2701, or an IBM 3704/3705 Communications Controller. The 3770 keyboard is not supported.

IBM 3780 Data Communications Terminal

Supported Functions

NPT is a line driver task operating under the control of the VNET supervisor. Each NPT task can drive one remote nonprogrammable station. In other words, each NPT task controls a single point-to-point communications line. The task is started by the VNET operator, identified with a destination name, and provided with a leased or switched telephone line. The communications line is either identified by the operator or derived from a table entry within VNET. The line is

then activated and the type of remote station and its configuration details are obtained from control cards entered at the remote station, or from a table entry within VNET. Once this initialization is accomplished, the terminal may then be used to submit files via the card reader and receive files on the punch and printer. The remote station operator can control input/output activity via control cards and standard station procedures. The VNET operator controls the operation with interactive commands from his console. The virtual machine user retrieves files sent to his virtual machine by using normal virtual card reader management programs and directs output to the appropriate station using the SPOOL and TAG commands of VM/370.

NPT operates with variations of the basic BSC protocol for each of the stations listed. The protocol is based upon the station identification information located in a SIGNON card read at initialization time. NPT functions are further described as follows:

- VNET operator functions
- Remote terminal operator functions
- Virtual machine user functions
- Input/output control
- Line allocation

VNET Operator Functions

The VNET operator controls the initiation and termination of the NPT task. He can control the spool files enqueued upon the VNET virtual machine in much the same way as the VM/370 operator controls the spooling function of VM/370. In addition, he can send and receive messages to and from the remote terminals controlled by NPT. Activity, on the communications line controlled by NPT, is logged on the VNET operator's console.

Remote Terminal Operator Functions

The remote terminal operator can:

1. Issue commands to NPT to affect changes in the operation of his terminal.
2. Provide a batch service, transmitting jobs to and receiving output from a batch virtual machine such as CMS BATCH.
3. Transmit and receive card decks, through NPT, to and from another terminal supported by VNET and attached to the same VM/370 system.
4. Transmit jobs, data files or commands to any node on the network and direct job output to any node or workstation on the NJI network.

Virtual Machine User Functions

The virtual machine user can:

1. Route the output of his virtual unit record devices to a remote nonprogrammable terminal.

2. Have a card deck entered at a remote nonprogrammable terminal and have it queued on his virtual machine reader.
3. Submit a job through VNET from his terminal and have the output directed back to a remote station.

Input/Output Control

NPT uses the VNET supervisor I/O services to perform input/output operations on the BSC line to the remote terminal and to control the virtual reader and punch. NPT uses the VNET supervisor console support facility to write messages to and receive commands and information from the VNET operator.

NPT communications I/O comprises five separate operations:

1. Control of the line when the task is idle. When NPT reads the telecommunications control unit with a three second timeout, the timeout is used to force periodic checking for the arrival of spool files to send.
2. Transmission procedure for sending files to the remote station.
3. The procedure for receiving files from the remote station.
4. Error analysis and recovery while transmitting to the remote station.
5. Error analysis and recovery while receiving from the remote station.

All input/output operations are executed following the 270x BSC protocol for the type, configuration, and features of the remote terminal as determined at task initialization time. Separate send and receive buffers provide for the interruption of long output files to allow the input of cards or commands. When the input transmission is completed, output transmission is resumed from the point of interruption. Transmission to a remote punch device is performed in transparency mode, if the transparency feature is available, while transmission to a remote printer is always performed in nontransparency mode with elimination of trailing blanks in each record. Print files are always translated in order to eliminate illegal characters that would force a transparent wait state on a teleprocessing control unit in nontransparency mode.

Line Allocation

The Line Allocator in the VNET supervisor allocates an available line to NPT as part of the execution of the VNET START command. The line has either been designated in the START command, found in the VNET link table, or selected by the Line Allocator from a pool of switched lines set up at system generation of VNET. When the NPT task requests termination, the VNET supervisor automatically indicates that the line can be reassigned, effectively deallocating it. It is selected from the table of available lines by the allocator the next time a line is requested.

VMB LINE DRIVER

This line driver is for the transmission of VM/370 spool files between VM/370 VNET facilities over binary synchronous communications lines.

DMTVMB communicates with another copy of itself using the file address as specified on the VM/370 TAG command (location, and userid) to determine the recipient virtual machine.

DMTVMB will support both print and punch file transmission between users operating on two different VM/370 machines or transmission from a VM/370 user to a real unit record device on a remote VM/370 machine.

DMTVMB requires no special operating instructions and supports the full VNET command language except for EACKSPAC, HOLD IMMED, and FWDSPACE count.

VMC LINE DRIVER

DMTVMC is a line driver intended for use over a channel-to-channel adapter (CTCA) connecting VM/370 machines running VNET. DMTVMC passes VM/370 4K spool page buffers to another copy of itself, using a specially designed protocol to optimize utilization of the channel-to-channel adapter without creating heavy I/O activity. The 4K block is read from the VM/370 spool system, transmitted across the CTCA and then written into the receiving machine's spool system in such a way as to minimize SIO execution. Like DMTVME, DMTVMC requires no special operating instructions, and supports the full VNET command language except for EACKSPAC, HOLD IMMED, and FWDSPACE count.

NJI LINE DRIVER

The NJI line driver is designed for communication between VNET and Network Job Interface or Network Job Entry compatible subsystems using binary synchronous communication lines or channel-to-channel adapter. These systems include HASP II Version 4.0, ASP 3.2, and JES2/NJE. DMTNJI supports the same types of file transmissions as DMTVMB. It also requires no special operating instructions and supports the full VNET command language except for EACKSPAC, HOLD IMMED, and FWDSPACE count.

VME/VMC/NJI COMMON FACTORS

These line drivers, operating as tasks under the VNET subsystem, provide for communication from VNET to NJI/NJE compatible subsystems as well as other VNET subsystems, over binary synchronous communication lines and channel-to-channel adapters. This provides VM/370 users capability:

- to submit jobs to a remote batch processor for execution.
- to direct the output from a job to any remote system or back to the users virtual machine reader.
- to route output to a remote batch system for processing and take advantage of special forms and output processing routines available at that system.

Products Supported

The following software products are supported as remote systems:

VM/370 Networking PRPQ 5799-ATA
JES2 Network Job Entry Facility Program Product 5740-XR8
ASP Networking PRPQ 5799-ATP
HASP Networking PRPQ 5799-ATC

Supported Functions

NJI/VMB/VMC are line driver tasks operating under the control of the VNET supervisor. Each line driver task can communicate with one remote system. In other words, each line driver task controls one communication adapter, either a binary synchronous line or channel-to-channel adapter. The functional support is described below in the following categories:

- VNET operator functions
- Remote system operator functions
- Virtual machine users functions

VNET Operator Functions

The VNET operator controls the initiation and termination of the line driver task. He can control the spool files enqueued upon the VNET virtual machine in the same way as the VM/370 operator controls the spooling function of VM/370. In addition, he can send commands and/or messages to any other remote system.

Remote System Operator Functions

The remote system operator can issue commands to effect the operation of the file transfer to his location at the directly connected system.

Virtual Machine User Functions

The virtual machine user can:

- Route the output of his virtual unit record output devices to any remote system for processing.
- Submit files to execute as jobs at remote batch systems.
- Receive files entered at remote systems real card readers at his virtual machine reader.
- Have output from a job executed at a remote batch system returned to his virtual machine reader, under user control, when this function is supported by the remote batch system.

Part 2 describes the elements involved in installing a VNET virtual machine. Two main areas are discussed:

1. Planning for VNET Installation
2. Installing VNET

This section describes the procedure for creating the VNET dynamic directory which defines your local VNET system and also the guidelines used for the selection of line drivers for a particular application.

THE VNET DYNAMIC DIRECTORY

Each VNET installation must specify the local definitions and options that pertain to its operation. To do so, the CMS editor is used to build a directory file with filename and filetype of 'VNET DIRECT'. This file must reside on the VNET system disk when VNET is IPLed. As part of its initialization, VNET reads the directory and builds its system control blocks according to the local installation specifications. No installation variable information needs to be specified with a VNET system load.

An installation may need to make minor modifications to its VNET directory on a normal day to day basis. Installations might find it convenient to allow multiple write access to the VNET system disk for the purpose of updating the VNET directory (and the PROFILE VNET initial command file), taking precautions to avoid concurrent multiple access while writing the VNET system disk. Because VNET never writes its system disk, and reads its system disk only during execution of operator commands, the directory may be updated during production VNET operation, and tested by simply IPLing the VNET system disk in the virtual machine being used for editing the updates. When this is done, the changes become effective on the next VNET virtual machine IPL. (Link and route definitions may normally be made immediately effective by use of the VNET operator DEFINE, DELETE, and ROUTE commands on the VNET operator console.)

VNET maintains information pertaining to directly connectable locations in its link table entries, and each indirectly connected location and its next direct link are identified in routing table entries. The VNET link and routing tables are dynamically constructed during initialization, according to the directory specifications. In addition to the link and route definitions included in the VNET directory, VNET automatically generates sixteen null link entries and sixteen null route entries which may be used to dynamically define links and routes during VNET operation by means of the DEFINE and ROUTE commands.

VNET will accept and enqueue a file for transmission if an empty tag slot is available; otherwise, the file is left pending, and cannot be managed through the VNET command language. Pending files increase operating overhead and are awkward to deal with in general. The provision for pending files is intended to manage an abnormal situation as gracefully as possible, and installations should seek to avoid that operating circumstance.

VNET builds its tag slots as part of its initialization. The number of tag slots built is at least as great as the sum of the tag slots reserved for exclusive use by links in the keep operands of the LINK directory control statements. More 'extra' tag slots may be generated, up to a limit which depends on the size of the VNET virtual machine's virtual storage. This limit is computed as one tag slot per 1024 bytes of virtual storage. Extra tag slot generation may be requested by means of the TAGS directory control statement. The number of extra tag slots

requested on the TAGS statement is added to the sum of the links' reserved tag slots, up to the virtual storage limit. If no TAGS directory control statement is included in the directory, a default request of one extra tag slot per 2048 bytes of virtual storage is assumed.

VNET DIRECTORY CONTROL STATEMENTS

The VNET directory control statements should be in the following formats, with one or more blanks as operand delimiters. All operands are positional from left to right. If any operand is omitted, all operands to the right of that operand in the statement must be omitted as well. Operands may be entered in columns 1 through 71. All data entered to the right of column 71, and all data entered to the right of the last possible operand are ignored. No continuation of VNET directory control statements is provided. Entirely blank records, and records having an asterisk (*) in column 1 are ignored, allowing these lines to be used for comments and print formatting.

If a directory control statement is found to be in error during VNET initialization, the erroneous statement and a diagnostic error message are typed on the VNET operator console, the erroneous statement is ignored, and initialization processing continues. The directory control statements must be grouped sequentially by type when multiple statements of the same type are entered. Excluding comments and blank records, the first directory control statement must be a LOCAL statement, defining the local VNET installation's location ID. If links are to be defined, all LINK statements must follow next. If default line driver initialization parameters are to be defined, all PARM statements must follow the LINK statements. If routes are to be defined, all ROUTE statements must be entered next. If allocatable switched telecommunications ports are to be included, all PORT statements must follow next. If extra file tag slots for enqueueing inactive files for transmission are to be requested, a single TAGS control statement must be entered next.

Example: A simple VNET directory might appear as follows:

```
*          DEFINE VNET INSTALLATION VARIABLES

LOCAL     VNETHSYS      7

LINK      CAMERIDG     DMTVMP      084  5
LINK      TDCSYS1     DMTVMB      096  5      TDC1 *    8
LINK      WORKSTA1    DMTSMI      *    7      WS1 *    4

PARM      WORKSTA1    M1

ROUTE     PALOALTO    CAMBRIDG
ROUTE     TDCSYS2     TDCSYS1
ROUTE     WCCSYS10    CAMBRIDG
ROUTE     WCCSYS11    CAMBRIDG

PORT      086
PORT      087

TAGS      512
```


use with the link depends on the type of remote telecommunications system involved. If driverid is not specified, or is specified as *, a default value of undefined is assumed, and the line driver type must be specified when the link is activated.

- port specifies the virtual device address (hexadecimal CUU) of a permanent telecommunications port to be used for communication on the link being defined. Valid virtual device addresses are hexadecimal two through 6FF. If port is not specified, or is specified as *, a default value of undefined is assumed, and the port address must be specified when the link is activated.
- zone specifies the number of time zone boundaries between the link's remote location and Greenwich to the east, the International Date Line being included as a time zone boundary. The zone number is used to convert System/370 time of day to date and time for use in messages to the remote location. Valid zone numbers range from decimal zero through 24. If zone is not specified, or is specified as *, a default value of zero (Greenwich Mean Time) is assumed.
- task specifies a task name for use by the line driver program associated with the link. Each VNET task must have a unique task name while it is active. Attempts to activate a link using a task name identical to the task name of a concurrently active task will fail with an error diagnostic message. Valid task names are one- to four-character alphanumeric characters. Task names reserved for VNET system control tasks are 'REX', 'AXS', and 'LAX'. If task is not specified, or is specified as *, the task name definition defaults to the first four characters of the specified linkid.
- class specifies the classes of files which may be transmitted by the active link. Valid class specifications are one to four one-character VM/370 spool classes, which may be A through Z, 0 through 9. Files will be transmitted in class order, left to right. If class is not specified, or is specified as *, a default class of * is assumed, allowing files to be transmitted independently of class.
- keep specifies the number of virtual storage file tag slots to be reserved for exclusive use by the link being defined. Valid keep specifications are decimal numbers from zero to sixteen. If keep is not specified, or is specified as *, a default keep specification of two is assumed.

PARM Control Statement

The PARM control statement defines a default parameter string of arbitrary text information to be made available to a line driver when a link is activated by means of a START command. The parameter string is generally used to specify processing modes or other options to a line driver, and its format and content are dependent on the type of line driver to be used. The parameter string specified in the PARM control statement may be overridden by the PARM parameter on the START command.

The PARM control statement must follow a LINK control statement or another PARM control statement. The PARM control statement must refer to a link which is defined by a previous LINK control statement, and only a single PARM control statement may be included in the VNET directory for a particular link. The format of the PARM control statement is:

```
PARM linkid [parmtext]
```

where:

linkid is the one- to eight-character identifier of the previously defined link to which the parameter string is to apply.

parmtext is any arbitrary character string, bounded by the leftmost and rightmost nonblank characters, which is to be interpreted as initialization information by a line driver at link activation time.

ROUTE Control Statement

Each ROUTE control statement defines a remote location with which the local VNET installation may indirectly exchange files, jobs, commands, and messages through one or more interconnected locations. The ROUTE control statement specifies the location ID for a single remote location to be defined, and the link ID of the link on which transmissions destined for the remote location are to be made.

The ROUTE control statement must follow a LINK or PARM control statement, or another ROUTE control statement. The link ID specified in the ROUTE control statement must have been defined in a preceding LINK control statement. The format of the ROUTE control statement is:

```
ROUTE locid linkid
```

where:

locid is the one- to eight-character location identifier of the remote location which is being defined for indirect communication.

linkid is the one- to eight-character link identifier of the link on which transmissions destined for the remote location which is being defined are to be made. This link must have been defined by a preceding LINK control statement.

PORT Control Statement

Each PORT control statement specifies a single switched BSC port that may be dynamically allocated for communication with a remote location at link activation time. Telecommunication ports may be defined for use with a particular link in a LINK control statement in the VNET directory, or as the object of a LINE keyword in a START command. If the port is not defined by either means, VNET will automatically search for an available switched port that has been defined by the PORT control statement in the VNET directory. If one is found it will be assigned to the newly activated link, and the operator will be notified of the assignment.

A PORT control statement must follow the LOCAL control statement, and any LINK, PARM, or ROUTE control statement, or another PORT control statement. The format of the PORT control statement is:

```
PORT vaddr
```

where:

vaddr specifies the virtual device address (hexadecimal CUU) of a switched (dialable) telecommunications port that may be dynamically allocated for communication to a remote location to which no leased line connection exists. Valid virtual device addresses are hexadecimal 002 through 6FF.

TAGS Control Statement

The TAGS control statement allows the VNET installation to request extra tag slots to be used to enqueue files for transmission. When VNET receives more files for transmission than can be enqueued in its available tag slots, the files are made pending. Pending files cannot be managed through the VNET command language.

The maximum number of tag slots that can be generated is computed as the size of the VNET virtual machine's virtual storage divided by decimal 1024 (one tag slot per K of virtual storage). The sum of the tag slots specified to be kept in link definitions plus the number of extra tag slots requested in the TAGS control statement are generated at VNET initialization, up to the maximum number of tag slots described above. If the number of extra tag slots requested in the TAGS control statement exceeds the maximum number of tag slots described above, the maximum number of tag slots is generated and a diagnostic error message is issued. Otherwise, if the sum of the link keep specifications plus the request from the TAGS control statement exceeds the allowable maximum tag slots, the maximum number of tag slots is generated and no diagnostic error message is issued.

The TAGS control statement must follow the IOCAL control statement, or a LINK, PARM, ROUTE, or PORT control statement. The TAGS control statement may be specified only once or omitted. The format of the TAGS control statement is:

```
TAGS nnnnn
```

where:

nnnnn specifies the decimal requested number of extra tag slots to be generated at VNET initialization time. This number represents the greatest number of files which may be concurrently enqueued in addition to those enqueued using tag slots specified to be kept in LINK control statements, assuming VNET virtual storage is sufficiently large to avoid truncation of tag slot generation. Valid requests for extra tag slots range from decimal 1 through 16384. A fixed length block of virtual storage must be reserved for each tag slot generated at VNET initialization.

VNET DIRECTORY EXAMPLES

This section illustrates minimum VNET directory examples for three simple networks. Each example presents the directory contents as viewed by each node in the network. These examples are designed to aid in the definition of your VNET system.

Figure 5 shows the simplest form of a job network consisting of two VM/370 systems connected via a teleprocessing line. This network contains two locations, NEWYORK and BUFFALO. The directory at location NEWYORK shows a LOCAL entry defining the location and the relative time zone of NEWYORK to Greenwich Mean Time (GMT). The LINK statement shows a direct communication path to location BUFFALO. This statement also defines the line driver type to be used for communication with BUFFALO. Note that this must match the line driver type shown on the LINK NEWYORK defined at location BUFFALO. The directory at location BUFFALO reflects a mirror image of the directory at NEWYORK, showing a LOCAL entry of BUFFALO and a direct communication path (LINK) to NEWYORK.

Figure 6 shows a three-node direct store and forward network consisting of three VM/370 VNET systems. These systems are interconnected via two telecommunications lines. Files destined for location MIAMI originating at CHICAGO must be stored and forwarded through location ATLANTA. The view of the network at location CHICAGO shows one direct communication path (LINK) to ATLANTA and one indirect communication path (ROUTE) to MIAMI through ATLANTA. The view of the network from ATLANTA shows direct paths (LINKS) to both CHICAGO and MIAMI thus no ROUTE statements are necessary. Finally location MIAMI shows a direct path to ATLANTA and an indirect path to CHICAGO through ATLANTA.

TWO NODE SIMPLE NETWORK

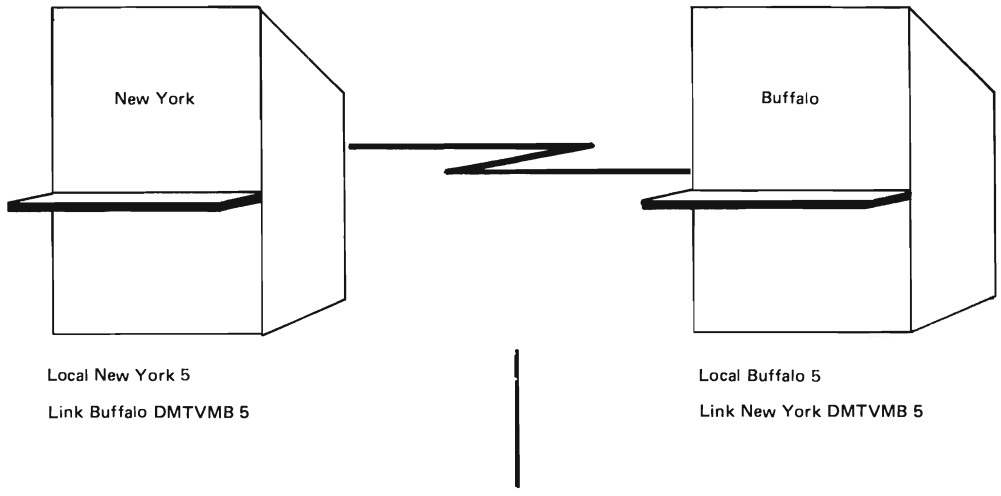


Figure 5. Two-Node Simple Network

THREE NODE STORE AND FORWARD NETWORK

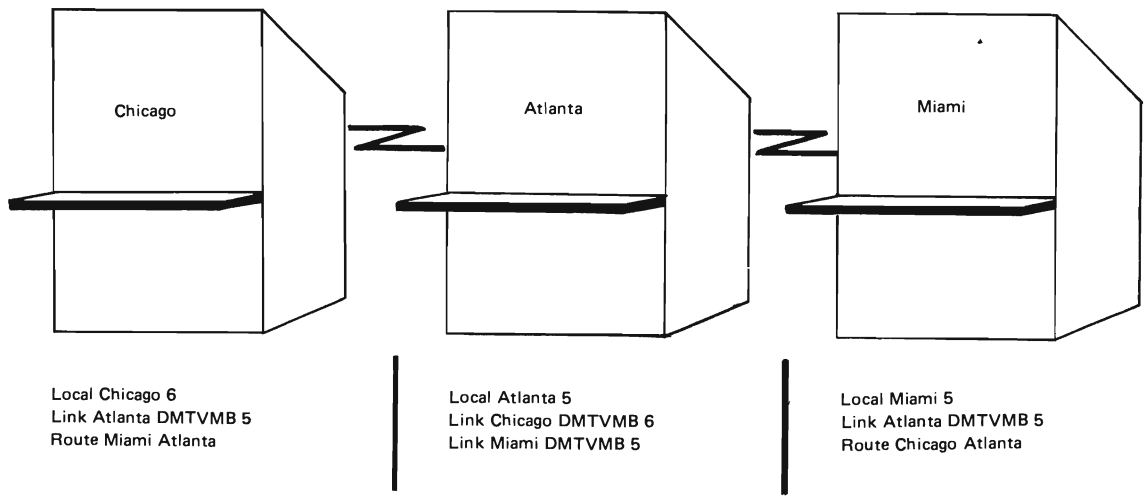


Figure 6. Three-Node Store And Forward Network

The final example shows a four-node VM/370 network interconnected via three telecommunications lines and one channel to channel adapter. This illustrates the ability to provide for alternate paths between two nodes in a VM/370 network. VNET provides for the definition of a direct path plus one indirect path to a given location. However, caution must be used in specifying the network definitions when multiple paths exist. When using alternate paths, the indirect path should be specified only on one end of the network connection.

For example, assume the NEWYORK directory contains an alternate path (ROUTE) to BOSTON via TORONTO and the TORONTO directory contains a route to BOSTON via NEWYORK. If the direct links between NEWYORK/BOSTON and TORONTO/BOSTON become inactive, a file destined for BOSTON would begin to loop. It would be continually transmitted between NEWYORK and TORONTO until a link from either location to BOSTON became active. Therefore as shown in Figure 7, the indirect path (ROUTE) to BOSTON is specified only at NEWYORK.

Similar examples could be shown for other paths in the sample network. Close coordination is necessary among the individual installations when defining a multi-system network.

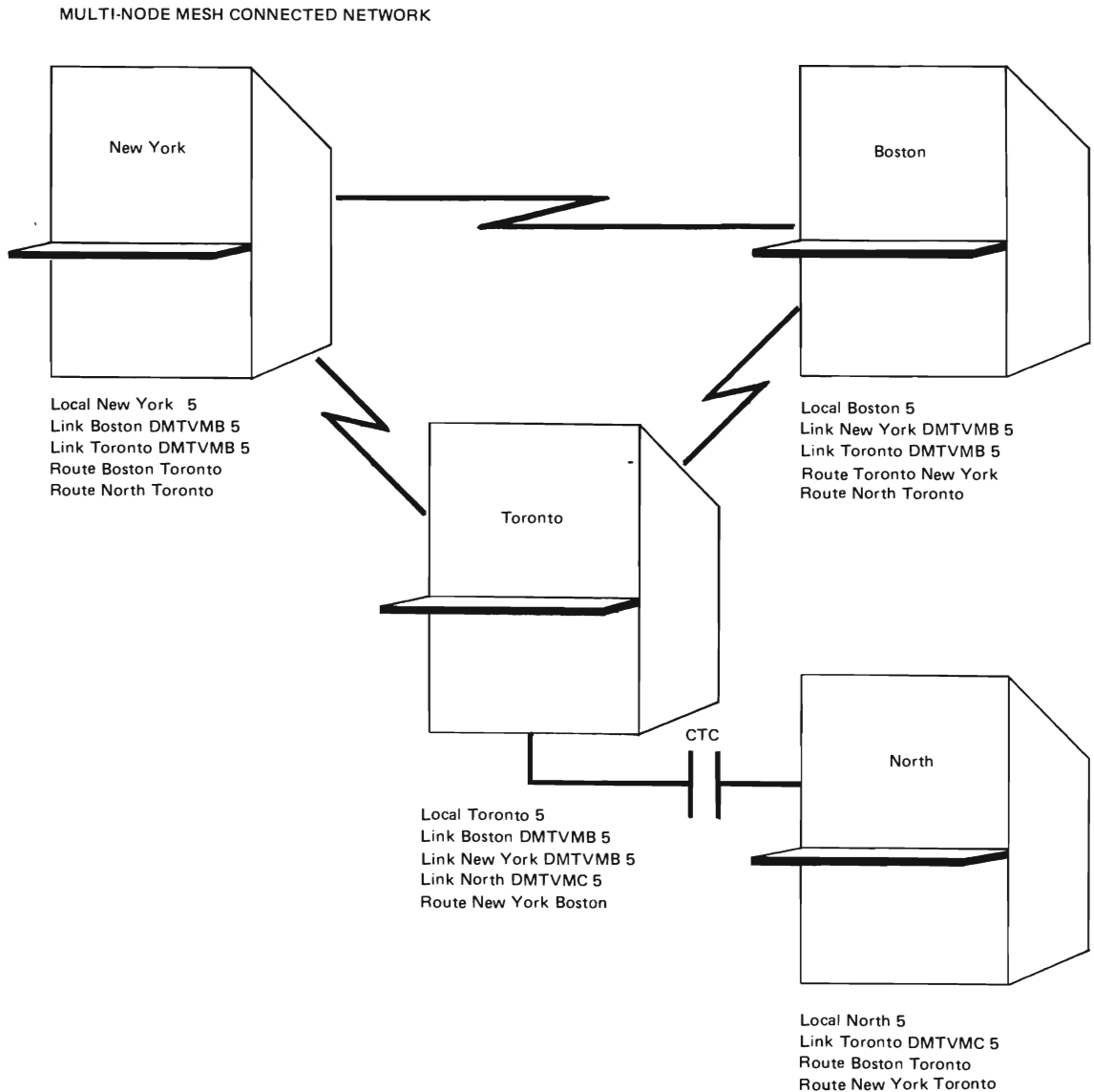


Figure 7. Multi-Node Mesh Connected Network

LINE DRIVER SELECTION

VNET provides the unique ability to manage many differing protocols among different links. Because of this flexibility the following guidelines are provided to assist the user in choosing the line driver to use between two locations:

- DMTNPT This line driver supports a 2770, 2780, 3770, or 3780 as a remote workstation to VNET.
- DMTSML This line driver supports a MULTI-LEAVING remote workstation attached to VNET. These include 1130, S/3, S/360, S/370, and 360/Model 20 systems used as workstations. This line driver can also be used to support the remote job entry of jobs into batch systems not supporting a job networking interface.
- DMTVMB This line driver supports VM/370 to VM/370 communications over binary synchronous communication lines.
- DMTVMC This line driver supports VM/370 to VM/370 communications over a channel-to-channel adapter.
- DMTNJI This line driver supports communications between VNET and Network Job Interface or Network Job Entry systems through binary synchronous communication lines or channel-to-channel adapter. These include HASP II Version 4.0, ASP 3.2, and JES2/NJE systems.

NOTE: Two VNET systems can communicate using the DMTNJI line driver. This is not recommended as a regular method of communication between VNET systems due to the protocol advantages inherent in the DMTVMB and DMTVMC line drivers. This method of communication could be used as a test of the line driver and communications equipment prior to connection with an NJI or NJE batch system.

In every case, the line driver used on a particular link must be compatible with the protocol used by the remote node. When the remote system is not another VM/370 VNET virtual machine, there will probably be only one line driver which may be used; DMTNJI, DMTSML or DMTNPT.

ACCOUNTING INFORMATION

DMTAXS text file is generated by the VNET Preloader using a loadlist named DMTAXS EXEC that contains two entries:

```
&1 &2 DMTAXM
&1 &2 DMTAXA
```

DMTAXM is the main DMTAXS module, containing the body of the spool file manager. DMTAXA is the name of the accounting routine that produces accounting records for files handled by VNET. This routine may be modified or replaced on a local basis to meet individual installation requirements. It is distributed as a default accounting routine with VNET. It uses the VM/370 diagnose x'4C' to enter virtual user accounting records into the CP accounting card output. The format of the accounting record produced by the supplied DMTAXA is shown in Part 1 of this manual under Accounting Record Provision.

INSTALLATION CONSIDERATIONS

USE OF TWO-LEVEL REMOTE ADDRESSING

The destination address structure in VNET allows for the use of a two level network address. This feature allows for a locally defined link to be addressed from other locations without having to be defined throughout the network. When a file is received at a destination VNET location, the userid parameter on the initial user TAG command is first checked against valid links defined at that location. If a matching link ID is found, the file is then routed to that locally defined link. If no link ID match is found, the file will be spooled to the specified virtual machine user ID.

Note: If a user ID is identical to a link ID at its VNET location, any attempt to address a file to that user ID causes the file to be transmitted on the link and produced as real output at the directly connected remote station.

INSTALLATION REQUIREMENTS

The update supplied with the installation tape for VNET for CP module DMKVSP must be applied to a VM/370 system for successful use of the VM-to-VM line drivers, DMTVME and DMTVMC, in combination with the Network Job Interface line driver, DMTNJI.

This update allows for imbedding of application data to be placed in the VM/370 spool system as a NOP (X'03') record. Current VM/370 discards the data associated with a NOP CCW. NOP records included in spool files, such as the current tag record, do not appear when spool files are read in virtual simulated readers or processed on real unit record output devices, but are accessible to programs using the CP diagnose read interface.

VNET requires the facilities of VM/370 Rel 3. Also required are any telecommunications facilities needed to establish a transmission path between nodes. In addition to the VM/370 DASD and spooling facilities, approximately 30 cylinders of 3330-type direct access storage space is required.



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GENERAL INFORMATION

The data and control files required to generate and install VNET are contained on the VNET distribution tape.

The distribution tape contains the following CMS files:

<u>File</u>	<u>Contents</u>
VNET NUCLEUS	The pre-assembled and generated nucleus supervisor routines required for VNET.
VNET DIRECT	A sample VNET directory.
PROFILE VNET	A sample profile command sequence.
DMTAXS TEXT	The preloaded spool file access method supervisor task.
DMTLAX TEXT	The communication line allocation supervisor task.
DMTNJI TEXT	The Network Job Interface (NJI) preloaded line driver module.
DMTNPT TEXT	The Nonprogrammable Terminal (NPT) line driver module.
DMTSML TEXT	The Spool MULTI-LEAVING (SML) line driver module.
DMTVMB TEXT	The VM-to-VM BSC (VMB) line driver module.
DMTVMC TEXT	The VM-to-VM CTCA (VMC) line driver module.
DMTLOAD EXEC	The loadlist EXEC file. This file is required to generate an VNET nucleus on the VNET system disk.
DMTMAC MACLIB	The file containing all the macros and copy files needed to assemble the VNET source files.
VNET CNTRL	The control file that is needed to assemble the VNET system via the VMFASM EXEC procedure.
DMTxxx ASSEMBLE	All the source files for VNET. There is an ASSEMBLE file for each TEXT file included in the loadlists (DMTLOAD EXEC, DMTNJI EXEC, and DMTAXS EXEC), and for each TEXT listed above, except for DMTNJI TEXT and DMTAXS TEXT which are generated by the preloader from the TEXT files included in the DMTNJI EXEC, and DMTAXS EXEC loadlists respectively.
DMTMAC EXEC	An EXEC file used to generate the DMTMAC MACLIB.
DMTAXS EXEC	The DMTAXS TEXT loadlist EXEC FILE. This file is required to preload the DMTAXS Spool Access Manager text file.

DMTNJI EXEC The DMTNJI TEXT loadlist EXEC FILE. This file is
 required to preload the DMTNJI line driver text file.

xxxxxxxxx MACRO
xxxxxxxxx COPY Source files for the corresponding entries in the
 DMTMAC MACLIB library.

DEFINING YOUR VNET VIRTUAL MACHINE

You need the VNET virtual machine defined when you generate VNET. This virtual machine must have at least 384K of virtual storage, a console, and a 5-cylinder VNET system disk with a write password.

If you did not include an entry in your VM/370 directory for the VNET virtual machine, you must add one now. See "VM/370 Planning and System Generation Guide" for a description of the Directory program, including the control statements necessary to define a virtual machine. Add the newly coded control statements to the existing directory file, and assemble and load the new VM/370 directory.

A suggested VM/370 directory entry for an VNET virtual machine is:

```
USER VNET password 512K
ACCOUNT NUMEER EIN17
OPTION ACCT
IPL 191
CONSOLE 009 3215
SPOOL C 2540 READER A
SPOOL D 2540 PUNCH A
SPOOL E 1403 A
LINK CMSSYS 190 190 R
MDISK 191 3330 81 5 ULISK1 W password
DEDICATE 078 078
DEDICATE 079 079
DEDICATE 07A 07A
DEDICATE 570 570
```

If the ACCT option is specified, VNET accounting records will be generated along with other CP accounting card records. If VNET accounting is not desired, it may be suppressed by excluding the ACCT option from the VNET virtual machine definition. If automatic IPL upon LOGON is not desired, the IPL directory control statement should be removed. If automatic IPL is desired and the VNET system disk is at an address other than 191, the IPL control statement should specify the virtual disk address which is to be used.

VNET automatically adapts to any virtual storage size of 384K or greater. The larger the specified virtual storage, the greater the number of line drivers that may be concurrently active, and the greater the number of default tag slots that will be automatically generated at VNET initialization.

The ECMODE option is not required and not recommended for the VNET virtual machine.

GENERATION PROCEDURE FOR VNET

Before you perform the generation procedure, be sure you have the following:

- The VNET Distribution tape
- A VM/370 directory entry for your VNET virtual machine
- A VM/370 directory entry for the software system support virtual machine (for example, the MAINT entry supplied with the VM/370 starter system directory).

You can use a 2314, 3330, 3340, or 3350 disk as the VNET system disk. The VNET nucleus occupies two cylinders on a 2314 or 3340, and one cylinder on a 3330 or 3350 disk.

The following system generation procedure for VNET assumes you have the MAINT virtual machine supplied with the VM/370 starter system in your VM/370 directory.

If you wish to generate and run RSCS and VNET concurrently, care should be taken to isolate the installation and maintenance files of the two systems on two separate user disks. Module names, libraries, and update procedures are, for the most part, identical for the two systems. If the two systems' data areas are not kept separate, the results are unpredictable.

VNET is distributed on a reel of tape containing the necessary files. The first file contains the VMFPLC module in tape dump format. VMFPLC is used to load the final files of the tape. The exact contents of the tape are listed in the Program Directory which is shipped with each VNET system tape. The final files contain the following:

- The files necessary to construct a default VNET system. This includes a VNET nucleus ready for installation on the VNET system disk, text decks for all line drivers, a sample VNET directory, and a sample PROFILE VNET initial operator command sequence.
- DMTxxx files of filetype ASSEMBLE containing the VNET source.
- The COPY and MACRO files contained in the DMTMAC maclib.
- The DMTMAC maclib.
- Required utility files for VNET: VNET CNTRL, DMTLOAD EXEC, DMTAXS EXEC, DMTNJI EXEC, DMTMAC EXEC, PRELOAD MODULE.
- An update to module DMKVSP in CP which is required for correct management of files which are to traverse any NJI link.

Step 1. Logon as MAINT and IPI CMS: To build the VNET nucleus, you must logon the software system support virtual machine (MAINT) and IPL the CMS system.

File 2 of the VNET distribution tape contains all the files necessary to construct a standard VNET system. If you wish to install an unmodified VNET system, you may do so by simply loading this file onto the VNET system disk. No assemblies are required to install VNET unless local modifications are to be made. The remaining files on the distribution tape contain source and macros needed to assemble updated modules. The

instructions on the following pages describe the simplified installation procedure for an unmodified VNET system. Users wishing to include local modifications in their VNET systems may do so using this description and the following section entitled "VNET Maintenance."

Step 2. Attach and Load the VNET Tape: Mount the VNET tape, if it is not already mounted. Then you must attach the real tape drive to your CMS virtual machine (MAINT). For example:

```
attach 280 to maint as 181
```

The VNET tape must be at address 181 because the TAPE command by default expects to find it at that address.

With the 191 minidisk that belongs to MAINT accessed as your A-disk, rewind and load the tape:

```
cp rewind 181
tape load
```

CMS responds with the following message:

```
LOADING...
VMFPLC  MODULE  A
END-OF-FILE OR END-OF-TAPE
```

Step 3. Format the VNET System Disk: You must link to the VNET system disk and format it. If you used the suggested VM/370 directory entry for the VNET virtual machine, your LINK command is:

```
link to vnet 191 as 195 w pass= password
```

This makes the VNET system disk (address 191 in the VNET virtual machine) available at virtual address 195 in the MAINT virtual machine. Remember the address you specify for MAINT. You must use this same virtual address later in the VNET generation procedure. (You use 195 when you build the VNET nucleus in Step 7.) Then, format the VNET system disk.

```
format 195 a
```

Next, format the VNET system disk again. You must use the recompute function of the FORMAT command to make the last cylinders of the VNET system disk unavailable to the CMS file system. The last one or two cylinders contain the VNET nucleus. If the VNET system disk is a 2314 or 3340, the last two cylinders are needed for the nucleus. For a 3330 or 3350, only the last cylinder is needed. The FORMAT command for a 2314 or 3340 VNET system disk is:

```
format 195 a 3 (recomp
```

The FORMAT command for a 3330 or 3350 VNET system disk is:

```
format 195 a 4 (recomp
```

Step 4. Load the default VNET system:

```
cp rew 181
tape fsf
vmfplc load
```

Step 5. Modify the supplied VNET Directory: You can use the CMS Editor to modify the supplied VNET directory, 'VNET DIRECT', to describe your local VNET configuration. The format of the entries in the VNET directory are described in a preceding section, "The VNET Dynamic Directory."

The following shows the sample directory which is supplied on the distribution tape:

```
*****
*
*          LOCAL LOCATION ENTRY
*
*****
```

```
LOCAL      HOME
```

```
*****
*
*          LINK DEFINITIONS
*
*****
```

```
LINK      NPTTEST      DMTNPT
LINK      SMITEST      DMTSML
LINK      NJITEST      DMTNJI
LINK      VMTTEST      DMTVME
LINK      VMCTEST      DMTVMC
```

Step 6. Modify the supplied PROFILE VNET: The supplied PROFILE VNET initial startup command file may be modified using the CMS editor to automatically issue any sequence of VNET commands at VNET IPL time.

Any legal VNET command may be entered in the command sequence. The use of a dash (-) as the first character of a command line included in a VNET automatic executor file will suppress the printing on the VNET operator console of the DMTREX679I message, which includes the command line, as the command executes. This feature is intended to be used to suppress printing of comment lines and of password information supplied in the parameter fields of START commands included in automatic execution VNET command sequences.

The following shows the default PROFILE VNET supplied on the VNET distribution tape:

```
*****
*
*          DEFAULT CP COMMAND SETTINGS
*
*****
CP SET IMSG OFF
CP SET EMSG TEXT
CP SPO CON START
```

Step 7. Install the VNET nucleus on the VNET system disk: The VNET nucleus must now be placed in your virtual machine reader before it is written to the VNET system disk. The following sequence of commands should be used:

```
CP CLOSE RDR
CP PUR RDR ALL
CP CLOSE PUN
CP PUR PUNCH CI A
CP SPO 00D TO * CI A
PUN VNET NUCLEUS (NOH
CP CLOSE RDR
CP SPO 00D OFF
CP IPL 00C CLEAR
```

This final command will load the VNET nucleus. You receive the following messages:

```
DMTINI411R SYSTEM DISK ADDRESS =      195
DMTINI412R REWRITE THE NUCLEUS ?      yes
DMTINI413R NUCLEUS CYL ADDRESS =      003 (004 for a 3330 or 3350)
```

Your responses to the messages are shown to the right of the messages above. You respond with the address of the VNET system disk, 195 in this case. You always respond with the same address you specified as vaddr2 when you were prompted for link parameters. The nucleus cylinder address is the same number that you specified in the FORMAT 195 A n (RECOMP) command in Step 3, and depends upon the device type of the VNET system disk in use.

After a brief pause, you will have written an IPLable VNET nucleus to the VNET system disk, as indicated by the message:

```
DMTINI410I NUCLEUS WRITE COMPLETE
CP ENTERED; DISABLED WAIT PSW '00020000 00000012'
```

You may now LOGON the VNET virtual machine, IPL the VNET system disk, and start your VNET operations.

VNET MAINTAINANCE

Standard VM/370 maintenance procedures are used to maintain the VNET system. VMFASM can be invoked to assemble any VNET source module using the supplied VNET control file. Also, a Release 3 DMKMAC maclib must be accessed for assembly of VNET modules. The loadlist DMTLOAD should be used when regenerating the VNET nucleus.

The DMTNJI line driver is a multi-module line driver distributed with VNET. The VNET preloader is used to construct DMTNJI TEXT from its component modules, DMTNCM, DMTNHD, and DMTNIT, using the following command:

```
PRELOAD DMTNJI VNET
```

'DMTNJI' specifies the name of an EXEC file loadlist which includes entries for each module comprising the DMTNJI line driver. 'VNET' specifies the CNTRL control file to be used for specification of TEXT and TXTxxxx file selection priority.

The spool access manager DMTAXS is also a multi-module task. The VNET preloader is used to construct DMTAXS TEXT from its component modules DMTAXM and DMTAXA, using the following command:

```
PRELOAD DMTAXS VNET
```

'DMTAXS' specifies the name of an EXEC file loadlist which includes entries for each module comprising the spool access manager DMTAXS. 'VNET' specifies the CNTRL control file to be used for specification of TEXT and TXTXXXX file selection priority.

THE VNET PRELOADER

The preloader is a VNET utility program that runs under CMS. The preloader collects multiple text files and reformats them into a single text file that can be dynamically loaded by the VNET loader. The preloader resolves external references and performs preliminary relocation of address constants. Its function is somewhat similar to that of existing link editors, except that its output is in standard text file format and does not include multiple CSECTS. Line drivers and other programs to be loaded as VNET tasks may be developed as multiple separate assembly modules which externally reference one another, and the assembled text files may be merged into a single VNET loadable text file by the preloader under CMS. The preloader is invoked as an ordinary CMS utility routine, using the following calling sequence:

```
PRELOAD loadlist (control)
```

'Loadlist' specifies the filename of an EXEC file which must be resident on the caller's A-disk. Each record of this file contains the filename, and optional filetype, of a text (object) file to be used as preloader input. 'Control' specifies the filename of a CNTRL file which must also be resident on the caller's A-disk if it is specified. The format and interpretation of this file are the same as for the VM/370 VMFLOAD utility. If a load list entry includes a filetype, that filetype is used to identify the input file. Otherwise, if a control file is specified, input file identifiers are constructed using the filename from the load list entry and a filetype of the form 'TXT....' The highest control level identifier for which a file can be located on the caller's accessed disks is used. If no filetype is included in a load list entry and no control file is specified, a default filetype of 'TEXT' is used. Input files are located by a scan of all the caller's disks in their access order.

The preloader output consists of two files, one with a filetype of 'TEXT', the other of filetype 'MAP', both with the same filename as that specified for the input load list. If either of these files already exists on the caller's A-disk, the old file is replaced by the new output file.

The output TEXT file is the merged and linked copy of the input files. The first CSECT or private code section encountered in the input will become the composite (single) output section, with a length which is the sum of all input section lengths (rounded up to doubleword multiples between sections as necessary for proper section alignment). For the output ESD, subsequent CSECTS are made into entries (LDs), and subsequent private code sections are disregarded. External references are included in the output ESD only if they remain unresolved.

Input TXT records of non-zero length are relocated and written to the output file. The output RID is an appropriately translated and relocated collection of all input RID records. The output END card does not specify any entry point, section length, or other code. No sorting is done by the preloader. In general, each output ESD, TXT, and RLD entry appears in the same order as the input entry from which it was translated.

ADCON and VCON fields are relocated within their TXT records. The use of ORG statements which cause relocatable constant fields to overlay or to be overlaid will probably produce results that differ from results obtained with a loader that completes TXT data loading prior to relocating ADCONs and VCONs.

The output MAP file is a printable record of the preloader processing, similar to a load map. The first line of the map specifies the output text file name, its residence volume label and virtual device address, and the date and time of file creation. The next section of the map is a listing of the control file used, if one was specified. The remainder of the map consists of a sequence of input file sections, one for each input file in processing order.

The first line of a map input section specifies the input file's filename, filetype, filemode, residence volume label and virtual device address, and the file creation date and time. (If the input file was located on a disk which was accessed as a 'read-only A-disk extension', the filemode, volume label, and virtual device address of the A-disk will be listed.) If invalid records are encountered in the input file data, they are written in the map sequentially following the input file identification line. The VM/370 VMFASM utility enters such 'invalid' records in text files to specify the updates and macro libraries used in assembly. Following these records, the input file's ESD is listed, including control sections and entries with their relocated addresses, duplicate external symbols, and unresolved external references, if any. The first control section encountered in the input specifies the output control section name; the output section length is included on this ESD map entry.

The preloader does not actually load its input modules into storage before generating its output section, but rather interprets, translates, and relocates its input text files on a two-pass record by record basis. This approach requires that for each TXT record of a particular input control section, each RID entry (one for each ADCON and VCON) which lies within that control section must be scanned to determine if it lies within the TXT record data. As a result, the preloader processing time has a component which is proportional to both the total number of TXT records and the total number of RLD entries for each input control section. Roughly stated, this means that when a particular input control section grows sufficiently large, the time required to process it becomes proportional not to the input control section size, but rather to the square of that size. This effect is likely to be most pronounced when a rather large text file which had been previously generated by the preloader is used as preloader input. In this case, much more CPU time may be required to reprocess the preloader output than was required to generate it in the first place, because several smaller control sections have been merged into a single large control section. This kind of program behavior can be expected, and does not indicate any kind of malfunction.

To speed preloader execution, relatively small (about 4K) input modules are recommended. Modules with unusually large numbers of relocatable constants should be kept especially small, and module size is less important for modules with unusually small numbers of relocatable constants.

Part 3 describes the operation of a VNET system. The main areas included are:

1. A general description of the operation of a VNET system.
2. A description of the specific procedures needed to operate a VNET system.



VNET OPERATOR COMMANDS

The VNET operator controls the functioning of the local VNET facility. He can:

- Manipulate the status, transmission priority, class and order of files owned by the VNET virtual machine.
- Initialize, suspend, or terminate transmission of files to remote terminals and stations.
- Reposition or restart files currently being transmitted.
- Send messages to remote terminals, stations and other nodes in the network.
- Send commands to remote batch processing systems.
- Query file, link or system information.
- Monitor link activity for any directly connected remote location.

File attributes and the parameters describing them in the VNET command language have maximum and default values identical to those of the VM/370 command language. Because many of the VNET operator commands are available to remote station operators, only brief descriptions of the commands that apply to the VNET virtual machine are included in this section. The commands are grouped in a general chronological sequence as the operator would use them. A complete description of all commands, with detailed format, can be found in "Appendix A: VNET Commands".

The commands available to the VNET virtual machine operator fall into four general classifications: link and line control, file control, communication and miscellaneous.

LINK AND LINE CONTROL COMMANDS

There are nine commands available to the VNET operator to manage the links and lines used for file transmission: DEFINE, ROUTE, DELETE, START, DRAIN, FORCE, HOLD, FREE, and SHUTDOWN.

The DEFINE Command

Use the DEFINE command to temporarily add a new link entry to the list of valid links (link table) for the local VNET installation, or to temporarily redefine an existing link definition. (Permanent link definitions or redefinitions can only be made by modifying the VNET Directory.) A link definition, with a link identifier equal to the location identifier of a remote station, must exist in the VNET link table before any transmission of files, to or from that remote station, can occur.

The DELETE Command

Use the DELETE command to temporarily delete a link definition from the VNET link table. (Permanent link deletions can only be made by deletion from the VNET Directory.) The link to be deleted must be inactive (drained or not started), and must have no unprocessed files addressed to it. Files subsequently addressed to a deleted or undefined link are purged from the system.

The ROUTE Command

Use the ROUTE command to define, modify, or delete an entry in the VNET routing table. Files are automatically requeued following execution of a route command, so that transmission of rerouted files can begin immediately.

The START Command

Use the START command to activate a particular inactive link. Certain keyword options may also be entered to temporarily override the link definition in the link table. This command may be issued to an active link but solely for the purpose of altering the class of files to be processed on that link or to reset a DRAIN operation before it has completed.

The DRAIN Command

Use the DRAIN command to deactivate an active link. If the link is currently processing a file, the link is deactivated when the current file has completed processing. If no file is being processed, the link is deactivated immediately.

The FORCE Command

Use the FORCE command if the DRAIN command fails to deactivate a link. The FORCE command causes immediate deactivation of the specified link and termination of its line driver task regardless of the status of file processing.

The HOLD Command

Use the HOLD command to temporarily suspend file transmission on an active link without deactivating it. Transmission is suspended at the end of the file currently being processed unless a keyword is entered signifying that transmission is to be halted immediately. In either case, transmission is restarted at the interrupted point when the FREE command is issued.

The FREE Command

Use the FREE command to resume transmission on a link previously in HOLD status.

The SHUTDOWN Command

Use the SHUTDOWN command for normal termination of VNET operations. SHUTDOWN effectively issues a DRAIN command to each currently active link.

FILE CONTROL COMMANDS

Files that are sent to the VNET virtual machine for transmission are put into the file queue assigned to the particular link to which the file is addressed. The VNET operator can use four commands to control these files while they are waiting to be transmitted: CHANGE, ORDER, REORDER, TRANSFER, and PURGE. These are defined as inactive files. He can also use four other commands to control files that are currently being transmitted: FLUSH, CLOSE, BACKSPAC, and FWDSPACE. These are defined as active files.

The CHANGE Command

Use the CHANGE command to alter one or more file attributes of a file owned by the VNET virtual machine, enqueued on some link's file queue, and not currently active.

The ORDER Command

Use the ORDER command to reorder the files enqueued on some link's file queue. This redefines the order in which particular files are processed. A file currently being processed cannot be reordered.

The REORDER Command

Use the REORDER command to cause all inactive files controlled by VNET to be reaccepted and routed. It is normally not used by the VNET operator but by VNET during internal operations. See command descriptions for details of REORDER usage.

The TRANSFER Command

Use the TRANSFER command to redirect specified inactive files enqueued on a link to a new destination. This causes VNET to dequeue them from the specified link and enqueue them on the link associated with the new specified destination.

The PURGE Command

Use the PURGE command to remove all or specified files, enqueued on a link, from the system before they are processed. A file currently being processed cannot be purged.

The FLUSH Command

Use the FLUSH command to discontinue processing the current file on a specified link. The discontinued file is either purged or held and link processing continues with the next file enqueued for transmission on that link. If the COPY attribute for the file specified multiple copies, only that current copy is discontinued unless the discontinuance of all copies for the file is also specified.

The CLOSE Command

Use the CLOSE command to clear the files if a link unexpectedly becomes inactive while processing active files. Active input files are reenqueued as inactive and later retransmission begins at the start of each input file. Active output files are purged.

The BACKSPAC Command

Use the BACKSPAC command to restart or reposition, in a backward direction, the file currently being processed on the specified link.

The FWDSPACE Command

Use the FWDSPACE command to reposition, in a forward direction, the file currently being processed on the specified link.

COMMUNICATION COMMANDS

The VNET operator can communicate with a remote station via the CMD or MSG commands. The choice of command used depends on the interpretation to be given to the text portion of the command.

The CMD Command

Use the CMD command to control functions performed by a remote system such as a HASP or ASP type batch processor, a remote VNET system, or a remote NJI compatible system.

The text portion is interpreted as a remote system command and is made available to the line driver for the next transmission. The functional meaning of the text depends on the nature of the remote system that receives the command. For example, if the remote system is a HASP or ASP type processor, the text would be:

```
$ Hasp cmd
```

```
--or--
```

```
* Asp cmd
```

For information on the allowable commands, refer to the appropriate subsystem system manuals listed in the Preface.

The MSG Command

Use the MSG command to send a message (as opposed to a command) to a remote station operator, remote VNET system operator, remote NJI system operator, or remote virtual machine user. The text portion is made available to the line driver for the specified link.

MISCELLANEOUS COMMANDS

Seven other commands are available to the VNET system programmer and operator to monitor and control the local network. They are:

The * (comment) Command

Use the * command to place comments or notations on the VNET operator console listing. It is accepted by the command processor but performs no function.

The CP Command

Use the CP Command to pass any permitted commands to the VM/370 Control Program without leaving the VNET environment.

The DISCONN Command

The DISCONN command is used by the VNET operator to disconnect his console from the VM/370 system while VNET continues to operate. An optional userid may be entered in the command line to specify the virtual machine that is to receive all VNET operator console output lines. If no virtual machine is specified, the VNET console output lines are discarded without being printed.

The EXEC Command

Use the EXEC command to execute frequently used sequences of VNET commands. The commands are stored in a CMS file on the VNET system disk with a file type of VNET.

The HT Command

Use the HT command to suppress the printing of any unwanted messages that are stacked for output to the VNET operator's console.

The QUERY Command

The QUERY command is used to request VNET system status information to be printed on the VNET operator console or remote station printer. The information requested can be for a particular link, a specific file, or for the system in general.

LINK INFORMATION: For a particular link, the operator can request status, activity, default, file, or queue information.

Status information includes activity status, type of line driver, line address, classes of files to be processed, HOLD status, DRAIN status, TRACE status, number of files in queue and number of files waiting to be queued.

Activity information includes the VM/370 spool file ID, originating VM/370 spool file ID, destination location and user ID, spool file class, file transmission priority, number of file records left to transmit, and total records, of the file currently being transmitted.

Default information includes task name, type of line driver, line address, classes of files to be processed, time zone identifying digit, and number of virtual storage file tag slots reserved for the specified link.

File information includes the number of files being transmitted, the number of files being received, the number of files accepted and in the queue, and the number of files pending.

Queue information includes the number of files in the queue and the number waiting to be entered in queue. In addition, for each file currently in the queue, an additional response is issued containing the spool file identification number, origin location, destination location, destination user ID (if any), spool file class, current transmission priority, the number of records in the file, and the file hold status.

FILE INFORMATION: For a specific file, the operator can request status information, VNET-related file attributes, or VM/370 spool-related attributes.

Status information includes activity status and the linkid of the link on which the file is queued or being transmitted.

VNET-related attributes include originating location and user ID, originating VM/370 spool ID, date and time of creation, time zone reference for time of day and the destination location and user ID.

VM/370 spool-related attributes include transmission priority, spool file class, number of copies requested, HOLD status, distribution code, filename and type, and data set name.

SYSTEM INFORMATION: The VNET operator can request a brief description of each inactive link, active link, port, non-zero queue, or route currently defined in the system.

Inactive link information includes link identification, activity status, default line driver type, and default line address.

Active link information includes link identification, link status, line driver type, line address, and hold status, drain status, and trace status.

Port information includes port availability status and identification of ports in use by link ID and port address.

Queue information includes the number of files being transmitted and received, the files accepted and enqueued, and the files pending for each link ID with a non-zero queue.

Route descriptions show the link ID for each route definition in the system route table.

The TRACE Command

Use the TRACE command to monitor line activity on a specified link. The trace information message includes the total number of communication line transactions (write/read combinations), the number of communication line transactions ending with a line error indication, and the number of timeouts that occurred on the line.

The line activity indicators are constantly accumulated by an active line driver, however the printing of the results on the VNET operator's console is initiated only through the TRACE command.

Note that the TRACE command results in the printing of summary information about a link at the VNET operator's console. The TRACE command with the LOG operand results in the creation of a printer spool file containing a detailed log of every I/O transaction on a link.

VNET MESSAGES

VNET messages are issued in response to commands, and during system execution. The response message is delivered to the associated command originator, generally the VNET local or remote operator, or both, depending on the availability of the remote station printer to serve as an operator console output medium. When VNET is operating "disconnected", unsolicited messages are issued to another virtual machine console or to the VM/370 operator console by means of the VM/370 MESSAGE command, if it is so specified in the DISCONN command. Console spooling can also be used to record messages issued to the VNET operator's console when the VNET virtual machine is running in disconnected mode. If these options are not taken, these messages are discarded.

Certain unsolicited messages are issued to virtual machine users via the VM/370 MESSAGE command when the message pertains to a file originated by or destined for the user.

A listing of all VNET messages, unsolicited or in response to commands, can be found in "Appendix E. VNET Message Summary." For a detailed listing and description of all VNET messages, see "Appendix B: VNET Messages".

The message codes listed conform to VM/370 standards. The origin of each message is encoded as the fourth, fifth, and sixth character of each message code. The possible codes are REX, CMX, AXM, INI, RGX, IRX, and xxx, where xxx is replaced with the code of the particular line driver module which is issuing the message: NPT, SML, VMB, VMC, or NCM, NHD, and NIT for the NJI driver. Printing of the ten-character message codes may be suppressed by the local and remote VNET operator by use of the SET EMSG command.

VNET utilizes the Diagnose function of CP to handle console functions such as DEFINE and DETACH. The use of these VM/370 commands by VNET results in two confirming messages being printed on the operator's console for each file processed by VNET. The VNET operator can issue the CP command SET IMSG OFF to suppress these informational messages.

In the event of a fatal error, VNET enters a disabled wait state. If either the DMTREX090T or DMTREX091T message is displayed on the VNET operator's console, an automatic virtual storage dump is also taken. Otherwise, the CP DUMP command should be issued.

COMMUNICATING WITH JES2 NJE SYSTEMS

VNET supports a subset of the full NJE protocol defined by the Network Job Entry Facility for JES2. For details of the full NJE protocol refer to Logic: Network Job Entry For JES2, Order No. IY24-6001. The following points must be considered when communicating with a JES2 NJE system:

1. The DMTNJI line driver supports the predefined connection protocol used by JES2 NJE. Therefore, any connection between VNET and JES2 NJE must be predefined by the JES2 system using a 'CONNECT' statement in the JES2 initialization deck. Failing to include the 'CONNECT' statement produces unpredictable results at link connection time. Additional 'CONNECT' statements must be added to the JES2 initialization deck for any locations receiving files from JES2 through the predefined VNET connection.
2. The DMTNJI line driver uses a single transmission stream (either job or output) to a remote system. It supports the simultaneous reception of one job stream and one output stream.
3. When a data set with multiple destinations is received by DMTNJI, the data set is stored and forwarded by VNET as separate files. When a job output file containing data sets with different attributes is processed by VNET (such as an output file containing both print and punch data sets), it is stored and forwarded as separate files.
4. NJE Global commands not destined for the local node are stored and forwarded to the final destination system in the normal manner. Global commands directed to the local VNET system by DMTNJI are translated into the appropriate VNET command. If the final transmission link to the local VNET system is not through the DMTNJI line driver, Global commands are not processed by VNET.

ID CARD FORMAT FROM REMOTE STATIONS

The ID card is entered at the beginning of a deck of cards from a remote terminal to specify the network destination of the file being entered.

The format of a single parameter ID card is as follows:

ID	userid
1	10

'userid' specifies the destination user at the directly connected VNET location to which the file following the ID card is addressed.

The format of the two parameter ID card is as follows:

ID	locid	userid
1	10	

'locid' 'userid' specifies the destination location and user address to which the file following the ID card is addressed. 'userid' may be replaced by the keyword 'SYSTEM' if the file is to be produced as real

unit record output at the destination location, and by the keyword 'JOB' if the file is to be entered as a job at the destination batch processing system via the Network Job Interface (NJI).

HEADER CARD FORMATS FOR VM/370 REAL READER

Files or jobs may be submitted through the VM/370 real card reader to VNET for transmission. The data deck to be transmitted must be preceded by an ID card to direct it to the VNET virtual machine and a 'tagtext' card to specify destination. The format of these cards is as follows:

```

ID 'userid' CLASS n 'filename' 'filetype'
                        'dsname'
```

where:

ID is a mandatory keyword.

userid specifies the name of the VNET virtual machine.

CLASS is an optional keyword.

n specifies the file class. The options are A-Z, 0-9. The default is A.

filename specifies the label on the input data.

dsname

filetype specifies the type of file if 'filename' is used.

The punching must start in card column one and each field must be separated by a blank column.

The second card contains the 'tagtext' portion of the TAG command used when submitting a file from a virtual machine user console.

```
'tagtext'
```

Punching starts in card column one and all fields are separated by a blank column.

A sample job file submitted through the real card reader to VNET for transmission to the node HOUSTON is shown below.

```
ID VNET           First card (ID card)
HCUSTON JOB       Second card (tagtext card)
//xxxxxxxxxxxx   Job file to be
//xxxxxxxxxxxx   transmitted to HOUSTON
//xxxxxxxxxxxx   by VNET.
```



*

r



.

.



SYSTEM START-UP

Under normal operating conditions starting VNET requires no operator action after the VNET virtual machine IPI. The route and link tables are created during the system initialization from the VNET directory on the VNET System disk. The line drivers are normally started by the automatic execution of the 'PROFILE VNET' file. All required START commands for the line drivers to be used are placed in the 'PROFILE VNET' file by the system programmer at system generation time.

Additional line drivers may be started individually, if required, by using the START command formats shown in the descriptions of starting the various line driver types.

Any temporary changes desired in the link and route definitions can be made using the commands described under "Dynamic Reconfiguration".

SYSTEM SHUT-DOWN

Operation of the VNET virtual machine is terminated when the system operator issues the SHUTDOWN command. This effectively issues a DRAIN command to each active link. Any link that is currently processing a file will complete that file and then deactivate. A link that is not processing a file deactivates immediately. When all links have reported successful deactivation the VNET operator may logoff his VNET virtual machine.

Any files waiting for transmission at the time of system shutdown will be retained by the VM/370 spooling facility. These files will be reaccepted and enqueued to the appropriate links when the VNET virtual machine is started again.

STARTING LINE DRIVERS

Line drivers manage the transmission of files between the VNET virtual machine and a particular class of remote nodes, terminals or stations. Five line drivers are supplied with VNET, designated as DMTNPT, DMTSML, DMTVMB, DMTVMC, and DMTNJI. See the section on "Line Drivers" in "Part 1: Introduction" for a detailed description of the function of each line driver.

The VNET operator initiates a line driver for a particular link by issuing the START command. If the previously defined link definition is still valid, only

START linkid

need be specified. Should any of the link attributes require modification for this particular communication session, the START

command with appropriate operands is used. For example, if the link to HOUSTON had been defined with a line address of 0B1 and a class of G, and the current session is to handle class S output on line address 0B3, the START command would look like:

```
START HOUSTON CLASS S LINE 0B3
```

For this session only, the HOUSTON link processes only class S output and uses the line port with virtual address 0B3. Non-class S output remains queued on Houston's link and is not transmitted until the class attribute is changed.

Since more than one link can require the same line driver, multiple copies of a line driver can be active simultaneously. Each copy is assigned a task name at the time the link is defined; otherwise, an appropriate descriptive default task name is generated by VNET when the link is activated.

Once the line driver is activated during system start-up or by the VNET operator, the link for a leased line is ready for a remote station to "sign on" with its identification and station characteristics. A link using a switched line must first complete a line connection by a dial-up procedure from either end of the link. The sign-on procedure varies by line driver and is covered in the respective line driver discussions.

STARTING SML

Before a remote station can sign on to SML, the appropriate task for that link must have been started during system start-up or by the VNET operator. An example of the START command for SML and the variables to be specified is as follows:

STArt	linkid[TYPE DMTSML][LINE vaddr]
	{Hrn}
	{Rrn}
	Parm {Arn}[Bnnnn] [password]
	{Mrn} [user/pwd]

where:

- linkid is the location identifier of the remote station that is to communicate with SML.
- DMTSML is the name of the line driver to be used with the newly activated link. This specification overrides the driver name which may have been previously defined for the link. If no driver was previously defined for the link, this field must be specified.
- vaddr is the virtual address of the communications line. (vaddr is used only if the line is to be other than one previously specified in a link definition.)
- Hrn sets SML mode, indicating that SML operates as a remote job entry system into a remote HASP or JES2 system as remote number rn.

Rrn sets SML mode, indicating that SML operates as a remote job entry station into the Remote Entry Subsystem (RES) of VS1 Release 2 as remote number rn.
 Arn sets SML mode, indicating that SML operates as a remote job entry system into a remote ASP or JES3 system as remote name rn.
 Mrn sets SML mode, indicating that SML operates as host to a remote programmable station signing on as remote number rn.
 Bnnnn indicates the telecommunication buffer size. The maximum value that can be specified in nnnn is 1017. If the operand is omitted, the buffer size defaults to 400. If the optional password operand is specified, the buffer size must be entered.

password user/pwd is an optional operand, used by the DMTSML line driver to validate the start of a terminal session as follows:

- In RJE mode, the specified identification is passed along to the remote system as part of the SIGNON record.

If the remote system is HASP, ASP, or JES, identification consists of a one- to eight-character password.

If the remote system is RES, identification consists of a one- to eight-character userid followed by a slash character followed by a one- to eight-character password for a maximum of 17 characters.

- In HOST mode, the identification consists of a one- to eight-character password that the remote station must supply on its SIGNON card in order to connect to VNET. If no password is entered on the START command, none will be required from the remote station.

For a full description of the START command, refer to "Appendix A: VNET Cmmmands".

If the operator has initialized the appropriate SML task, contact may be established by dialing the other location from either end of the link. If the line specified is a leased line, or if the above contact procedure has been successfully accomplished, the sign-on procedure is then executed.

Signing On in RJE Mode

If SML is operating in RJE mode, the SML task signs on to the remote HASP/ASP system. Using information from the START command and standard HASP/ASP protocol, SML builds a SIGNON record and submits it to the remote system. When the remote system accepts the SIGNON record, SML is notified and communication on the link is initiated.

Signing On in HOST Mode

If SML is operating in HOST mode, the remote station must submit the sign-on information. Since remote programmable stations are loaded with Remote Terminal Processor (RTP) programs in order to communicate with VNET, the SML SIGNON card or its equivalent is included in the program

deck. A password for system security may also be included. The format of the SIGNON card is as follows:

```
      1           16           25  
/*SIGNON      REMOTErn password
```

The value of rn following the keyword REMOTE must match the terminal number specified in the Mrn operand of the START command.

A password is required only if the START command specified a password operand, or if a password was part of the link definition in the VNET link table. If the password option is in effect, the password entered must match that in the START command or link table for the sign-on procedure to be completed.

File Processing (RJE Mode)

SML, operating in RJE mode, transmits files consisting of job control records and data to remote MULTI-LEAVING batch systems such as HASP and ASP. These files can originate from:

- VM/370 users spooling the files to VNET.
- Remote terminals submitting card decks, through an NPT line driver with valid destination information in the ID card.
- Remote stations submitting card decks, through an SML line driver operating in HOST mode, with valid destination information in the ID card.
- Remote NJI/NJE systems submitting card decks.

When the remote batch system has completed processing the data, printer and/or punch output is transmitted back to SML. This output is then printed or punched on the appropriate real I/O device at the directly connected location.

Input File Processing (HOST Mode)

The remote station submits input to the VNET machine through the remote card reader. This input can be directed to the virtual reader of a VM/370 user or to another remote terminal or location. Output processing at the remote station can usually be interrupted at any point to allow the transmission of input data. The specific procedure for interrupting output processing varies according to the remote hardware being utilized; this is explained in the "Operating Procedures" for the specific remote station. When the input has been processed, output processing can be resumed from the point of interruption.

A control card is placed in front of the deck to be sent from the remote station to the virtual machine card reader of a user or to another node, remote terminal or station. The format of this card is described under "ID Card Format from Remote Stations" in the "Operation Description" section. If the remote system console is used to enter the ID data, upper case notation must be used.

Output File Processing (HOST Mode)

When printer and punch files are transmitted to a remote terminal, a header line is created on the output to identify the originating userid, date, and time of transmission. Card decks punched at the remote terminal contain the source header information on the first card punched; the rest of the card is filled with asterisks. Printer files use a carriage control tape with channel 1 signifying the first print line.

In addition to header information, printer files are separated from one another by header pages which may be seen by the operator, at the edge of the unburst paper, to allow the operator to separate printed output. The header page format is as follows:

- page eject
- skip 61 lines
- 5 lines of n asterisks per line
- 1 line of n underscores
- 5 lines of n asterisks per line
- 2 blank lines
- the source header line
- page eject
- the print file

where n is 120 or the number of printable positions available on the remote printer, whichever is less.

The card and print file header information is as follows:

<u>Col</u>	<u>Field</u>	<u>Meaning</u>
1	llllllll	file origin location
13	vmvrvvmvm	file origin virtual machine
25	xx/xx/xx	file origin date
37	yy:yy:yy	file origin time
47	x.x.t.	time zone
55	WAS THE ORIGIN	

Remote Station Operator Commands

The remote station operator, under control of SML in HOST mode, is allowed to use a subset of the VNET commands. In general, the remote operator can issue commands that affect only his specific link. The VNET commands are described in "VNET Operator Commands". A complete description of all commands, with detailed format, can be found in "Appendix A: VNET Commands".

Note: With the exception of the MSG and CMD commands, the linkid operand is not to be entered by a remote station operator when submitting commands to VNET.

SML Messages

A subset of VNET operator messages are printed on the remote station console. Generally, they are responses to commands originating at the remote station. For a key to the distribution of messages, see "Appendix B: VNET Message Summary".

STARTING NPT

Before a remote terminal can sign on to NPT, the appropriate task for that link must have been started during system start-up or by the VNET operator. An example of the START command for NPT and the variables to be specified is as follows:

```
START | linkid[TYPE DMTNPT][LINE vaddr]
      | [Parm password[
```

where:

- linkid** is the location identifier of the remote terminal that NPT is to communicate with.
- DMTNPT** is the name of the line driver to be used with the newly activated link. This specification overrides the driver name that may have been previously defined for the link. If no driver was previously defined for the link, this field must be specified.
- vaddr** is the virtual address of the communications line. (vaddr is used only if the line is to be other than one previously specified in the link definition.)
- passwd** is an optional operand of one to eight characters which, if entered, designates a password that the remote station must supply to be allowed to connect to the VNET system. If a password is not supplied in the START command or in the VNET link table, the remote station is not required to supply a password at sign-on time.

For a full description of the START command, refer to "Appendix A: VNET Ccommands".

Signing On to NPT

Once the operator has initialized the appropriate NPT task, contact may be established on a switched line by dialing the other location from either end of the link. If the line specified is a leased line, or if the above contact procedure has been successfully accomplished, a SIGNON card must then be entered via the card reader at the remote terminal. The SIGNON card must precede all other cards, and is used only once in each session. In the event of a line drop, the SIGNON card must be re-entered via the card reader in order to restart the line. The SIGNON card is used to designate the type of terminal, the features it has, and other information as described below.

```
SIGNON | linkid type[ Bnnn ][ CMPR ][ Pnnn ]
       | [ TRSx ][ PCHx ][ PWD= passwd ]
```

where:

linkid is the location identifier of the remote terminal signing on to NPT. If this does not match the NPT task linkid of the START command, the SIGNON card is not accepted.

type indicates the terminal type and must be 2770, 2780, 3770 or 3780.

Bnnn specifies the line buffer extension in terms of the number of bytes (nnn) and may be: 128, 256, or 512 for the 2770; 170 or 400 for the 2780; 256 for the 3770; and 512 for the 3780. The defaults are:

<u>Terminal</u>	<u>Default</u>
2770	128
2780	170
3770	256
3780	512

CMPR specifies that the blank compression feature is present on the 2770, 3770, and 3780.

Pnnn specifies the number of print positions available at the remote printer. nnn may be 120, 132 or 144. The default value is P120 for the 2770, 2780 and 3780; it is P132 for the 3770.

TRSx is entered as TRSY (YES) if the remote terminal has the transparency feature and TRSN (NO) if it does not have the transparency feature. The default is TRSN.

PCHx is entered as PCHY (YES) if a punch is available at the remote terminal and PCHN (NO) if no punch is available. The default is PCHN.

LPRT specifies that all print output, including messages, is to be directed to the line printer. This keyword is only valid when a terminal type of 3770 has been specified. If the keyword is omitted, the default print device is the console printer.

PWD= passwd is a password that must match the password entered by the operator in the START command or contained in a link definition table owned by VNET. If no password was entered in the START command or contained in the VNET link table, this operand is not required.

Input File Processing

The remote terminal submits input to the VNET machine via the remote card reader. This input can be directed to the virtual reader of a VM/370 user or to another remote terminal or location. Output processing at the remote terminal can be interrupted at any point to allow the transmission of input data. When the input has been processed, the output processing can be resumed from the point of interruption.

A control card is placed in front of the deck to be sent from the remote terminal to the virtual machine card reader of a user or to another

node or remote station. The card's format is described under "ID Card Format From Remote Stations" in the "Operation Description" section.

If it is possible (as on the IBM 3770) to enter the ID card data from a keyboard, upper case notation must be used.

If the userid on the ID card is invalid, VNET spools the punch file to the real punch.

Output File Processing

When print and punch files are transmitted to a remote terminal, a header line is created on the output to identify the originating userid, date, and time of transmission. Card decks punched at the remote terminal contain the source header information on the first card punched; the rest of the card is filled with asterisks. Printer files use a carriage control tape with channel 1 signifying the first print line.

In addition to header information, printer files are separated from one another by header pages which may be seen by the operator, at the edge of the unburst paper, to allow the operator to separate printed output. The format of the separator page is as follows:

- page eject
- skip 61 lines
- 5 lines of n asterisks per line
- 1 line of n underscores
- 5 lines of n asterisks per line
- 2 blank lines
- the source header line
- page eject
- the print file.

where n is 120 or the number of printable positions available on the remote printer, whichever is less.

The card and print file header information is as follows:

<u>Col</u>	<u>Field</u>	<u>Meaning</u>
1	llllllll	file origin location
13	vmvmvmvm	file origin virtual machine
25	xx/xx/xx	file origin date
37	yy:yy:yy	file origin time
47	x.x.t.	time zone
55	WAS THE ORIGIN	

Remote Terminal Operator Commands

The remote terminal operator is allowed to use a subset of the VNET commands. The commands are punched on cards, beginning in column 1, one per card, and are read on the remote card reader. Command cards must precede the ID control card for an input file. In general, the remote operator can issue commands that affect only his specific link. The commands are described under "VNET Operator Commands". A complete description of all commands, with detailed format, can be found in "Appendix A: VNET Commands".

Note: With the exception of the MSG command, the linkid operand is not to be entered by a remote terminal operator when submitting commands to VNET.

NPT Messages

A subset of the VNET operator messages is printed on the remote terminal printer. Due to the unavailability of a separate console printer for messages, and the resulting confusion which would ensue if messages were mixed with printer output, DMTNPT provides for a message queue. Whenever the remote printer has completed processing an output file, the messages that have been queued, since the last message was printed, are transmitted and printed. Refer to "Appendix B: VNET Message Summary" for a key to the distribution of messages.

STARTING VMB

Before communication with another remote VM/370 system can begin, the VMB line driver task for the associated link must be started. This may be done automatically during system start-up or manually by the VNET operator. An example of the START command for VMB and the variables to be specified is as follows:

START	linkid [TYPE DMTVMB] [LINE vaddr] [Parm tpass rpass]
-------	---

where:

linkid is the location identifier of the remote system communicating with VMB.

DMTVMB is the name of the line driver to be used with the newly activated link. This specification overrides the driver name that may have been previously defined for the link. If no driver was previously defined for the link, this field must be specified.

vaddr is the virtual address of the communications line. (vaddr is used only if the line is to be other than one previously specified in the link definition.)

tpass is an optional operand, one to eight characters long, that specifies a password to be transmitted during the signon sequence.

rpass is an optional operand, one to eight characters long, that specifies a password that must be received from the remote system before file transfer is initiated. If the transmit password, tpass (see above), is specified and rpass is not, then a default rpass value the same as tpass results.

For a full description of the START command, refer to "APPENDIX A: VNET Commands".

STARTING VMC

To establish communication with another VM/370 system linked through a channel-to-channel adapter, a VMC line driver task must be started. This may be done automatically during system start-up or manually by the VNET operator. An example of the START command for VMC and the variables to be specified is as follows:

```
START linkid [ TYPE DMTVMC ] [ LINE vaddr ]
```

where:

linkid is the location identifier of the remote node communicating with VMC.

DMTVMC is the name of the line driver to be used with the newly activated link. This specification overrides the driver name that may have been previously defined for the link. If no driver was previously defined for the link, this field must be specified.

vaddr is the virtual address of the communications line. (vaddr is used only if the line is to be other than one previously specified in the link definition.)

For a full description of the START command, refer to "APPENDIX A: VNET Ccmmands".

STARTING NJI

Communication with systems other than VM/370 is typically managed by the NJI line driver. The NJI line driver task for the desired link may be started automatically during system start-up or manually by the VNET operator. The parameters on the VNET start command for the DMTNJI line driver are as follows:

```
START linkid[ TYPE DMTNJI ][ LINE vaddr ]
      parm {Buff=nnnn      }
           {Rest=nnnn     }
           {RIPass=password}
           {RNPass=password}
           {TIPass=password}
           {TNPass=password}
```

Any combination of the above parameters may be entered separated by blanks.

where:

linkid is the location identifier of the remote station that is to communicate with DMTNJI.

DMTNJI is the name of the line driver to be used with the newly activated link. This specification overrides the driver name

which may have been previously defined for the link. If no driver was previously defined for the link, this field must be specified.

- vaddr is the virtual address of the communications line. (vaddr is used only if the line is to be other than one previously specified in a link definition.)
- Euff= is an optional keyword which is used to specify the communications adapter buffer size for this link. This buffer size may range from 300 to 1017 bytes, with a default of 400.
- Rest= is an optional keyword which is used to specify the partial nodal resistance of this NJI connection. This number may range from 2 to 2000, with a default of 200. See System Programming Library: Network Job Entry Facility for JES2, Order No. GC23-0003.
- RIPass= is an optional keyword which is used to specify the line password required from the remote station before the transmission of data is initiated. The password specified may range from one to eight characters. If the correct password is not received at line connection time, the link is deactivated with a diagnostic error message (DMTNCM914E).
- RNPass= is an optional keyword which is used to specify the node password required from the remote station before the transmission of data is initiated. The password specified may range from one to eight characters. If the correct password is not received at line connection time, the link is deactivated with a diagnostic error message (DMTNCM914E).
- TIPass= is an optional keyword which is used to specify the line password to be transmitted to the remote station at line connection time. The password value may range from one to eight characters.
- TNPass= is an optional keyword which is used to specify the node password to be transmitted to the remote station at line connection time. The password value may range from one to eight characters.

For a full description of the START command, refer to "APPENDIX A: VNET Commands".

RESTARTING A LINE DRIVER

Under normal operation a line driver will only need to be restarted if it has been deactivated by a DRAIN or FORCE command. Under these conditions issuing the START command appropriate to the line driver in question reactivates it.

In the situation where a problem occurs in the telecommunication facility of a link, the procedure required varies depending on the line driver type.

The two VNET line drivers using the MULTI-LEAVING protocol, DMTSML and DMTNJI, provide a restart facility in the event of 40 consecutive three-second timeouts on the telecommunications adapter. When this condition occurs, the link is deactivated in such a fashion as to cause the execution of an exec file with the filename identical to the

'linkid' of the link being deactivated. This exec (user generated) would normally contain a START command for the link just deactivated, as well as any other valid VNET command.

The following example illustrates the contents of a file 'NEWYORK VNET' an automatic execution file for restarting a link 'NEWYORK'.

```
CP CLOSE 9
START NEWYORK
```

The execution of a DRAIN or FORCE command to a MULTI-LEAVING link will not cause the link's automatic restart execution file to be executed.

The VME and VMC line drivers will not deactivate in the event of transmission line problems. If the line fails a message is issued. The message is "DMTXXX143I LINK 'linkid' LINE 'vaddr' DISCONNECTED" or "DMTXXX160I LINE 'vaddr' DISABLED FOR LINK 'linkid'" depending on the problem. The line drivers will temporarily suspend transmission and attempt to automatically reinitialize and reenble the line.

If the problem is momentary the messages, "DMTXXX141I LINE 'vaddr' READY FOR CONNECTION TO LINK 'linkid'" and "DMTXXX142I LINK 'linkid' LINE 'vaddr' DATASET READY" are issued as the line is reestablished. Transmission of files resumes.

If the problem persists the operator should check for any obvious problem in the data set or modem in the case of a leased line. For a dial-up line the operator should redial to reestablish the line connection. Transmission of files then resumes at the point of interruption.

The NPT line driver will deactivate in the case of severe line interruption. In this case the line problem must be resolved. Following the reestablishment of a functioning transmission line a START command must be issued to the NPT line driver to re-establish the link.

DYNAMIC RECONFIGURATION

The commands available to the VNET system operator provide the ability to dynamically alter the VNET system configuration. Entries in the link and route tables can be added, deleted, or modified while the system is running. This enables the VNET system operator to respond immediately to changes in the operating environment of his node. If the normal transmission path for a link becomes unavailable, the route table can be altered to direct files to another link that provides a path to the file destination. If it becomes necessary to process a particular class of files first, a link can be redefined in the link table to access only the specified class of file for transmission.

CHANGING THE ROUTING TABLE

To change an entry in the routing table, issue a ROUTE command from the VNET operator's console. Specify the location ID for the remote location whose routing is to be modified or redefined. Also specify "TO linkid" defining the link that will process the files directed to the remote location. VNET issues a message in response to the ROUTE command, reporting the result of the command. Files awaiting transmission are

automatically reenqueued following execution of a ROUTE command. For a detailed description of the ROUTE command see "Appendix A, VNET Commands".

Changes to the routing table remain in effect until the next VNET system IPL. Permanent changes can only be made by altering the VNET directory.

CHANGING THE LINK TABLE

To change an entry in the Link Table, issue a DEFINE or DELETE command from the VNET operator's console. Before altering or deleting an entry for an active link, the link must first be made inactive by issuing a DRAIN command specifying the "linkid".

The DEFINE command is used to create temporary new link entries, redefine an entry that was deleted, or alter an existing entry in the Link Table. The DELETE command is issued to temporarily "undefine" a link and make it unavailable to the VNET system.

VNET issues messages in response to both the DEFINE and DELETE commands. For a detailed description of the DEFINE and DELETE commands see "Appendix A: VNET Commands".

Changes to the Link Table remain in effect until the next VNET system IPL. Permanent changes can only be made by altering the VNET directory.



Part 4 is a guide for the VM/370 user who needs to use the VNET system during the course of his work. The following main areas are covered.

1. The commands the user needs to work with the VNET system.
2. Examples of VNET usage.
3. Messages a VM/370 user may expect while using VNET.



The interface between a VM/370 user and the VNET virtual machine consists of the SPOOL and TAG commands along with the spool file tag associated with every output spool file generated by a VM/370 user.

VM/370 SPOCI COMMAND

All files to be transmitted via VNET must be spooled to the VNET virtual machine. The form of the CP SPOOL command used with VNET is as follows:

SPOOL	{Printer} {Punch } [TO] userid {CONsole} {vaddr }
-------	--

where:

PRINTER denotes all printer class device
PRT output.

PUNCH denotes all punch class device
PCH output.

CONSOLE denotes all ccnsole class device output.

vaddr denotes all output from the specified virtual device
address.

userid is the ID of the virtual machine in which VNET resides.

Note: Other SPOOL command options, such as CLASS and COPY, can also be specified; see the VM/370: Command Language Guide for General Users.

VM/370 TAG COMMAND

The VM/370 CP TAG command is used to enter or query data in the spool file tag. The command has three functional formats:

- Tag contents may be prespecified for all output files from a particular category of output devices or from a single output device.
- Tag contents for an existing closed spool file may be replaced.
- The tag contents associated with an output device contained in a closed output file may be displayed.

The TAG command syntax is as follows:

TAg	{	{Printer}	}
	{ DEV	{PUnch }	[tagtext] }
	{	{CONsole}	}
	{	{vaddr }	}
	{		}
	{ FILE	spoolid	[tagtext] }
	{		}
	{	{Printer}	}
	{	{DEV	{PUnch }
	{	{CONsole}	}
	{ QUery	{	{vaddr }
	{		}
	{	{FILE	spoolid }
	{		}

The first operand of the TAG command specifies the function to be performed:

- DEV allows the user to perform the initialization, replacement, or deletion of the tag data associated with an output device. All spool files, generated by the device specified in the second operand, will contain the tag data entered in the third operand. If there is no third operand, the tag data will be blank.
- FILE allows the user to replace the entire tag data of any spool file queued on his virtual reader and identified by the second operand with the new tag data specified in the third operand. This allows the user to correct the tag of a file returned to his reader queue by VNET because of an invalid address in the tag. If there is no third operand, the tag is set to blanks.
- QUERY DEV allows the user to display the current setting of the tag information associated with the output device or device class specified in the third operand.
- QUERY FILE allows a user to display the tag information of any spool file queued on his virtual reader. The specific file in his reader queue is identified by the third operand.
- PRINTER is the synonym for all printer class devices.
PRT
- PUNCH is the synonym for all punch class devices.
PCH
- CONSOLE is the synonym for all console class devices.
- vaddr is the virtual device address of a virtual unit record device or console.
- spoolid is the unique identification number assigned to a spool file by the VM/370 spooling facility. The numbers range from 1 to 9900.
- tagtext is the new or replacement tag data used in the TAG DEV and TAG FILE format of the command. The entire command line to the right of the third operand (beginning with the leftmost

non-blank character to a maximum of 136 characters) becomes the new contents of the tag for the specified device, device class, or specific file. If no text is specified, the contents of the tag are set to blanks.

TAG QUERY COMMAND RESPONSES:

```
TAG QUERY DEV {PRINTER}
               {PUNCH  }
               {CONSOLE}
               {VADDR  }
```

Displays the contents of the tags associated with each device of the specified class as follows:

```

    {PRT }
    {PUN } vaddr TAG:
    {CONS}
    {VADDR}
    tagtext..... ] repeated for
                   ] each device in
                   ] the specified
                   ] class
```

TAG QUERY DEV vaddr

Displays the contents of the tag associated with the specified device as follows:

```

    {PRT }
    {PUN } vaddr TAG:
    {CONS}
    tagtext.....
           if tag data exists

TAG NOT SET
           if the TAG command was never issued to that device.
```

TAG QUERY FILE spoolid

Displays the contents of the tag associated with the specified file as follows:

```

tagtext.....
           if tag data exists

(TAG BLANK)
           if the tag is all blanks

(TAG MISSING)
           if the file did not contain a tag because it was either
           an input file from the real card reader or was an output
           file generated before VM/370 Release 2 PLC 11.
```

VNET USAGE OF TAG AND SPOCI COMMANDS

When a VM/370 user creates a file that is intended for transmission to a remote location via VNET as a JOB file, the syntax of the spool file tag data is:

TAg	DEV vaddr locid	[userid] JOB	[priority [JOB]]
-----	-----------------	-----------------	--------------------

where:

- vaddr is the virtual device address for which the TAG is set.
- locid is the location identifier of the destination location for output generated by this virtual device.
- userid is the identification of the remote virtual machine or remote station at the specified location that is to receive the output generated by this device.
- priority is the requested transmission priority (a decimal number 0-99), defaulting to 50, implying a higher priority with lower numerical value.
- JOB a keyword indicating that the output of this punch device be transmitted as a job.

The additional parameter on the VM/370 TAG command when interfacing to a non-VNET system for the transmission of OUTPUT is as follows:

Note: The specification of any of these parameters does not imply the support of these features on the subsystem at the output location.

TAg	DEV vaddr locid	[userid] priority
		[rmtid]
	{FCB[C]=carriage	}
	{FORMS[F]=formstype	}
	{UCS[T]=train	}
	{INDEX[I]=index	}
	{EXTWTR[W]=writename	}
	{BURST[E]=Y N	}
	{OPTCD=J	}
	{CHARS[X]=tran	}
	{COPYG[G]=nn	}
	{FLASH[O]=flash	}
	{FLASHC[Q]=nn	}
	{MODIFY[Y]=modify	}
	{MODTRC[M]=0 1 2 3	}
Any combination of NJI keywords may be specified separated by blanks up to a total tag length of 136 characters.		

The accepted abbreviation for each keyword is shown enclosed in [].

where:

vaddr is the virtual device address for which the TAG is to be set.

locid is the location identifier of the destination location for output generated by this virtual device.

userid is the identification of the remote virtual machine
rwtid or remote work station at the specified location that is to receive the output generated by this device.

priority is the requested transmission priority (a decimal number 0-99), defaulting to 50, implying a higher priority with lower numerical value.

FCB= is a keyword indicating the forms control buffer for printing the output of this device. This specification can be from 1 to 8 characters.

FORMS= is a keyword indicating the special forms for printing the output of this device. This specification can be from 1 to 8 characters.

UCS= is a keyword indicating the universal character set for printing the output of this device. This specification can be from 1 to 8 characters.

INDEX= is a keyword indicating the data set indexing position offset for the 3211 printer. This parameter may range from 1 to 31.

EXTWTR= is a keyword indicating the external writer to process the output of this device when it is printed or punched at a remote location.

The following parameters are specified if the receiving subsystem is to print the data from this device on the 3800 printer and does not imply VM/370 support of that device. Currently the only subsystem supporting the 3800 printer is JES2.

BURST= is a keyword indicating whether the output from this device should be threaded into the Burster-Trimmed-Stacker on the 3800 printer. This parameter must be either Y or N.

OPTCD=J is a keyword which indicates that each line of data produced by this device contains a table reference character for the 3800 printer.

CHARS= is a keyword which indicates the names of character arrangement tables, which define the characters for printing on the 3800 printer. This specification can be from 1 to 8 characters and may be specified up to a maximum of four times, once for each translate table desired.

COPYG= is a keyword which indicates the copy grouping for the output of this device when printed on the 3800 printer. Each group up to 8 can range from 1 to 255. This parameter may be specified up to a maximum of eight times indicating eight copy groups.

FLASH= is a keyword which indicates the name of the forms overlay frame to be used when printing the output of this device on the 3800 printer. This specification can be from 1 to 8 characters.

FLASHC= is a keyword which indicates the number of the total copies of the output of this device on which the forms overlay is to be printed on the 3800 printer. This parameter can range from 1 to 255.

MODIFY= is a keyword which indicates the copy modification module to be used in modifying the data, produced by this device when printed on the 3800 printer. This specification can be from 1 to 8 characters.

MCDTRC= is a keyword which indicates the table reference character for selecting which character arrangement table is be used when printing the output of this device on the 3800 printer. This parameter can be either be 0, 1, 2, or 3.

If userid is not applicable, as in NPT and SMI support, and priority is to be specified, a dummy userid must be included.

The remainder of the 136 byte tag is ignored by VNET.

To specify that all printer output is to be transmitted to Houston, a VM/370 user would enter the following commands:

```
TAG DEV PRINTER HOUSTON
SPOOL PRINTER TO NET
```

where HOUSTON is the location identifier of the receiving station and NET is the userid of the VNET virtual machine.

If one particular output device is to have its output transmitted to Palo Alto with a priority of 10 and no userid specified, the VM/370 user would enter the following commands:

```
TAG DEV 00D PALOALTO SYSTEM 10
SPOOL 00D TO NET
```

where 00D is the virtual output device address; PALOALTO, the location identifier of the receiving station; SYSTEM, a dummy userid entry; 10, the priority value; and NET, the userid of the VNET virtual machine.

The VM/370 user may want to set up a CMS EXEC file to handle remote spooling operations. A sample of such an EXEC, called SEND, follows:

```
SPOOL &2 TO NET
TAG DEV &2 &1
&2 &3 &4
SPOOL &2 OFF
```

The EXEC would be invoked as follows:

```
SEND PALCALTO PRINT PROG LISTING
```

The EXEC executes as follows:

```
SPOOL PRINT TO NET
TAG DEV PRINT PALOALTO
PRINT PROG LISTING
SPOOL PRINT OFF
```

USER EXAMPLES

This section illustrates several examples of VNET usage. It is not intended to show complete examples of the usage of VNET in conjunction with the JES2/NJE program product and the PRPQs for ASP and HASP. Users of a mixed environment of NJE/NJI subsystems should refer to the related publications listed in the Preface. The examples presented here provide samples of the types of facilities available.

Example 1. Specifying Destination of VM/370 Virtual Output

A CMS user on a VM/370 system in NEWYORK wants the output from his virtual printer directed to BOSTON. Assuming a network configuration as shown in Figure 7 (Part 2 of this manual), with the NEWYORK/BOSTON link temporarily inactive, the following illustrates the user's console:

```
spo e to net
R;

tag dev e boston system
R;

pr profile exec
PRT FILE 0150 TO NET      COPY 01 NOHOLD
R;

12:59:26
MSG FROM NET : SENT FILE 0150 (0150) ON LINK
              TORONTO TO BOSTON SYSTEM

12:59:36
MSG FROM NET : FROM TORONTO: SENT FILE 0386 (0150)
              ON LINK BOSTON TO BOSTON SYSTEM
```

Note that the spool ID assigned at the originating system by VM/370 is returned in each network response message as the file proceeds through the network. Also, the path the file took to its final destination was determined by VNET. The user specified only the final destination for file processing.

Example 2. VNET Job Submission to a Batch Processor

This example illustrates a CMS user at location NEWYORK submitting a JOB to an ASP NJI system in BUFFALO. Output returning from a batch job submitted through VNET will be processed by the real unit devices attached to VM/370 unless overridden by the user via JCL.

User RALPH wants a source deck assembled at BUFFALO and the resultant object deck and message data set returned to his virtual machine reader. He wants the assembly listing printed on an offline printer.

The following illustrates the JCI he might use with the source deck:

```
//CCMPFILE JOB 1,MSGLEVEL=1,NOTIFY=RALPH
/*MAIN SYSTEM=ANY
/*FORMAT PR DDNAME=SYSMSG,DEST=NEWYORK.RALPH
/*FORMAT PU DDNAME=,DEST=NEWYORK.RALPH
//STEP EXEC ASMF
//ASM.SYSIN DD *
TEST      CSECT
          END
/*
```

The NOTIFY keyword on the JOB card causes any TSO NOTIFY messages produced by the batch processing system to be returned by the network to the CMS terminal.

The following illustrates the terminal session for the job:

```
tag dev d buffalo system 50 job
R;

spo d to net
R;

pun compile job (noh
PUN FILE 8921 TO NET      COPY 01 NOHCLD
R;

16:57:47
MSG FROM NET : SENT FILE 8921 (8921) ON LINK
                BUFFALO TO BUFFALO SYSTEM

16:57:54
MSG FROM NET : FROM BUFFALO: AMSV01 JOB 5880,
                COMPILE IS ON SYS E

PRT FILE 8923 FROM NET      COPY 01 NOHOLD

16:58:02
MSG FROM NET : FILE (8921) SPOOLED TO RALPH -- ORG BUFFALO
                (SYSTEM) 10/17/76 16:57:59 E.D.T.

PUN FILE 8925 FROM NET      COPY 01 NOHOLD

16:58:05
MSG FROM NET : FILE (8921) SPOOLED TO RALPH -- ORG BUFFALO
                (BUFFALO) 10/17/76 16:59:59 E.D.T.
```

Example 3. VNET Output Transmission Using Special Forms

This example illustrates the transmission of spool output from a VM/370 system to a remote batch system that has special forms capability. This CMS user wants the output from his virtual printer directed to BUFFALO to be printed on white paper using a text (TN5) print train. The following illustrates the users console:

```
spo e to net
R;

tag dev e buffalo system 50 f=white t=text
R;
```

```
print profile exec
PRINT FILE 0118 TO NET      COPY 01 NOHOLD
R;
```

```
12:55:49
MSG FROM NET : SENT FILE 0118 (0118) ON LINK
                BUFFALO TO BUFFALO SYSTEM
```

Example 4. VNET JOB Submission With Special Output Processing

This example illustrates a job running on a HASP batch processor with the output to be printed at a VM/370 node with a VM output class. VNET sets the output class from the first character of the batch system forms specification.

```
//EXAMPLE JOE 1, MSGLEVEL=1
/*OUTPUT 1234 DEST=MIAMI,F=R
//STEP EXEC ASMFC
//SYSPRINT DD SYSOUT=(A,,1234)
//SYSIN DD *
TEST CSECT
      END
/*
```

When the job executes the SYSPRINT data set is printed at node MIAMI with VM output class 'R'.

USER MESSAGES

This section contains a list and a short description of messages directed to the console of the virtual machine user by VNET. For a detailed description of each message see "Appendix B: VNET Messages".

DMTAXM101I FILE 'spoolid' ('orgid') ENQUEUED ON LINK 'linkid'

The user file specified is accepted by VNET and is ready for transmission.

DMTAXM102I FILE 'spoolid' ('orgid') PENDING FOR LINK 'linkid'

The link specified has no tag slot available for the user file. The file is held by VNET and enqueued automatically as space becomes available.

DMTAXM103E FILE 'spoolid' ('orgid') REJECTED -- INVALID DESTINATION ADDRESS

The file specified is returned to the user if the origin is local, otherwise it is purged. The destination address in the tag did not match any VNET route or link table entry.

DMTAXM104I FILE ('orgid') SPOOLED TO 'userid' -- ORG 'locid'(userid)
mm/dd/yy hh:mm:ss

A file has arrived from a remote location and is awaiting user disposition. The file originator is identified.

DMTAXM111I User 'userid' NOT IN CP DIRECTORY -- FILE ('orgid') spooled TO SYSTEM

A file received by VNET was addressed to a local user 'userid' which is not in the local VM/370 system directory. The file had an origin spool ID of 'orgid'.

DMTxxx147I SENT FILE 'spoolid' ('orgid') ON LINK 'linkid' TO 'locid'
'userid'

The specified file has been successfully passed to the next
node in the network

DMTxxx170I FROM 'locid': (message text)

DMTxxx171I FROM 'locid' ('userid'): (message text)

These messages identify the source of the accompanying text
on the user console.

DMTSML935E LINK 'linkid' IN RJE MODE -- PRINT FILE 'spoolid' PURGED

The specified link is working as a submitting RJE workstation
and cannot accept print files.

DMTNPT936E NO REMOTE PUNCH AVAILABLE ON LINK 'linkid' -- FILE 'spoolid'
PURGED

The terminal specified is not capable of producing the user
specified punched output.

MANAGING RETURNED FILES

VNET rejects any file that does not contain in its tag a destination
address that matches an entry in the VNET route or link tables. The file
is returned to the virtual reader queue of the originating local virtual
machine user. The file tag must be corrected and the file resubmitted to
VNET. The following example with the VNET virtual machine ID of 'NET'
shows how this is done.

1. The user directs a print file to VNET for transmission by
issuing TAG and SPOOL commands.

```
TAG DEV 00E HOYSTON  
SPOOL 00E to NET
```

The destination address "HOYSTON" is incorrect.

2. The user issues a PRINT command.
3. VM/370 responds with the message "PRT FILE 6783 TO NET". The
spoolid of the file is 6783.
4. VNET examines the file tag and finds no match in the route or
link tables. The file is returned to originator's virtual
machine reader.
5. VM/370 issues a message to the user "RDR FILE 6783 TRANSFERRED
FROM NET". VNET issues a message to the user "MSG FROM NET: FILE
6783 REJECTED -- INVALID DESTINATION ADDRESS".
6. The user corrects the tag and resubmits the file. The tag is
corrected by issuing a TAG FILE command "TAG FILE 6783 HOUSTON".
The file is resubmitted by issuing a TRANSFER command "TRANSFER
6783 TO NET".
7. VNET accepts the file and enqueues it on the link required to
reach the destination "HOUSTON".

Before further files are to be sent, the tag for the user's virtual printer should be corrected by reissuing the TAG Dev command with the correct address 'HOUSTON'.



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Appendices contain detailed descriptions of all commands and messages, plus reference information on communicating with remote stations and terminals.

Appendix A contains a detailed description of the VNET commands. The messages resulting from the use of each command are included in the description of the command.

NOTATIONAL CONVENTIONS

The notation used to define the command syntax in this publication is described in the following paragraphs:

1. Truncations and Abbreviations of Commands

Where truncation of a command name is permitted, the shortest acceptable version of the command is represented by uppercase letters. (Remember, however, that VNET commands may be entered with any combination of upper and lowercase letters.) The example below shows the format specification for the BACKSPAC command.

EAckspac

This representation means that EA, EAC, BACK, BACKS, EACKSP, BACKSPA, and BACKSPAC are all valid specifications for this command name, as are any of those combinations in which lower case characters are substituted for their upper case equivalents.

Operands and options are specified in the same manner. Where truncation is permitted, the shortest acceptable version of the operand or option is represented by uppercase letters in the command format box. If no minimum truncation is noted, the entire word (represented by all capital letters) must be entered.

2. The following symbols are used to define the command format and should never be typed when the actual command is entered.

underscore	_
braces	{ }
brackets	[]
ellipsis	...

3. Uppercase letters and words, and the following symbols, should be entered as specified in the format box.

asterisk	*
comma	,
hyphen	-
equal sign	=
parentheses	()
period	.
colon	:

4. Lowercase letters, words, and symbols that appear in the command format box represent variables for which specific information should be substituted. For example, in the BACKSPAC command, linkid represents a variable link identifier, such as NEWYORK.
5. Choices are represented in the command format boxes by stacking.

```
A  
B  
C
```

6. An underscore indicates an assumed default option. If an underscored choice is selected, it need not be specified when the command is entered.

Example:

The representation

```
A  
B  
C
```

indicates that either A, B, or C may be selected. However, if B is selected, it need not be specified. Or, if none is entered, B is assumed.

7. The use of braces denotes choices, one of which must be selected.

Example:

The representation

```
[ A ]  
< B >  
[ C ]
```

indicates that you must specify A, B, or C. If a list of choices is enclosed by neither brackets nor braces, it is to be treated as if enclosed by braces.

8. The use of brackets denotes choices, one of which may be selected.

Example:

The representation

```
[ A ]  
[ B ]  
[ C ]
```

indicates that you may enter A, B, or C, or you may omit the field.

9. An ellipsis indicates that the preceding item or group of items may be repeated more than once in succession.

Example:

The representation

(options...)

indicates that more than one option may be coded within the parentheses.

OPERATOR COMMAND USAGE

The VNET commands described below can be issued by either the VNET operator or the remote station operator with the following exceptions:

- CLOSE, CP, DEFINE, DELETE, DISCONN, EXEC, FORCE, REORDER, ROUTE, SHUTDOWN, TRACE, and TRANSFER commands may be executed only by the VNET operator.
- START has limited functional capabilities when issued by a remote station operator. (See the START command description.)
- Commands, issued by a remote station operator, affect only the status of that station's link. With the exception of the MSG and the QUERY command, the linkid operand must not be specified in a remote station command line.

File attributes which are those of the VM/370 spool system, and the operands describing them in the VNET command language, have maximum values and default values identical to those of the VM/370 command language and system. Command names and keywords may be specified by typing any part of the command name or keyword from the minimum truncation to the full name. The minimum truncation in each case is indicated by upper case letters.

VNET COMMANDS

* (COMMENT)

The * command performs no function, and is accepted by the command processor as a valid command which produces no response messages. The * command line may be entered directly from the VNET operator console or from a command EXEC procedure. The intent of this command is to provide a means of annotating VNET operator console listings. The format of the * command is:

* [any comment text]

Responses:

None.

BACKSPAC

The BACKSPAC command causes the current file being transmitted to be restarted or repositioned backward. This command is not supported by the DMTVMB, DMTVMC, or DMTNJI line drivers. The format of the BACKSPAC command is:

Backspac	[linkid] [<u>File</u> nnn]
----------	---------------------------------

where:

linkid is the one- to eight-character link identifier for the link on which the current file being transmitted is to be repositioned. If the command is issued by the VNET operator, this operand must be specified; if issued from a remote station, it must be omitted.

FILE is a keyword which specifies that the file being transmitted is to be restarted from the beginning.

nnn is the number of data units to be backspaced. For a print file, data unit refers to printer pages, which are counted in the same way as for the analagous VM/370 spooling command. For a punch file, data unit refers to file records which include any write type command code.

Responses:

```
DMTxxx510I FILE 'spoolid' BACKSPACED
DMTxxx511E NO FILE ACTIVE ON LINK 'linkid'
```

CHANGE

The CHANGE command alters one or more attributes of a spool file owned by the command originator. In order to affect a file using the CHANGE command, the file must be inactive (that is, no link may be actively processing it). The format for the CHANGE command is:

CHange	[linkid] spoolid	{	PRiority	nn	Name	{	fn {ft}	}	}
			CLass	c			dsname		}
			COpy	nn					}
			HOld NOHold						}
			DIst	distcode					}

where:

linkid is the one- to eight-character link identifier for the link on which the file to be changed is enqueued. If the command is issued by the VNET operator, this operand must

be specified; if issued from a remote station, it must be omitted.

spoolid is the numeric spool file identifier for the file which is to be changed.

PRIORITY nn designates the new transmission priority for the file. nn is a decimal number from 0-99 with 0 signifying the highest priority.

CLASS c designates the new class for the file. c is a one-character alphameric field from A to Z or from 0-9.

COPY nn alters the number of copies to be made of the file. The value of nn (number of copies) must be a number from 1 through 99. For nn less than 10, the leading zero is optional.

HOLD prevents the processing of the file until it is released by a CHANGE ccommand specifying NOHOLD.

NOHOLD releases the specified spool file if it had been in HOLD status.

DIST distcode changes the distribution code of the specified file. distcode is a one- to eight-character identification to be associated with the file.

NAME fn (ft) changes the name of the specified file. If specified, NAME dsname this operand must be the last entry in the command line.

Responses:

DMTAXM520I FILE 'spoolid' CHANGED
DMTAXM521I FILE 'spoolid' HELD FOR LINK 'linkid'
DMTAXM522I FILE 'spoolid' RELEASED FOR LINK 'linkid'
DMTAXM523I LINK 'linkid' QUEUE REORDERED
DMTAXM524E FILE 'spoolid' ACTIVE -- NO ACTION TAKEN
DMTAXM525E FILE 'spoolid' IS FOR LINK 'linkid' -- NO ACTION TAKEN
DMTAXM526E FILE 'spoolid' NOT FOUND -- NO ACTION TAKEN

CLOSE

For VNET Operator Only

The CLOSE ccommand causes one or more active files on an inactive link to be deactivated. Active input files are reenqueued as inactive files, and subsequent retransmission begins at the start of each input file.

Active output files (which are normally incomplete) are discarded. The format of the CLOSE command is:

Close	linkid	<pre>[ALL INput OUTput spoolid]</pre>
<p>Only one keyword may be entered. If no keyword is entered, a default of ALL is assumed.</p>		

where:

- linkid is the one- to eight-byte link identifier for the link on which the files to be closed are enqueued. The specified link must be inactive when the CLOSE command is issued.
- ALL is a keyword which specifies that all active input and output files are to be deactivated. Active input files are deactivated and requeued. Active output files are deactivated and purged.
- INPUT is a keyword which specifies that the all active input files for the specified link are to be deactivated and requeued.
- OUTPUT is a keyword which specifies that all active output files for the specified link are to be deactivated and purged.
- spoolid ... specifies particular input file(s) to be deactivated and requeued.

Responses:

```
DMTAXM500I nn FILE(S) CLOSED ON LINK 'linkid'
DMTAXM501E LINK 'linkid' ACTIVE -- NO FILE(S) CLOSED
DMTAXM502E FILE 'spoolid' INACTIVE -- NO ACTION TAKEN
```

CMD

When issued with a text operand, the included text is interpreted as a remote system command and is forwarded for execution at the specified location. The format of the text must conform to the command syntax of the particular system to which the command is addressed. The local VNET performs no processing on the remote system command which is entered. The CMD command provides the means by which operators and users can execute allowable query and control functions at remote systems. The format of the CMD command is:

CMD	locid	text
-----	-------	------

where:

locid is the one- to eight-byte location identifier of the remote system which is to receive and execute the command specified in the text line.

text is an arbitrary string of alphameric characters comprising the text line to be presented to the remote location as a system command. The maximum length of the character string is 120 characters.

(Format requirements for this string are dependent on the type of remote system implied by locid.)

Responses:

```
DMTxxx302E LINK 'linkid' IS NOT DEFINED
DMTxxx303E LINK 'linkid' IS NOT ACTIVE
DMTCMX310E LOCATION 'locid' IS NOT DEFINED
DMTxxx320E LINK 'linkid' NOT CONNECTED
```

CP

For VNET Operator Only

The CP command transmits commands to the VM/370 Control Program without leaving the VNET command environment. The format of the CP command is:

CP		{command line}
----	--	----------------

where:

command line is any CP command permitted for the command privilege of the VNET virtual machine. The omission of this field will produce error message DMTCMX204E.

Responses:

None. (Response from CP may result.)

DEFINE

For VNET Operator Only

The DEFINE command causes a new link to be temporarily added to the set of valid links for the local VNET installation, or causes an existing inactive link definition to be temporarily redefined. Permanent link definitions and changes can only be made by modifying the VNET directory. Files addressed to the remote station whose location ID is identical to the link ID may be processed after the link has been defined. Up to sixteen new links may be temporarily defined.

The format of the DEFINE command is:

DEFINE	linkid	{	CLASS	c	}
		{	KEEP	holdslot	}
		{	LINE	vaddr	}
		{	TASK	name	}
		{	TYPE	driverid	}
		{	ZONE	zoneid	}

where:

- linkid** is the one- to eight-character link identifier for the new link to be defined, or for the existing link to be redefined.
- CLASS c** specifies the classes of files which may be processed by the active link. c can be either *, meaning all file classes may be processed, or from one to four classes (single characters with no intervening blanks). If no classes are specified, the default is *.
- KEEP holdslot** specifies the number of virtual storage file tag slots to be reserved for exclusive use by the link being defined. "holdslot" is a decimal number from zero to sixteen. If the KEEP parameter is omitted, a default value of two is assumed.
- LINE vaddr** designates the virtual device address (vaddr) of a permanent telecommunications port to be used for processing files for the affected link. If this parameter is omitted, the LINE definition defaults to undefined.
- TASK name** designates a task name for use by the line driver associated with the link. name is a one- to four-character alphanumeric identifier. If this parameter is omitted, the task definition defaults to undefined.
- TYPE driverid** designates the name of the line driver which is to be associated with the link. driverid is a one- to eight-character name of the line driver to be used (DMTSML, DMTNPT, DMTNJI, DMTVMB, or DMTVMC). The proper line driver to use with the link depends on the type of remote telecommunications system involved. If a new link is being defined and this operand is not specified, the type definition defaults to undefined.
- ZONE zoneid** specifies the number of time zone boundaries between the remote location and Greenwich to the east, the International Date Line being included as a time zone boundary. If the ZONE parameter is omitted, a default of 0 (Greenwich Mean Time) is assumed.

Responses:

```
DMTCMX540I NEW LINK 'linkid' DEFINED
DMTCMX541I LINK 'linkid' REDEFINED
DMTCMX542E LINK 'linkid' ACTIVE -- NOT REDEFINED
DMTCMX543E LINK 'linkid' NOT DEFINED -- LINK LIMIT REACHED
DMTCMX653I LINK 'linkid' DEFAULT 'task' 'type' 'vaddr' c Z=z R=r
```

DELETE

For VNET Operator Only

The DELETE command causes a previously defined link to become temporarily undefined. Permanent deletion of a link can only be made by deleting the entry from the VNET directory. The link to be deleted must be inactive and must have no files enqueued or pending at the time the DELETE command is issued. Files addressed to an undefined link are rejected as invalidly addressed.

```
DElETE | linkid
```

where:

linkid is the one- to eight-byte link identifier for the link which is to be undefined.

Responses:

```
DMTCMX550I LINK 'linkid' NOW DELETED
DMTCMX551E LINK 'linkid' ACTIVE -- NOT DELETED
DMTCMX552E LINK 'linkid' HAS A FILE QUEUE -- NOT DELETED
```

DISCONN

For VNET Operator Only

The DISCONN command causes the VNET operator console to be disconnected from the VM/370 system while VNET continues to operate. The VNET DISCONN command operates the same as the VM/370 DISCONN command, except that another userid may be specified to receive all VNET operator console output lines. If no userid is specified, the VNET console output lines are discarded without being printed. In order for the VNET operator to reconnect his console, he must log on to the system again. The format of the DISCONN command is:

```
DISConn | [ userid ]
```

where:

userid is the one- to eight-character ID for the virtual machine which is to receive subsequent VNET operator console output lines.

Responses:

```
DMTCMX560I VNET DISCONNECTING
DMTCMX561E USERID 'userid' NOT RECEIVING
```

DRAIN

The DRAIN command causes the specified link to be deactivated after the file currently being processed is completed. The link is deactivated immediately if no file is being processed when the DRAIN command is issued. An inactive link is activated by a START command. If a START command is issued for the link before final file processing is complete, the link is not deactivated and normal processing is continued. The format for the DRAIN command is:

```
DRain | [linkid]
```

where:

linkid is the one- to eight-character link identifier for the link which is to be deactivated. If the command is issued by the VNET operator, this operand must be specified; if issued from a remote station, it must be omitted.

Responses:

```
DMTxxx570I LINK 'linkid' NOW SET TO DEACTIVATE
DMTxxx571E LINK 'linkid' ALREADY SET TO DEACTIVATE
```

EXEC

For VNET Operator Only

The EXEC command executes a sequence of VNET commands which are contained within a CMS file on the VNET system disk. The format of the EXEC command is as follows:

```
Exec | filename
```

where:

filename is the filename of a file containing one or more VNET commands to be executed. The filetype of the file must be 'VNET', and the file must contain fixed length 80 character records.

VNET exec files may contain any valid VNET command except another EXEC command. Each line of the exec file is interpreted as a single VNET command line, and no conditionals or substitution variables are provided.

At Initial Program Load, VNET will normally search its system disk for a file named 'PROFILE VNET', and will automatically execute the file as an exec file if it is found. This function may be suppressed by IPLing VNET using the 'NOPROF' parameter as follows:

```
Ipl vaddr PARM NOPROF
```

Responses:

```
DMTCMX675E EXEC 'filename' NOT FOUND ON DISK 'vaddr' -- COMMAND FILE
NOT EXECUTED
DMTCMX676E FATAL ERROR READING FROM 'vaddr' -- EXEC 'filename'
PROCESSING TERMINATED
DMTCMX677E EXEC 'filename' FILE FORMAT INVALID -- EXEC NOT EXECUTED
DMTCMX678E EXEC 'filename' IN EXECUTION -- NEW EXEC COMMAND IGNORED
DMTRES679I EXECUTING 'filename' COMMAND: (command line)
```

FLUSH

The FLUSH command causes file processing to be halted for the file which is currently being transmitted on a link. The file is either purged or held, and link processing continues with the next file which is enqueued for transmission on the link. The format for the FLUSH command is:

Flush		[linkid]	[spoolid]	[ALL HOLD]
			[*]	

where:

linkid is the one- to eight-character link identifier for the link on which the file to be FLUSHed is being transmitted. If the command is issued by the VNET operator, this operand must be specified; if issued from a remote station, it must be omitted.

spoolid is the numeric spool file identifier for the file which is to be flushed. This field is provided to assure that an operator does not inadvertently destroy the wrong file through a timing error.

* the asterisk character (*) specifies that the current file being transmitted is to be flushed.

Note: This option is only available to the remote operator.

ALL is a keyword which signifies that all copies of the file being transmitted are to be deleted. If this option is not specified, only the current copy is deleted and the next copy, if any, is processed.

HOLD is a keyword which specifies that the file being transmitted is not to be purged, but rather is to be saved and placed in system hold status. Processing of the file may be restarted after the file has been taken out of hold status by means of the CHANGE command.

Responses:

```
DMTxxx580I FILE 'spoolid' PROCESSING TERMINATED
DMTxxx581E FILE 'spoolid' NOT ACTIVE
```

FORCE

For VNET Operator Only

The FORCE command causes the immediate deactivation of the specified link, and the termination of its line driver task. The format of the FORCE command is as follows:

```
FORCE | linkid
```

where:

linkid is the one- to eight-byte link identifier of the link to be deactivated.

The FORCE command should be used only when the DRAIN command fails to deactivate the link. Note that the DRAIN command allows files in active transmission to complete before deactivation of the link.

Responses:

```
DMTREX002I LINK 'linkid' DEACTIVATED
```

FREE

The FREE command causes file transmission for a particular link to be resumed. The hold status for each of the files enqueued on the link is not affected. The FREE command has no effect on a link for which file transmission had not been previously suspended through the use of the HOLD command. The format for the FREE command is:

```
FRee | [linkid]
```


where:

linkid is the one- to eight-byte link identifier for the link on which file transmission is to be resumed. If the command is issued by the VNET operator, this operand must be specified; if issued from a remote station, it must be omitted.

Responses:

```
DMTxxx590I LINK 'linkid' RESUMING FILE TRANSFER
DMTxxx591E LINK 'linkid' NOT IN HOLD STATUS
```

FWDSpace

The FWDSpace command causes the current file being transmitted to be repositioned forward. The format of the FWDSpace command is:

FWdspace [linkid] [nnn]

where:

linkid is the one- to eight-character link identifier for which the current file being transmitted is to be repositioned. If the command is issued by the VNET operator, this operand must be specified; if issued from a remote station, it must be omitted.

nnn is the number of data units to be forward spaced (if none is specified, a default of 1 is assumed). For a print file, data unit refers to printer pages, which are counted in the same way as for the VM/370 BACKSPAC command. For a punch file, data unit refers to file records which include any write type command code. If nnn is greater than the number of data units remaining to be processed, the command functions as a FLUSH command.

NOTE: The nnn operand is not supported by the DMTVMB, DMTVMC, or DMTNJI line drivers.

Responses:

```
DMTxxx600I FILE 'spoolid' FORWARD SPACED
DMTxxx511E NO FILE ACTIVE ON LINK 'linkid'
```

HOLD

The HOLD command causes file transmission for a particular link to be temporarily suspended, without deactivating the link. File transmission is suspended when the currently active file is completed, or, optionally, file transmission may be suspended immediately, and resumed from that point at a later time. The HOLD command does not affect the

hold status of any file enqueued for transmission on the link. File transmission for the link may be resumed by means of the FREE command. The format of the HOLD command is:

```
[ HOLD      | [linkid] [IMMED]
```

where:

linkid is the one- to eight-byte link identifier of the link for which file transmission is to be suspended. If the command is issued by the VNET operator, this operand must be specified; if issued from a remote station, it must be omitted.

IMMED is a keyword which specifies that active file transmission, if any, is to be suspended immediately.

NOTE: The IMMED operand is not supported by the DMTVMB, DMTVMC, or DMTNJI line drivers.

Responses:

```
DMTxxx61CI LINK 'linkid' TO SUSPEND FILE TRANSMISSION
DMTxxx611I LINK 'linkid' FILE TRANSMISSION SUSPENDED
DMTxxx612E LINK 'linkid' ALREADY IN HOLD STATUS
DMTxxx531I VALID COMMAND RECOGNIZED ON LINK 'linkid' -- NO
ACTION TAKEN
```

HT

The HT command suppresses the printing of any messages which are stacked for output to the VNET operator console. The command has no effect on the execution of any other commands which may be in progress or pending. If entered from a remote station console, HT will purge any messages pending in that link's message stack. The format of the HT command is as follows:

```
[ HT      |
```

Responses:

None.

MSG

The MSG command causes a line of arbitrary text to be forwarded to a remote station and presented to a user or operator as a message. The format of the MSG command is:

```
Msg | locid userid [msgtext]
```

where:

locid is the one- to eight-byte location identifier of the location which is to receive the specified text line. If the message is for a local VM/370 user, this operand is specified as the local VNET location ID.

userid is a one- to eight-byte identifier of a user at the specified location, or the identifier 'VNET' for the remote VNET operator console. If the message is to be sent to a remote batch terminal the userid field will be ignored, but a dummy entry must be included to avoid deletion of the first word of the message text.

msgtext is an arbitrary string of alphameric characters comprising the message to be presented to the specified location and user. The maximum length of the character string is 120 characters.

Responses:

```
DMTxxx302E LINK 'linkid' IS NOT DEFINED
DMTxxx303E LINK 'linkid' IS NOT ACTIVE
DMTCMX310E LOCATION 'locid' IS NOT DEFINED
DMTxxx320E LINK 'linkid' NOT CONNECTED
DMTRGX330E USERID MISSING OR INVALID
DMTRGX331E 'userid' NOT LOGGED ON
DMTRGX332E 'userid' NOT RECEIVING
```

ORDER

The ORDER command causes the file queue for a particular link to be reordered as specified. The effect of the command is to redefine the order in which particular files are to be processed on the link. The specified files are placed at the start of the link queue in the specified order, and the file priority attribute is automatically set to zero (top priority) for each specified file. The format of the ORDER command is:

```
Order | [linkid] {spoolid1 [ spoolid2 ... ] }
```

where:

linkid is the one- to eight-byte link identifier for the link on which the file queue is to be reordered. If the command is issued by the VNET operator, this operand must be specified; if issued from a remote station, it must be omitted.

spoolid1 specifies the affected file(s), and defines the new order in which they are to be enqueued.
...

Responses:

```
DMTAXM523I LINK 'linkid' QUEUE REORDERED
DMTAXM524E FILE 'spoolid' ACTIVE -- NO ACTION TAKEN
DMTAXM525E FILE 'spoolid' IS FOR LINK 'linkid' -- NO ACTION TAKEN
DMTAXM526E FILE 'spoolid' NOT FOUND -- NO ACTION TAKEN
```

PURGE

The PURGE command causes specified inactive files for a particular link to be removed from the system before they are processed on the link. Any file may be purged, regardless of its status, as long as it has not been selected for transmission. The format of the PURGE command is:

PURge	<linkid]	{	ALI	}
		{	spoolid1 spoolid2 ...	}

where:

linkid is the one- to eight-byte link identifier for the link on which the files to be removed are enqueued. If the command is issued by the VNET operator, this operand must be specified; if issued from a remote station, it must be omitted.

ALL specifies that the entire queue of files for the link is to be removed from the system.

spoolid1 specifies the particular file(s) to be removed from the system.
...

Responses:

```
DMTAXM524E FILE 'spoolid' ACTIVE -- NO ACTION TAKEN
DMTAXM525E FILE 'spoolid' IS FOR 'linkid' -- NO ACTION TAKEN
DMTAXM526E FILE 'spoolid' NOT FOUND -- NO ACTION TAKEN
DMTAXM640I 'nn' FILE(S) PURGED ON LINK 'linkid'
```

QUERY

The QUERY command is used to display linkid, file, or system status information. If the command is issued by the VNET operator, the response is directed to the VNET virtual machine console. If the

command is issued by a remote operator, the response is printed on the remote station printer. For the information returned by each option of the QUERY command, refer to the appropriate message text in "Appendix E: VNET Message Summary." The format of the QUERY command is:

Query	{	locid	}
	{	linkid	{ ACTIVE }
	{		{ DEF }
	{		{ FILES }
	{		{ QUEUE }
	{		{ SUM }
	{		
	{	File spoolid	[STAT]
	{		VM
	{		VNET
	{		
	{	System	[Active]
	{		[Links]
	{		[Ports]
	{		[Queue]
	{		[Routes]

Only one item: a linkid, a file, or the system, may be queried at any one time, and only one keyword may be specified.

where:

- locid requests information pertaining to the active attributes and status of the link specified by the one- to eight-character locid. (See the description of messages DMTCMX651I and DMTCMX652I.)
- linkid ACTIVE requests information pertaining to the active file descriptors for the link specified by the one- to eight-character linkid. (See the description of messages DMTCMX656I and DMTCMX665I.)
- DEF requests information pertaining to the defined default attributes of the link specified by the one- to eight-character linkid. (See the description of message DMTCMX653I.)
- FILES requests information pertaining to the file status of the link specified by the one- to eight-character linkid. (See the description of message DMTCMX654I.)
- QUEUE requests a list of brief descriptions of each inactive file enqueued for transmission, in the current queue order, on the link specified by the one- to eight-character linkid. (See the descriptions of messages DMTCMX654I and DMTCMX655I.)
- SUM requests information pertaining to the transaction and error counters maintained by the line driver concerning activity on the communications adapter. (See description of message DMTCMX149I.)

FILE spoolid STAT requests certain information pertaining to the particular file which is specified by the numeric spoolid. (See the descriptions of messages DMTCMX660I and DMTCMX661I.)

VNET requests a description of the VNET control related attributes and status of the file specified by spoolid. (See the description of message DMTCMX662I.)

VM requests a description of the VM/370 spool system related attributes of the file specified by spoolid. (See the description of message DMTCMX663I.)

SYSTEM LINKS requests brief descriptions of each link currently defined in the system. (See the descriptions of messages DMTCMX670I, DMTCMX671I, and DMTCMX673I.)

ACTIVE is a qualifier used with the SYSTEM keyword to request that only information pertaining to active links is to be listed.

PORTS is a qualifier used with the SYSTEM keyword to request that a brief description of entries in the switchable port table be given. (See the descriptions of messages DMTCMX625I, DMTCMX626I, and DMTCMX627I.)

QUEUE is a qualifier used with the SYSTEM keyword to request that message DMTCMX654I be issued for each link with a non-zero queued or pending file count. (See description of message DMTCMX654I and message DMTCMX674I.)

ROUTES is a qualifier used with the SYSTEM keyword to request that a brief description of entries in the routing table be given. (See the descriptions of messages DMTCMX634I and DMTCMX636I.)

Responses:

QUERY 'locid':

```
DMTCMX636I 'locid' ROUTED THROUGH LINK 'linkid'
DMTCMX637I 'locid' NCT ROUTED
DMTCMX651I LINK 'linkid' INACTIVE
DMTCMX652I LINK 'linkid' (CONNECT|ACTIVE) 'task' 'type' 'vaddr' c
              (HO|NOH) (DR|NOD) (NCT|TRS|TRL|TSL)
```

QUERY 'linkid' ACTIVE:

```
DMTCMX656I FILE 'spoolid' ('orgid') 'locid' 'userid' CL a PR pp
              LEFT mmmmmmmmm OF nnnnnnnn
DMTCMX665I NO FILE ACTIVE
```

QUERY 'linkid' DEF:

```
DMTCMX653I LINK 'linkid' DEFAULT 'task' 'type' 'vaddr' c Z=z R=r
```

QUERY 'linkid' FILES:

DMTCMX654I LINK 'linkid' S=s R=r Q=q P=p

QUERY 'linkid' QUEUE:

DMTCMX654I LINK 'linkid' S=s R=r Q=q P=p
DMTCMX655I FILE 'spoolid' ('orgid') 'locid' 'userid' CL a PR pp
REC nnnnnnnn (HO|NOH)

QUERY 'linkid' SUM:

DMTCMX149I LINK 'linkid' LINE ACTIVITY; TOT=mmmmmmmm;
ERRS=nnnnnnnn; TMOUTS=pppppppp

QUERY FILE 'spoolid' STAT:

DMTCMX660I FILE 'spoolid' INACTIVE ON LINK 'linkid'
DMTCMX661I FILE 'spoolid' ACTIVE ON LINK 'linkid'
DMTCMX664E FILE 'spoolid' NOT FOUND

QUERY FILE 'spoolid' VM:

DMTCMX663I FILE 'spoolid' PR pp CL a CO nn (HO|NOH) DI 'distcode',
NA ('fn ft'|'dsname')
DMTCMX664E FILE 'spoolid' NOT FOUND

QUERY FILE 'spoolid' VNET:

DMTCMX662I FILE 'spoolid' ORG 'lccid1' 'userid1' ORGID 'orgid'
mm/dd/yy hh:mm:ss z.z.z. TO 'locid2' 'userid2'
DMTCMX664E FILE 'spoolid' NOT FOUND

QUERY SYSTEM ACTIVE:

DMTCMX670I LINK 'linkid' (CONNECT|ACTIVE) -- LINE 'vaddr' (HO|NOH)
(DR|NOD) (NOT|IRS|TRL|TSL)
DMTCMX672I NO LINK ACTIVE

QUERY SYSTEM LINKS:

DMTCMX670I LINK 'linkid' (CONNECT|ACTIVE) -- LINE 'vaddr' (HO|NOH)
(DR|NOD) (NOT|IRS|TRL|TSL)
DMTCMX671I LINK 'linkid' INACTIVE
DMTCMX673I NO LINK DEFINED

QUERY SYSTEM PORTS:

DMTCMX625I NO PORTS AVAILABLE
DMTCMX626I PORT 'vaddr' AVAILABLE
DMTCMX627I PORT 'vaddr' IN USE BY LINK 'linkid'

QUERY SYSTEM ROUTES:

DMTCMX634I NO LOCATIONS ROUTED
DMTCMX636I 'locid' ROUTED THROUGH LINK 'linkid'

QUERY SYSTEM QUEUE:

DMTCMX654I LINK 'linkid' S=s R=r Q=q P=p
DMTCMX674I NO FILES QUEUED

REORDER

For VNET Operator Only

The REORDER command causes all inactive files currently owned by the VNET virtual machine to be reaccepted and routed. REORDER is not normally issued by the VNET operator, but is issued internally by VNET during processing of CLOSE, DEFINE, DELETE, ROUTE, or START commands, and following any link deactivation. The format of the REORDER command is:

REORDER

(Execution of this command will never adversely affect VNET operations. However, in case of abnormal occurrences, files presented to VNET might not be immediately accepted and transmitted automatically. Execution of the REORDER command forces VNET to inspect its input files, and can have the effect of initiating transmission of a 'hung' file.)

Responses:

DMTAXM109I FILE QUEUE REORDERED

ROUTE

For VNET Operator Only

The ROUTE command defines, modifies, or deletes an entry in the VNET routing table. The VNET routing table is used by VNET to automatically determine which link is to receive files, commands, and messages which cannot be transmitted to their destination location on a direct link. A direct link and an indirect route may be concurrently defined for the same remote location, using a single locid. In this case, indirect routing is automatically used only when the indirect link is active and the direct link is not. Files are automatically requeued following execution of a ROUTE command, so that transmission of rerouted files can begin immediately. The format of the ROUTE command is as follows:

Route		locid	{TO linkid}
			{OFF }

where:

locid is the one- to eight-character identifier for the location whose routine is to be modified.

TO linkid specifies the link through which files, commands, and messages addressed to the specified remote location are to be routed.

OFF cancels indirect routing for the specified locid.

Responses:

```
DMTCMX630I 'locid' NOW ROUTED THROUGH LINK 'linkid'
DMTCMX631I INDIRECT ROUTING FOR 'locid' DEACTIVATED
DMTCMX632E 'locid' INVALID ROUTE SPECIFIED
DMTCMX633E 'locid' NOT ROUTED -- ROUTE LIMIT REACHED
DMTCMX638E LOCATION 'locid' HAS A FILE QUEUE --
          INDIRECT ROUTING NOT DEACTIVATED
```

SHUTDOWN

For VNET Operator Only

The SHUTDOWN command effectively issues a DRAIN command to each link which is currently active. This function provides a convenient means for gracefully terminating VNET operations. The format of the SHUTDOWN command is:

SHUTDOWN

Responses:

See responses to the DRAIN command.

START

The START command, issued by the VNET operator, can cause a specified inactive link to be activated. It can also be used by either the VNET or remote operator to cause a particular active link to begin processing files of a specified set of classes or to reset a pending deactivation due to a DRAIN command. The format of the START command is:

Start		linkid	[Class	c]	[Parm ...]
				LINE	vaddr		
				TASK	name		
				TYPE	driverid		

Any combination of keywords with associated options may be entered in any order, except that Parm keyword must be the rightmost keyword, if it is entered.

where:

- linkid** is the one- to eight-character link identifier for the inactive link to be activated, or for the active link on which file processing is to be altered. If the command is issued by the VNET operator, this operand must be specified; if issued from a remote station, it must be omitted.
- CLASS c** specifies classes of files which may be processed subsequent to the command execution. c can be either *, meaning all file classes may be processed, or from one to four classes (single characters with no intervening blanks). If * is specified, no other classes may be specified. If multiple classes are specified for a link, files are processed in the order that the classes were specified, and in priority order within each particular class. If * is specified, files are processed in priority sequence, only. If no classes are specified, the definition of CLASS in the link's link table is used.
- LINE vaddr** designates the virtual device address (vaddr) of the line port which is to be used by the newly activated link. The value specified overrides a device address which may have been previously defined for the link. If no line port address is specified, the previously defined address is used. If no address was previously defined and no address is specified, an available switched port is selected for use, and the operator is informed of that selection. This keyword option is valid only when activating an active link.
- TASK name** designates a task name for use by the line driver to be initialized, which overrides the name which may have been previously defined for the link. name is a one- to four-character alphanumeric identifier. If this field is not specified, the name previously defined for the link is used. If no name was previously defined for the link, an appropriate descriptive default task name is generated and used. This keyword option is valid only when activating an active link.
- TYPE driverid** designates the name of the line driver which is to be used for the link to be activated. driverid is a one- to eight-character name of the line driver to be used with the newly activated link and must have been defined during VNET generation. This keyword option is valid only when activating an active link. See the section in this document on line driver selection for determining which line driver to use for a given application. This specification overrides the driver name which may have been previously defined for the link.
- Note:** If no line driver type was previously defined for the link, this field must be specified.
- PARM** is a keyword which causes the remainder of the command line to the right of the PARM keyword to be made available to the newly activated line driver. No further interpretation is performed on the command line after a PARM keyword is encountered, so it must always be the rightmost keyword to be specified. For a description of

the PARM operands for each line driver, see the section on the START command in the description of each line driver.

Responses:

```
DMTCMX700I ACTIVATING LINK 'linkid' 'task' 'type' 'vaddr' c
DMTCMX701E NO SWITCHED LINE AVAILABLE -- LINK 'linkid' NOT ACTIVATED
DMTCMX702E LINE 'vaddr' IS IN USE BY LINK 'linkid1' -- LINK 'linkid2'
          NOT ACTIVATED
DMTCMX703E DEV 'cuu' IS NOT A LINE PORT -- LINK 'linkid' NOT ACTIVATED
DMTCMX704E LINE 'vaddr' CC=3 NOT OPERATIONAL -- LINK 'linkid'
          NOT ACTIVATED
DMTCMX705E DRIVER 'type' NOT FOUND ON DISK 'vaddr' -- LINK 'linkid'
          NOT ACTIVATED
DMTCMX706E FATAL ERROR LOADING FROM 'vaddr' -- LINK 'linkid'
          NOT ACTIVATED
DMTCMX707E DRIVER 'type' FILE FORMAT INVALID -- LINK 'linkid'
          NOT ACTIVATED
DMTCMX708E VIRTUAL STORAGE CAPACITY EXCEEDED -- LINK 'linkid'
          NOT ACTIVATED
DMTCMX709E TASK NAME 'task' ALREADY IN USE -- LINK 'linkid'
          NOT ACTIVATED
DMTCMX710E MAX ('nn') ACTIVE -- LINK 'linkid' NOT ACTIVATED
DMTxxx750E LINK 'linkid' ALREADY ACTIVE -- NO ACTION TAKEN
DMTCMX751I LINK 'linkid' ALREADY ACTIVE -- NEW CLASS(ES) SET AS REQUESTED
DMTxxx752I LINK 'linkid' STILL ACTIVE -- DRAIN STATUS RESET
DMTSML901E INVALID SML MODE SPECIFIED -- LINK 'linkid' NOT ACTIVATED
DMTSML906E INVALID SML BUFFER PARAMETER -- LINK 'linkid' NOT ACTIVATED
DMTNIT911E INVALID NJI BUFFER SIZE SPECIFIED -- LINK 'linkid'
          NOT ACTIVATED
DMTNIT912E INVALID NJI NODAL RESISTANCE SPECIFIED -- LINK 'linkid'
          NOT ACTIVATED
DMTNIT913E INVALID PASSWORD PARAMETER SPECIFIED -- LINK 'linkid'
          NOT ACTIVATED
```

TRACE

For VNET Operator Only

The TRACE command causes the specified active link to report certain line activity information on the operator console, or to cease reporting such information. (See the description of the message DMTxxx149I in "VNET Message Summary".) The purpose of this function is to provide operator assurance that the line service is functioning properly, and to generate documentation to be used in problem determination. The format of the TRACE command is:

TRace		linkid	[SUM]	[LOG]
			[NOSum]	[NOLog]
If keywords are not entered, a default of SUM is assumed.								

where:

linkid is the one- to eight-byte link identifier of the link for which activity tracing is to be initiated or terminated.

SUM is a keyword which specifies that the link's line driver is to report all line activity in a standard format.

NOSUM is a keyword which specifies that the link's line driver is to cease reporting line activity. This is the initial state on system start-up.

LOG is the keyword that starts the logging of I/O activity on the link.

NOLOG is the keyword that stops the logging of I/O activity and initiates the automatic printout of the log data. This is the initial state on system start-up.

Responses:

```
DMTxxx149I LINK 'linkid' LINE ACTIVITY; TOT=mmmmmmmm;
           Errs=nnnnnnnn; TMOUTS=pppppppp
DMTxxx801I LINK 'linkid' LOG ACTIVATED
DMTxxx802I LINK 'linkid' LOG DEACTIVATED
DMTxxx803I LINK 'linkid' SUM REPORTING DEACTIVATED
DMTxxx810E LINK 'linkid' LOG ALREADY ACTIVE
DMTxxx811E LINK 'linkid' LOG NOT ACTIVE
DMTxxx812E LINK 'linkid' SUM REPORTING ALREADY ACTIVE
DMTxxx813E LINK 'linkid' SUM REPORTING NOT ACTIVE
```

TRANSFER

For VNET Operator Only

The TRANSFER command redirects inactive files specified by 'spoolid' to a new destination. VNET removes the files from 'linkid' and enqueues them on the link associated with the path to the new 'locid'.

```
TRANSFER | [linkid] spoolid1 spoolid2 ... TO locid [userid]
```

where:

linkid is the one- to eight-byte link identifier of the link from which files are to be transferred.

spoolid1 specifies the particular file(s) to be transferred from the specified link.

locid is the one- to eight-byte location identifier of the new destination for the specified spoolids.

userid is a one- to eight-byte identifier specifying the new destination userid for the specified spoolids. This userid will default to 'system' if not specified.

Responses:

DMTAXM524E FILE 'spoolid' ACTIVE -- NO ACTION TAKEN
DMTAXM525E FILE 'spoolid' IS FOR LINK 'linkid' -- NO ACTION TAKEN
DMTAXM526E FILE 'spoolid' NOT FOUND -- NO ACTION TAKEN
DMTAXM645I 'nn' FILE(S) TRANSFERRED ON LINK 'linkid'



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Appendix B contains a detailed description of the VNET messages and wait state codes. A message summary is included that groups the messages according to the type of operation in progress at the time of message generation.

VNET messages are issued in response to commands and spontaneously during system execution. Messages, in response to commands, are issued to the command originator and, in certain cases, to the VNET local operator. Spontaneous messages are issued to the VNET local operator whenever error or informational conditions arise during system operation. Certain spontaneous messages are issued to virtual machine users when they apply to files originated or destined for the users.

MESSAGE FORMAT

The message codes listed conform to VM/370 standards. The first three characters (DMT) denote the VNET component of VM/370. The next three characters denote the module origin of each message; the possible codes are REX, RGX, CMX, AXM, INI, IRX, NPT, SML, VMB, VMC, NCM, NHD, and NIT. Some messages can be issued by more than one module. The next three characters contain the message number. The last character is a message severity code and consists of the following:

R	response message
I	informational message
E	error message
T	terminal error -- system shutdown
S	severe error message

The message code (DMTAXM101I for example) is included in the message line if the "ON" option of the CP command "EMSG" is chosen. Time, in the format of "hh:mm:ss", appears at the start of the message line. This is the time the message was generated.

MESSAGE DESCRIPTIONS

DMTAXM101I FILE 'spoolid' ('orgid') ENQUEUED ON LINK 'linkid'

Explanation: This message is issued when the file identified by 'spoolid', origin spoolid 'orgid', has arrived at the VNET virtual machine, and has been successfully accepted and enqueued on the link identified by 'linkid'. This message is also issued when a previously pending file is accepted after a tag slot has become available.

System Action: The newly accepted file is made available to the link's line driver for future transmission. If the line driver is waiting for a file to transmit, it is notified that the new file is available.

Operator Action: None.

DMTAXM102I FILE 'spoolid' ('orgid') PENDING FOR LINK 'linkid'

Explanation: The file identified by 'spoolid', origin spoolid 'orgid', has arrived at the VNET virtual machine, but has not been enqueued on the link 'linkid' to which it is addressed, because no tag slot is available.

System Action: The link's pending count is incremented, and the file will be automatically accepted when a tag slot becomes available.

Operator Action: If VNET repeatedly exhausts its available tag slots in normal operation, more extra tag slots should be generated using the 'TAGS' directory control statement, or by increasing the VNET virtual machine's virtual storage size.

DMTAXM103E FILE 'spoolid' ('orgid') REJECTED -- INVALID DESTINATION ADDRESS

Explanation: The file identified by 'spoolid' origin spoolid 'orgid' has arrived at the VNET virtual machine bearing a destination address which is invalid, or which specifies a location ID that is not defined in the local VNET system as either a link or an indirect route.

System Action: If the file originated from a local VM/370 user, it is transferred back to the originator along with this message. If the file originated at a remote location, it is purged and this message is sent to the originator.

User Action: If the file is transferred back from VNET, the tag on the file to be transmitted may be corrected using the VM/370 'TAG FILE 'spoolid'' command to reflect a correct destination, and the file may then be transferred back to the VNET virtual machine using the VM/370 'TRANSFER 'spoolid' TO 'vmid'' command. If the file is purged because it arrives at a location which does not have the destination location ID defined, the situation should be reported to local VNET system support personnel.

DMTAXM104I FILE ('orgid') SPOOLED TO 'userid1' -- ORG 'locid' ('userid2') mm/dd/yy hh:mm:ss

Explanation: A file has been received from a remote location, acknowledged, written to the VM/370 spool system, closed, and spooled to the local virtual machine to which the file was addressed.

orgid - the originating VM/370 spool ID, or the origin job number, of the file.

userid1 - the ID of the local virtual machine to which the file has been spooled.

locid - the location identifier of the file's originator.

userid2 - the name of the file originator's system or device at the remote location.

mm/dd/yy - the date of the file's origination at the remote location.

hh:mm:ss - the time of day of the file's origination at the remote location.

System Action: The virtual output device used to process the file is detached and normal processing continues.

Operator Action: None.

DMTAXM105I FILE 'spoolid' PURGED

Explanation: The file identified by 'spoolid' has been purged from the system as a result of normal processing.

System Action: The file's virtual storage tag is dequeued and its slot is freed. If another file is pending, it is accepted. All system tables are updated, and normal processing continues.

Operator Action: None.

DMTAXM106I FILE 'spoolid' MISSING -- DEQUEUED FROM LINK 'linkid'

Explanation: The file identified by 'spoolid' could not be located in the VNET virtual machine spool input file queue during an attempt to open the file for the link identified by 'linkid'. This situation can arise when a user retrieves a file from the the VNET spool queue using the VM/370 'TRANSFER 'spoolid' FROM 'vmid'' command.

System Action: The file's virtual storage tag is dequeued and its slot is freed. If another file is pending, it is accepted. The link table entry is updated, and normal processing continues.

Operator Action: No action is necessary. This message does not indicate an error condition.

DMTAXM107I 'nn' PENDING FILES FOR LINK 'linkid' MISSING

Explanation: A number ('nn') of pending files for the link identified by 'linkid' have been found to be missing from the VNET virtual machine spool input queue during an attempt to accept a pending file. This situation can arise when a user retrieves a file from the VNET spool queue using the VM/370 'TRANSFER 'spoolid' FROM 'vmid'' command.

System Action: The link table entry is updated to reflect the proper pending file status, and normal processing continues.

Operator Action: No action is necessary. This message does not indicate an error condition.

DMTAXM109I FILE QUEUE REORDERED

Explanation: As the result of a VNET CLOSE, DEFINE, DELETE, REORD, ROUTE, or START command, or as the result of a link deactivation, the inactive file queue has been reordered to reflect the updated status of the VNET system.

System Action: Each file enqueued by VNET is re-examined and, if appropriate, rerouted in light of changed system status.

Operator Action: None.

DMTAXM111I USER 'userid' NOT IN CP DIRECTORY -- FILE ('orgid') SPOOLED TO SYSTEM

Explanation: A file received by VNET was addressed to a local user 'userid' which is not in the local VM/370 system directory. The file had an origin spool ID of 'orgid'.

System Action: The received file is spooled to a real unit record device at the receiving location.

Operator Action: None.

DMTAXM500I 'nn' FILE(S) CLOSED ON LINK 'linkid'

Explanation: A number of files denoted by 'nn' that were active on the inactive link identified by 'linkid' have been deactivated either in response to a VNET CLOSE command, or as an automatic result of link deactivation.

System Action: Previously active input files are reenqueued for complete retransmission. Previously active output files are normally incomplete, and are therefore purged.

Operator Action: None.

DMTAXM501E LINK 'linkid' ACTIVE -- NO FILE(S) CLOSED

Explanation: The VNET operator attempted to issue a CLOSE command to an active link specified by 'linkid'.

System Action: CLOSE command processing is suppressed and file status remains unchanged.

Operator Action: The command may be reissued after the link has been deactivated.

DMTAXM502E FILE 'spoolid' INACTIVE -- NO ACTION TAKEN

Explanation: The file identified by 'spoolid' is already inactive. The action requested by the preceding command could not be performed.

System Action: The preceding command has no effect, and normal processing continues.

Operator Action: Verify the spool file ID used in the preceding command. If it was incorrect, the command may be retried with a corrected spool file ID. If it was correct, and the file is inactive, the preceding command was not valid for inactive files.

DMTAXM520I FILE 'spoolid' CHANGED

Explanation: The file identified by 'spoolid' has been altered as requested in the processing of the preceding command. The new file status remains in effect until it is changed again through operator command processing.

System Action: All appropriate action implied by the change of status is performed. This might include reordering a link queue if a file priority was changed, notifying a waiting

line driver if a file class was changed, and so on. Normal VNET processing continues.

Operator Action: None.

DMTAXM521I FILE 'spoolid' HELD FOR LINK 'linkid'

Explanation: The file identified by 'spoolid' has been placed in hold status as the result of processing of the preceding command.

The file will be kept in hold status and will not be transmitted until it is removed from hold status by command processing.

Operator Action: None.

DMTAXM522I FILE 'spoolid' RELEASED FOR LINK 'linkid'

Explanation: The file identified by 'spoolid' and enqueued on the link identified by 'linkid' has been released from hold status as a result of the processing of the preceding command. The file is now eligible for transmission on the link.

System Action: The released file will be selected for transmission according to the normal rules of file priority. The link's line driver is asynchronously notified of the file's availability for transmission if the line driver had been waiting for a file to transmit. Normal VNET processing continues.

Operator Action: None.

DMTAXM523I LINK 'linkid' QUEUE REORDERED

Explanation: The file tag queue in VNET virtual storage for the link identified by 'linkid' has been reordered in response to execution of a command. The new order of the queue represents the order of file transmission for the link.

System Action: The files reordered to the beginning of the queue are automatically given a priority of zero (highest), and normal processing continues.

Operator Action: None.

DMTAXM524E FILE 'spoolid' ACTIVE -- NO ACTION TAKEN

Explanation: The file identified by 'spoolid' is actively being read and transmitted on a link, and the action requested in the preceding command cannot be performed on active files.

System Action: The preceding command has no effect, and normal processing continues.

Operator Action: If desired, the file may be deactivated by means of a VNET 'FLUSH.'linkid' 'spoolid' HOLD' command, and the preceding command may then be retried.

DMTAXM525E FILE 'spoolid' IS FOR LINK 'linkid' -- NO ACTION TAKEN

Explanation: The file identified by 'spoolid' is enqueued on the link identified by 'linkid', which is different from the linkid specified in the preceding command.

System Action: The action requested in the preceding command is not performed, and normal processing continues.

Operator Action: Verify that the specified spool file ID and link ID are correct. If an error is found, retry the preceding command.

DMTAXM526E FILE 'spoolid' NOT FOUND -- NO ACTION TAKEN

Explanation: The file identified by 'spoolid' which was specified in the preceding command is not owned by VNET, or is pending.

System Action: The preceding command has no effect, and normal processing continues.

Operator Action: Verify the spool file ID used in the preceding command. If it was incorrect, the command may be retried with a corrected spool file ID. If it was correct, and the file is pending at the VNET virtual machine, the file may be manipulated through the use of VM/370 CP spooling commands.

DMTAXM640I 'nn' FILE(S) PURGED ON LINK 'linkid'

Explanation: The number of files denoted by 'nn' which were enqueued on the link specified by 'linkid' have been purged from the system in response to a PURGE command.

System Action: The files' virtual storage tags are dequeued and the tag slots are released. Pending files for the link are accepted if a sufficiently large number of free tag slots results.

Operator Action: None.

DMTAXM645I 'nn' FILE(S) TRANSFERRED ON LINK 'linkid'

Explanation: The number of files denoted by 'nn' which were enqueued on the link specified by 'linkid' have been re-addressed to a new destination in response to a TRANSFER command.

System Action: The destination address for the file or files is permanently changed, and the files are requeued to their new destination by a file queue reorder which is automatically performed by TRANSFER command processing.

Operator Action: None.

DMTCMX001I FREE STORAGE = 'nn' PAGES

Explanation: This message is issued automatically when the number of pages of unallocated virtual storage available to

VNET increases or decreases by a certain increment. The new number of available free pages is denoted by 'nn'.

System Action: Normal VNET processing continues.

Operator Action: This information is intended to help the operator understand the state of VNET system processing. Knowledge of virtual storage utilization helps the operator to decide whether to activate or deactivate links, and allows the system programmer to decide an appropriate virtual storage size for the VNET virtual machine.

DMTCMX003I LINK 'linkid' EXECUTING: (command line text)

Explanation: The VNET command described by (command line text) has been forwarded by a directly connected remote station for execution by the local VNET system. The link identifier of the originating remote station is specified by 'linkid'.

System Action: The command is executed, and the resulting response is automatically returned to the originating remote station.

Operator Action: None.

DMTCMX004I LOCATION 'locid' EXECUTING: (command line text)

Explanation: The VNET command described by (command line text) has been forwarded by the network operator at a remote location for local execution. The location identifier for the originating remote location is identified by 'locid'.

System Action: The command is executed, and the resulting response is automatically returned to the originating remote network operator.

Operator Action: None.

DMTCMX005I LOCATION 'locid'('userid') EXECUTING: (command line text)

Explanation: The VNET command described by (command line text) has been forwarded by an interactive user at a remote location for execution by the local VNET system. The command originator's location and user identifiers are specified by 'locid'('userid'), respectively.

System Action: The command is executed if it is a valid command for user execution, and the resulting response is automatically returned to the originating remote interactive user.

Operator Action: None.

DMTCMX200I VNET

Explanation: This message is issued in response to a null line entered as a VNET command. A null line is a line that contains no characters.

System Action: If a command which is entered from a VNET operator console contains no characters as the result of console input line editing, this message is not issued and another console read is automatically started. Normal VNET processing continues.

Operator Action: None.

DMTCMX201E INVALID COMMAND 'command'

Explanation: The character string identified by 'command' was entered as a VNET command. The command either is prohibited for use by the command originator, or is not a defined VNET command.

System Action: The command is ignored, and normal processing continues.

Operator Action: The command may be retried if it was entered in error.

DMTCMX202E INVALID LINK 'linkid'

Explanation: The character string identified by 'linkid' was entered as a VNET link ID in a console command input string, and it does not conform to syntactical requirements for VNET link IDs. (It is not one to eight alphanumeric characters.)

System Action: The command is ignored, and normal processing continues.

Operator Action: The command may be retried if it was entered in error.

DMTCMX203E INVALID SPOOL ID 'spoolid'

Explanation: The character string identified by 'spoolid' was entered as a spool file ID in a console command input string, and it does not conform to syntactical requirements for VM/370 spool file IDs (one to four decimal digits, 1-9900).

System Action: The command is ignored, and normal processing continues.

Operator Action: The command may be retried if it was entered in error.

DMTCMX204E INVALID KEYWORD 'keyword'

Explanation: The character string identified by 'keyword' was entered as a keyword in a console command input string, and it is not a valid keyword for the command issued.

System Action: The command is ignored, and normal processing continues.

Operator Action: VNET command documentation should be consulted to determine command syntax and restrictions. The command may be retried if it was entered in error.

DMTCMX205E CONFLICTING KEYWORD 'keyword'

Explanation: The keyword identified by 'keyword' was used in the preceding command in an invalid way. The keyword may have been entered more than once in the same command line, or the keyword may be invalid because another mutually exclusive keyword was entered in the same command.

System Action: The command is ignored, and normal processing continues.

Operator Action: VNET command documentation should be consulted to determine command syntax and restrictions. The command may be retried if it was entered in error.

DMTCMX206E INVALID OPTION 'keyword' 'option'

Explanation: The combination of a keyword and its option identified by 'keyword' 'option' was entered in a console command line, and it is not a valid combination for the command issued.

System Action: The command is ignored, and normal processing continues.

Operator Action: VNET command documentation should be consulted to determine command syntax and restrictions. The command may be retried if it was entered in error.

DMTCMX207E CONFLICTING OPTION 'keyword' 'option'

Explanation: The combination of a keyword and its option identified by 'keyword' 'option' was used in the preceding command in an invalid way. The presence of another keyword or keyword-and-option combination in the same command may preclude specification of the identified keyword-and-option combination.

System Action: The command is ignored, and normal processing continues.

Operator Action: VNET command documentation should be consulted to determine command syntax and restrictions. The command may be retried if it was entered in error.

DMTCMX208E INVALID USER ID 'userid'

Explanation: The operand identified by 'userid' was entered in a VNET command as an interactive user ID, and is invalid as such.

System Action: The command is ignored, and normal processing continues.

Operator Action: Valid interactive user IDs contain one to eight nonblank valid EBCDIC characters. The preceding command may be retried if it was entered in error.

DMTCMX209E RESTRICTED COMMAND 'command'

Explanation: An attempt was made to execute the command identified by 'command' which is not authorized for execution by the originating remote operator or user.

System Action: The command has no effect, and normal VNET processing continues.

Operator Action: The command may be retried if it was entered in error. Questions concerning authorization for command execution should be directed to those responsible for VNET system support. The VNET operator may be directly contacted for any special line, file, or routing requests.

DMTCMX210E INVALID LOCATION 'locid'

Explanation: A previously entered command specified as its object a location ID identified by 'locid' which was not valid. The invalid location ID may have contained more than eight characters, or may have contained no characters at all.

System Action: The command is ignored, and normal VNET processing continues.

Operator Action: The command may be retried if it was entered in error.

DMTCMX310E LOCATION 'locid' IS NOT DEFINED

Explanation:

A previously entered command specified as its object a location ID identified by 'locid' which was valid, but which was not defined as a direct link or an indirect route at the time of command processing.

System Action: The command is ignored, and normal VNET processing continues.

Operator Action: The command may be retried if it was entered in error. A DEFINE command may be executed to temporarily define a new link, or a ROUTE command may be executed to temporarily define a new indirectly routed location. Corresponding LINK and ROUTE entries should be made to the VNET DIRECT file for permanent directory definitions.

DMTCMX540I NEW LINK 'linkid' DEFINED

Explanation: The link identified by 'linkid' is now defined as the result of VNET DEFINE command processing. Attributes of the newly defined link are determined by the specified and default DEFINE command options.

System Action: The VNET file queue is automatically reordered. Files may be automatically enqueued on the newly defined link. The new link definition will remain in effect until the VNET system is restarted, or until it is removed by a VNET DELETE command.

Operator Action: Users may begin addressing files, commands, and messages to the newly defined link. A LINK statement defining the new link must be added to the VNET directory to cause the link to be defined after a VNET system restart.

DMTCMX541I LINK 'linkid' REDEFINED

Explanation: The previously defined link, identified by 'linkid', has had its definition changed as the result of command processing, according to the specified keyword options.

System Action: The changes in the link definition become effective immediately.

Operator Action: None.

DMTCMX542E LINK 'linkid' ACTIVE -- NOT REDEFINED

Explanation: The previously defined link, identified by 'linkid', has not been redefined because the link was active at the time of command processing.

System Action: The command execution is terminated, the command has no effect, and normal processing continues.

Operator Action: The command may be retried successfully after the link has been deactivated.

DMTCMX543E LINK 'linkid' NOT DEFINED -- LINK LIMIT REACHED

Explanation: An attempt was made to define a new link, but the maximum allowable number of defined links had already been reached.

System Action: The command execution is terminated, the command has no effect, and normal processing continues.

Operator Action: Check the command line to see if it was accurately typed. If an existing link definition was to have been altered, retry the command with a corrected command line. If a new link was to be defined, another link must be temporarily removed from the VNET system by means of the VNET DELETE command before the command can be successfully retried.

DMTCMX550I LINK 'linkid' NOW DELETED

Explanation: The previously defined link, identified by 'linkid', is now temporarily deleted as a result of VNET DELETE command processing.

System Action: Spool files addressed to the deleted link's location ID are no longer accepted, and are rejected as invalidly addressed. Such files may be returned to local originating users, or are purged if they are not of local origin. The deleted link can no longer be activated.

Operator Action: Files, commands, and messages can no longer be handled through the previously defined link.

DMTCMX551E LINK 'linkid' ACTIVE -- NOT DELETED

Explanation: An attempt was made to temporarily delete the link identified by 'linkid' from the VNET system by the VNET DELETE command. The attempt was unsuccessful because the specified link was active at the time of command processing.

System Action: The link remains defined and active, the command has no effect, and normal processing continues.

Operator Action: The command may be successfully retried when the link has been deactivated.

DMTCMX552E LINK 'linkid' HAS A FILE QUEUE -- NOT DELETED

Explanation: An attempt was made to temporarily delete the link identified by 'linkid' by a VNET DELETE command. The attempt was unsuccessful because the specified link had at least one file enqueued on it at the time of command processing.

System Action: The link remains defined, the command has no effect, and normal processing continues.

Operator Action: Before the link can be deleted, all files enqueued on it and pending for it must be purged, either by console command execution or through normal file transmission.

DMTCMX560I VNET DISCONNECTING

Explanation: The VNET virtual machine console is disconnected as a result of command execution. If an alternate virtual machine was specified to receive VNET output messages, that virtual machine will begin receiving the console messages through the VM/370 MSG function.

System Action: VNET continues processing normally without a main operator console.

Operator Action: The VNET main virtual machine console may be reconnected through the normal VM/370 LOGON procedure.

DMTCMX561E USERID 'userid' NOT RECEIVING

Explanation: An attempt has been made to disconnect the main VNET virtual operator console with a secondary virtual machine ID identified by 'userid' specified to receive VNET console output messages. The specified virtual machine either was not receiving messages or was not logged on at the time of command processing.

System Action: The command processing is terminated, the command has no effect, and normal processing continues.

Operator Action: The command can be retried with a different virtual machine ID specified, or with no virtual machine ID specified. The same virtual machine ID can be specified after it has been logged on and set to receive messages.

DMTCMX625I NO PORTS AVAILAELE

Explanation: This message is issued in response to a QUERY SYSTEM PORTS command. At the time of command execution, no switchable ports had been defined to the VNET system. Switchable ports are defined to the VNET system by the PORT entry in the VNET directory (VNET DIRECT)

System Action: None.

Operator Action: None.

DMTCMX626I PORT 'vaddr' AVAILAELE

Explanation: This message is issued in response to a QUERY SYSTEM PORTS ccommand. Either this message or message 'DMTCMX627' is issued once for each switchable port defined by a PORT entry in the VNET directory (VNET DIRECT). The switchable port identified by its virtual device address 'vaddr' was not in use by an active link at the time of command processing.

System Action: None.

Operator Action: None.

DMTCMX627I PORT 'vaddr' IN USE BY LINK 'linkid'

Explanation: This message is issued in response to a QUERY SYSTEM PORTS command. Either this message or message 'DMTCMX626' is issued once for each switchable port defined by a PORT entry in the VNET directory (VNET DIRECT). The switchable port identified by its virtual device address 'vaddr' was in use by the active link identified by 'linkid' at the time of command execution.

System Action: None.

Operator Action: None.

DMTCMX630I 'locid' NOW RCUTED THROUGH LINK 'linkid'

Explanation: In response to a VNET ROUTE command, file, command, and message transmission to the location identified by 'locid' may be indirectly routed through the link identified by 'linkid'.

System Action: The VNET routing table has been updated to reflect the new indirect route. A direct link and an indirect route may be concurrently defined for the same remote location, using a single locid. In this case, files, commands, and messages may be transmitted directly or indirectly, depending upon dynamic system status.

Operator Action: None.

DMTCMX631I INDIRECT ROUTING FOR 'locid' DEACTIVATED

Explanation: In response to a ROUTE command, files, commands, and messages addressed to the location identified by 'locid' will no longer be indirectly routed.

System Action: The VNET routing table has been updated to reflect the routing change. Files addressed to the identified location are rerouted for direct transmission (if a link is defined), or are returned to local originating users, or are purged.

Operator Action: None.

DMTCMX632E 'locid' INVALID ROUTE SPECIFIED

Explanation: An invalid indirect route for the location identified by 'locid' was specified on a preceding ROUTE command.

System Action: The command is ignored and normal processing continues.

Operator Action: The ROUTE command may be retried with a valid route specification.

DMTCMX633E 'locid' NOT ROUTED -- ROUTE LIMIT REACHED

Explanation: An attempt was made to define a new route by means of the ROUTE command, but the maximum allowable number of indirect route definitions had already been reached.

System Action: The command processing is suppressed, the command has no effect, and normal processing continues.

Operator Action: An existing route definition must be deleted before the command can be successfully retried.

DMTCMX634I NO LOCATIONS ROUTED

Explanation: This message is in response to a QUERY SYSTEM ROUTES command. No indirect routing was defined to the VNET system.

System Action: None.

Operator Action: None.

DMTCMX636I 'locid' ROUTED THROUGH LINK 'linkid'

Explanation: This message is in response to a QUERY 'locid' command. Files, commands, and messages addressed to the location identified by 'locid' may be automatically enqueued for indirect transmission on the link identified by 'linkid'.

System Action: None.

Operator Action: None.

DMTCMX637I 'locid' NOT ROUTED

Explanation: This message is in response to a QUERY 'locid' OFF command. The specified 'locid' was not defined for indirect routing at the time of command processing.

System Action: No action is taken, and normal processing continues.

Operator Action: The command may be retried if it had been entered in error.

DMTCMX638E LOCATION 'locid' HAS A FILE QUEUE -- INDIRECT ROUTING NOT DEACTIVATED

Explanation: This message is in response to a query 'locid' OFF command. The specified location identified by 'locid' has files queued for it on the link it is routed through.

System Action: No action is taken, and normal processing continues.

Operator Action: The command may be retried if it has been entered in error. If correct, use the transfer, purge or define commands to remove the queued files from the link the 'locid' is routed through, and retry the command.

DMTCMX651I LINK 'linkid' INACTIVE

Explanation: This message is issued in response to a QUERY 'locid' command. The location specified in the command was defined for direct connection, and its link identified by 'linkid' was not active at the time of command processing.

System Action: None.

Operator Action: None.

DMTCMX652I LINK 'linkid' (CONNECT|ACTIVE) 'task' 'type' 'vaddr' c (HO|NOH) (DR|NOD) (NOT|TRS|TRI|TSL)

Explanation: This message is issued in response to a QUERY 'locid' command. The location specified in the command was defined for direct connection, and its link identified by 'linkid' was active at the time of command processing. The CONNECT keyword indicates that the line driver successfully received a satisfactory response from the remote station on the last attempted exchange. The ACTIVE keyword implies that the line driver's last attempted exchange failed due to line or remote system failure, or that local telecommunications equipment has not been dialed or is not properly set.

task - is the task name of the line driver task.
type - is the name of the line driver is use for the active link.
vaddr - is the virtual device address of the line port in use by the active link.
c - is the class or classes of files that may be processed by the active link.
HO - indicates that the active link is in hold status.
NOH - indicates that the active link is not in hold status.
DR - indicates that the active link is in the process of draining, and will terminate when line activity is quiesced.
NOD - indicates that the active link is not in the process of draining.

- NOT - indicates that no trace option is active for the link.
- TRS - indicates that the trace sum option is active for the link, and that the trace log option is inactive.
- TRL - indicates that the trace log option is active for the link, and that the trace sum option is inactive.
- TSL - indicates that both the trace sum and trace log options are active for the link.

System Action: None.

Operator Action: None.

DMTCMX653I LINK 'linkid' DEFAULT 'task' 'type' 'vaddr' c Z=z R=r

Explanation: This message is in response to a QUERY 'linkid' DEF command, and is automatically issued when a new link is defined or when an existing link definition is modified by means of the DEFINE command. The link identified by 'linkid' was defined at the time of command processing, and the default attributes listed in the message pertain to that definition. The message does not indicate whether the link was active or inactive at the time of command processing, and the default attributes listed may be different from those actually in use with the link if it was active.

- task - the default task name to be associated with the defined link's line driver task when the link is activated.
- type - the name of the default line driver defined for the link.
- vaddr - the default virtual device address of a line port to be used by the link when it is activated.
- c - the default class or classes of files which may be processed by the link when it is active.
- z - the number designating the terrestrial time zone number in which the remote location is defined to reside. This is the number of time zone boundaries between the remote location and Greenwich to the east, the International Date Line being included as a time zone boundary.
- r - the number of virtual storage file tag slots reserved for exclusive use by this link.

System Action: None.

Operator Action: None.

DMTCMX654I LINK 'linkid' S=s R=r Q=q P=p

Explanation: This message is issued in response to a QUERY 'linkid' QUEUE command, and is issued in response to a QUERY SYSTEM QUEUE once for each link on which at least one file is either enqueued or active. The status of the file queue for the link identified by 'linkid' is described.

- s - the number of files being actively transmitted (sent) on the link.
- r - the number of files being actively received on the link.

- q - the number of files accepted and enqueued for transmission on the link.
- p - the number of files pending but not yet accepted for the active link.

System Action: In response to a QUERY 'linkid' QUEUE command, an additional message (DMTCMX655I) is issued for each file accepted and enqueued on the link, describing the status of each such file.

Operator Action: None.

DMTCMX655I FILE 'spoolid' ('orgid') 'locid' 'userid' CL a PR pp REC
nnnnnnnn (HO|NOH)

Explanation: A message of this form is issued for each file accepted and enqueued for transmission on the link specified by 'linkid' in the preceding QUERY 'linkid' QUEUE command.

- spoolid - the VM/370 spool file ID for the file.
- orgid - the originating VM/370 spool file ID, or the origin job number, of the file.
- locid - the destination location ID to which the file is addressed.
- userid - the destination user ID (if any) to which the file is addressed.
- a - the spool file class.
- pp - the file's current transmission priority.
- nnnnnnnn - the total number of records in the file.
- HO - indicates that the file is in hold status.
- NOH - indicates that the file is not in hold status.

System Action: This message is issued once for each inactive file which is enqueued and waiting to be transmitted on the specified link.

Operator Action: The QUERY 'linkid' ACTIVE command may be issued to determine the status of files being actively transmitted on the link.

DMTCMX656I FILE 'spoolid' ('orgid') 'locid' 'userid' CL a PR pp LEFT
mmmmmmmm OF nnnnnnnn

Explanation: This message is issued in response to a QUERY 'linkid' ACTIVE command. The response describes the state of the file which was being actively transmitted on the link specified by 'linkid' at the time the QUERY command was executed. The substitution fields have the following meaning:

- spoolid - the VM/370 spool file ID for the active file.
- orgid - the originating VM/370 spool file ID, or the origin job number, of the file.
- locid - the destination location ID to which the file is addressed.
- userid - the destination user ID (if any) to which the file is addressed.
- a - the spool file class.
- pp - the file's current transmission priority.
- mmmmmmmm - the number of records in the file which remain to be transmitted.
- nnnnnnnn - the total number of records in the file.

System Action: None.

Operator Action: The QUERY 'linkid' ACTIVE command may be issued to determine the status of inactive files enqueued for transmission on the link.

DMTCMX660I FILE 'spoolid' INACTIVE ON LINK 'linkid'

Explanation: This message is issued in response to a QUERY FILE 'spoolid' STAT command. At the time of command processing, the file identified by 'spoolid' was inactive, and was enqueued for transmission on the link identified by 'linkid'.

System Action: None.

Operator Action: None.

DMTCMX661I FILE 'spoolid' ACTIVE ON LINK 'linkid'

Explanation: This message is issued in response to a QUERY FILE 'spoolid' STAT command. At the time of command processing, the file identified by 'spoolid' was active, and was being transmitted on the link identified by 'linkid'.

System Action: None.

Operator Action: None.

DMTCMX662I FILE 'spoolid' ORG 'locid1' 'userid1' ORGID 'orgid' mm/dd/yy
hh:mm:ss z.z.z. TO 'locid2' 'userid2'

Explanation: This message is in response to the VNET command QUERY FILE 'spoolid' VNET. The VNET control related attributes of the file identified by 'spoolid' are described.

locid1 - the location ID of the location at which the file originated.
userid1 - the user ID of the originator of the file.
orgid - the originating VM/370 spool ID, or the origin job number, of the file.
mm/dd/yy - the file creation date.
hh:mm:ss - the file creation time of day.
z.z.z. - the time zone with reference to which the time of day is expressed.
locid2 - the destination location ID to which the file is addressed.
userid2 - the destination user ID (if any) to which the file is addressed.

System Action: None.

Operator Action: None.

DMTCMX663I FILE 'spoolid' PR pp CL a CO nn (HO|NOH) DI 'distcode', NA
('fn ft' | 'dsname')

Explanation: This message is issued in response to the VM/370 CP command, QUERY FILE 'spoolid' VM. The VM/370 spool system related attributes of the file identified by 'spoolid' are described.

pp - the file's priority.
a - the file's spool file class.
nn - the file's copy count.
HO - indicates that the file is in hold status.

NOH - indicates that the file is not in hold status.
distcode - the file's distribution code.
fn ft - the file's filename filetype.
dsname - the file's data set name.

System Action: None.

Operator Action: None.

DMTCMX664E FILE 'spoolid' NOT FOUND

Explanation: This message is issued in response to a QUERY FILE 'spoolid' command. The file identified by 'spoolid' could not be found by VNET, meaning either that the file is not owned by the VNET virtual machine, or that the file is pending and has not yet been accepted by VNET.

System Action: None.

Operator Action: Verify that the spool file ID was correctly typed. If it was not, retry the command with the correct spool file ID. If it was correctly typed, retry the command after some time has elapsed to allow the file to move from pending to enqueued status.

DMTCMX665I NO FILE ACTIVE

Explanation: This message is issued in response to a QUERY 'linkid' ACTIVE command. At the time of QUERY command processing, no file was being actively transmitted on the specified link.

System Action: None.

Operator Action: None.

DMTCMX670I LINK 'linkid' (CONNECT|ACTIVE) -- 'type' LINE 'vaddr'
(HO|NOH) (DR|NOD) (NOT|TRS|TRI|TSL)

Explanation: This message is issued in response to a QUERY SYSTEM command, or to a QUERY SYSTEM ACTIVE command. One such message is produced for each active link in the VNET facility at the time of command processing. The active link described by the message is identified by 'linkid'. The CONNECT keyword indicates that the line driver successfully received a satisfactory response from the remote station on the last attempted exchange. The ACTIVE keyword implies that the line driver's last attempted exchange failed due to line or remote system failure, or that local telecommunications equipment has not been dialed or is not properly set.

type - the name of the line driver in use by the active link.
vaddr - the virtual device address of the line port in use by the active link.
HO - indicates that the active link is in hold status.

- NOH - indicates that the active link is not in hold status.
- DR - indicates that the active link is in the process of draining, and will terminate when line activity is quiesced.
- NOD - indicates that the active link is not in the process of draining.
- NOT - indicates that no trace option is active for the link.
- TRS - indicates that the trace sum option is active for the link, and that the trace log option is inactive.
- TRI - indicates that the trace log option is active for the link, and that the trace sum option is inactive.
- TSL - indicates that both the trace sum and trace log options are active for the link.

System Action: This message is issued for each active link in the system.

Operator Action: None.

DMTCMX671I LINK 'linkid' INACTIVE -- DEFAULT 'type' LINE 'vaddr'

Explanation: This message is issued in response to a QUERY SYSTEM command. One such message is produced for each inactive link in the VNET facility at the time of command processing. The inactive link is identified by 'linkid', its default line driver type is identified by 'type', and its default line port virtual address is identified by 'vaddr'.

System Action: This message is issued for each inactive link in the system.

Operator Action: None.

DMTCMX672I NO LINK ACTIVE

Explanation: This message is issued in response to a QUERY SYSTEM ACTIVE command. The VNET system had no active link at the time of command processing.

System Action: None.

Operator Action: None.

DMTCMX673I NO LINK DEFINED

Explanation: This message is issued in response to a QUERY SYSTEM command. The VNET system had no link defined at the time of command processing.

System Action: None.

Operator Action: None.

DMTCMX674I NO FILES QUEUED

Explanation: This message is in response to a QUERY SYSTEM QUEUE command. No files were active, and no files were queued or pending in the VNET input file queue at the time of the command processing.

System Action: None.

Operator Action: None.

DMTCMX675E EXEC 'filename' NOT FOUND ON DISK 'vaddr' -- COMMAND FILE NOT EXECUTED

Explanation: An attempt was made to execute the VNET operator command exec file identified by 'filename'. The exec file was not found on the VNET system disk identified by 'vaddr'.

System Action: EXEC command processing is suppressed, the EXEC command has no effect, and normal processing continues.

Operator Action: Verify that the filename was correctly entered on the EXEC command line, and that the specified exec file has a filetype of 'VNET'. If an error is found, the EXEC command may be retried. If no error is found and the condition persists, the problem may be referred to those responsible for VNET system generation and maintenance.

DMTCMX676E FATAL ERROR READING FROM 'vaddr' -- EXEC 'filename' PROCESSING TERMINATED

Explanation: In the process of executing the VNET exec file identified by 'filename', an uncorrectable I/O error was encountered in reading the file from the VNET system disk identified by 'vaddr'.

System Action: EXEC command processing is terminated at the point of error.

Operator Action: The command may be retried if appropriate. If the error condition persists, the problem may be referred to those responsible for VNET system generation and maintenance.

DMTCMX677E EXEC 'filename' FILE FORMAT INVALID -- EXEC NOT EXECUTED

Explanation: An attempt was made to execute the VNET operator command exec file identified by 'filename'. In the process of reading the file from the VNET system disk, an invalid file format was encountered.

System Action: EXEC command processing is terminated at the point of error.

Operator Action: Verify that the EXEC command filename was correctly specified. If appropriate, the command may be retried. If the error condition persists, the problem may be referred to those responsible for VNET system generation and maintenance.

DMTCMX678E EXEC 'filename' IN EXECUTION -- NEW EXEC COMMAND IGNORED

Explanation: While executing commands from the VNET exec file identified by 'filename', another EXEC command was encountered.

System Action: The subsequent EXEC command processing is suppressed, and the original EXEC command processing continues.

Operator Action: Those responsible for VNET system generation and maintenance should be notified.

DMTCMX700I ACTIVATING LINK 'linkid' 'task' 'type' 'vaddr' c

Explanation: The link identified by 'linkid' was inactive and has become active as a result of command processing. The message describes the variable attributes in effect for this active link.

- task - the task name associated with the activated link's line driver.
- type - the name of the line driver in use by the activated link.
- vaddr - the virtual device address of the line port in use by the activated link.
- c - the class or classes of files that can be processed by the activated link.

System Action: The activated link remains active, and the listed attributes remain in effect, until the link is deactivated or the attributes are explicitly modified. The link is activated whether or not a line connection is complete to the remote location. Active exchange of files, commands, and messages will begin automatically as soon as the remote station has been appropriately initialized and the data line has been established.

Operator Action: None.

DMTCMX701E NO SWITCHED LINE AVAILABLE -- LINK 'linkid' NOT ACTIVATED

Explanation: An attempt was made to activate the link identified by 'linkid' with no specified line port virtual device address. The link had no defined default line port address, and no common switched line ports were available at the time of command processing.

System Action: The command processing is terminated, the link remains inactive, and normal processing continues.

Operator Action: The command can be retried with a specified line port address, or it can be retried when a common switched line port becomes available.

DMTCMX702E LINE 'vaddr' IS IN USE BY LINK 'linkid1' -- LINK 'linkid2' NOT ACTIVATED

Explanation: An attempt was made to activate the link identified by 'linkid2'. The line port virtual device

address specified in the request to activate the link, identified by 'vaddr', was found to be in use by another active link, identified by 'linkid1', at the time of command processing.

System Action: The command processing is terminated, the command has no effect, and normal processing continues.

Operator Action: The command can be retried with a specified line port address that is not in use by another active link, or it can be retried with no line port address specified, in which case an attempt will be made to reserve and utilize a valid line port.

DMTCMX703E DEV 'cuu' IS NOT A LINE PORT -- LINK 'linkid' NOT ACTIVATED

Explanation: An attempt was made to activate the link identified by 'linkid' with a line port address identified by 'cuu'. A virtual device at address 'cuu' exists, but it is not a usable line port type device.

System Action: The command processing is terminated, the link remains inactive, and normal processing continues.

Operator Action: The command can be retried with a specified line port address that is valid and available, or it can be retried with no line port address at all, in which case an attempt will be made to select and reserve a common switchable line port.

DMTCMX704E LINE 'vaddr' CC=3 NOT OPERATIONAL -- LINK 'linkid' NOT ACTIVATED

Explanation: An attempt was made to activate the link identified by 'linkid' with a line port address identified by 'vaddr'. Either no device was defined for the VNET virtual machine at virtual address 'vaddr', or the device at that address was logically disconnected from the I/O system.

System Action: The command processing is terminated, the link remains inactive, and normal processing continues.

Operator Action: The command can be retried with a specified line port address that is valid and operational, or it can be retried with no line port address at all, in which case an attempt will be made to select and reserve a common switchable line port.

DMTCMX705E DRIVER 'type' NOT FOUND ON DISK 'vaddr' -- LINK 'linkid' NOT ACTIVATED

Explanation: An attempt was made to activate the link identified by 'linkid' using a line driver name of 'type'. The specified line driver was not found on the VNET system disk.

System Action: The command processing is terminated, the link remains inactive, and normal processing continues.

Operator Action: Verify that the driver name used was correctly typed. If it was not, retry the command with a corrected line driver type specification. If the command was

correctly typed, notify a person responsible for system support. Verify that the intended line driver resides on the VNET system disk with a filename of 'type' and a filetype of 'TEXT'.

DMTCMX706E FATAL ERROR LOADING FROM 'vaddr' -- LINK 'linkid' NOT ACTIVATED

Explanation: An attempt was made to activate the link identified by 'linkid'. In the process of loading the link's line driver from the disk identified by 'vaddr', an uncorrectable I/O error was encountered.

System Action: Loading is abandoned, the error is logged, the command processing is terminated, and the link remains inactive.

Operator Action: Retry the command. If the error condition persists, notify a person responsible for operations or system support.

DMTCMX707E DRIVER 'type' FILE FORMAT INVALID -- LINK 'linkid' NOT ACTIVATED

Explanation: An attempt was made to activate the link identified by 'linkid', with a line driver type specification of 'type'. In the process of reading the driver file and loading the driver into virtual storage, the loader detected an invalid data format in the driver file.

System Action: Loading is abandoned, the command processing is terminated, and normal processing continues.

Operator Action: Verify that a correct line driver type specification has been used. If an improper driver type was used, retry the command with a correct driver type specification. If the proper driver type was used, notify a person responsible for system support.

DMTCMX708E VIRTUAL STORAGE CAPACITY EXCEEDED -- LINK 'linkid' NOT ACTIVATED

Explanation: An attempt was made to activate the link identified by 'linkid'. During the activation process, a virtual free storage requirement could not be met because there was insufficient virtual storage available for allocation by the VNET system.

System Action: The command processing is terminated, the link remains inactive, and normal processing continues.

Operator Action: A START command may be retried later, when more virtual storage may be available. Deactivating another link will increase available virtual storage. If this situation occurs regularly, it might be corrected by increasing the size of the VNET virtual machine's virtual storage prior to VNET IPL.

DMTCMX709E TASK NAME 'task' ALREADY IN USE -- LINK 'linkid' NOT ACTIVATED

Explanation: An attempt to activate the link 'linkid', in response to a START command, failed because the task name 'task' specified for use was in use by another task in the system.

System Action: The START command is suppressed, and normal processing continues.

Operator Action: Retry the START command specifying a different task name by use of the 'TASK' keyword, or retry the START command after the line driver with the conflicting task name has been deactivated.

DMTCMX710E MAX ('nn') ACTIVE -- LINK 'linkid' NOT ACTIVATED

Explanation: An attempt to activate the link 'linkid', in response to a START command, failed because the maximum allowable number 'nn' of concurrent active links had already been reached.

System Action: The START command is ignored, and normal processing continues.

Operator Action: Retry the START command after one or more links been deactivated.

DMTCMX750E LINK 'linkid' ALREADY ACTIVE -- NO ACTION TAKEN

Explanation: A START command was issued specifying the link identified by 'linkid'. The link was already active at the time of command processing, and no modifiable attributes were changed from their previous settings.

System Action: The START command is ignored, and normal processing continues.

Operator Action: None.

DMTCMX751I LINK 'linkid' ALREADY ACTIVE -- NEW CLASS(ES) SET AS REQUESTED

Explanation: A START command was issued specifying the link identified by 'linkid'. The link was already active at the time of command processing, and the new class specification for the link has been accepted.

System Action: The link automatically begins processing files bearing the newly specified class(es) if any are enqueued on the link.

Operator Action: None.

DMTCMX752I LINK 'linkid' STILL ACTIVE -- DRAIN STATUS RESET

Explanation: A START command was issued specifying the link identified by 'linkid'. The link was active at the time of command processing, but it was in the process of terminating as the result of a previous DRAIN command.

System Action: The link remains active with the same attributes that had previously been in effect, except that the link's drain status is reset. Normal VNET processing continues.

Operator Action: None.

DMTINI410I NUCLEUS WRITE COMPLETE

Explanation: The VNET nucleus has been successfully written to the VNET system disk.

System Action: A masked off wait state PSW is loaded with a wait state code of X'12'.

Operator Action: The newly loaded VNET system should be tested by IPLing the VNET system disk onto which the nucleus was written.

DMTINI411R SYSTEM DISK ADDRESS = cuu

Explanation: 'cuu' designates the virtual device address of the disk onto which the VNET nucleus is to be written. This disk becomes the VNET system disk.

System Action: If an invalid device address is entered, message 'DMTINI481E INVALID DEVICE ADDRESS - REENTER' is issued. Message DMTINI408R is then reissued, and a valid VNET system disk virtual device address may be entered.

If the IPL device designated is not currently defined, is not in read/write status, or is an unsupported device type, message 'DMTINI484E IPL DEVICE ERROR - REENTER' is issued. Message DMTINI411R is then reissued.

Operator Action: CP console function mode may be entered by signalling attention, and the status of the designated device may be determined by entering the CP command:

QUERY VIRTUAL cuu

Corrective action may be taken to define the device for the VNET virtual machine, or to access it in read/write status. VNET may be reentered by issuing the CP command:

BEGIN

The VNET system device address may then be entered in response to this message.

Once the IPL device address is accepted, the message DMTINI412R is issued.

DMTINI412R REWRITE THE NUCLEUS ? {YES|NO}

Explanation: The VNET loader is prompting the operator for a decision as to whether or not the VNET nucleus is to be rewritten to the system disk.

System Action: If a response other than 'yes' or 'no' is given, message 'DMTINI483E INVALID REPLY - ANSWER "YES" OR

"NO" is issued. Message 'DMTINI412R' is reissued and a valid response may be entered.

If 'no' is entered, the remaining questions pertaining to the writing of the VNET nucleus are skipped, and initialization is immediately begun by the VNET system which has been loaded into virtual storage.

If 'yes' is entered, message 'DMTINI413R' is issued.

Operator Action: Enter 'yes' or 'no', as described above.

DMTINI413R NUCLEUS CYL ADDRESS = nnn

Explanation: 'nnn' designates the cylinder address on the designated VNET system disk to which the VNET nucleus is to be written. 'nnn' is entered in decimal, and normally is the number of the first cylinder beyond the area of the disk in use for CMS files. This number will normally be the same as the number of cylinders previously specified in the CMS command:

FORMAT 'cuu' 'mode' 'nnn' (RECOMP

System Action: If a valid decimal cylinder number is not entered, message 'DMTINI482E INVALID CYLINDER NUMBER - REENTER' is issued, followed by reissue of message 'DMTINI413R'.

If the cylinder specified is not greater than the number of cylinders already in use on the device for CMS files (as specified in a preceding CMS FORMAT command), then the message 'DMTINI485E CYLINDER IN USE FOR CMS FILES' is issued. Message 'DMTINI413R' is then immediately reissued.

When the nucleus cylinder address is correctly entered, message 'DMTINI410R' is issued.

Operator Action: The cylinder number may be reentered correctly if it had been previously entered in error. If the cylinder number had not been erroneously entered, the cylinder number is not valid and a valid number must be determined. The CMS command:

QUERY DISK 'mode'

may be used to determine the number of cylinders formatted for use by the CMS file system. The CP command:

QUERY VIRTUAL 'vaddr'

may be used to determine the total number of cylinders on the virtual disk. If the number of cylinders in use for CMS is less than the total number of cylinders available on the disk, the number of cylinders in use for CMS files should be used as the VNET nucleus cylinder address when the VNET load is retried. If the number of cylinders in use for CMS files

is equal to the total number of cylinders available on the disk, the CMS command:

FORMAT 'vaddr' 'mode' 'nnn' (RECOMP

should be used to reduce the number of cylinders in use by CMS, as described in the VNET installation procedures documentation.

DMTINI481E INVALID DEVICE ADDRESS - REENTER

Explanation: The device address entered was not correct. It either included at least one character which is not a valid hexadecimal digit (0-9, A-F) or it was not within the range of valid device addresses (X'001'-X'6FF').

System Action: Message 'DMTINI411R' is reissued.

Operator Action: See the description of message 'DMTINI411R'.

DMTINI482E INVALID CYLINDER NUMBER - REENTER

Explanation: Either zero or an invalid decimal number was entered.

System Action: Message 'DMTINI413R' is reissued.

Operator Action: See the description of message 'DMTINI413R'.

DMTINI483E INVALID REPLY - ANSWER "YES" OR "NO"

Explanation: The only valid responses to the query are 'yes' or 'no'. Neither was entered.

System Action: Message 'DMTINI412R' is reissued.

Operator Action: See the description of message 'DMTINI412R'.

DMTINI484E IPI DEVICE ERROR - REENTER

Explanation: The virtual device address entered as the address of the VNET system disk was not defined (attached) for the VNET virtual machine, or the disk was not in write/read status, or the device at the entered address is not supported.

System Action: Message 'DMTINI411R' is reissued.

Operator Action: See the description of message 'DMTINI411R'.

DMTINI485E CYLINDER IN USE FOR CMS FILES

Explanation: The specified nucleus cylinder number was not greater than the number of cylinders indicated in the CMS Master File Directory for the VNET system disk.

System Action: Message 'DMTINI413R' is reissued.

Operator Action: See the description of message 'DMTINI413R'.

DMTINI498S IPL DEVICE WRITE I/O ERROR

Explanation: An uncorrectable I/O error was encountered while attempting to write the VNET nucleus.

System Action: VNET load processing is halted, and a masked off wait state PSW of code X'12' is loaded.

Operator Action: See the description of message 'DMTINI413R'. Verify that the nucleus cylinder number entered in response to message 'DMTINI413R' is not larger than the total number of cylinders on the specified VNET system disk, and verify that the VNET system disk is in write/read mode. If no error can be determined, those responsible for VNET system support should be contacted.

DMTINI499T IPL DEVICE READ I/O ERROR

Explanation: An uncorrectable I/O error was encountered while attempting to read the VNET nucleus from the VNET system disk.

System Action: A masked off wait state PSW of code X'11' is loaded.

Operator Action: The IPL may be retried. If the problem persists, personnel responsible for VNET system support should be notified.

DMTIRX000I VNET VER v, LEV l, mm/dd/yy READY

Explanation: This message signals the completion of VNET initialization, including the activation of the AXS and LAX tasks. VER v and LEV l specify the version and level of VNET that is in use. mm/dd/yy specifies the date on which the VNET in use was generated.

System Action: The system begins normal processing by accepting files and commands.

Operator Action: Normally, one or more links are activated at this time.

DMTIRX400I VNET DIRECT mm/dd/yy hh:mm, nn MAX ACTIVE LINKS, tt TAGS

Explanation: This message is generated at system initialization immediately following the initial VNET message 'DMTIRX000I'. The directory file ('VNET DIRECT') used to initialize the VNET system was last modified at the date and time specified by mm/dd/yy hh:mm.

nn is the maximum number of links that may be active at one time. This number is calculated based on the virtual storage size of the VNET virtual machine.

tt indicates the total number of available tag slots. This number also depends on available virtual storage size.

System Action: Initialization proceeds with the execution of the PROFILE VNET command file, if any, and normal VNET processing begins.

Operator Action: This message is intended to allow the operator to verify the version of the VNET directory used to initialize the system.

DMTIRX449I MAX TAGS REQUEST OF 1 PER VIRTUAL STORAGE K ASSUMED

Explanation: The VNET directory contained a valid TAGS entry requesting a number of extra tag slots in excess of the maximum allowed for the virtual storage size in use. The referenced TAGS statement is typed immediately preceding this statement. The maximum permitted number of extra tag slots is one extra tag slot for each 1024 bytes of virtual storage size.

System Action: The maximum permitted number of extra tag slots are generated, and normal initialization proceeds.

Operator Action: It should be verified that the correct VNET directory is in use, and that the VNET virtual machine has the intended virtual storage size. If both are the case, the TAGS entry in the VNET directory should be modified to request a number of extra tag slots no greater than the allowed maximum for the virtual storage size in use.

DMTIRX450E INVALID DIRECTORY ENTRY

Explanation: During initialization, the VNET directory was found to contain a record which was neither a comment nor a valid directory entry. The referenced record is typed immediately preceding this message.

System Action: The record is ignored and normal initialization processing continues.

Operator Action: This message indicates an error in the preparation of the VNET directory. The directory should be updated to correct the desired entry, or to eliminate the invalid record.

DMTIRX451E DIRECTORY ENTRY OUT OF ORDER

Explanation: During initialization, a VNET directory entry was recognized in a position which either precedes a prerequisite entry or follows a valid entry which it is required to precede. The referenced entry is typed immediately preceding this message.

System Action: The entry is ignored, and normal initialization processing continues.

Operator Action: The VNET directory should be updated to correct the erroneous order of entries.

DMTIRX452E LOCAL PREVIOUSLY SPECIFIED

Explanation: During initialization, a VNET directory entry describing the local location ('LOCAL') was recognized following the acceptance of a previous valid LOCAL entry. The referenced entry is typed immediately preceding this entry.

System Action: The preceding LOCAL entry remains in effect, the subsequent LOCAL entry is ignored, and normal initialization processing continues.

Operator Action: The VNET directory should be updated to include only one LOCAL entry.

DMTIRX453E PARM PREVIOUSLY SPECIFIED FOR LINK

Explanation: During initialization, the VNET directory was found to contain an entry specifying a default START parm ('PARM') on a link for which a previous valid PARM entry had been encountered. The referenced entry is typed immediately preceding this message.

System Action: The subsequent PARM entry is ignored, the first PARM entry encountered for the link remains in effect, and normal initialization processing continues.

Operator Action: The VNET directory should be updated to remove multiple PARM entries which specify the same link.

DMTIRX454E TAGS PREVIOUSLY SPECIFIED

Explanation: During initialization, the VNET directory was found to contain more than one request for extra tag slots ('TAGS'). This message is produced each time a TAGS entry is encountered after a valid previous TAGS record was processed. The subsequent TAGS entry is typed immediately preceding the message.

System Action: The first valid TAGS entry encountered in the VNET directory remains in effect. The subsequent TAGS entry is ignored, and normal initialization processing continues.

Operator Action: The VNET directory should be updated to contain a single valid TAGS entry.

DMTIRX455E DUPLICATE LOCATION ID

Explanation: During initialization, the VNET directory was found to contain a routing entry ('ROUTE') which specified a destination location ID which had been specified in a valid previous ROUTE entry. The subsequent ROUTE entry is typed immediately preceding this message.

System Action: The original ROUTE entry remains in effect, the subsequent ROUTE entry is ignored, and normal initialization processing continues.

Operator Action: The VNET directory should be updated to contain no more than one ROUTE entry for a single, unique destination location ID.

DMTIRX456E DUPLICATE LINK ID

Explanation: During initialization, the VNET directory was found to contain a link definition entry ('LINK') specifying a link ID which had been specified in a valid previous LINK entry. The subsequent LINK entry is typed immediately preceding this message.

System Action: The preceding LINK entry remains in effect, the subsequent LINK entry is ignored, and normal initialization processing continues.

Operator Action: The VNET directory should be updated to include no more than one LINK entry which specifies a single, unique link ID.

DMTIRX457E DUPLICATE PORT ADDRESS

Explanation: During initialization, the VNET directory was found to contain more than one switchable port entry ('PORT') which specified the same port address. The subsequent PORT entry is typed immediately preceding this message.

System Action: The preceding PORT entry remains in effect, the subsequent PORT entry is ignored, and normal initialization processing continues.

Operator Action: The VNET directory should be updated to contain no more than one PORT entry for a single, unique port address.

DMTIRX458E UNDEFINED LINK ID

Explanation: During initialization, the VNET directory was found to contain a default parameter entry ('PARM') or a routing entry ('ROUTE') specifying a link ID for which no link had been defined. The referenced entry is typed immediately preceding this message.

System Action: The PARM or ROUTE entry is ignored, and normal initialization processing continues.

Operator Action: The VNET directory should be updated such that all link IDs specified in PARM and ROUTE entries have been defined by previous LINK entries.

DMTIRX461E LOCATION ID MISSING OR INVALID

Explanation: During initialization, the VNET directory was found to contain a local definition entry ('LOCAL') or routing entry ('ROUTE') specifying a local or destination location ID which was too long or contained invalid characters, or the location ID was not specified at all. The referenced LOCAL or ROUTE entry is typed immediately preceding this message.

System Action: The LOCAL or ROUTE entry is ignored, and normal initialization processing continues.

Operator Action: The VNET directory should be updated to contain the valid location IDs desired by the installation.

DMTIRX462E LINK ID MISSING OR INVALID

Explanation: During initialization, the VNET directory was found to contain a link definition entry ('LINK'), a default parm entry ('PARM'), or a routing entry ('ROUTE') specifying a link ID which was too long, contained invalid characters, or was identical to the previously defined local location ID, or which did not specify a link ID at all. The referenced LINK, PARM, or ROUTE entry is typed immediately preceding this message.

System Action: The entry in error is ignored, and normal initialization processing continues.

Operator Action: The VNET directory should be updated to contain the valid link IDs desired by the installation.

DMTIRX463E INVALID DRIVER SPECIFICATION

Explanation: During initialization, the VNET directory was found to contain a link definition entry ('LINK') specifying a driver type (CMS filename) which was too long, or which contained invalid characters. The referenced LINK entry is typed immediately preceding this message.

System Action: The entry in error is ignored, and normal initialization processing continues.

Operator Action: The VNET directory should be updated to contain the valid line driver type desired by the installation.

DMTIRX464E PORT ADDRESS MISSING OR INVALID

Explanation: During initialization, the VNET directory was found to contain a link definition entry ('LINK') or switchable port entry ('PORT') specifying a port address which contained invalid characters or which was out of the valid port address range (X'000'-X'6FF'); or the port address was not specified at all on a PORT entry. The referenced LINK or PORT entry is typed immediately preceding this message.

System Action: The LINK or PORT entry in error is ignored, and normal initialization processing continues.

Operator Action: The VNET directory should be updated to contain the valid port address desired by the installation.

DMTIRX465E INVALID ZONE SPECIFICATION

Explanation: During initialization, the VNET directory was found to contain a local location definition entry ('LOCAL') or a link definition entry ('LINK') specifying a time zone number which contained invalid characters, or which was not within the range of valid time zone numbers. The time zone number is defined as the number of time zone boundaries between the location and Greenwich to the east, the International Date Line being included as a time zone boundary; and the valid range of time zone numbers is 0 to 24 decimal. The referenced LOCAL or LINK entry is typed immediately preceding this message.

System Action: The LOCAL or LINK entry in error is ignored, and normal initialization processing continues.

Operator Action: The VNET directory should be updated to contain the valid time zone number desired by the installation.

DMTIRX466E INVALID TASK SPECIFICATION

Explanation: During initialization, the VNET directory was found to contain a link definition entry ('LINK') specifying a default task name which contained more than four characters, or invalid characters. The referenced LINK entry is typed immediately preceding this message.

System Action: The LINK entry in error is ignored, and normal initialization processing continues.

Operator Action: The VNET directory should be updated to contain the valid task name desired by the installation.

DMTIRX467E INVALID CLASS SPECIFICATION

Explanation: During initialization, the VNET directory was found to contain a link definition entry ('LINK') specifying a default class which contained more than four characters, or invalid characters. The referenced LINK entry is typed immediately preceding this message.

System Action: The LINK entry in error is ignored, and normal initialization processing continues.

Operator Action: The VNET directory should be updated to contain the valid class specification desired by the installation.

DMTIRX468E INVALID KEEP SPECIFICATION

Explanation: During initialization, the VNET directory was found to contain a link definition entry ('LINK') specifying a keep number which contained invalid characters, or which was not within the range of valid keep numbers (0 to 16 decimal). The keep number specifies the minimum number of tag slots which are to be kept available for exclusive enqueueing of files on the link being defined. The referenced LINK entry is typed immediately preceding this message.

System Action: The LINK entry in error is ignored, and normal initialization processing continues.

Operator Action: The VNET directory should be updated to contain the valid number of tag slots desired by the installation to be reserved for the link to be defined.

DMTIRX469E TAGS COUNT MISSING OR INVALID

Explanation: During initialization, the VNET directory was found to contain a tag slot request entry ('TAGS') which specified an extra tag slot count containing invalid characters, or which was not within the valid range for extra

tag slot requests (1 to 16384 decimal). The referenced TAGS entry is typed immediately preceding this message.

System Action: The TAGS entry in error is ignored, and normal initialization processing continues.

Operator Action: The VNET directory should be updated to specify the valid keep number of extra tag slots desired by the installation.

DMTIRX490T UNSUPPORTED SYSTEM RESIDENCE DEVICE TYPE

Explanation: The VM/370 device type code for the I/O device from which VNET was IPLed was not recognized as a DASD device type supported by VNET as a system residence device.

System Action: VNET initialization is terminated, and a masked off wait state PSW is loaded.

Operator Action: The VNET system must be reloaded to a DASD device which is supported by the VNET system in use as a system residence device.

DMTIRX491T FATAL ERROR READING VNET DIRECT

Explanation: An unrecoverable I/O error occurred during initialization on the VNET system residence device. The most likely cause of this error is the absence of the VNET directory file ('VNET DIRECT') from the system residence device. Other possible causes include VM/370 sysgen or directory errors involving the VNET system residence device, CMS or editor system errors in writing the VNET DIRECT file, incompatible CMS file system update levels, or machine malfunctions on the associated real I/O device.

System Action: VNET system initialization is terminated, and a masked off wait state PSW is loaded.

Operator Action: The VNET IPL should be retried. If the error condition persists, the possible causes listed in the explanation above should be investigated, and any detected specification errors should be corrected. If the error condition continues to persist, or if it arises intermittently, the VNET system should be dumped using the CP command:

DUMP 0-

The resulting dump should be submitted to those responsible for VNET system support.

DMTIRX492T FATAL ERROR LOADING DMTAXS

Explanation: An unrecoverable I/O error occurred during the initial loading of the VNET DMTAXS module. The most likely causes of this error are the absence of the 'DMTAXS TEXT' file from the VNET system residence device, or the incorrect naming of the file as 'DMTAXS TXTxxxx'. Other possible causes include CMS or assembler system errors in writing the DMTAXS TEXT file, incompatible CMS file system update levels, or machine malfunctions on the associated real I/O device.

System Action: VNET system initialization is terminated, and a masked off wait state PSW is loaded.

Operator Action: The VNET IPL should be retried. If the error condition persists, the possible causes listed in the explanation above should be investigated, and any detected specification errors should be corrected. If the error condition continues to persist, or if it arises intermittently, the VNET system should be dumped using the CP command:

DUMP 0-

The resulting dump should be submitted to those responsible for VNET system support.

DMTIRX493T FATAL ERROR LOADING DMTLAX

Explanation: An unrecoverable I/O error occurred during the initial loading of the VNET DMTLAX module. The most likely causes of this error are the absence of the 'DMTLAX TEXT' file from the VNET system residence device, or the incorrect naming of the file as 'DMTLAX TXTxxxx'. Other possible causes include CMS or assembler system errors in writing the DMTLAX TEXT file, incompatible CMS file system update levels, or machine malfunctions on the associated real I/O device.

System Action: VNET system initialization is terminated, and a masked off wait state PSW is loaded.

Operator Action: The VNET IPI should be retried. If the error condition persists, the possible causes listed in the explanation above should be investigated, and any detected specification errors should be corrected. If the error condition continues to persist, or if it arises intermittently, the VNET system should be dumped using the CP command:

DUMP 0-

The resulting dump should be submitted to those responsible for VNET system support.

DMTIRX494T LOCAL LOCATION DEFINITION MISSING

Explanation: During initialization, no valid local location definition entry ('LOCAL') was encountered in the VNET directory. The local location definition must be included as the first non-comment entry in the VNET directory. No directory entry is accepted until a valid LOCAL entry has been processed.

System Action: VNET initialization processing is terminated, and a masked off wait state PSW is loaded.

Operator Action: The VNET directory must be updated to contain a valid LOCAL entry as the first non-comment directory entry.

DMTNCM915E INCOMPATIELE NJI BUFFER SIZES -- LINK 'linkid' IS BEING DEACTIVATED

Explanation: The connection control information received from the remote station specifies a different buffer size than that specified at the local location.

System Action: The affected line driver executes its disconnect procedure, and the link is automatically deactivated.

Operator Action: Local VNET system support personnel should be notified of the problem.

DMTNCM916E INVALID NJI SIGNON CONNECTION RECORD RECEIVED -- LINK 'linkid' IS BEING DEACTIVATED

Explanation: An invalid signon record has been received from the remote station.

System Action: The affected line driver executes its disconnect procedure, and the link is automatically deactivated.

Operator Action: The local VNET system support personnel should be notified of the problem.

DMTNHD910E INVALID NJI PARAMETER 'parm' ON TAG -- PARAMETER IGNORED

Explanation: In the scanning of file tag specified by the local originating user, an invalid parameter identified by 'parm' was encountered.

System Action: The invalid parameter is ignored, its applicable default applies, and file processing continues.

Operator Action: None.

DMTNHD917I NJI LINK 'linkid': (JOB|OUTPUT) ('orgid'), JOBNAME 'job', PGMR 'user'

Explanation: This message is automatically issued each time the NJI line driver for the active link identified by 'linkid' encounters a job header record in the data stream being received from the remote system. The job header defines the beginning of a job or job output in the data stream being received. The substitution parameters in the message specify the following:

JOB	- denotes the beginning of reception of a job file.
OUTPUT	- denotes the beginning of reception of a job output file.
orgid	- identifies the job file's origin spool ID or job number.
job	- identifies the job name of the job or output file being received.
user	- identifies the originating user's programmer name or user ID.

System Action: The job or output file is written to the VM/370 spool system as it is received, and it is forwarded to the next link on its path, delivered to a local user, or

processed on a local real spool output device, depending on its destination address.

Operator Action: None.

DMTNIT911E INVALID NJI BUFFER SIZE SPECIFIED -- LINK 'linkid' NOT ACTIVATED

Explanation: During initial processing immediately following link activation, the line driver encountered an invalid buffer size request.

System Action: The specified link is automatically deactivated.

Operator Action: The START command may be retried specifying a valid buffer size. If the problem persists, local VNET system support personnel should be notified.

DMTNIT912E INVALID NJI NODAL RESISTANCE SPECIFIED -- LINK 'linkid' NOT ACTIVATED

Explanation: During initial processing immediately following link activation, the line driver encountered an invalid nodal resistance specification.

System Action: The specified link is automatically deactivated.

Operator Action: The START command may be retried specifying a valid nodal resistance. If the problem persists, local VNET system support personnel should be notified.

DMTNPT907E SIGNON TYPE PARAMETER MISSING

Explanation: The sign-on record previously entered did not include a TYPE parameter specifying the type of remote terminal in use.

System Action: The link remains active but not signed on, and file, command, and message exchange for the link remains suspended pending successful sign-on.

Operator Action: Any errors present on the sign-on card should be corrected, the TYPE parameter should be included on the sign-on card, and the sign-on procedure should be retried.

DMTNPT936E NO REMOTE PUNCH AVAILABLE ON LINK 'linkid' -- FILE 'spoolid' PURGED

Explanation: An attempt was made to transmit a punch file to a remote terminal which was not equipped to produce punched output.

System Action: The specified file is purged.

Operator Action: None.

DMTREX002I LINK 'linkid' DEACTIVATED

Explanation: The link identified by 'linkid' has been deactivated as a result of the execution of a previous DRAIN or FORCE command, or as the result of a line driver terminal error.

System Action: The link's line driver task is deleted from the system, all storage allocated to the task is made free, and the link table entry is updated. The link remains inactive until it is reactivated by a START command.

Operator Action: If the link deactivation was spontaneous, that is, not as the result of a DRAIN command, the link should be restarted by a START command. If spontaneous deactivations recur, the local VNET system support personnel should be notified.

DMTREX080E PROGRAM CHECK -- LINK 'linkid' DEACTIVATED

Explanation: A program check interrupt occurred while the line driver for the link identified by 'linkid' was executing. There are no normal cases in which this situation arises, and it probably reflects either a software or system generation error in either VNET or CP.

System Action: A dump of VNET virtual storage is automatically taken and queued for real spool print output. The affected link is automatically deactivated. Normal VNET operation for other links is not affected.

Operator Action: Hard copy VNET console output leading up to the program check should be retrieved, if possible, and attached to the VNET virtual dump when it has printed. The dump and the console output should be turned over to those responsible for VNET system support.

DMTREX090T PROGRAM CHECK IN SUPERVISOR -- VNET SHUTDOWN

Explanation: A program check interrupt has occurred during the execution of MSUP, the VNET supervisor, or during execution of one of the VNET system control tasks, REX, AXS, or IAX. There are no normal cases in which this situation arises, and it probably reflects either a software or system generation error in either VNET or CP.

System Action: A dump of VNET virtual storage is automatically taken and queued for real spool print output. Messages queued for operator output are written to the operator console, and VNET terminates by loading a masked off wait state PSW with wait state code X'001'.

Operator Action: When this situation arises immediately following VNET IPL, hard copy VNET console output leading up to the program check should be retrieved, if possible, and attached to the VNET virtual dump when it has printed. The dump and the console output should be turned over to those responsible for VNET system support. The VNET system should be re-IPLed, and dialable links should be restarted and reconnected.

DMTREX091T INITIALIZATION FAILURE -- VNET SHUTDOWN

Explanation: An unrecoverable error occurred during the initial loading of the supervisor components, MSUP, REX, AXS, and LAX.

System Action: A virtual storage dump is automatically taken, and a masked off wait state PSW is loaded, terminating system operation.

Operator Action: Hard copy VNET operator console output should be retrieved if possible, attached to the VNET storage dump after it has been printed, and turned over to those responsible for VNET system support. The VNET system IPL may be retried.

DMTREX679I EXECUTING 'filename' COMMAND: (command line)

Explanation: The VNET command included in the message as (command line) has been read from the VNET exec file identified by 'filename', and will be executed.

System Action: The specified command is executed, and EXEC command processing continues.

Operator Action: None.

DMTRGX330E USERID MISSING OR INVALID

Explanation: In a preceding VNET MSG command, the userid was not supplied or was invalid at its destination location.

System Action: The message is discarded undelivered.

User Action: The MSG command may be retried if the user ID was entered in error.

DMTRGX331E 'userid' NOT LOGGED ON

Explanation: The user identified by 'userid' which was specified in a VNET MSG command could not receive the message because the user was not logged on.

System Action: The message is discarded undelivered.

User Action: The MSG command may be retried at a later time.

DMTRGX332E 'userid' NOT RECEIVING

Explanation: The user identified by 'userid' which was specified in a VNET MSG command cannot receive console messages because the user's console is disconnected, or because the user has set messages or warnings off using the CP SET command.

System Action: The message is discarded undelivered.

User Action: The MSG command may be retried at a later time.

DMTSML901E INVALID SML MODE SPECIFIED -- LINK 'linkid' NOT ACTIVATED

Explanation: During initial processing immediately following link activation, the line driver encountered an invalid mode specification.

System Action: The specified link is automatically deactivated.

Operator Action: The START command may be retried specifying a valid mode. If the problem persists, local VNET system support personnel should be notified.

DMTSML906E INVALID SML BUFFER PARAMETER -- LINK 'linkid' NOT ACTIVATED

Explanation: During initial processing immediately following link activation, the line driver encountered an invalid buffer specification.

System Action: The specified link is automatically deactivated.

Operator Action: The START command may be retried specifying a valid buffer request. If the problem persists, local VNET system support personnel should be notified.

DMTSML935E LINK 'linkid' IN RJE MODE -- PRINT FILE 'spoolid' PURGED

Explanation: An attempt was made to transmit a print file on a link which was operating as a workstation submitting jobs to a remote batch system. When operating in this mode, print file cannot be transmitted.

System Action: The specified file is automatically purged.

Operator Action: None.

VNET MESSAGES GENERATED BY MORE THAN ONE MODULE

In some cases, the same message can be generated by more than one VNET module. This section contains explanations of such messages.

The module code in these messages appears in this section as 'xxx', as for example, DMTxxx070E. When the message is issued, however, the xxx is replaced by the three letter code for the issuing module.

DMTxxx070E I/O ERROR cuu SIOCC cc CSW csw SENSE sense CCW ccw

Explanation: A message of this format is issued by any task in VNET that detects an uncorrectable hardware or system error during the processing of an I/O operation. The causes of such an error vary, depending on the particular device type and command code.

cuu - the virtual device address of the I/O device on which the error occurred.
cc - the condition code resulting from the issuing of the SIO command on the device for the operation which was in error.

- csw - the composite CSW associated with the operation in error. The composite CSW is a logical ORing of the CSW information associated with the SIO or the interrupts from the device while the I/O operation was active.
- sense - the sense information associated with the I/O operation in error if the I/O operation ends with unit check set on.
- ccw - the first CCW of the I/O operation in error if it failed to start, or the last CCW fetched by the channel before the I/O operation terminated with an error indication.

System Action: The error is logged, and appropriate recovery procedures are taken. The exact effect of the I/O error condition depends on the existing conditions when it occurs. The system may continue processing normally, the link may be automatically deactivated, or VNET may shut down.

Operator Action: This message may indicate a serious system or hardware error, or it may indicate common conditions such as intervention required. If the message is issued unexpectedly, VNET system support personnel should be notified.

DMTxxx108E SYSTEM ERROR READING SPOOL FILE 'spoolid'

Explanation: A return code reflecting a VM/370 system error has been received in response to a read to the file identified by 'spoolid'.

System Action: The error is logged and the failing operation is retried up to ten times. If a retry is successful, normal processing continues. If the error persists, an attempt is made to purge the file and a message to that effect is issued to the operator and to the originating virtual machine.

Operator Action: This message indicates a VM/370 system error. Local system support personnel should be notified.

DMTxxx141I LINE 'vaddr' READY FOR CONNECTION TO LINK 'linkid'

Explanation: This message is issued by a line driver to inform the operator that the line identified by 'vaddr' is being enabled for communications processing to the link identified by 'linkid'. Normally, this is the first message issued by a line driver after link activation, and it may be issued during active processing after a line becomes disconnected.

System Action: The line driver begins an enable operation on the line and waits for completion, signalling a completed connection. If the line identified by 'vaddr' is a non-switchable line, the connection completes automatically when the telecommunications hardware is properly configured and functional. Normal VNET processing continues.

Operator Action: No response is needed if the line identified by 'vaddr' is a non-switchable line, or if it is a switchable line with auto-answer and the remote station is to complete the connection. If the line is a switchable line, the operator should ensure that the necessary steps are taken to

complete the connection to the location identified by 'linkid' (typically, he should dial and establish the connection).

DMTxxx142I LINK 'linkid' LINE 'vaddr' DATASET READY

Explanation: This message signals completion of the line connection for the link identified by 'linkid' on the line port address identified by 'vaddr'. This message is issued automatically when a non-switchable line is enabled, and it is issued when a connection is completed for a switchable line. This message does not necessarily indicate that any successful interaction with the remote station has taken place on the connected line.

System Action: Normal exchange of files, commands, and messages automatically begins if the telecommunication hardware and remote system are properly initialized and functioning correctly.

Operator Action: None.

DMTxxx143I LINK 'linkid' LINE 'vaddr' DISCONNECTED

Explanation: The virtual line port address identified by 'vaddr' and associated with the active link identified by 'linkid' is now disconnected, having been connected prior to the message. This may be the result either of an apparent line disconnection due to line errors, or of a remote station disconnection, or of the execution of a disabling sequence by the local line driver during link deactivation.

System Action: If the link is not in the process of deactivating, the line driver will automatically attempt to reestablish the line connection. Exchange of files, commands, and messages is suspended until the line reconnection is completed.

Operator Action: If the link is not being deactivated, installation procedures for reconnecting the line should be carried out.

DMTxxx144I RECEIVING FILE ('orgid') ON LINK 'linkid' FROM 'locid' 'userid', REC nnnnnnnn

Explanation: This message indicates that reception of a new file from the remote location identified by 'locid' and user at that location identified by 'userid' (if any) has begun. The file being received has an origin spoolid indicated by 'orgid' and contains the number of records indicated by 'nnnnnnnn'.

System Action: File processing continues, and the new file is written to the VM/370 spool system as it is received.

Operator Action: None.

DMTxxx145I RECEIVED FILE ('orgid') ON LINK 'linkid' TO 'locid' 'userid'

Explanation: A new file has been completely received and acknowledged on the link identified by 'linkid'. The

originating spoolid or job number of the new file is identified by 'orgid'. The file received is addressed to the location identified by 'locid' and the to the user at that location identified by 'userid'.

System Action: If the file is addressed to the local location it is automatically spooled to the receiving user or queued for real output. If the file is addressed to another location it is automatically enqueued for transmission on the next link of its path. Normal link processing continues.

Operator Action: None.

DMTxxx146I SENDING FILE 'spoolid' ('orgid') ON LINK 'linkid' FROM 'locid' 'userid', REC nnnnnnn

Explanation: This message indicates that transmission of a file from the remote location identified by 'locid' and user at that location identified by 'userid' (if any) has begun. The file being transmitted has an origin spoolid indicated by 'orgid' and contains the number of records indicated by 'nnnnnnn'. The identified file has become active.

System Action: Transmission of the file will normally continue to completion. If the file transmission is interrupted by a system failure or telecommunication hardware failure, the file will be retained and retransmitted, either from the point of interruption or from the beginning, depending on variable system characteristics and error conditions.

Operator Action: None.

DMTxxx147I SENT FILE 'spoolid' ('orgid') ON LINK 'linkid' TO 'locid' 'userid'

Explanation: Transmission of the active file identified by 'spoolid' on the link identified by 'linkid' has been successfully completed and acknowledged by the remote station. The file is addressed to the location identified by 'locid', and to the user identified by 'userid' at that location. The file's originating spoolid or job number is identified by 'orgid'.

System Action: Disposition of the identified file follows, according to the status of the file. Normally the file would be purged, unless multiple copies of the file are being sent to a remote terminal. Normal link processing continues.

Operator Action: None.

DMTxxx148I ACTIVE FILE 'spoolid' SENDING RESUMED ON LINK 'linkid'

Explanation: Transmission of the file identified by 'spoolid' on the link identified by 'linkid' has been resumed from the point at which transmission had previously been interrupted. File transmission may have been interrupted as the result of a telecommunication hardware failure, an unexpected terminal error in the link's line driver, a remote system failure, or entry of the link into immediate hold status.

System Action: Normal link processing continues.

Operator Action: None.

DMTxxx149I LINK 'linkid' LINE ACTIVITY: TOT= mmmmmmmm; ERRS= nnnnnnnn;
TMOUTS= pppppppp

Explanation: This message is issued in response to a TRACE 'linkid' SUM command, and occasionally thereafter while trace sum mode remains in effect for the specified link. The message is reissued when any one of the trace values reaches its incremental threshold, normally 20 for NPT, VMB, and VMC; and 60 for SMI and NJI.

mmmmmmmm - the total number of successful transactions that have taken place on the identified link since the last similar message was issued, or since the link was initially activated.

nnnnnnnn - the total number of transactions that have ended in error since the last similar message was issued, or since the link was initially activated.

pppppppp - the total number of time-outs that have occurred while waiting for response from the remote station since the last similar message was issued, or since the link was initially activated.

System Action: Normal VNET processing continues.

Operator Action: The trace function is intended to provide some information concerning the state of communications on the link for use by installation personnel in diagnosing and correcting problems with communication hardware. If the trace information seems to indicate serious malfunctioning, corrective action should be taken. Corrective action might include dropping and redialing a switchable telecommunication port, deactivating and restarting a link using a different port, or reporting the difficulty to support and maintenance personnel.

DMTxxx160I LINE 'vaddr' DISABLED FOR LINK 'linkid'

Explanation: Communication exchange by the link identified by 'linkid' on the line identified by 'vaddr' has been terminated, and the line has been disabled. If the line in use is a switchable line, this means that the line has been disconnected.

This message may be issued during normal processing as a result of a spontaneous line disconnection. It is always issued during the process of link deactivation.

System Action: If link deactivation is in process, it continues normally. Otherwise, the line driver will automatically reinitialize and reenables the line, allowing a switchable line to be redialed. File processing for the link is suspended.

Operator Action: None.

DMTxxx170I FROM 'locid': (message text)

Explanation: The character string included in the message as (message text) has been received from the remote location identified by 'locid', and is addressed to the recipient. The message originated either from automatic remote system processing, or from the remote VNET operator.

System Action: Normal VNET processing continues.

Operator Action: If the message originated from a remote VNET operator and the recipient wishes to respond, the response message should be addressed as: MSG 'locid' VNET (response message text).

DMTxxx171I FROM 'locid'('userid'): (message text)

Explanation: The character string included in the message as (message text) has been received from a user identified by 'userid' at the location identified by 'locid', and is addressed to the message recipient. The special keyword VNET appears as the 'userid' field when the message origin is VNET operator console.

System Action: Normal VNET processing continues.

Operator Action: None.

DMTxxx190E INVALID SPOOL BLOCK FORMAT ON FILE 'spoolid'

Explanation: VM/370 spool control or data information contained in the file identified by 'spoolid' has been found to be in error at the local installation.

System Action: The error condition is logged, the identified file is automatically purged from the system, and link processing continues.

Operator Action: This message indicates a local VM/370 system error. The local VM/370 system support personnel should be notified of this error.

DMTxxx300I ACCEPTED BY TASK 'task'

Explanation: The preceding console command has been processed by the VNET syntax scanner and first level semantic processor, and a command element has been built. That command element has been made available to the task named 'task', and that task has accepted the command element for second level semantic processing.

System Action: Command semantic processing continues at the task named 'task'. Further response to the command will be issued from that task.

Operator Action: None.

DMTxxx301E REJECTED BY TASK 'task' -- PREVIOUS COMMAND ACTIVE

Explanation: The preceding console command has been processed by the VNET syntax scanner and first level semantic

processor. A command element has been built and made available to the task named 'task', but that task was unable to accept the command element for further processing because a previously issued command was still being actively processed.

System Action: The command execution is terminated, the command has no effect, and normal processing continues.

Operator Action: The command may be retried. Command execution will be successful when previous command processing is complete.

DMTxxx302E LINK 'linkid' IS NOT DEFINED

Explanation: The syntactically valid link ID identified by 'linkid' was entered in the preceding console command, but no such link is defined with that ID and the command issued requires a defined link ID.

System Action: The command execution is terminated, the command has no effect, and normal processing continues.

Operator Action: Check to see if the link ID was specified as intended. If it was incorrectly typed, retry the command with a correct link ID. If it was correctly typed, you must define the specified link in a VNET DEFINE command or in a LINK statement in the VNET directory before the command can be executed.

DMTxxx303E LINK 'linkid' IS NOT ACTIVE

Explanation: The link identified by 'linkid' was specified in the preceding command, but the link is inactive and the command requires specification of an active link.

System Action: The command execution is terminated, the command has no effect, and normal processing continues.

Operator Action: Check to verify that the command was entered as intended. The command may be retried if it was incorrectly entered, or the specified link may be activated prior to command retry.

DMTxxx304E REJECTED BY TASK 'task' -- NOT RECEIVING

Explanation: Processing of the preceding command could not be completed because the second level processing task named 'task' refused to accept the command service request from the REX task.

System Action: The command is ignored, and normal processing continues.

Operator Action: Repeated occurrences of this message indicate a system error, and VNET system support personnel should be notified.

DMTxxx320E LINK 'linkid' NOT CONNECTED

Explanation: A previous MSG or CMD command was addressed by its originator such that it would have been transmitted on the link identified by 'linkid'. This means either that the command's destination location address was the link's location (identified by 'linkid'), or that the destination location was routed by the local VNET system via that link. At the time the command was presented to the link's line driver for transmission, the line driver was unable to successfully communicate with the remote station due to telecommunications hardware or remote system malfunctions.

System Action: The message or command is discarded, and normal VNET processing continues.

Operator Action: The link's telecommunications hardware should be inspected for any indications of line disconnection or malfunction. When the problem has been corrected, normal processing will begin automatically, and the response message to a QUERY 'locid' command will say 'CONNECT' rather than 'ACTIVE'. The CMD or MSG command may be retried when the link has been reconnected.

DMTxxx510I FILE 'spoolid' BACKSPACED

Explanation: The file identified by 'spoolid' has been backspaced according to the request in the previous BACKSPAC command.

System Action: File transmission continues, beginning from the new file position.

Operator Action: None.

DMTxxx511E NO FILE ACTIVE ON LINK 'linkid'

Explanation: A valid command for active files was issued to the link identified by 'linkid', but no file was being actively transmitted on the link at the time of command execution.

System Action: Normal link processing continues, and the command has no effect.

Operator Action: The command may be retried if it was entered in error.

DMTxxx531I VALID COMMAND RECOGNIZED ON LINK 'linkid' -- NO ACTION TAKEN

Explanation: A valid VNET command has been recognized on the link specified by 'linkid'. The command could not be executed by VNET due to line driver implementation restrictions.

System Action: Normal VNET processing continues.

Operator Action: None.

DMTxxx570I LINK 'linkid' NOW SET TO DEACTIVATE

Explanation: In response to the DRAIN command, the link identified by 'linkid' has set drain status and will be deactivated. If the VNET operator issues the START command before the link is deactivated, drain status will be reset and processing will continue on the link.

System Action: If the line driver is not in active communication with the remote station at the time of DRAIN command execution, the link is deactivated immediately. Otherwise, action is taken to quiesce line activity. This includes the finishing of transmission for an active file if one exists, and it may include the signaling to the remote station of an impending termination. File reception is completed for a file which is being actively received. No new files are activated for transmission or accepted for reception while the link is in drain status. When line activity is quiesced, the link deactivates.

Operator Action: If the DRAIN command fails to deactivate the link within a reasonable period of time, a FORCE command may be issued to deactivate the link unconditionally, regardless of actual line activity.

DMTxxx571E LINK 'linkid' ALREADY SET TO DEACTIVATE

Explanation: A DRAIN command was executed specifying the link identified by 'linkid', which was already in drain status as the result of a previous DRAIN command.

System Action: The line driver continues its attempts to quiesce the line, and the command has no effect.

Operator Action: If the DRAIN command fails to deactivate the link within a reasonable period of time, the FORCE command may be executed to immediately deactivate the link, regardless of line activity.

DMTxxx580I FILE 'spoolid' PROCESSING TERMINATED

Explanation: Transmission of the active file identified by 'spoolid' has been terminated before the completion of file processing. This message is issued either in response to a FLUSH command, or automatically when a remote system is restarted.

System Action: Disposition of the identified file is made according to the status of the file. The file may be purged from the system, or the file may be held for future retransmission. If a FLUSH command was entered, the next copy of the file may begin transmission if multiple copies remain and 'ALL' was not specified. Normal link processing continues.

Operator Action: None.

DMTxxx581E FILE 'spoolid' NOT ACTIVE

Explanation: This message is in response to a VNET command which requires specification of an active file as the

command's object. At the time of command processing, the spoolid specified in the command ('spoolid') was not active.

System Action: The command has no effect, and normal link processing continues.

Operator Action: The status of a file may be determined by issuing a QUERY FILE 'spoolid' command. The command may be retried if it was entered in error.

DMTxxx590I LINK 'linkid' RESUMING FILE TRANSFER

Explanation: The active link identified by 'linkid' was in hold status, and has been removed from hold status in response to FREE command processing.

System Action: File transmission on the identified link resumes automatically when a file eligible for transmission is available.

Operator Action: None.

DMTxxx591E LINK 'linkid' NOT IN HOLD STATUS

Explanation: The link identified by 'linkid' was not in hold status when a FREE command was processed requesting that the link leave hold status.

System Action: The command is ignored, and normal link processing continues.

Operator Action: None.

DMTxxx600I FILE 'spoolid' FORWARD SPACED

Explanation: The file identified by 'spoolid' has been forward spaced as requested by a preceding FWDSpace command.

System Action: File transmission continues, beginning from the new file position.

Operator Action: None.

DMTxxx610I LINK 'linkid' TO SUSPEND FILE TRANSMISSION

Explanation: The link identified by 'linkid' has entered hold status. File transmission has not been suspended because at the time of command processing a file was being actively transmitted, and the 'IMMED' option was not specified.

System Action: The link remains in hold status. File transmission will be suspended when the processing of currently active output files has been completed.

Operator Action: None.

DMTxxx611I LINK 'linkid' FILE TRANSMISSION SUSPENDED

Explanation: This message is in response to HOLD command processing. The link identified by 'linkid' has entered hold

status, and file transmission has been halted. Either no file was being actively transmitted at the time of command processing, or the link had been in hold status and its active file transmission has completed, or an active file was being transmitted and the 'IMMED' operand was specified.

System Action: The link remains in hold status, and file transmission remains suspended until the link is explicitly freed from hold status. If active file transmission was interrupted, the transmission of the active file resumes from the point at which transmission was interrupted, when the link is removed from hold status. The link continues to process files received from the remote station normally while in hold status.

Operator Action: None.

DMTxxx612E LINK 'linkid' ALREADY IN HOLD STATUS

Explanation: This message is issued in response to HOLD command processing. The command requested that the link specified by 'linkid' be placed in hold status. The link was already in hold status at the time of command processing.

System Action: The link remains in hold status, and the command has no effect.

Operator Action: None.

DMTxxx801I LINK 'linkid' LOG ACTIVATED

Explanation: This message is issued in response to a TRACE 'linkid' LOG command. The specified link's log trace had been inactive prior to command processing, and now has been activated.

System Action: While log trace is active for a link, a record of each line I/O transaction is written to a spool print file. Each record contains the channel program executed, the composite CSW, the ending sense data if any, and the beginning and ending data string from each buffer used. The spool file is queued for real printer output when the log trace is deactivated for the link.

Operator Action: None.

DMTxxx802I LINK 'linkid' LOG DEACTIVATED

Explanation: This message is issued in response to a TRACE 'linkid' NOLOG command. The specified link's log trace had been active prior to command processing, and now has been deactivated.

System Action: Logging of each line I/O transaction is terminated, and the spool print file log of prior transactions is closed and enqueued for real printer processing.

Operator Action: This function is intended to provide system support personnel to obtain diagnostic information concerning telecommunication system behavior. When communication on a

particular link appears to be malfunctioning, a log trace may be prepared and submitted to the support personnel.

DMTxxx803I LINK 'linkid' SUM REPORTING DEACTIVATED

Explanation: This message is issued in response to a TRACE 'linkid' NOSUM command. The specified link had been in sum trace mode prior to command processing, and has now left sum trace mode.

System Action: No further sum trace messages will be issued, and normal link processing continues.

Operator Action: None.

DMTxxx810E LINK 'linkid' LOG ALREADY ACTIVE

Explanation: This message is issued in response to a TRACE 'linkid' LOG command. The command requested that the specified link enter log trace mode, and the link had already been in log trace mode at the time of command processing.

System Action: The link remains in log trace mode, the command has no effect, and normal link processing continues.

Operator Action: None.

DMTxxx811E LINK 'linkid' LOG NOT ACTIVE

Explanation: This message is issued in response to a TRACE 'linkid' NOLOG command. The command requested that the specified link leave log trace mode, and the link had not been in log trace mode at the time of command processing.

System Action: Log trace remains inactive for the link, the command has no effect, and normal link processing continues.

Operator Action: None.

DMTxxx812E LINK 'linkid' SUM REPORTING ALREADY ACTIVE

Explanation: This message is issued in response to a TRACE 'linkid' SUM command. The command requested that the specified link enter sum trace mode, and the link had already been in sum trace mode at the time of command processing.

System Action: The link remains in sum trace mode, the command has no effect, and normal link processing continues.

Operator Action: None.

DMTxxx813E LINK 'linkid' SUM REPORTING NOT ACTIVE

Explanation: This message is issued in response to a TRACE 'linkid' NOSUM command. The command requested that the specified link leave sum trace mode, and the link had not been in sum trace mode at the time of command processing.

System Action: Sum trace remains inactive for the link, the command has no effect, and normal link processing continues.

Operator Action: None.

DMTxxx902E NON-SIGNON CARD READ ON LINK 'linkid'

Explanation: The link identified by 'linkid' had not been signed on, and a record received from the remote station was not a SIGNON card, contrary to line driver operational requirements.

System Action: The link remains active but not signed on, and file, command, and message exchange for the link remains suspended pending successful sign-on.

Operator Action: Any errors present on the sign-on card should be corrected, and the sign-on procedure should be retried.

DMTxxx903E PASSWORD SUPPLIED ON LINK 'linkid' IS INVALID

Explanation: An attempt to sign-on a remote station has failed because the password entered on the SIGNON record does not match the password specified by the operator when the remote station's link, identified by 'linkid', was started.

System Action: The link remains active but not signed on, and file, command, and message exchange for the link remains suspended pending successful sign-on.

Operator Action: Any errors present on the SIGNON card should be corrected, and the sign-on procedure should be retried. If the problem persists, the operations personnel at both ends of the link should establish an agreed upon password.

DMTxxx904E SIGNON PARAMETER='parm' ON LINK 'linkid' INVALID

Explanation: A sign-on record for the link identified by 'linkid' contained the invalid parameter identified by 'parm'.

System Action: The link remains active but not signed on, and file, command, and message exchange for the link remains suspended pending successful sign-on.

Operator Action: Any errors present on the sign-on card should be corrected, and the sign-on procedure should be retried.

DMTxxx905I SIGNON OF LINK 'linkid' COMPLETE

Explanation: A valid SIGNON record has been received on the link identified by 'linkid', and the link sign-on procedure has been successfully completed.

System Action: Exchange of files, commands, and messages is automatically begun on the identified link.

Operator Action: If the remote station is a bulk terminal, normal operational procedures should be followed for sending input files and receiving output files.

DMTxxx913E INVALID PASSWORD PARAMETER SPECIFIED -- LINK 'linkid' NOT ACTIVATED

Explanation: During initial processing immediately following link activation, the line driver encountered an invalid password specification.

System Action: The specified link is automatically deactivated.

Operator Action: The START command may be retried specifying a valid password. If the problem persists, local VNET system support personnel should be notified.

DMTxxx914E INCORRECT PASSWORD RECEIVED ON LINK 'linkid'

Explanation: A valid password parameter received in a SIGNON record from the remote system did not match the local link password in effect at the time.

System Action: The line driver executes its disconnect sequence. Dependent on the line driver in use, the line may be re-enabled or the link may be automatically deactivated.

Operator Action: The problem should be communicated to those responsible for system support at the remote location. If the problem persists, the problem should be reported to personnel responsible for local VNET system support.

DMTxxx918E LINK 'linkid' DOES NOT MATCH REMOTE LOCATION 'locid'

Explanation: A SIGNON record received from the remote system specified a location ID 'locid' which was not the same as the link ID 'linkid' for the line driver in use at the local location. The link ID is defined as the location ID of the directly connected remote location.

System Action: The line driver executes its disconnect sequence. Dependent on the line driver in use, the line may be re-enabled or the link may be automatically deactivated.

Operator Action: The problem should be communicated to personnel responsible for local VNET system support.

DMTxxx919E SIGNON SEQUENCE ON LINK 'linkid' FAILED

Explanation:

- (a) Data was received from the remote system before a SIGNON record was successfully received and accepted.
- (b) An unrecoverable line error occurred during signon sequence.
- (c) An incorrect password or location ID was detected at the remote system.
- (d) The remote system is incompatible with the line driver in use.

System Action: The line driver executes its disconnect sequence. Dependent on the line driver in use, the line may be re-enabled or the link may be automatically deactivated.

Operator Action: The problem should be communicated to personnel responsible for local VNET system support.

DMTxxx934E ID CARD MISSING ON LINK 'linkid' -- INPUT FILE PURGED

Explanation: A file has been entered at a remote station without an ID card specifying the destination.

System Action: The input file is flushed, and normal processing continues.

Operator Action: An ID card should be placed at the beginning of the input file deck, or errors in an existing ID card should be corrected, and the file input operation should be retried. The operational procedures for the remote terminal and line driver in use should be consulted to determine format requirements for the input file ID card.

VNET MESSAGE SUMMARY

The message codes listed conform to VM/370 standards. The first three characters (DMT) denote the VM/370 Networking PRPQ (VNET). The next three characters denote the module origin of each message; the possible codes are REX, CMX, AXM, INI, NPT, SMI, VMB, VMC, NCM, NHD and NIT. Some messages can be issued by more than one module. These messages appear in the Summary with the fourth, fifth, and sixth characters encoded as xxx. However, when the message is issued, xxx will be replaced with the appropriate module code. The next three characters contain the message number. The last character is a message severity code and consists of the following:

R	response message
I	informational message
E	error message
T	terminal error -- system shutdown
S	severe error message

The key to the left of the message codes indicates the possible destinations of each message; the column headings are as follows:

VNET	- VNET local operator's console
ORIG	- Command originator
VMID	- Virtual machine user
CPOP	- VM/370 CP operator

VNET SPONTANEOUS MESSAGES

V O V C
 N R M P
 F I I O
 T G D P

VNET Spontaneous Messages

```

X      DMTIRX000I VNET  VER v, LEV 1, mm/dd/yy  READY
X      DMTCMX001I FREE STORAGE = 'nn' PAGES
X      DMTREX002I LINK 'linkid' DEACTIVATED
X      DMTCMX003I LINK 'linkid' EXECUTING: (command line text)
X      DMTCMX004I LOCATION 'locid' EXECUTING: (command line text)
X      DMTCMX005I LOCATION 'locid'('userid') EXECUTING: (command line
      text)
X      DMTxxx070E I/O ERROR cuu SIOCC cc CSW csw SENSE sense CCW ccw
X      DMTREX080E PROGRAM CHECK -- LINK 'linkid' DEACTIVATED
X      X DMTREX090T PROGRAM CHECK IN SUPERVISOR -- VNET SHUTDOWN
X      X DMTREX091T INITIALIZATION FAILURE -- VNET SHUTDOWN
X      X DMTAXM101I FILE 'spoolid' ('orgid') ENQUEUED ON LINK 'linkid'
X      DMTAXM102I FILE 'spoolid' ('orgid') PENDING FOR LINK 'linkid'
X      DMTAXM103E FILE 'spoolid' ('orgid') REJECTED -- INVALID
      DESTINATION ADDRESS
X      X DMTAXM104I FILE ('orgid') SPOOLED TO 'userid1' -- ORG 'locid'
      (userid2) mm/dd/yy hh:mm:ss
X      DMTAXM105I FILE 'spoolid' PURGED
X      DMTAXM106I FILE 'spoolid' MISSING -- DEQUEUED FROM LINK
      'linkid'
X      DMTAXM107I 'nn' PENDING FILES FOR LINK 'linkid' MISSING
X      X DMTxxx108E SYSTEM ERROR READING SPOOL FILE 'spoolid'
X      DMTAXM109I FILE QUEUE REORDERED
X      X DMTAXM111E USER 'userid' NOT IN CP DIRECTORY -- FILE ('orgid')
      SPOOLED TO SYSTEM
X      DMTxxx141I LINE 'vaddr' READY FOR CONNECTION TO LINK 'linkid'
X      DMTxxx142I LINK 'linkid' LINE 'vaddr' DATASET READY
X      DMTxxx143I LINK 'linkid' LINE 'vaddr' DISCONNECTED
X      DMTxxx144I RECEIVING FILE ('orgid') ON LINK 'linkid' FROM
      'locid' ('userid'), REC nnnnnnnn
X      DMTxxx145I RECEIVED FILE ('orgid') ON LINK 'linkid' TO 'locid'
      'userid'
X      DMTxxx146I SENDING FILE 'spoolid' ('orgid') ON LINK FROM
      'locid' 'userid'
X      X DMTxxx147I SENT FILE 'spoolid' ('orgid') ON LINK 'linkid' TO
      'locid' 'userid'
X      DMTxxx148I ACTIVE FILE 'spoolid' SENDING RESUMED ON LINK
      'linkid'
X      DMTxxx149I LINK 'linkid' LINE ACTIVITY; TOT= mmmmmmmm; ERRS=
      nnnnnnnn; TMOUTS= pppppppp
X      DMTxxx160I LINE 'vaddr' DISABLED FOR 'linkid'
X      X DMTxxx170I FROM 'linkid': (message text)
X      X DMTxxx171I FROM 'linkid'('userid'): (message text)
X      DMTxxx190E INVALID SPOOI BLOCK FORMAT ON FILE 'spoolid'
X      DMTIRX400I VNET DIRECT mm/dd/yy hh:mm,'nn' MAX
      ACTIVE LINKS, 'tt' TAGS
  
```

```

V O V C
N R M P
E I I O
T G D P
X      DMTxxx580I FILE 'spoolid' PROCESSING TERMINATED
      X      DMTNHD910E INVALID NJI PARAMETER 'parm' ON TAG -- PARAMETER
              IGNORED
X      DMTNHD917I NJI LINK 'linkid': (JOB|OUTPUT) ('orgid'), JOBNAME
              'job', PGMR 'user'
      X      DMTxxx934E ID CARD MISSING ON LINK 'linkid' -- INPUT FILE
              PURGED
X      X      DMTSML935E LINK 'linkid' IN RJE MODE -- PRINT FILE 'spoolid'
              PURGED
X      X      DMTNPT936E NO REMOTE PUNCH AVAILABLE ON LINK 'linkid' -- FILE
              'spoolid' PURGED

```

CCMMAND RESPONSES

General Command Responses

```

X      DMTCMX200I VNET
X      DMTCMX201E INVALID COMMAND 'command'
X      DMTCMX202E INVALID LINK 'linkid'
X      DMTCMX203E INVALID SPOOL ID 'spoolid'
X      DMTCMX204E INVALID KEYWORD 'keyword'
X      DMTCMX205E CONFLICTING KEYWORD 'keyword'
X      DMTCMX206E INVALID CPTION 'keyword' 'option'
X      DMTCMX207E CONFLICTING OPTION 'keyword' 'option'
X      DMTCMX208E INVALID USER ID 'userid'
X      DMTCMX209E RESTRICTED COMMAND 'command'
X      DMTCMX210E INVALID LOCATION 'locid'
X      DMTxxx300I ACCEPTED BY TASK 'task'
X      DMTxxx301E REJECTED BY TASK 'task' -- PREVIOUS
              COMMAND ACTIVE
X      DMTxxx302E LINK 'linkid' IS NOT DEFINED
X      DMTxxx303E LINK 'linkid' IS NOT ACTIVE
X      DMTxxx304E REJECTED BY TASK 'task' -- NOT RECEIVING
X      DMTCMX310E LOCATION 'locid' IS NOT DEFINED
X      DMTxxx320E LINK 'linkid' NOT CONNECTED
X      DMTRGX330E USERID MISSING OR INVALID
X      DMTRGX331E 'userid' NOT LOGGED ON
X      DMTRGX332E 'userid' NOT RECEIVING
X      DMTxxx531I VALID COMMAND RECOGNIZED ON LINK 'linkid' --
              NO ACTION TAKEN

```

Specific Command Responses

BACKSPAC:

```

X      DMTxxx510I FILE 'spoolid' BACKSPACED
X      DMTxxx511E NO FILE ACTIVE ON LINK 'linkid'

```

CHANGE:

```

X      DMTAXM520I FILE 'spoolid' CHANGED
X      DMTAXM521I FILE 'spoolid' HELD FOR LINK 'linkid'
X      DMTAXM522I FILE 'spoolid' RELEASED FOR LINK 'linkid'

```

V O V C
N R M P
E I I O
T G D P

Specific Command Responses

X DMTAXM523I LINK 'linkid' QUEUE REORDERED
X DMTAXM524E FILE 'spoolid' ACTIVE -- NO ACTION TAKEN
X DMTAXM525E FILE 'spoolid' IS FOR LINK 'linkid' --
NO ACTION TAKEN
X DMTAXM526E FILE 'spoolid' NOT FOUND -- NO ACTION TAKEN

CLOSE:

X DMTAXM500I nn FILE(S) CLOSED ON LINK 'linkid'
X DMTAXM501E LINK 'linkid' ACTIVE -- NO FILE(S) CLOSED
X DMTAXM502E FILE 'spoolid' INACTIVE -- NO ACTION TAKEN

CMD:

X DMTxxx302E LINK 'linkid' IS NOT DEFINED
X DMTxxx303E LINK 'linkid' IS NOT ACTIVE
X DMTCMX310E LOCATION 'locid' IS NOT DEFINED
X DMTxxx320E LINK 'linkid' NOT CONNECTED

DEFINE:

X DMTCMX540I NEW LINK 'linkid' DEFINED
X DMTCMX541I LINK 'linkid' REDEFINED
X DMTCMX542E LINK 'linkid' ACTIVE -- NOT REDEFINED
X DMTCMX543E LINK 'linkid' NOT DEFINED -- LINK LIMIT REACHED
X DMTCMX653I LINK 'linkid' DEFAULT 'task' 'type' 'vaddr'
c Z=z R=r

DELETE:

X DMTCMX550I LINK 'linkid' NOW DELETED
X DMTCMX551E LINK 'linkid' ACTIVE -- NOT DELETED
X DMTCMX552E LINK 'linkid' HAS A FILE QUEUE -- NOT DELETED

DISCONN:

X DMTCMX560I VNET DISCONNECTING
X DMTCMX561E USERID 'userid' NOT RECEIVING

DRAIN:

X X DMTxxx570I LINK 'linkid' NOW SET TO DEACTIVATE
X X DMTxxx571E LINK 'linkid' ALREADY SET TO DEACTIVATE

V O V C
N R M P
E I I O
T G D P

Specific Comrand Responses

EXEC:

X DMTCMX675E EXEC 'filename' NOT FOUND ON DISK 'vaddr' --
COMMAND FILE NOT EXECUTED
X DMTCMX676E FATAL ERROR READING FROM 'vaddr' -- EXEC
'filename' PROCESSING TERMINATED
X DMTCMX677E EXEC 'filename' FILE FORMAT INVALID --
EXEC NOT EXECUTED
X DMTCMX678E EXEC 'filename' IN EXECUTION -- NEW EXEC
COMMAND IGNORED
X DMTREX679I EXECUTING 'filename' COMMAND: (command line)

FLUSH:

X X DMTxxx580I FILE 'spoolid' PROCESSING TERMINATED
X DMTxxx581E FILE 'spoolid' NOT ACTIVE

FORCE:

X DMTREX002I LINK 'linkid' DEACTIVATED

FREE:

X X DMTxxx590I LINK 'linkid' RESUMING FILE TRANSFER
X X DMTxxx591E LINK 'linkid' NOT IN HOLD STATUS

FWDSpace:

X DMTxxx600I FILE 'spoolid' FORWARD SPACED
X DMTxxx511E NO FILE ACTIVE ON LINK 'linkid'

HOLD:

X X DMTxxx610I LINK 'linkid' TO SUSPEND FILE TRANSMISSION
X X DMTxxx611I LINK 'linkid' FILE TRANSMISSION SUSPENDED
X X DMTxxx612E LINK 'linkid' ALREADY IN HOLD STATUS

MSG:

X DMTxxx302E LINK 'linkid' IS NOT DEFINED
X DMTxxx303E LINK 'linkid' IS NOT ACTIVE
X DMTCMX310E LOCATION 'locid' IS NOT DEFINED
X DMTxxx320E LINK 'linkid' NOT CONNECTED
X DMTRGX330E USERID MISSING OR INVALID
X DMTRGX331E 'userid' NOT LOGGED ON
X DMTRGX332E 'userid' NOT RECEIVING

V O V C
N R M P
E I I O
T G D P

Specific Command Responses

ORDER:

X X DMTAXM523I LINK 'linkid' QUEUE REORDERED
X X DMTAXM524E FILE 'spoolid' ACTIVE -- NO ACTION TAKEN
X X DMTAXM525E FILE 'spoolid' IS FOR LINK 'linkid' --
NO ACTION TAKEN
X X DMTAXM526E FILE 'spoolid' NOT FOUND -- NO ACTION TAKEN

PURGE:

X X DMTAXM524E FILE 'spoolid' ACTIVE -- NO ACTION TAKEN
X X DMTAXM525E FILE 'spoolid' IS FOR 'linkid' --
NO ACTION TAKEN
X X DMTAXM526E FILE 'spoolid' NOT FOUND -- NO ACTION TAKEN
X X DMTAXM640I 'nn' FILE(S) PURGED ON LINK 'linkid'

QUERY 'locid':

X DMTCMX636I 'locid' ROUTED THROUGH LINK 'linkid'
X DMTCMX637I 'locid' NCT ROUTED
X DMTCMX651I LINK 'linkid' INACTIVE
X DMTCMX652I LINK 'linkid' (CONNECT|ACTIVE) 'task' 'type'
'vaddr' c (HO|NOH) (DR|NOD) (NOT|TRS|TRL|TSL)

QUERY 'linkid' ACTIVE:

X DMTCMX656I FILE 'spoolid' ('orgid') 'locid' 'userid'
CL a PR pp LEFT mmmmmmmmm OF nnnnnnnn
X DMTCMX665I NO FILE ACTIVE

QUERY 'linkid' DEF:

X DMTCMX653I LINK 'linkid' DEFAULT 'task' 'type' 'vaddr'
c Z=z R=r

QUERY 'linkid' FILES:

X DMTCMX654I LINK 'linkid' S=s R=r Q=q P=p

QUERY 'linkid' QUEUE:

X DMTCMX654I LINK 'linkid' S=s R=r Q=q P=p
X DMTCMX655I FILE 'spoolid' ('orgid') 'locid' 'userid'
CL a PR pp REC nnnnnnnn (HO|NOH)

V O V C
N R M P
E I I O
T G D P

Specific Command Responses

QUERY 'linkid' SUM:

X DMTCMX149I LINKID 'linkid' LINE ACTIVITY; TOT=mmmmmmmm;
ERRS=nnnnnnnn;
TMOUTS=pppppppp

QUERY FILE 'spoolid' STAT:

X DMTCMX660I FILE 'spoolid' INACTIVE ON LINK 'linkid'
X DMTCMX661I FILE 'spoolid' ACTIVE ON LINK 'linkid'
X DMTCMX664E FILE 'spoolid' NOT FOUND

QUERY FILE 'spoolid' VM:

X DMTCMX663I FILE 'spoolid' PR pp CL a CO nn (HO|NOH)
DI 'distcode', NA ('fn ft'|'dsname')
X DMTCMX664E FILE 'spoolid' NOT FOUND

QUERY FILE 'spoolid' VNET:

X DMTCMX662I FILE 'spoolid' ORG 'locid1' 'userid1'
ORGID 'orgid' mm/dd/yy hh:mm:ss z.z.z.
TO 'locid2' 'userid2'
X DMTCMX664E FILE 'spoolid' NOT FOUND

QUERY SYSTEM ACTIVE:

X DMTCMX670I LINK 'linkid' (CONNECT|ACTIVE) -- LINE
'vaddr' (HO|NOH) (DR|NDR) (NCT|TRS|TRL|TSL)
X DMTCMX672I NO LINK ACTIVE

QUERY SYSTEM LINKS:

X DMTCMX670I LINK 'linkid' (CONNECT|ACTIVE) -- LINE
'vaddr' (HO|NOH)
X DMTCMX671I LINK 'linkid' INACTIVE
X DMTCMX673I NO LINK DEFINED

QUERY SYSTEM PORTS:

X DMTCMX625I NO PORTS AVAILABLE
X DMTCMX626I PORT 'vaddr' AVAILABLE
X DMTCMX627I PORT 'vaddr' IN USE BY LINK 'linkid'

V O V C
N R M P
E I I O
T G D P

Specific Command Responses

QUERY SYSTEM ROUTES:

X DMTCMX634I NO LOCATIONS ROUTED
X DMTCMX636I 'locid' ROUTED THROUGH LINK 'linkid'

QUERY SYSTEM QUEUE:

X DMTCMX654I LINK 'linkid' S=s R=r Q=q P=p
X DMTCMX674I NO FILES QUEUED

REORD:

X DMTAXM109I FILE QUEUE REORDED

ROUTE:

X DMTCMX630I 'locid' NCW ROUTED THORUGH LINK 'linkid'
X DMTCMX631I INDIRECT ROUTING FOR 'locid' DEACTIVATED
X DMTCMX632E 'locid' INVALID ROUTE SPECIFIED
X DMTCMX633E 'locid' NOT ROUTED -- ROUTE LIMIT REACHED
X DMTCMX638E LOCATION 'locid' HAS A FILE QUEUE --
INDIRECT ROUTING NOT DEACTIVATED

START:

X DMTCMX700I ACTIVATING LINK 'linkid' 'task' 'type'
'vaddr' c
X DMTCMX701E NO SWITCHED LINE AVAILABLE -- LINK 'linkid'
NOT ACTIVATED
X DMTCMX702E LINE 'vaddr' IS IN USE BY LINK 'linkid1' --
LINK 'linkid2' NOT ACTIVATED
X DMTCMX703E DEV 'cuu' IS NOT A LINE PORT -- LINK 'linkid'
NOT ACTIVATED
X DMTCMX704E LINE 'vaddr' CC=3 NOT OPERATIONAL --
LINK 'linkid' NOT ACTIVATED
X DMTCMX705E DRIVER 'type' NOT FOUND ON DISK 'vaddr' --
LINK 'linkid' NOT ACTIVATED
X DMTCMX706E FATAL ERROR LOADING FROM 'vaddr' -- LINK 'linkid'
NOT ACTIVATED
X DMTCMX707E DRIVER 'type' FILE FORMAT INVALID -- LINK 'linkid'
NOT ACTIVATED
X DMTCMX708E VIRTUAL STORAGE CAPACITY EXCEEDED -- LINK 'linkid'
NOT ACTIVATED
X DMTCMX709E TASK NAME 'task' ALREADY IN USE -- LINK 'linkid'
NOT ACTIVATED
X DMTCMX710E MAX ('nn') ACTIVE -- LINK 'linkid' NOT ACTIVATED
X X DMTxxx750E LINK 'linkid' ALREADY ACTIVE -- NO ACTION TAKEN
X X DMTCMX751I LINK 'linkid' ALREADY ACTIVE -- NEW CLASS (ES)
SET AS REQUESTED

V O V C
N R M P
E I I O
T G D P

Specific Command Responses

```
X X   DMTxxx752I LINK 'linkid' STILL ACTIVE -- DRAIN STATUS RESET
X     DMTSML901E INVALID SML MODE SPECIFIED -- LINK 'linkid'
      NOT ACTIVATED
X     DMTSML906E INVALID SML BUFFER PARAMETER -- LINK 'linkid'
      NOT ACTIVATED
X     DMTNIT911E INVALID NJI BUFFER SIZE SPECIFIED --
      LINK 'linkid' NOT ACTIVATED
X     DMTNIT912E INVALID NJI NODAL RESISTANCE SPECIFIED --
      LINK 'linkid' NOT ACTIVATED
X     DMTNIT913E INVALID PASSWORD PARAMETER SPECIFIED --
      LINK 'linkid' NOT ACTIVATED
```

TRACE:

```
X     DMTxxx801I LINK 'linkid' LOG ACTIVATED
X     DMTxxx802I LINK 'linkid' LOG DEACTIVATED
X     DMTxxx803I LINK 'linkid' SUM REPORTING DEACTIVATED
X     DMTxxx810E LINK 'linkid' LOG ALREADY ACTIVE
X     DMTxxx811E LINK 'linkid' LOG NOT ACTIVE
X     DMTxxx812E LINK 'linkid' SUM REPORTING ALREADY ACTIVE
X     DMTxxx813E LINK 'linkid' SUM REPORTING NOT ACTIVE
```

TRANSFER:

```
X     DMTAXM524E FILE 'spoolid' ACTIVE -- NO ACTION TAKEN
X     DMTAXM525E FILE 'spoolid' IS FOR LINK 'linkid' --
      NO ACTION TAKEN
X     DMTAXM526E FILE 'spoolid' NOT FOUND -- NO ACTION TAKEN
X     DMTAXM645I 'nn' FILE(S) TRANSFERRED ON LINK 'linkid'
```

Messages Generated During the Sign-On Procedure

SIGNON:

```
X     DMTxxx902E NON-SIGNON CARD READ ON LINK 'linkid'
X X   DMTxxx903E PASSWORD SUPPLIED ON LINK 'linkid' IS INVALID
X     DMTNPT904E SIGNON PARAMETER='parm' INVALID
X X   DMTxxx905I SIGNON of LINK 'linkid' COMPLETE
X     DMTNPT907E SIGNCN TYPE PARAMETER MISSING
```

V O V C
N R M P
E I I O
T G D P

Messages Generated During the Sign-On Procedure

X DMTxxx913E INVALID PASSWORD PARAMETER SPECIFIED --
LINK 'linkid' NOT ACTIVATED
X DMTxxx914E INCORRECT PASSWORD RECEIVED ON LINK 'linkid'
X DMTNMC915E INCOMPATIBLE NJI BUFFER SIZES -- LINK 'linkid'
IS BEING DEACTIVATED
X DMTNMC916E INVALID NJI SIGNON CONNECTION RECORD
RECEIVED -- LINK 'linkid' IS BEING DEACTIVATED
X DMTxxx918E LINK 'linkid' DOES NOT MATCH REMOTE LOCATION
'locid'
X DMTxxx919E SIGNON SEQUENCE ON LINK 'linkid' FAILED

VNET System Initialization Messages

X DMTINI410I NUCLEUS WRITE COMPLETE
X DMTINI411R SYSTEM DISK ADDRESS = ccu
X DMTINI412R REWRITE THE NUCLEUS ? {YES|NO}
X DMTINI413R NUCLEUS CYL ADDRESS = nnn
X DMTINI481E INVALID DEVICE ADDRESS -- REENTER
X DMTINI482E INVALID CYLINDER NUMBER -- REENTER
X DMTINI483E INVALID REPLY -- ANSWER "YES" OR "NO"
X DMTINI484E IPL DEVICE ERROR -- REENTER
X DMTINI485E CYLINDER IN USE FOR CMS FILES
X DMTINI498S IPL DEVICE WRITE I/O ERROR
X DMTINI499T IPL DEVICE READ I/O ERROR

X DMTIRX449I MAX TAGS REQUEST OF 1 PER VIRTUAL
STORAGE K ASSUMED
X DMTIRX450E INVALID DIRECTORY ENTRY
X DMTIRX451E DIRECTORY ENTRY OUT OF ORDER
X DMTIRX452E LOCAL PREVIOUSLY SPECIFIED
X DMTIRX453E PARM PREVIOUSLY SPECIFIED FOR LINK
X DMTIRX454E TAGS PREVIOUSLY SPECIFIED
X DMTIRX455E DUPLICATE LOCATION ID
X DMTIRX456E DUPLICATE LINK ID
X DMTIRX457E DUPLICATE PORT ADDRESS
X DMTIRX458E UNDEFINED LINK ID
X DMTIRX461E LOCATION ID MISSING OR INVALID
X DMTIRX462E LINK ID MISSING OR INVALID
X DMTIRX463E INVALID DRIVER SPECIFICATION
X DMTIRX464E PORT ADDRESS MISSING OR INVALID
X DMTIRX465E INVALID ZONE SPECIFICATION
X DMTIRX466E INVALID TASK SPECIFICATION
X DMTIRX467E INVALID CLASS SPECIFICATION
X DMTIRX468E INVALID KEEP SPECIFICATION
X DMTIRX469E TAGS COUNT MISSING OR INVALID
X DMTIRX490T UNSUPPCRTED SYSTEM RESIDENCE DEVICE
X DMTIRX491T FATAL ERROR READING VNET DIRECT
X DMTIRX492T FATAL ERRCR LOADING DMTAXS
X DMTIRX493T FATAL ERROR LOADING DMTLAX
X DMTIRX494T LOCAL LOCATION DEFINITION MISSING

VNET WAIT STATE CODES

When VNET enters a wait state, the VNET operator is notified via the CP message:

```
DMKDSP450W CP ENTERED; DISABLED WAIT PSW
```

issued to the VNET operator's console. Using CP commands, the operator can display the virtual machine's PSW. The three rightmost hexadecimal characters indicate the error condition.

- 001 Explanation: If no VNET message was issued, a program check interrupt has occurred during the execution of the program check handler. The probable cause is a programming error. If the VNET message:

```
DMTREX091T INITIALIZATION FAILURE -- VNET SHUTDOWN
```

was issued, VNET operation has been terminated because of an error in the loading of DMTAXS or DMTIAX. A dump of virtual storage is automatically taken. Verify that the CMS files DMTAXS TEXT and DMTIAX TEXT are correctly written and resident on the VNET system residence device. If the VNET message:

```
DTMREX090T PROGRAM CHECK IN SUPERVISOR -- VNET SHUTDOWN
```

was issued, the program check handler has terminated VNET due to a program check interrupt in other than a dispatched line driver. The probable cause is a programming error.

The wait state code is loaded by DMTREX at VNET termination or automatically during program check handling.

Operator Action: If neither of the above two messages was issued, use the CP DUMP command to dump the contents of virtual storage. IPL to restart. If the problem persists, notify your system support personnel.

- 007 Explanation: A program check interrupt has occurred during initial processing, before the program check handler could be activated. This may be caused by a programming error or by an attempt to load VNET into an incompatible virtual machine. The latter case can occur if the virtual machine (1) has an incomplete instruction set, (2) has less than 512K of virtual storage, or (3) does not have the required VM/370 Diagnose interface support. The wait state code is loaded automatically during the initial loading and execution of the VNET supervisor, DMTINI, DMTREX, DMTAXS, and DMTLAX.

Operator Action: Verify that the VNET virtual machine configuration has been correctly specified and that the "retrieve subsequent file description" function of DIAGNOSE code X'14' is supported. Dump the contents of virtual storage via the CP DUMP command. If the problem persists, notify your system support personnel.

- 011 Explanation: An unrecoverable error has occurred during the reading of the VNET nucleus from DASD storage. This may be caused by a hardware malfunction of the DASD device. It may be the result of (1) an incorrect virtual DASD device definition, (2) an attempt to use a system residence device unsupported by VNET, (3) incorrect VNET system generation procedures, or (4) the subsequent overwriting of the VNET nucleus on the system residence device.

The wait state code is loaded by DMTINI after an attempt, successful or not, to issue the message:

DMTINI402I IPL DEVICE READ I/O ERROR

Operator Action: Verify that the VNET system residence device has been properly defined as a virtual DASD device and that the real DASD device is mounted and operable. If the problem persists, dump virtual storage via the CP DUMP command and notify your system support personnel. The VNET system residence device may have to be restarted or the VNET system may have to be regenerated.

012 Explanation: The VNET nucleus has been successfully written to the VNET system disk. This wait state code occurs at the end of VNET system generation following the message:

DMTINI410I NUCLEUS WRITE COMPLETE

Operator Action: Test the newly loaded VNET system by IPLing from the VNET system disk that contains the new nucleus.

This portion contains operational information for each of the following remote nonprogrammable terminals supported by the NPT line driver operating under VNET:

- IBM 2770 Data Communication System
- IBM 2780 Data Transmission Terminal, Models 1 and 2
- IBM 3770 Data Communication System, nonprogrammable models
- IBM 3780 Data Communications Terminal

The following topics are discussed as they relate to each terminal:

- Supported configuration
- Operational notes
- Entering commands
- Error recovery procedures

IBM 2770 AS A REMOTE TERMINAL

SUPPORTED CONFIGURATION

The IBM 2770 Data Communication System with the 2772 Multipurpose Control Unit (from now on called 2770) can be used as an NPT remote terminal. It can be connected to VNET via a switched or leased point-to-point communication line.

The following devices are required for operating a 2770 as an NPT remote terminal:

- One IBM 2213 Printer, Model 2, or one IBM 2203 Printer, or one IBM 1053 Printer
- One IBM 2502 Card Reader, Model A1 or A2
- EBCDIC Transmission Code

Other supported equipment and features are as follows (feature numbers are shown in parentheses):

- One IBM 545 Card Punch, Model 3 or 4, with or without 3950 attachment.
- EBCDIC Transparency (3650)
- Buffer Expansion (1490)
- Additional Buffer Expansion (1491)

- Space Compression/Expansion (6555)
- Synchronous Clock (7705)

2770 OPERATIONAL NOTES

Establishing the connection with VNET is the same for all nonprogrammable terminals and is covered in "Part 3: VNET System Operation" under "Starting NPT" and "Signing on to NPT".

During all 2770 terminal sessions with NPT, the 2770 console switches should be set as follows:

<u>Switch</u>	<u>Setting</u>
JOB SELECT VARIABLE SELECT	SELECT
INPUT KEYBOARD, 2 (card reader)	both up
OUTPUT PRINTER, 2 (card punch)	both up
DIRECT DATA OUTPUT PRINTER	up
TERM MODE	LINE
SELECTION REQD	down
ANSWER	MANUAL
MCNITOR PRINT	as desired by installation, norrally down

Any of above that refer
to device not on your 2770 down

All other VARIABLE SELECT
switches down

During installation, your 2770 may have been provided with the equivalent of all the above switch settings at one of the five JOB positions on the JOB SELECT switch. If so, simply set to that position and ignore all VARIABLE SELECT switches. When power is on, console lights show the settings that are in effect.

The TRANSPCY switch should be set in the down position except when used for transmitting EBCDIC card decks that use all 256 possible punch combinations.

ENTERING CCMMANDS

The remote terminal operator submits commands to VNET through the remote card reader in the same manner as he enters card files. The commands are punched, one per card, starting in column 1. One or more commands may be submitted at any one time. Commands are only accepted before the ID card of an input card deck or after an input card deck has been completely processed (end-of-file generated).

TERMINATING A SESSION

To terminate a session, the remote terminal operator issues the DRAIN command. The link is deactivated after the file currently being processed is completed.

ERROR RECOVERY PROCEDURES

Most problems you encounter result in lights appearing on the 2770 console or the I/O devices themselves. Some lights are not error lights; these are DATA SET READY, CARRIER OFF, DATA IN BUFFER, LINE MODE, PROCFED, BID, SEIN REQD, TRANSPCY, MANUAL ANSWER, and any of the I/O device lights that are not blinking. Any I/O device light which is blinking indicates that the device is not ready. Other lights provide clues to problems and are discussed in the following sections.

Error Recovery For A Line Drop

If for any reason a line drop occurs, all activity at the remote terminal halts. If the terminal was receiving, the printer or punch will stop. If the terminal was transmitting, the reader stops and VNET closes the partially transmitted file.

In order to restart, you must redial the line and reenter your SIGNON card. When the SIGNON card is accepted by VNET, normal line activity will resume. If receiving, activity will restart from the point of interruption. If transmitting, you can either restart from the file that was interrupted or you can send the rest of the data as a separate file.

If some other user dials in on the disconnected line before you do and submits his own SIGNON card, VNET will recognize the new linkid as being different from the one in effect at the time the line dropped. The new user is terminated and the link is deactivated. If your terminal was receiving, the printer or punch file is placed at the end of the queue for your link and is put into HOLD status.

To restart under these circumstances, you must first have the VNET operator reactivate your link via the START command. you can then redial the line and resubmit your SIGNON card. When the SIGNON card is accepted, line activity will resume. Transmission can be either continued or restarted. Printer or punch output will resume with the file following the one that was active at the time the line dropped. In order to process the interrupted file, you must change its status from HOLD to NOHOLD via the CHANGE command.

Error Recovery When Transmittting

When transmitting, any card reader trouble is indicated by a blinking INPUT 2 or 3 light, whichever your card reader is attached to. The following lights on the card reader may further indicate the type of trouble:

FEED CHECK

The bottom card in the hopper failed to feed. Remove the cards from the hopper. Press the Non-Process Runout (NPRO) button. Repair the bottom hopper card, if necessary, and make sure the feed throat is clear. Reload the cards and push reader START and console START.

ATTENTION

Full stacker or empty hopper with EOF off. Correct the problem, then push reader START and console START.

READ CHECK

VALIDITY CHECK

Last card in the stacker (if no jam) and the following card (run out by NPRO after hopper cards are removed) must be re-read. After appropriate correction, place these two cards at the front of the card stack in the hopper, push reader START and console START.

TERMINAL ADDRESS

The NPT program is trying to send output while you are trying to start an input function. Continue the input procedure until you have turned on the BID light. Then press CHECK RESET and wait for input to begin. Press CHECK RESET again if TERMINAL ADDRESS comes on again.

BID RETRY

The NPT program has failed to give permission to transmit. Press CHECK RESET to cause the 2770 to try again. If this fails, ask the local VNET operator to check the task.

INPUT CHECK

BUFFER CHECK

TRNSPCY CHECK

With any one of these serious errors, you must always do a job restart. Make sure you have turned on the TRANSPCY switch if the input card deck contains object decks or other cards requiring transparent transmission.

RECORD CHECK

LINE CHECK

These lights may come on while NPT is attempting retransmissions for line errors; they will go out if recovery is successful. If they stay on and the transmission does not proceed, you must do a CHECK RESET and restart the output device for the output to continue.

Note: It is possible in this case to lose a record, or to have a record duplicated.

Error Recovery When Receiving

Output device trouble is indicated by blinking OUTPUT PRINTER or OUTPUT 2 lights on the devices as follows:

CARRIAGE CHECK

The printer carriage, forms, or carriage tape are not ready or jammed. Correct the condition and press console CHECK RESET and START.

PRINT CHECK

The printer had a parity error. Press console CHECK RESET and START. Failure to recover indicates hardware trouble.

CHECK light or any card punch not ready condition

Hopper empty, stacker full, or jams are the possible causes. Set the keyboard switch to KEYPCH. Remove any cards from the stacker or the eject station just below the stacker and discard all cards after the last one with a column 80 punch. Clear the entire card feed path. With blank cards in the hopper, press the FEED key twice and the RELEASE key once and then set the switch to AUTO PCH. Press console CHECK RESET and START. The first card through the feed after recovery is blank and should be discarded.

When receiving, certain console lights may require your attention as follows:

TERMINAL ADDRESS

The NPT program is trying to send output but your 2770 is not ready. Make sure your switch setup is correct, ready all output devices, and press console CHECK RESET.

OVERRUN

This usually indicates that features on your 2770 were not specified correctly when you signed on to the VNET virtual machine. Ask the VNET operator either to restart the task in order to send the correct SIGNON card or to change the recorded configuration.

BUFFER CHECK

This serious hardware error always requires you to reset and restart the operation. Failure to recover indicates hardware trouble.

LINE CHECK

The NPT program is attempting retransmissions. If they are successful, the light goes out. If the light stays on and printing or punching does not continue within a short time, you must do a line restart.

For other combinations of error lights consult the publication System Components: IBM 2770 Data Communications System, GA27-3013.

IBM 2780 AS A REMOTE TERMINAL

SUPPORTED CONFIGURATION

The IBM 2780 Data Transmission Terminal, Models 1 and 2, used as NPT remote terminals, can be connected to VNET via a switched or leased point-to-point line. EBCDIC Transmission, feature code 9762, is required.

The following supported features are optional (feature numbers are in parentheses):

- EBCDIC Transparency (8030)
- 120/144-Character Print Line (5820 or 5821)

- Multiple Record Transmission (5010)
- Synchronous clock (7705)

2780 OPERATIONAL NOTES

Establishing the connection with VNET is the same for all nonprogrammable terminals and is covered in "Part 3: VNET System Operation" under "Starting NPT" and "Signing on to NPT".

After having established the connection with VNET, the following steps must be performed:

1. Make sure that the mode-selection knob is at one of the positions TSM-TRSP, TSM or REC. Do not put the knob in the PRINT or PUNCH position (to receive a punch file put the knob in REC position).
2. Push START on the printer.

ENTERING COMMANDS

The remote terminal operator submits commands to VNET through the remote card reader in the same manner as he enters card files. The commands are punched, one per card, starting in column 1. One or more commands may be submitted at any one time. Commands are only accepted before the ID card of an input card deck or after an input card deck has been completely processed (end-of-file generated).

TERMINATING A SESSION

To terminate a session, the remote terminal operator issues the DRAIN command. The link is deactivated after the file currently being processed is completed.

ERROR RECOVERY PROCEDURES

Most problems you encounter result in lights appearing on the reader-punch or printer control panels. Some lights are not error lights; these are DATA SET READY, the two READY lights, END OF FILE, I/O BFR FULL, CTR1, CTR2, CTR4 and usually LINE.

POWER-ON reset

The POWER-ON reset operation is referred to frequently throughout this manual. Contrary to its name, a POWER-ON reset does not involve the 2780 POWER ON/OFF switch (on the right side of the 2780); this switch needs to be turned on only once during 2780 operations. You can perform a POWER-ON reset by turning the mode selection switch knob from its current position to any other

position. This resets the 2780. If the knob is already where you want it, then turn it to some other position and back to the desired one.

CAUTION: Do not do a POWER-ON reset when the printer is printing, or while cards are being read or punched.

Error Recovery For A Line Drop

If for any reason a line drop occurs, all activity at the remote terminal halts. If the terminal was receiving, the printer or punch will stop. If the terminal was transmitting, the reader stops and VNET closes the partially transmitted file.

In order to restart, you must redial the line and reenter your SIGNON card. When the SIGNON card is accepted by VNET, normal line activity will resume. If receiving, activity will restart from the point of interruption. If transmitting, you can either restart from the file that was interrupted or you can send the rest of the data as a separate file.

If some other user dials in on the disconnected line before you do and submits his own SIGNON card, VNET will recognize the new linkid as being different from the one in effect at the time the line dropped. The new user is terminated and the link is deactivated. If your terminal was receiving, the printer or punch file is placed at the end of the queue for your link and is put into HOLD status.

To restart under these circumstances, you must first have the VNET operator reactivate your link via the START command. you can then redial the line and resubmit your SIGNON card. When the SIGNON card is accepted, line activity will resume. Transmission can be either continued or restarted. Printer or punch output will resume with the file following the one that was active at the time the line dropped. In order to process the interrupted file, you must change its status from HOLD to NOHOLD via the CHANGE command.

Error Recovery When Transmitting

TERM ADDR

This light comes on when you are reading cards. If the cards stop reading and the READY and TERM ADDR lights are on, perform the following steps:

1. Remove the cards from the hopper and press NPRO to run out the two cards in the feed.
2. Put these two cards in front of the deck previously removed in Step 1, and place the cards back in the hopper.
3. Do a POWER-ON reset.
4. Wait for the TERM ADDR light to come on again. This may take as long as 10 seconds.
5. Do another POWER-ON reset, press the END OF FILE and START, so that the END OF FILE and READY lights come on.

6. Cards should start reading within 15 seconds. If they do not, and the TERM ADDR light comes on again, repeat the above steps.

If the above steps continue to fail, you may have interrupted printing or punching to read in cards before the printing or punching had completed. Try to ready the printer and punch.

DATA CHECK

DATA CHECK and EQUIP CHECK

DATA CHECK, EQUIP CHECK, and PARITY CHECK

The reader could not read a card correctly. Perform the following steps:

1. Remove cards from the hopper (not the stacker).
2. Press NPRO. Two cards will run out into the stacker. The first of these cards is the bad one.
3. Correct the bad card.
4. Put both cards back in the hopper, followed by the cards you removed from the hopper.
5. Press END OF FILE and START so that the END OF FILE and READY lights come on.

OVER RUN

PARITY CHECK

PARITY CHECK and EQUIP CHECK

RECORD and LINE

To correct errors when these lights are on, you must first find out how many cards have been read but not yet transmitted. Add up the CTR lights to do this. For example, if CTR1 and CTR2 are on, three cards have been read, but not yet transmitted. Without removing all cards from the stacker:

1. Remove the cards from the hopper.
2. Press NPRO to run out the two cards in the feed mechanism.
3. Remove the last $N+2$ cards from the stacker, where N is the number of cards read but not yet transmitted.
4. Put these cards back into the hopper, followed by the cards you removed from the hopper in Step 1. Do a POWER-ON reset.
5. Press END OF FILE and START so that END OF FILE and READY lights come on.

EQUIP CHECK

A mechanical error has occurred. Use the procedure for DATA CHECK, but you should not need to correct a card.

LINE

Wait a few moments to see whether or not the reader starts reading cards by itself. If it does not:

1. Press STOP.

2. Press END OF FILE and START so that the END OF FILE and READY lights come on.

HOPR

No card was fed. Check the bottom card in the hopper for damaged edges. Repair or remake the card and replace it and the rest of the cards back in the hopper. Press END OF FILE and START so that the END OF FILE and READY lights come on.

Error Recovery When Receiving

Some of the errors you may encounter when receiving are self-explanatory, such as END OF FORM (another box of paper is needed) or FORM CHECK (the paper is jammed).

One error deserves particular attention. It is indicated by OVER RUN and INCP. If you get this error, you may have specified the wrong remote configuration on the SIGNON card and NPT is attempting to use features your 2780 Data Transmission Terminal does not have. Ask the VNET operator either to restart the task, in order to send the correct SIGNON card, or to change the recorded configuration in the VNET link table via the DEFINE command.

You may also see the following error indicators:

TERM ADDR

The device (printer or punch) is not ready.

1. Press STOP and CHECK RESET on the reader-punch.
2. Make the output device ready.

EQUIP CHECK

The punch has mechanically malfunctioned. Press NPRO to run out the cards in the feed mechanism and discard them. Make the punch ready again.

SYNCH CHECK

The printer has printed a line containing errors.

1. Press STOP.
2. Press RESET (on printer).
3. Press the START button on the printer; the line is reprinted.

PARITY CHECK

If the printer was printing, do a POWER-ON reset and press START on the printer. (You may get some duplicate print lines.)

If the punch was punching:

1. Remove cards from the hopper (not the stacker)
2. Press NPRO to run out the two cards in the feed mechanism

3. Throw away the last N+K cards that were stacked

where:

N is the number represented by the CTR lights. For example, if CTR1 and CTR2 are lit, N is 3; if all CTR lights are off, N is 0.

K = 2 if all CTR lights are off or if the I/O BFR FULL light is off.

= 1 if any of the CTR lights and the I/O BFR FULL light are on.

4. Reload blank cards in the hopper and make the punch ready

For other combinations of error lights, consult the publication IBM 2780 Data Transmission Terminal -- Component Description, Order No. GA27-3005.

IBM 3770 AS A REMOTE TERMINAL

SUPPORTED CONFIGURATION

The IBM 3770 Data Communication System can be used as an NPT remote station only when operating in 2770 or 3780 BSC mode. It can be connected to VNET via a switched or leased point-to-point communication line. The IBM 3770 is only supported on a communication line terminating in an Integrated Communications Adapter (ICA) on the System/370 Model 135, an IEM 2701, or an IBM 3704/3705 Communications Controller. The 3770 keyboard is not supported.

The following devices are required for operating the 3770 as an NPT remote station:

- One of the following communication terminals:

IBM 3771 Models 1, 2, and 3 (in 2770 mode)
IBM 3773 Models 1, 2, and 3 (in 2770 mode)
IBM 3774 Models 1 and 2 (in 2770 mode)
IBM 3775 Model 1 (in 2770 mode)
IBM 3776 Models 1 and 2 (in 2770 or 3780 mode)
IBM 3777 Model 1 (in 2770 or 3780 mode)

- One IEM 2502 Card Reader, Model A1, A2, or A3; IBM 3501 Card Reader or IBM 3521 Card Punch with the read feature installed

The valid terminal/reader combinations are shown on the following table. Note: the applicable attachment features must also be ordered.

Communication Terminal	Reader Supported
IBM 3771	3501, 3521
IBM 3773	NONE
IBM 3774	NONE
IBM 3775	NONE
IBM 3776	3501, 3521
IBM 3777	2502

The 3773, 3774 and 3775 communication terminals are supported only for console printer output and for input (in card image format) from the diskette. For further information on these terminals, refer to the following publications:

IBM 3773, 3774, and 3775 Programmable Communication Terminals:

Programmer's Guide, Order No. GC30-3028

Operator's Guide, Order No. GA27-3114

The following features/functions are included with 2770/3780 BSC compatibility:

- EBCDIC transmission code
- EBCDIC transparency
- 256/256 byte alternating buffers (2770 mode)
- 512/512 byte alternating buffers (3780 mode)
- Extended retry
- External clock (up to 4800 EPS)
- WACK response
- Printer form controls
- Device selection
- Expanded print line (132 positions)
- Transmit/receive monitor print (2770 prints only after positive acknowledgement from the line. The 3770 always prints)

Other supported equipment and functions are as follows:

- One IBM 3521 Card Punch (not supported on 3773 or 3777)
- One IBM 3784 Line Printer (standalone, with 3774 only)
- Space compression/expansion
- Diskette storage

If installed, the diskette can give expanded input/output capability with 2770/3780 BSC operations.

When the 3770, is in 2770/3780 BSC mode, it has two operator-selected modes for remote component selection:

1. Data to Selected Device with Default to Printer: In this mode of operation, the data from the line is directed to the output device specified by the component selection (DC) character received. Component selection characters used are as follows:

DC1--Selects Console Printer
DC2--Selects Card Punch
DC3--Selects Disk
DC4--Selects Line Printer

If no component selection (DC) character is received, an automatic default occurs to output the data to the printer.

2. Data to Magnetic Disk with Transparent Data to Punch: In this mode of operation, the data from the line is directed to the magnetic disk unless it is transparent data. If transparent data is received, it is directed to the punch. If component selection (DC) characters are received, they are stripped off and ignored.

3770 OPERATIONAL NOTES

Establishing the connection with VNET is the same for all ncnprogrammable terminals and is discussed in "Part 3: VNET System Operation" under "Starting NPT" and "Signing on to NPT".

Operation of the 3770 system is discussed in the following publications:

Operating Procedures Guide:

IBM 3771 and 3773 Communications Terminals
Order No. GA27-3100

IBM 3774 and 3775 Communications Terminals
Order No. GA27-3094

IBM 3776 Communication Terminal,
Order No. GA27-3107

IBM 3777 Communication Terminal,
Order No. GA27-3124

ENTERING CMMANDS

The remote terminal operator submits commands to VNET through the remote card reader in the same manner as he enters card files. The commands are punched, one per card, starting in ccolumn 1. One or more commands may be submitted at any one time. Cmmmands are only accepted before the ID card of an input card deck or after an input card deck has been completely processed (end-of-file generated).

TERMINATING A SESSION

To terminate a session, the remote terminal operator issues the DRAIN command. The link is deactivated after the file currently being processed is completed.

ERROR RECOVERY

The OPRN CHECK (Operational Check) indicator turns on when an operating procedure error occurs, or an input or output device needs some operator attention (such as a printer out-of-forms condition). An error code displays in the numeric position readout (NPR) indicators.

The SYSTEM CHECK indicator turns on when a controller, or an input or output device error occurs. An error code displays in the numeric pcsition readout (NPR) indicators.

The operator panel speaker sounds when an operational check or a system check occurs; if installed, the audible alarm sounds for jobs other than keyboard jobs when the EXTEND/ALARM switch is on.

When the 3770 stops due to an error or an attention condition:

- Either the SYSTEM CHECK or the OPRN CHECK indicator is on.
- If an input or output device error occurred, the operator panel indicator for the device in error turns on.
- The number displayed in the readout (NPR) indicates the error type.

If the audible alarm sounds, press the RESET key to turn it off. For the error recovery procedure that applies to the error code number displayed, see the section "Numeric Position Readout (NPR) Error Codes" in the Operating Procedures Guides for 3770 terminals.

Error Recovery For A Line Drop

If for any reason a line drop occurs, all activity at the remote terminal halts. If the terminal was receiving, the printer or punch will stop. If the terminal was transmitting, the reader stops and VNET closes the partially transmitted file.

In order to restart, you must redial the line and reenter your SIGNON card. When the SIGNON card is accepted by VNET, normal line activity will resume. If receiving, activity will restart from the point of interruption. If transmitting, you can either restart from the file that was interrupted or you can send the rest of the data as a separate file.

If some other user dials in on the disconnected line before you do and submits his own SIGNON card, VNET will recognize the new linkid as being different from the one in effect at the time the line dropped. The new user is terminated and the link is deactivated. If your terminal was receiving, the printer or punch file is placed at the end of the queue for your link and is put into HOLD status.

To restart under these circumstances, you must first have the VNET operator reactivate your link via the START command. you can then redial the line and resubmit your SIGNON card. When the SIGNON card is accepted, line activity will resume. Transmission can be either continued or restarted. Printer or punch output will resume with the file following the one that was active at the time the line dropped. In order to process the interrupted file, you must change its status from HOLD to NOHOLD via the CHANGE command.

IBM 3780 AS A REMOTE TERMINAL

SUPPORTED CONFIGURATION

The IBM 3780 Data Communications Terminal, used as an NPT remote station, can be connected to VNET via a switched or leased point-to-point communications line. EBCDIC transmission code is required.

The following devices and features are optional (feature numbers are in parentheses):

- One IEM 3781 Card Punch
- Component Selection (1601, required for the 3781)
- EECDIC Transparency (3601)
- Additional Print Positions (5701)
- Synchronous Clock (7705)

3780 OPERATIONAL NOTES

Establishing the connection with VNET is the same for all nonprogrammable terminals and is covered in "Part 3: VNET System Operation" under "Starting NPT" and "Signing on to NPT".

For 3780 operations with NPT, set certain 3780 console switches as follows:

<u>Switch</u>	<u>Setting</u>
TERM MODE LINE/HOME	LINE
TRNSPCY	ON or OFF as desired
SPACE COMPRESS/EXPAND	ON or OFF as desired
OFF LINE TEST	OFF
AUTO RESTART	ON
INQUIRY MODE	OFF
ANSWER AUTO/MAN	OFF
TELE (WORLD TRADE ONLY)	OFF
SPEED (WORLD TRADE ONLY)	At the desired transmission speed

ENTERING COMMANDS

The remote terminal operator submits commands to VNET through the remote card reader in the same manner as he enters card files. The commands are punched, one per card, starting in column 1. One or more commands may be submitted at any one time. Commands are only accepted before the ID card of an input card deck or after an input card deck has been completely processed (end-of-file generated).

Interrupting Output Processing

If it becomes necessary to enter a command or input card file while the terminal is busy with a lengthy output processing, the output may be interrupted as follows:

1. Ready the card reader with the input cards (commands and/or data).
2. Press TERM RESET
3. Press START on the console.

Note: Due to the nature of the 3780 hardware, print or punch records that were in the 3780 buffer when TERM RESET was pressed will be lost by this procedure. The alternative is to wait until the output processing has completed.

TERMINATING A SESSION

To terminate a session, the remote terminal operator issues the DRAIN command. The link is deactivated after the file currently being processed is completed.

ERROR RECOVERY PROCEDURES

Most problems you encounter result in lights appearing on the 3780 console and on the I/O devices themselves. Some lights are not error lights; these are DATA SET READY, CARRIER OFF, DATA IN BUFFER, LINE MODE, BID, TRANSPCY, MANUAL ANSWER, and any of the I/O device lights when on steady. Any I/O device light that is blinking indicates that the device is not ready. Other lights provide clues to problems and are discussed in the following sections.

Error Recovery For A Line Drop

If for any reason a line drop occurs, all activity at the remote terminal halts. If the terminal was receiving, the printer or punch will stop. If the terminal was transmitting, the reader stops and VNET closes the partially transmitted file.

In order to restart, you must redial the line and reenter your SIGNON card. When the SIGNON card is accepted by VNET, normal line activity will resume. If receiving, activity will restart from the point of interruption. If transmitting, you can either restart from the file that was interrupted or you can send the rest of the data as a separate file.

If some other user dials in on the disconnected line before you do and submits his own SIGNON card, VNET will recognize the new linkid as being different from the one in effect at the time the line dropped. The new user is terminated and the link is deactivated. If your terminal was receiving, the printer or punch file is placed at the end of the queue for your link and is put into HOLD status.

To restart under these circumstances, you must first have the VNET operator reactivate your link via the START command. you can then redial the line and resubmit your SIGNON card. When the SIGNON card is accepted, line activity will resume. Transmission can be either continued or restarted. Printer or punch output will resume with the file following the one that was active at the time the line dropped. In order to process the interrupted file, you must change its status from HOLD to NOHOLD via the CHANGE command.

Error Recovery When Transmitting

When transmitting, any card reader trouble is indicated by a blinking reader light. The following lights on the card reader may further indicate the type of trouble:

FEED CHECK

The bottom card in the hopper failed to feed. Remove hopper cards. Press NPRO. Repair the bottom hopper card, if necessary, and make sure the feed throat is clear. Reload the cards. Press reader START and console START.

ATTENTION

Full stacker or empty hopper with EOF OFF. Correct the problem, press reader START and console START.

READ CHECK

VALIDITY CHECK

Last card in stacker (if no jam) and following card (run out by NPRO after hopper cards are removed) must be re-read. After appropriate correction, place these two cards at the front of the unprocessed cards in the hopper, push reader START and console START.

TERMINAL ADDRESS

The NPT program is trying to send output while you are trying to start an input function. Continue input procedure until you have turned on the BID light. Then press CHECK RESET and wait for input to begin. Press CHECK RESET if TERMINAL ADDRESS comes on again.

INPUT CHECK

EUFFER CHECK

TRNSPCY CHECK

With these serious errors you must always do a job restart. Make sure that you have turned on the TRANSPCY switch if the input card deck contains object decks or other cards requiring transparent transmission.

RECORD CHECK

LINE CHECK

These lights may come on while NPT is attempting retransmissions for line errors; they will go out if recovery is successful. If they stay on and the transmission does not proceed, you must do a CHECK RESET and restart the input device. The input is continued; however, it is possible in this case to have a record duplicated.

Error Recovery When Receiving

Output device trouble is indicated by a blinking printer light on the console panel or EQUIP CHECK on the 3781 Card Punch panel.

FORM CHECK

CARRIAGE INTERLOCK

END-OF-FORM

The printer carriage, forms, or carriage tape are not ready or jammed. Correct the condition; press CHECK RESET and START on the console panel.

BUFFER CHK

The printer had a parity error. Press CHECK RESET and START on the console panel. Failure to recover indicates hardware trouble.

EQUIP CHECK

The punch has mechanically malfunctioned.

Make the punch ready again.

When receiving, certain other console lights may require your attention, as follows:

TERMINAL ADDRESS

The NPT program is trying to send output but your 3780 is not ready. Make sure your switch setup is correct, ready all output devices, and press console CHECK RESET.

BUFFER CHECK

This serious hardware error always requires you to reset and restart the operation. Failure to recover indicates hardware trouble.

LINE CHECK

The NPT program is attempting retransmissions. If NPT is successful, the light goes out. If the light stays on and printing or punching does not continue within a short time, you must do a line restart.

For other combinations of error lights, consult the publication Component Information for the IBM 3780 Data Communication Terminal, GA27-3063.



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APPENDIX C. REMOTE TERMINAL AND STATIONS
PART 2. PROGRAMMABLE (SPOOL MULTI-LEAVING) REMOTE STATIONS

This portion contains operational information for each of the following remote programmable MULTI-LEAVING stations supported by the SML line driver operating in HOST mode under VNET:

- IBM System/360
- IBM System/370
- IBM System 360 Model 20
- IBM 2922 Programmable Terminal
- IBM System/3 Model 10 Card System
- IBM 1130 System

The following topics are described as they relate to each station:

- Supported configuration
- Remote Station Processor program functions
- Operating procedures
- Error Recovery Procedures

Another section provides information on the use of the VNET virtual machine as a Remote Job Entry workstation communicating with a HASP/ASP-type batch processor.

In addition, MULTI-LEAVING Remote Job Entry Work Station (MRJE/WS) support is briefly described for the following remote stations:

- IBM System/3 Models 6, 8, 10, 12, and 15
- IBM System/32

The MRJE/WS support for these systems is described in publications listed in the section "IBM System/3 and System/32 as Remote Stations".

IBM SYSTEM/360 AND SYSTEM/370 AS REMOTE STATIONS

The following sections contain instructions for operating any model of System/360 or System/370 equipped for EBCDIC transmission and binary synchronous communications, as a HASP MULTI-LEAVING remote station. The term System/360 is used to refer to both the System/360 and the System/370.

CONFIGURATION SPECIFICATIONS

Any System/360 with 8K or more bytes of main storage, a supported transmission control unit, and a supported card reader may be used as an VNET remote station.

The following transmission control units are supported:

- Integrated Communications Adapter (ICA) on the System/370 Model 135.
- IBM 2701 Data Adapter Unit with Synchronous Data Adapter Type II.

- IBM 2703 Transmission Control Unit with Synchronous Terminal Control.
- IBM 3704 Communications Controller in emulation mode only.
- IBM 3705 Communications Controller in emulation mode only.

The following unit record devices are supported:

- IBM 2540 Card Read Punch
- IBM 2501 Card Reader
- IBM 2520 Card Read Punch
- IBM 1442 Card Read Punch
- IBM 1403 Printer
- IBM 1443 Printer
- IBM 3203 Printer Model 4
- IBM 3211 Printer
- IBM 3203 Printer Model 4 (for System/370 Models 138 and 148 only)
- IBM 1052 Printer-Keyboard

Communications lines (switched or nonswitched) whose speed is compatible with the hardware are supported. Only one console, the standard operator console, is supported on each remote station.

REMOTE TERMINAL PROCESSOR (RTP) PROGRAM

A special program for the IBM System/360 allows it to operate as a remote workstation for MULTI-LEAVING operating systems such as HASP and ASP. For details on generating the appropriate workstation program, see the publication OS/VS2 HASP II Version 4 System Programmer's Guide, Order No. GC27-6992. An IBM System/360 under control of this program and communicating with VNET can be viewed as a logical extension of the VM/370 spool system. This program (HASP/RTP360) performs input, output and communication functions.

HASP/RTP360 can read, print, and punch data concurrently, depending on the options selected by the installation and the capabilities of the unit record devices.

Due to the use of blocking and character compression to minimize line transmission time, the speed at which the System/360 unit record devices operate is dependent on the data being transmitted and the number of concurrent functions. Certain job mixes, because of their data characteristics, enable HASP/RTP360 to operate the unit record devices at near maximum speed. Other job mixes may cause the devices to operate in short bursts because of contention on the communications line.

Input Functions

HASP/RTP360 provides the following input functions at the remote station:

- Reads from the attached card reader(s).
- Recognizes operator requests, and reads from the attached console.
- Identifies, compresses, and blocks card images and commands for transmission to VNET.
- Queues blocked records for transmission to VNET.

Output Functions

HASP/RTP360 provides the following output functions at the remote station:

- Dequeues blocked records received from VNET.
- Identifies the device required for output of the records.
- Deblocks and decompresses output records, queueing the images for printing, punching, or typing.
- Prints, punches, and types the output records, as required.
- Sets status flags, indicating backlog conditions on the output devices.

Communication Functions

HASP/RTP360 provides the following communication functions at the remote station:

- Establishes and maintains synchronization with VNET.
- Dequeues blocked input requests and transmits them to VNET (upon request from VNET).
- Provides backlog status flags, indicating the station's ability to receive the various output streams from VNET.
- Receives output from VNET and queues the blocked records for processing.

OPERATING PROCEDURES

The following sections provide information for initiating and operating the HASP/RTP360 program during the remote job stream processing session.

The initiation of a remote job stream processing session involves initial program loading of the HASP/RTP360 program deck, establishment of the communication lines, and exchange of initial control information between VNET and the HASP/RTP360 program. The initial control sequence ends with the passing of the sign-on information from the remote station.

Initial Program Load (IPI)

The following steps should be taken to perform the initial program loading of the HASP/RTP360 program deck:

1. If the power for the System/360 is off, press POWER ON.
2. Ready the HASP/RTP360 deck in reader 1 (designated by central system personnel) and press START and EOF on the reader. (The last card of the deck should be blank or a /*SIGNON card, as directed by the installation.)
3. Ready printers, punches, and the console.
4. Set the LOAD UNIT rotary switches to the device address of reader 1.
5. Disable the interval timer, if present.
6. Set the MODE (RATE) and DIAGNOSTIC (FLT) switches to PROCESS.
7. Set CHECK CONTROL to STOP.
8. Press SYSTEM RESET and LOAD.
9. All cards of the HASP/RTP360 deck are read by the reader.
10. HASP/RTP360 prints the /*SIGNON card, if present, followed by a VNET environment recording error printout (if the contents of core remain unchanged since the last run of the program).
11. The remote station is now ready to communicate with VNET. HASP/RTP360 waits while communications are established with VNET.

Establishing a Communication Line

The procedures for establishing communications with VNET are as follows:

1. Ready the data set. This involves different actions, based on the type of data set. Ready nonswitched lines only requires that the data set DATA button be pressed (if present). To ready a dial line data set, perform the following:
 - a. Press the TALK button, and lift the receiver off the data set.

- b. Dial the assigned number for the remote station.
 - c. If the VNET line is available, the central system answers with a high pitched tone. Press DATA and hang up immediately; the data set is now ready.
 - d. If the VNET line is in use, a busy signal is received. Hang up and try again later, or dial an alternate communication line number.
 - e. If the call is not answered, the VNET operator has not given the necessary command to authorize use of that communication line. Contact the VNET operator and request that he issue the START command for your link.
2. When requested by VNET, HASP/RTP360 begins the initial control sequence.
 3. When the initial sequence is complete, the sign-on information is transmitted to VNET. HASP/RTP360 "handshakes" with VNET until the processing of job streams actually begins.

Output Processing

The printing and punching of remote output is handled automatically by the VNET - HASP/RTP360 system, except as controlled by the remote station operator or VNET operator, via commands to VNET.

Input Processing

With the exception of 2520 and 1442 combination reader/punch devices, input submission can be initiated at any time from any card reader supported by the HASP/RTP360 program. Multiple readers may be used concurrently. Place the cards in the input hopper, and press reader START. When all of an input stream has been loaded into the hopper, press reader EOF to allow the reading of the last cards to signal the program that the end of stream has been read.

HASP/RTP360 input readers are considered always "hot"; that is, the program is continually testing each reader and attempting to read cards. When any card reader is loaded, HASP/RTP360 immediately reads and transmits the cards to VNET.

Operating a Combination Card Read Punch

Devices with single card paths for both read and punch functions are termed combination reader/punches if they are supported for both functions. The following are supported combination devices:

- 1442 Card Read Punch
- 2520 Card Read Punch

Dual devices have four basic status conditions that affect the operator:

1. Neutral -- reader empty during normal program execution.

2. Input -- reading normal input stream.
3. Output -- punching normal output from VNET.
4. Output error recovery -- attempting to recover from punch errors.

At IPL time, the combination device is in neutral status and may be treated as any reader device, since the operator is at liberty to submit multiple input streams at any time. Any blank cards mixed in the input stream are submitted to VNET as input. When HASP/RTP360 recognizes the end-of-file (EOF) the combination device reverts to the neutral status.

When the combination device is in neutral status, the operator may choose to ready the device with blank cards, placing the device in output status. If VNET has output waiting, HASP/RTP360 responds immediately by punching the blank cards. However, after all punching is finished, or if there is a pause due to low line speeds, the operator may not run the remaining cards out of the device and ready it with job stream cards. The procedure for interrupting the output mode follows:

1. Press STOP on the device.
2. Remove the cards from the hopper. (Do not run the cards out of the card path.)
3. Place the input stream cards in the hopper, and press reader START.
4. If the punch is busy, the device continues punching until the input stream is encountered; then, the device enters input status. (It is not necessary that all blank cards be removed from the hopper.)
5. If the punch is momentarily idle, the operator can cause the device to pass one card through by pressing reader STOP and then START. If several blank cards are in the hopper in front of the job stream, the operation must be repeated for each blank card.

The combination device is in error recovery status when a punch error occurs. HASP/RTP360 attempts to repunch the record in error into the following card. If HASP/RTP360 encounters a punched card, a read error occurs (see unit record error procedures). The operator should run out the input stream cards using the NPRO key, place one or more blank cards in front of the input stream, and ready the device.

ENTERING COMMANDS

All messages entered into the 1052 operator's console via the keyboard are transmitted to VNET for action. Although all commands transmitted to VNET are listed on the VNET operator's console, only those available to the remote user are read and acted upon.

The operator should perform the following steps when entering commands:

1. Press the REQUEST button on the right side of the keyboard. The ATTN indicator (indicator above the keyboard on the 1052) glows momentarily.
2. When the PROCD indicator comes on, type in the command and press EOB (numerical 5 key pressed while ALTN CODING key is depressed).

3. If a typing error is noticed prior to pressing EOB, press CANCEL (numerical 0 key pressed while ALTN CODING is depressed) and repeat step 2.
4. If, after receiving a PROCD indicator, no command is to be entered, press EOB.

TERMINATING A SESSION

To terminate remote processing, the remote station operator should enter a DRAIN command or a /*SIGNOFF card which prevents VNET from initiating any more remote output and releases the communication line (if switched) when the current print and punch streams are finished. The DATA light on the data set goes out and ESCA enters a check condition. For nonswitched lines, VNET makes the line available and waits for an initial sequence request from the HASP/RTP360 program. HASP/RTP360 logs UNIT CHECK on the console message device. The operator should determine whether printing and punching of output streams have successfully terminated and should press STOP on the CPU. To start a new session, the operator must perform the steps described previously, starting with the Initial Program Load of HASP/RTP360.

ERROR RECOVERY

The following sections indicate some common error conditions and the necessary steps for recovery from the errors.

Communication Adapter Errors

Due to the design of the synchronization technique for VNET remote stations, no errors are expected during a processing session. The unusual occurrence, therefore, of any error condition results from either system or communication facility malfunction or from operational conditions. In general, the display of error messages is only informational, because the station processor automatically initiates the appropriate recovery action. A statistical summary of all errors is maintained in the VNET Environmental Recording Table, and a historical report is produced each time HASP/RTP360 is loaded, unless storage has been cleared. Additionally, the occurrence of any error causes a descriptive message to be displayed immediately on the console typewriter. Figure 8 indicates each possible communication error, its meaning, and the recovery action taken.

Unit Record Errors

Many of the unit record device errors that can occur during processing allow HASP/RTP360 to continue processing without operator intervention. Some errors (such as DATA check, END OF FORM, etc.) require operator assistance before use of the device can be continued. In any event all errors occurring on unit record devices are logged in the VNET Environmental Recording Error Printout Table and are displayed immediately on the 1052 operator's console.

When the error message is printed, the operator should perform the following:

1. Determine which device is in error (see Figure 9).
2. Note the device status; if HASP/RTP360 continues to use the device, the error message is informative in nature.
3. Correct the error in accordance with procedures prescribed for the device.
4. Ready the device to resume operation.

Error	Description	Recovery Action
01rree00	Block sequence check. A transmission check was duplicated or lost. rr = received block number ee = expected block number	If a duplicate, the received block is ignored. If a lost block, VNET is signaled to restart the job.
02000000	Negative reply received. A transmission block was not correctly received by VNET.	The bad record is retransmitted.
03rrrr00	Unknown response received. An unrecognizable control character was received from VNET. rrrr = first two characters received (if rrrr is correct sequence, ending sequence was bad).	VNET is requested to retransmit the record.
04C00000	Unit exception. Indicates receipt of an EOT character from VNET (EOT is not utilized in MULTI-LEAVING).	VNET is requested to retransmit the record.
05ss0000	Unit check. A check condition has occurred in the communication adapter. ss = sense byte indicating type of check: 80 = Command reject 40 = Intervention required 20 = Bus out check 10 = Equipment check 08 = Data check 04 = Overrun 02 = Lost Data 01 = Time out	The failing operation will be retried. If a write operation was in process at the time of error, the write will be reissued; otherwise, VNET is requested to retransmit.
06cc0000	Unusual end. An unusual end condition has occurred in the channel or control unit interface. cc = CSW byte 5	The failing operation is retried.
07000000	SIO failure. A start I/O instruction was rejected by the Synchronous Data Adapter.	The Start I/O is retried.

Figure 8. HASP/RTP360 Communication Adapter Error Messages

Remote Station Restart

In the event of an untimely interruption of the remote station operation (such as a machine, program, communications, or environmental

failure), the remote station operator should notify appropriate maintenance personnel of the malfunction and save material that can be used to determine the source of the failure. With the aid of the VNET operator, the remote operator should also prepare to restart the station as follows:

1. Notify the central operator of the failure and, if necessary, request his assistance in preparing for restart.
2. Determine, from the VNET operator's record, which deck was currently being transmitted to VNET. The input stream, starting with that current deck, must be submitted to VNET after restart.
3. Determine the loss of data on the output devices and inform the VNET operator to backspace or restart the printer or punch, as necessary. (The VNET link should be made available for a subsequent session with the remote station or other stations within the system.)
4. When the remote station is available, restart the session beginning with the Initial Program Load of HASP/RTP360.

Message	Description	Program Action
05ss0aaa	<p>Unit check. Device with address "aaa" has unit check error described by sense byte "ss" and/or indicator lights on the device console.</p> <p>Sample sense byte settings:</p> <p>40 = Intervention required 10 = Equipment check 08 = Data check - card read, card punched, or line printed incorrectly. 01 = Carriage control tape channel 9 encountered on printer</p>	<p>Wait for operator. Treat as data check. Depending on device: ignore, retry, or wait for operator. Ignore.</p>
06cc0aaa	<p>Unusual end. Previous I/O came to an unusual end. IBM customer engineer should be consulted. cc = CSW byte 5 aaa = device address</p>	<p>Treat as data check.</p>
<p><u>Note:</u> Printing on a line that has a carriage control tape channel 9 or 12 punch appears as an error and is logged as an error. The installation should place these punches in line positions that do not contain print information. Do not eliminate the punches from the carriage tape.</p>		

Figure 9. HASP/RTP360 Unit Record Error Messages

IBM SYSTEM/360 MODEL 20 AND IEM 2922 AS REMOTE STATIONS

The following section contains instructions for operating the IBM System/360 Model 20, equipped with a Binary Synchronous Communications Adapter, or the IBM 2922 Programmable Terminal as a VNET MULTI-LEAVING,

remote station. All information on the Model 20 also applies to the IBM 2922 unless a variation is noted.

Configuration Specifications

Any submodel of the Model 20 with at least 8K bytes of main storage, a Binary Synchronous Communications Adapter, EBCDIC transmission, Full Transparency, and a supported card reader may be used as a VNET remote station.

The following unit record devices are supported in any combination:

- IBM 2501 Card Reader
- IBM 2520 Card Read Punch
- IBM 2560 Multi-Function Card Machine
- IBM 1442 Card Punch
- IBM 1403 Printer
- IBM 2203 Printer
- IBM 2152 Printer-Keyboard

Any speed communication line supported by the hardware (switched or nonswitched) is supported. It is recommended (but not required) that a submodel 5 be used in conjunction with high-speed communications lines (19,200 bps and greater) for maximum performance. Certain other features of the Model 20 that are supported but are not required include:

- 2152 Printer-Keyboard. Cannot be used on other than a submodel 5 if a high-speed communications line (19,200 bps or greater) is used.

The IBM 2922 is supported as a VNET remote station with the same package as is used with the Model 20. The standard 2501 Card Reader and 1403 Printer available with the 2922 are the supported input and output devices.

Remote Terminal Processor (RTP) Program

A special program exists for the IBM System/360 Model 20 and the IBM 2922 Programmable Terminal which allows them to operate as remote workstations for MULTI-LEAVING operating systems such as HASP and ASP. For details on generating the appropriate workstation program, see the publication OS/VS HASP II Version 4 System Programmer's Guide, Order No. GC27-6992. A Model 20 or IBM 2922 under control of this program and communicating with VNET can be viewed as a logical extension of the VM/370 spool system. This program (HASP/RTPM20) performs input, output and communications functions.

HASP/RTPM20 can read, print, and punch data concurrently, depending on the options selected by the installation and the capabilities of the unit record devices.

Due to the use of blocking and character compression to minimize line transmission time, the speed at which the Model 20 unit record devices operate is dependent on the data being transmitted and the number of concurrent functions. Certain job mixes, because of their data characteristics, enable HASP/RTPM20 to operate the unit record devices at near full speed. Other job mixes may cause the devices to operate in short bursts because of contention on the communications line.

Input Functions

HASP/RTPM20 provides the following input functions at the remote station:

- Reads from the attached card reader(s).
- Recognizes operator requests, and reads from the attached console.
- Identifies, compresses, and blocks card images and commands for transmission to VNET.
- Queues blocked records for transmission to VNET.

Output Functions

HASP/RTPM20 provides the following output functions at the remote station:

- Dequeues blocked records received from VNET.
- Identifies the device required for output of the records.
- Deblocks and decompresses output records, queueing the images for printing, punching, or typing.
- Prints, punches, and types the output records, as required.
- Sets status flags, indicating backlog conditions on the output devices.

Communication Functions

HASP/RTPM20 provides the following communication functions at the remote station:

- Establishes and maintains synchronization with VNET.
- Dequeues blocked input requests and transmits them to VNET (upon request from VNET).
- Provides backlog status flags, indicating the station's ability to receive the various output streams from VNET.
- Receives output from VNET and queues the blocked records for processing.

Operating Procedures

This section provides information for starting and operating the Model 20 or IBM 2922 during the remote job stream processing session.

The initiation of a remote job stream processing session involves initial program loading of the HASP/RTPM20 program deck, establishment of the communication lines, and exchange of initial control information between VNET and the HASP/RTPM20 program. The initial control sequence ends with the passing of the sign-on information from the remote station.

INITIAL PROGRAM LOAD (IPL)

The following steps should be taken to perform the initial program loading of the HASP/RTPM20 program deck:

1. If the power is off, press POWER ON.
2. Ready the HASP/RTPM20 deck in the supported card reader. (The last card of the deck should be blank or a /*SIGNON card, as directed by the installation).
3. Ready the printer, punch, and console (as required).
4. Set time sharing key down.
5. Set the address/register data switches to one of the following:
 - 1F00 - 8K storage
 - 2F00 - 12K storage
 - 3F00 - 16K storage
6. Set the mode switch to PROCESS.
7. Press LOAD.
8. All the cards in the HASP/RTPM20 deck are read, except the last card. Press reader START to read the last card.
9. The IPL is complete when the last card is read. HASP/RTPM20 prints the /*SIGNON card, if present, followed by a VNET environmental recording error printout (if the contents of main storage remain unchanged since the last time the program was run).
10. The ESCA indicator lights should show periodic transmit and receive activity.
11. The remote station is now ready to communicate with VNET.

ESTABLISHING A COMMUNICATION LINE

The procedures for establishing communications with VNET are as follows:

1. Ready the data set. This involves different actions, based on the type of data set. Readyng nonswitched lines only requires that the data set DATA button be pressed, if present. To ready a dial line data set, perform the following:

- a. Press the TALK button, and lift the receiver off the data set.
 - b. Dial the assigned number for the remote station.
 - c. If the VNET line is available, the central system answers with a high pitched tone. Press DATA and hang up immediately; the data set is now ready.
 - d. If the VNET line is in use, a busy signal is received. Hang up, and try again later, or dial an alternate communication line number.
 - e. If the call is not answered, the VNET operator has not given the necessary command to authorize use of that communication line. Contact the VNET operator and request that he issue the START command for your link.
2. When requested by VNET, HASP/RTPM20 begins the initial control sequence.
 3. When the initial sequence is complete, the sign-on function is transmitted to VNET. HASP/RTPM20 "handshakes" with VNET until the processing of job streams actually begins.

OUTPUT PROCESSING

The printing and punching of remote output is handled automatically by the VNET - HASP/RTPM20 system, except as controlled by the remote station operator or VNET operator, via commands to VNET.

INPUT PROCESSING

Deck submission can be initiated at any time, depending on the capabilities of the card reader/punch combination attached to the Model 20. There is no restriction on when the operator can submit a deck stream with the following reader/punch combinations:

1. 2501 Card Reader - 2560 Multi-function Card Machine (secondary feed)
2. 2501 Card Reader - 1442 Card Punch
3. 2501 Card Read - 2520 Card Punch
4. 2560 Multi-Function Card Machine (primary feed) - 1442 Card Punch
5. 2520 Card Read Punch - 1442 Card Punch

The operator places the cards in the hopper. The reader stops just before reading the last card of each job stream. The operator should put more cards in the reader or press START on the reader, allowing the last card to indicate the end of the input stream.

The input reader to HASP/RTPM20 is always considered "hot"; that is, the program is continually testing the reader and attempting to read cards. During this time the appropriate CARD I/O indicator on the CPU console is on (see Unit Record Error Procedures). This condition is not an error but indicates that HASP/RTPM20 is ready to send the next input.

OPERATING A COMBINATION CARD READ PUNCH

Devices with single card paths for both read and punch functions are considered combination reader/punch devices. When using these devices as combination devices, the operator must concern himself with the status of the device. The following are supported combination devices:

- 2520 Card Read Punch
- 2560 MFCM (read - primary feed)
(punch - secondary feed)

Note: These devices are not considered combination devices when used in combinations listed previously under "Input Processing".

Operating the 2520 Card Read Punch

The 2520 has four basic status conditions that affect the operator:

1. Neutral -- reader empty during normal program execution.
2. Input -- reading normal input stream.
3. Output -- punching normal from VNET.
4. Output Error recovery -- attempting to recover from punch errors.

At IPL time the 2520 is in neutral status and may be treated as any reader device; the operator is at liberty to submit multiple input streams at any time. Any blank cards mixed in the input stream are submitted to VNET as input. When HASP/RTPM20 recognizes an end-of-file (EOF), the 2520 reverts to the neutral status.

When the 2520 is in neutral status, the operator may choose to ready the device with blank cards, thereby placing it in output status. If VNET has output waiting, HASP/RTPM20 responds immediately by punching the blank cards. However, after all punching is finished or if there is a pause due to low line speeds, the operator may not run the remaining cards out of the 2520 and ready it with input stream cards. The procedure for interrupting the output mode is as follows:

1. Press STOP on the 2520.
2. Remove the cards from the hopper. (Do not run the cards out of the card path.)
3. Place the input stream cards in the hopper and press reader START.
4. If the punch is busy, the device continues punching until the input stream is encountered; then, the 2520 enters the input status. (it is not necessary to remove all blank cards from the hopper.)
5. If the punch is momentarily idle, it is waiting for local commands from the console (if installed). The operator can cause the 2520 to pass one card through by typing on the console ".SR1" (start reader 1). If several blank cards are in the hopper prior to the input stream, this command must be entered for each blank card. For configurations without consoles, the operator can simulate the .SR1 command by setting data dial 2 to numerical value 2 and moving data dial 1 one position in either direction. Do not move dial 1 twice. Upon completion of the skip function, set data dial 2 out of position 2.

The 2520 is in error recovery status when a punch error occurs. HASP/RTPM20 attempts to repunch the record in error. If HASP/RTPM20 encounters a nonblank card, a read error occurs (see Unit Record Error Procedures). The operator should run out the input stream cards using the NPRO key, place one or more blank cards in front of the input stream and ready the 2520.

Operating the Combination 2560 MFCM

The 2560 has two basic status conditions:

1. Input -- submitting decks using primary feed and hopper.
2. Output -- punching data from VNET using secondary feed.

Blank cards, for punching, should always be in the 2560 secondary feed hopper during normal processing. HASP/RTPM20 periodically tests the primary feed for input stream cards. If input stream cards are encountered, the HASP/RTPM20 suspends the output status and submits the input stream to VNET. The operator should always press STOP on the combination 2560 prior to loading the input stream in the primary feed hopper since HASP/RTPM20 cycles the feed mechanism when it tests for input stream cards.

Entering Commands

VNET commands, as well as local commands, may be entered at the 2152 operator's console. Any message entered at the 2152 keyboard and not recognized as a local command is transmitted to VNET for action. Although all commands transmitted to VNET are listed on the VNET operator's console, only those designated as available to the remote user are acted upon. Local commands that are available to the HASP/RTPM20 operator signal the status of the unit record devices. Figure 10 contains a list of all available local commands.

Command	Meaning/Comments
.SR1	Start reader 1. This command tells HASP/RTPM20 that the operator has corrected a data check condition and has made the card reader ready to continue reading the input stream (the first card is a corrected version of the card in error). This command is also used to terminate the output status of a combination 2520 card reader/punch.
.SU1	Start punch 1. This command tells HASP/RTPM20 that the operator has removed the incorrectly punched card from the punch stacker (1442) and the punch is ready.

Figure 10. HASP/RTPM20 Local Commands

The operator should perform the following steps when entering commands:

1. Press the REQ button that is located to the right of the console typewriter keyboard. The request indicator (indicator marked "R" at the right of the REQ button) glows momentarily.
2. When the proceed indicator comes on (indicator marked "P" below the request indicator), type in the command and press EOT.
3. If a typing error is noticed prior to pressing EOT, press CAN (cancel) and repeat step 2.
4. If, after receiving a proceed indicator, no command is to be entered, type "." and press EOT. This is recognized as an invalid local command and is ignored.

Commands are identified by a period (.) in the first type position. Except for the use of upper and lower case alphabetic characters, the commands must appear exactly as listed. No blanks are allowed.

Terminating a Session

To terminate remote processing, the remote station operator should enter a DRAIN command or /*SIGNOFF card indicating that VNET should not initiate any additional remote output and should release the communication line (if switched) when the current print and punch streams are finished. The DATA light on the data set goes out, and BSCA enters a check condition. For nonswitched lines, VNET makes the line available and waits for an initial sequence request from the HASP/RTPM20 program. Versions of HASP/RTPM20 that support console messages log UNIT CHECK on the console. The operator should check to see if printing and punching of output streams have successfully terminated and should press STOP on the CPU. To start a new session, the operator must perform the steps described previously starting with the Initial Program Load of HASP/RTPM20.

Error Recovery

The following sections indicate some common error conditions and the necessary steps for recovery from the errors.

COMMUNICATION ADAPTER ERRORS

Due to the design of the synchronization technique for VNET remote stations, no errors are expected during a processing session. The unusual occurrence, therefore, of any error condition results from either a system or a communication facility malfunction or from operational conditions. In general, the display of error messages is only informational, because the station processor automatically initiates the appropriate recovery action.

A statistical summary of all errors is maintained in the VNET Environmental Recording Table, and a historical report is produced each time HASP/RTPM20 is loaded, unless storage has been cleared. Additionally, the occurrence of any error causes a descriptive message to be displayed immediately on the console typewriter.

Figure 11 indicates each possible communication error, its meaning, and the recovery action taken.

UNIT RECORD ERRORS

As a result of unit record device errors that inhibit I/O, HASP/RTPM20 continuously tests the device, while performing other functions that can continue. The operator is notified of device error by the CPU indicator panel as follows:

1. Card I/O 1 -- 2501 Card Reader
2. Card I/O 2 -- 2520 Card Read Punch or 2560 Multi-Function Card Machine

Message	Meaning	Action Taken
01rree00	Block sequence check. A transmission block was duplicated or lost. rr = received block number ee = expected block number	If a duplicate, the received block is ignored. If a lost block, VNET is signaled to restart the stream.
020C0000	Negative reply received. A transmission block was not correctly received by VNET.	The bad record is retransmitted.
03rrrr00	Unknown response received. An unrecognizable control character was received from VNET. rrrr = first character received (if rrrr is in correct sequence, ending sequence was bad).	VNET is requested to retransmit the record.
05ss0000	Unit check. A check condition has occurred in the communication adapter. ss = sense byte indicating type of check. 01 = overrun on write 02 = parity check on write 81 = overrun on read 88 = lost data on read 90 = time out (no response received from VNET in three seconds) A0 = transmission error C0 = EOT received	The failing operation is retried. If a write operation was in progress at the time of the error, the write is reissued; otherwise, VNET is requested to retransmit.

Figure 11. HASP/RTPM20 Communication Adapter Error Messages

3. Card I/O 3 — 1442 Card Punch
4. Printer — 1403 Printer or 2203 Printer

Indicators on the device control panel indicate the nature of the problem. The operator should correct the error, according to procedures prescribed for the device, and then ready the device. HASP/RTPM20 automatically resumes use of the device.

Unit record errors that occur during I/O result in various program actions, appropriate to the operator message facilities available for informing the operator and the nature of the error encountered. Figure

Device-Function	Action with Console	Action without Console
2501, 2520, 2560 - read	<ol style="list-style-type: none"> 1. Type error message¹. 2. Wait for .SR1 command. 3. Read. 	<ol style="list-style-type: none"> 1. STOP with device address in in ESTR register². 2. Reread when CPU started.
1442 - punch	<ol style="list-style-type: none"> 1. Type error message¹. 2. Wait for .SU1 command. 3. Repunch record in error. 	<ol style="list-style-type: none"> 1. STOP with device address in ESTR register². 2. When CPU started, repunch record in error.
2520, 2560 - punch	<ol style="list-style-type: none"> 1. Select out card in error. 2. Repunch record in error. 	<ol style="list-style-type: none"> 1. Select out card in error. 2. Repunch record in error.
2203, 1403 - print	Ignore error.	Ignore error.
2152 - write	<ol style="list-style-type: none"> 1. Ignore first error. 2. Wait on next attempt to use device³. 	Not applicable.
2152 - read	<ol style="list-style-type: none"> 1. Initiate reread. 2. Wait on next attempt to use device³. 	Not applicable.
¹ Error messages are of the form: 050000a UNIT CHECK, where a is the device address of the unit in error.		
² Device addresses correspond to the CPU panel CARD I/O indicator numbers.		
³ Console error indicator is cleared by pressing OFF LINE, then ON LINE.		

Figure 12. HASP/RTPM20 Action on Unit Record I/O Execution Errors

12 indicates the program action taken for each device supported by the system. When notified of the error via the 2152 console, the operator should:

1. Note the address code in the error message (see Figure 12).
2. Correct the error for "data check".
3. Ready the device for program retry of I/O.
4. Type the appropriate command (.SR1, .SU1) to signal HASP/RTPM20 that the device is ready.

Without the 2152 console, the program stops the CPU with the address of the device in the ESTR register. The operator should (without delay):

1. Note the address of the device in the ESTR register.
2. Press STOP on the indicated device.
3. Press START on the CPU to allow continuation of other functions.
4. Correct the error for "data check".
5. Ready the device for program retry of I/O.

REMOTE STATION RESTART

In the event of an untimely interruption of the remote station operation (such as a machine, program, communications, or environmental failure), the remote station operator should notify appropriate maintenance personnel of the malfunction, save material that may be of use in determining the source of the failure, and (with the aid of the VNET operator) prepare for restarting the station, as follows:

1. Notify the VNET operator of the failure and, if necessary, request his assistance in preparing for restart.
2. Determine the current job that was being transmitted to VNET. (The VNET operator has a record of the deck currently being submitted to VNET.) The input stream, starting with that current deck, must be resubmitted to VNET after restart.
3. Determine the loss of data on the output devices and inform the VNET operator to backspace or restart the printer or punch, as necessary. (The VNET link should be made available for a subsequent session with the remote station or with other stations within the system.)
4. When the remote station is available, restart the session beginning with the Initial Program Load of HASP/RTPM20.

IBM SYSTEM/3 AND SYSTEM/32 AS REMOTE STATIONS

The IBM System/3 Models 6, 8, 10, 12, and 15, and the IBM System/32 are supported as remote work stations by VNET.

There are two types of MULTI-LEAVING Remote Job Entry Work Station (MRJE/WS) support for the System/3 and System/32. The first, which is for the System/3 Model 10 card system only, applies to a program produced by VM/370 generation. This program is in the form of a card deck, which is punched out at the System/3 and must be loaded to enable communication with the host system. This is described in the section "IBM System/3 Model 10 Card System as a Remote Station".

The second type of MRJE/WS support runs on System/3 Models 6, 8, 10, 12, and 15, and on the System/32. This support consists of a group of programs that support all System/3 or System/32 input and output devices, including disks and tape. This support requires the System/3 or System/32 System Control Program (SCP) and related MRJE/WS programs.

Information describing MRJE/WS support for the System/3 is contained in the following manuals, which contain references to other System/3 SCP manuals.

System/3 Models 6, 8, 10, and 12

IBM System/3 MULTI-LEAVING Remote Job Entry Work Station

Support Reference Manual, Order No. GC21-7621

Program Logic Manual, Order No. SY21-0544

System/3 Model 15

IBM System/3 MULTI-LEAVING Remote Job Entry Work Station

Support Reference Manual, Order No. GC21-5115

Program Logic Manual, Order No. SY21-05521

System/32

The System/32 is supported with the following features:

- 5320 System Unit (Any Model A12 through B33)
- Binary Synchronous Communications Adapter (#2073)
- System Control Program (5725-SC1)

Information describing support for the System/32 is contained in the following publications.

IBM System/32 System Control Programming Reference Manual, Order No. GC21-7593

IBM System/32 Operator's Guide, Order No. GC21-7591

IBM System/32 Data Communications Logic Manual, Order No. SY21-0551

IBM SYSTEM/3 MODEL 10 CARD SYSTEM AS A REMOTE STATION

The following section contains instructions for operating the IBM System/3 Model 10 card system equipped with a Binary Synchronous Communications Adapter, as a VNET MULTI-LEAVING remote station.

Configuration Specifications

The System/3 Model 10, with the following features, is supported as a VNET remote MULTI-LEAVING work station.

The minimum System/3 requirements are:

- 5410 Central Processing Unit (any model)
- Binary Synchronous Communications Adapter
- EBCDIC Transmission code
- Text Transparency
- 5424 Multi-function Card Unit (any model)
- 5203 Printer (any model)

Supported features are:

- 1442 Card Read Punch (RPQ 843175 on System/3 5410 CPU and RPQ 841205 on 1442 Card Read Punch)
- 5471 Printer Keyboard or 5475 Data Entry Keyboard
- Universal Character Set on the 5203 Printer
- Additional Print positions for 5203 Printer
- Any type or speed transmission line available for System/3

Recommended features are:

- 24 or 36 extra print positions on 5203 Printer (to provide standard VM/370 print line)
- Universal Character Set and PN train on the 5203 Printer (to provide for standard VM/370 character set)
- 5471 Printer-Keyboard (as a remote operator console)

The following features are incompatible with VM/370 support and should not be specified:

- Multi-Point Network Attachment (#9482)
- USASCII Transmission Code (#9061)
- Station Selection (#7477)

All features not specifically prohibited may be attached to the System/3 but are not supported by the HASP System/3 station processor program.

Remote Terminal Processor (RTP) Program

A special program exists for the IBM System/3 Model 10 card system which allows it to operate as a remote work station for MULTI-LEAVING operating systems such as HASP and ASP. For details on generating the appropriate work station program, see the publication OS/VS2 HASP II Version 4 System Programmer's Guide, Order No. GC27-6992. A System/3 under control of this program and communicating with VNET can be viewed as a logical extension of the VM/370 spooling system. This program (HASP/RTPSYS3) performs input, output, and communications functions.

HASP/RTPSYS3 can read, print, and punch data concurrently, depending on the options selected by the installation and the capabilities of the unit record devices.

Due to the use of blocking and character compression to minimize line transmission time, the speed at which the System/3 unit record devices operate is dependent on the data being transmitted and the number of concurrent functions. Certain job mixes, because of their data characteristics, enable HASP/RTPSYS3 to operate the unit record devices at near full speed. Other job mixes cause the devices to operate in short bursts because of contention on the communications line.

INPUT FUNCTIONS

HASP/RTPSYS3 provides the following input functions at the remote station:

- Reads from the attached card reader(s).
- Recognizes operator requests, and reads from the attached console.
- Identifies, compresses, and blocks card images and commands for transmission to VNET.
- Queues blocked records for transmission to VNET.

OUTPUT FUNCTIONS

HASP/RTPSYS3 provides the following output functions at the remote station:

- Dequeues blocked records received from VNET.
- Identifies the device required for output of the records.
- Deblocks and decompresses output records, queueing the images for printing, punching, or typing.
- Prints, punches, and types the output records, as required.
- Sets status flags, indicating backlog conditions on the output devices.

COMMUNICATION FUNCTIONS

HASP/RTPSYS3 provides the following communications functions at the remote station:

- Establishes and maintains synchronization with VNET.
- Dequeues blocked input requests and transmits them to VNET (upon request from VNET).
- Provides backlog status flags, indicating the terminal's ability to receive the various output streams from VNET.
- Receives output from VNET and queues the blocked records for processing.

Operating Procedures

This section describes normal operation procedures for the System/3 as a Remote Job Entry station. To start a Remote Job Entry session, the operator should load the Remote Station Processor (HASP/RTPSYS3) program deck, establish a connection between System/3 and the central computer, and sign on.

INITIAL PROGRAM LOAD (IPL)

The HASP/RTPSYS3 program deck is either a deck of 96-column cards or a deck of 80-column cards.

To load the 96-column load deck:

1. Put the deck in the rightmost card hopper of the MFCU.
2. Press START on the MFCU.
3. Press PROGRAM LOAD on the System/3. (For disk systems, the program load selection now must point to MFCU.)
4. Press START on the printer.

To load the 80-column load deck:

1. Raise the CE controls cover on the System/3.
2. With the CE Mode Selector at PROCESS, press SYSTEM RESET.
3. Turn the CE Mode Selector to ALTER STOR.
4. Set the data knobs to C2, and press START once.
5. Set the data knobs to 01, and press START once.
6. Set the data knobs to 00, and press START once.
7. Set the data knobs to 00, and press START once.
8. Set the data knobs to 31, and press START once.

9. Set the data knobs to 54, and press START once.
10. Set the data knobs to 00, and press START once.
11. Set the data knobs to 03, and press START once.
12. Set the data knobs to F3, and press START once.
13. Set the data knobs to 51, and press START once.
14. Set the data knobs to 01, and press START once.
15. Set the data knobs to F1, and press START once.
16. Set the data knobs to 52, and press START once.
17. Turn the CE Mode Selector to PROCESS.
18. Press SYSTEM RESET.
19. Close the CE Controls cover.
20. Put the 80-column load deck in the 1442.
21. Press START on the reader, the printer, and the System/3. Cards begin reading.
22. When the reader ready light goes out, press START on the reader.

Midway through the program deck, the reader stops reading and the printer starts printing the VNET Environmental Recording and Editing Program (HEREP), a standard feature of HASP/RTPSYS3. The information printed is the content of certain error counters; these counters contain a record of the unit checks that occurred during the last remote station session. If the counters have been destroyed, one line is printed:

HEREP COUNTERS HAVE BEEN ALTERED.

In any case, program loading automatically resumes after printing is complete.

Program loading has completed satisfactorily if, when the cards stop reading, the console indicator DT TERM READY is ON and either the hopper is empty or the first card in the hopper is not an EOR or /*SIGNON card. Decks or blank cards may be stacked behind the program deck. If DDT TERM READY is not ON, the last card of the program deck was not an EOR or /*SIGNON card, or a card read error occurred. To correct a card read error, follow the procedure under halt code F3 in the IBM System/3 Card System Operator's Guide. Ready the hopper, and depress the START key (on dual programming systems, the PROGRAM LEVEL ONE RESET key) if halt code F3 is displayed.

If the DT TERM READY light is ON and the hopper contains an EOR or /*SIGNON card, the operator should remove the cards from the primary hopper, press STOP and then NPRO on the reader. The card that was stacked when NPRO was pressed is either an EOR or a /*SIGNON card. Reload the program deck, making sure that it ends with either the correct /*SIGNON card or a single EOR card.

ESTABLISHING A COMMUNICATION LINE

The next step in initiating a remote session is establishing a line connection between the System/3 and VNET. The VNET operator should already have issued the VNET command START linkid, where linkid is the location identifier associated with the System/3.

If the communication line is nonswitched, make sure that any controls on the line's data set are in the DATA position. The System/3 automatically establishes communication with VNET.

If the communication line is switched, pick up the data set's telephone handset and depress the data set's TALK button. Dial the proper telephone number and listen for the ring. When the ring is answered (automatically by VNET) you will hear a high-pitched tone, followed by silence. Depress the data set's DATA key and hang up the handset. The System/3 initiates communications with VNET and automatically sends it the /*SIGNON card. As the /*SIGNON card is being sent, the message:

COMMUNICATIONS ESTABLISHED

prints on the 5471 Printer-Keyboard and on the 5203 Printer (if the 5203 is ready).

If the System/3 has the Auto-Call feature and the /*SIGNON card (or the default /*SIGNON card, if not overridden) specifies a telephone number, leave the data set in AUTO. The System/3 automatically dials the required telephone number. When the number answers, the System/3 automatically signs on.

If the call is not answered, or if the System/3 halts with halt code CA (call aborted) while trying to auto-call, the trouble is most likely that an incorrect telephone number was dialed or specified on the /*SIGNON card. It could also be that the VNET operator did not start the correct line. In the latter case, contact the VNET operator and request that he issue the correct START command for your link.

An auto-call halt CA can occur if the called number is busy. In that case, depress the console START (or PROGRAM LEVEL ONE HALT RESET) key to repeat the auto-call or redial manually.

OUTPUT PROCESSING

The remote operator need only press START on the printer to allow printing to occur. Once a file has reached VNET, printing starts automatically. When a user's printed output is complete, VNET queues that user's punched output (if any) for processing.

Notes on the 5203 Printer

1. At initial program load time, the system checks indicators of the 5203 to determine which print chain is mounted. If the indicators show a 48 character-set chain, the system assumes character arrangement IC; otherwise, it assumes character arrangement PN.
2. At initial program load time, the system sets the number of print lines per page to 66 (may be different for each installation).

For dual-carriage printers, the system uses only the left carriage; the operator must not press the RIGHT CARRIAGE RESTORE key.

3. At initial program load time, the system sets line numbers for programmed page skipping. These line numbers are provided to simulate the carriage tape control normally encountered in VM/370. A skip to carriage channel 1 results in a page eject; a skip to channel 12 stops 5 lines from the bottom of the page; and a skip to any other channel results in no page movement. Carriage tape channels may, however, be defined differently for each installation.

INPUT PROCESSING

The remote operator places into a card hopper (either 5424 or 1442 card reader) a stack of one or more decks and makes the card hopper ready. The system reads the first card, finds it punched, and requests permission from VNET to start sending a job stream. When the system receives permission from VNET, it continues reading cards and sending them to VNET.

If the remote operator is reading cards on the 5424, he may use either card hopper. The last card of his stack of decks must be a /*EOF card (the characters /*EOF punched into columns 1-5); this card instructs the system to send an end-of-job-stream indicator to VNET and to make the card hopper dormant.

If the remote operator is reading from the 1442, he ends the job stream by pressing START when the hopper is empty. No special considerations apply to preparing or reading 80-column cards.

OPERATING A COMBINATION CARD READ PUNCH

Devices with single card paths for both read and punch functions are considered combination reader/punches, if they are supported for both functions. The following are supported combination devices on the System/3:

- 5424 Multi-function Card Unit
- 1442 Card Read Punch

Operating the 5424 Multi-function Card Unit

1. Either hopper of the 5424 can be used as a reader or a punch. When a previously dormant 5424 hopper reads a punched card, it becomes a reader. It remains a reader until it reads a /*EOF card; it then goes dormant with the /*EOF card in the wait station.
2. When a previously dormant 5424 hopper reads a blank card, it becomes a punch. It remains a punch until it has completed punching all decks queued for it. If no decks are queued for it, the operator can make the hopper dormant by removing the blank cards from it.

3. The 5424 can read cards much faster than it can punch cards; therefore, to increase card throughput, the system performs card reading preferentially over card punching. When using both hoppers, one as a reader and one as a punch, punching tends to proceed intermittently.
4. Though the 5424 has two hoppers, it has only one card path. For error recovery purposes, the system ensures the card path is empty before switching hoppers. Therefore, if the operator is using both hoppers as readers, or both as punches, the system tends to process cards from one or the other of the hoppers, rather than dividing its time evenly between them.
5. Each blank card to be punched is read before it is punched, to make sure it is blank. A card that is not blank is stacked in the read stacker for the hopper from which it came.
6. Stacker selection is as follows:

<u>Condition</u>	<u>Stacker</u>
Reading from primary	1
Punching from primary	2
Punching from secondary	3
Reading from secondary	4

7. When preparing 96-column cards for the input deck, the operator should avoid punching column 81, since the system makes special use of this column. In any case, the system only transmits the contents of columns 1-80; columns 82-96 are completely ignored. If the RMTGEN parameter &S30BJDK was set to 1 when HASP/RTPSYS3 was generated, the system inspects column 81. If that column contains the character "1", the system assumes that the card contains a hexadecimal image of the first 40 bytes of an 80-column card. It reads the next card, checks for a "2" in column 81, combines the cards into an 80-column card image, and transmits the card image. No checks are made for validity of hexadecimal characters. If a "2" card does not follow a "1" card, the "1" card is ignored.
8. Certain punching restrictions are placed on the 5424. For all systems, if column 1 is x'6A' (12-11 punch on an 80-column card) the system recognizes a VNET job separator card, extracts the spool file number to punch a System/3 job separator card, and ignores the rest of the card. If the RMTGEN parameter &S30BJDK was specified as 1 when HASP/RTPSYS3 was generated, then the system recognizes a card image of an object deck and punches two 96-column cards with a hexadecimal representation of the card; see Item 7 above. If the RMTGEN parameter &S396COL was specified as 1, the system recognizes the left 48 columns (if column 80 is odd) or the right 48 columns (if column 80 is even) of a 96-column card; in this way all 96 columns of a System/3 card can be punched. This feature is used to create the System/3 Remote Station Processor program deck, which is punched in System/3 load mode.

For a detailed description of the RMTGEN macros used in generating the Remote Station Processor program, see the OS/VS2 HASP II Version 4 System Programmer's Guide.

Operating the 1442 Card Read Punch

1. When a previously dormant 1442 reads a punched card, it becomes a reader. It remains a reader until the operator presses the START button after the hopper becomes empty (or until it reads a /*EOF

card); it then becomes dormant. If it became dormant because the operator pressed the START button with no cards in the hopper, it also runs out the cards in its feed path.

2. When a previously dormant 1442 reads a blank card, it becomes a punch. It remains a punch until it has completed punching all files queued for it. Only after all queued decks have been punched can the operator safely remove cards from the 1442 hopper; with the hopper empty and no more punching to do, the 1442 becomes dormant. Press the NPRO button to stack the two blank cards remaining in the card feed path into the right stacker.
3. All cards processed by the system are stacked into the left stacker.

Entering Commands

If the System/3 includes a 5475 Data Entry Keyboard or a 5471 Printer-Keyboard, the keyboard can be used to enter commands. Otherwise, punch the commands on cards and enter them through a reader, exactly as if they were jobs.

The only valid commands from a remote station are a subset of the VNET commands described previously under "Remote Station Operator Commands."

ENTERING COMMANDS FROM THE 5471 PRINTER-KEYBOARD

To type a command to VNET, press the REQ key. If the system can immediately allow you to type a command, the PROCEED light goes on; otherwise the REQUEST PENDING light goes on. You can press the REQ key while you are typing a command, while the system is typing a message to you, or while the console is dormant.

When the PROCEED light comes on, start typing the command. If you make a mistake, press the CANCEL key and start typing again.

When you are finished typing, press either the END key or the RETURN key; their functions are identical. The command is transmitted to VNET, and it is executed (if valid) and printed along with the remote station number on the VNET operator's console.

If the command contains 120 characters, the remote station automatically performs the END key function when the 120th character is typed.

The 5471 does not type messages if the end-of-forms switch is on. When the 5471 runs out of forms, reload forms, press the REQ key, and then press the END key. The 5471 resumes typing if there are messages to be typed.

ENTERING COMMANDS FROM THE 5475 DATA ENTRY KEYBOARD

To type a command to VNET, merely start typing on the 5475 Data Entry Keyboard. The keyboard is always "alive." After the first character is typed, the column indicator becomes active and displays "02", the position of the character to be typed next. If you make a mistake, depress the FLD ERASE key; the column indicator displays "01" and you can start typing again.

When you are finished typing, depress the REL key to transmit the command to VNET. When the column indicators go dark, begin typing another command. If you type a command of 120 characters, the system automatically performs the REL key function when you have typed the 120th character.

ENTERING COMMANDS FROM CARDS

To send commands to VNET from a card reader, punch the commands, one per card, starting in column 1. Put one or more commands cards, followed by a /*EOF card, into an available card hopper and press START. The commands are transmitted along with the remote station number and reader number to the VNET operator's console.

The /*EOF control card consists of the characters "/*EOF" punched in columns 1-5. This control card must be the last card read by an MFCU hopper when the hopper is reading, whether decks, commands, or just a /*SIGNOFF card is being read. This card may optionally be used on the 1442 Card Read Punch, but the recommended 1442 procedure is as stated previously.

The EOR control card consists of the characters "EOR" in card columns 2-4. It is used instead of the /*SIGNON card when the default /*SIGNON card, assembled into the HASP/RTPSYS3 deck, is not to be overridden.

SYSTEM/3 LOCAL COMMAND PROCESSING

If the System/3 Remote Station Processor programs include the local command facility, you can issue commands to be executed locally by the System/3. Place a card containing the command into any dormant card hopper and press START. Do not use a /*EOF card.

For each command, the command name starts in column 1 and is followed by the operand field.

Command completion is indicated by one of the following messages, printed in the same place as error messages:

CODE0000 Command completed satisfactorily

CODE0001 Syntax error in command

CODE0002 Operand value error in command

A /*CARRIAGE command defines printer carriage information. The operand field has the format:

```
[L=forms-length] {,chan=line-no}
[ ,chan=lin-no... ]
```

where:

forms-length is the number of print lines on a page of forms (it must not be greater than 112).

chan is the carriage-channel number (it must be between 1 and 12).

line-no is the line number at which forms skipping stops for the indicated carriage channel (it must not be greater than forms-length).

Notes:

1. The /*CARRIAGE command is effective as soon as it is read in.
2. Specification of the I= operand destroys all previous carriage channel settings.

Terminating a Session

When you are finished using the System/3 as a Remote Job Entry station, put into an available hopper the two cards:

```
/*SIGNOFF
/*EOF
```

and press START on the card reader.

The /*SIGNOFF card tells VNET to disconnect the communication line after it has finished sending the current print and punch streams to the System/3 and after it has finished receiving the current deck from the System/3. That is, VNET disconnects when all currently operating functions are complete. If you sign off before VNET has started printing or punching some, or all of your files, VNET saves the output for transmission to your station the next time you sign on with the same remote station identification. The DRAIN command can alternatively be used to perform the same function.

When VNET finally disconnects the communication line, the System/3 communication adapter gets a time-out error every three seconds for about 20 seconds; then the DATA light on the data set telephone goes out. When the System/3 is dormant, press the STOP button on the console to stop the customer meter from running. The current RJE session is now ended.

Error Recovery

Two general classes of errors are defined in the System/3 Remote Station Processor: communication errors and unit record errors. For either type of error, the system generates an 8-character error message. If the system has a 5471 console, error messages are typed on it as they occur. If the system does not have a 5471 console, error messages may or may not be printed on the 5203 printer, depending on how the Remote Terminal Processor program was generated. The format of all error messages is:

```
ttxxxxuu
```


where tt is the message type, xxxx is additional error information, and uu is the device on which the error occurred. The correspondence between uu and device is as follows:

<u>Device</u>	<u>uu</u>
BSCA	00
1442	05
5203	0E
5424	0F

COMMUNICATION ADAPTER ERRORS

The communication technique used by VNET prevents BSCA errors during a processing session. Therefore, any BSCA error that occurs while the operator is signed on is an unusual condition, resulting from system or communication facility malfunction or operational conditions. For all BSCA errors shown in Figure 13, the BSCA processor within the System/3 Remote Terminal Processor automatically takes corrective action. The operator should regard all BSCA error messages only as informational messages.

UNIT RECORD ERRORS

Unit record error messages are provided for errors on the 1442 Card Read Punch (an RPQ device), the 5424 Multi-function Card Unit, and the 5203 Printer.

Message	Meaning	Action Taken
01rree00	A block sequence check occurred. A transmission block was duplicated or lost. rr is the received block number and ee is the expected block number. Both rr and ee range from x'80' to X'8F'.	Duplicate transmission blocks are ignored. Lost transmission blocks cause automatic job restart.
02000000	The System/3 received a negative acknowledgment (NAK) from VNET.	The transmission block that was negatively acknowledged is retransmitted.
03rrrr00	The transmission block received by the System/3 had an unrecognizable starting or ending sequence. The starting sequence is rrrr; if it is correct, the ending sequence is in error.	The System/3 sends a NAK to VNET, which then retransmits the block.
05ssss00	The System/3 BSCA has a unit check. The BSCA status indicators are ssss. For example: 8000 denotes a timeout error 8400 denotes a timeout error with abortive disconnect	The appropriate action is taken to continue or restore communication.

Figure 13. HASP/RTPSYS3 Communication Adapter Error Messages

5424 Multi-function Card Unit (MFCU)

The only MFCU error message is:

05sssss0F

where:

ssss represents the MFCU status indicators

In all cases, operator intervention is required. The operator should check the MFCU control panel to determine the card hopper to which the error message applies.

<u>Code</u>	<u>Meaning</u>
PRI	The primary (rightmost) card hopper needs attention.
SEC	The secondary (leftmost) card hopper needs attention.

The system attempts to perform its previous operation when the operator has cleared the error condition: if it was reading when an error occurred, it tries to read the same card again; if it was punching, it tries to punch again. Therefore, if the 5424 was punching, the operator should throw away the last card punched; if the 5424 was reading, he should place the last card read in the hopper again, so the system can reread it. First, however, he must lift the cards out of the indicated hopper and press the NPRO key to clear the error condition.

5203 Printer

The only 5203 error message is 05sssss0E, where "ssss" represents the 5203 status indicators. If any error light is on at the 5203 control panel, the operator must correct the condition and press printer START. The system automatically retries printing when an incrementer failure or print check occurred.

1442 Card Read Punch

The only 1442 error message is 05sssss05, where "ssss" represents the status indicators. The system recovers from 1442 errors the same way it recovers from MFCU errors. The operator should perform the action indicated by the 1442 error lights; then, throw away the last card punched or place the last card read back in the hopper and press START.

REMOTE STATION RESTART

In the event of an untimely interruption of the remote station operation such as a machine, program, communications, or environmental failure, the remote operator should notify appropriate maintenance personnel of the malfunction, save material which may be of use in determining the source of the failure, and with the aid of the VNET operator, prepare for restarting the station as follows:

1. Notify the VNET operator of the failure and, if necessary, request his assistance in preparing for restart.

2. Determine the current deck that was being transmitted to VNET. (The VNET has a record of the current deck being submitted to VNET.) The input stream starting with the current job must be submitted to VNET after restart.
3. Determine the loss of data on the output devices and inform the VNET operator to backspace or restart the printer or punch as necessary. (The VNET link should be made available for subsequent session with the remote station or other stations within the system.)
4. When the remote terminal is available, restart the session beginning with the Initial Program Load of HASP/RTPSYS3.

IBM 1130 SYSTEM AS A REMOTE STATION

The following section contains instructions for operating an IBM 1130 System, equipped with a Binary Synchronous Communications Adapter, as a VNET MULTI-LEAVING remote station.

Configuration Specifications

Any model of the 1130 (except Models 4A and 4B) with at least 8K words of storage, the Synchronous Communications Adapter, and any card reader, may be used as a VNET remote station. All standard readers, printers, and punches available for the 1130 system are supported in any combination. The console printer/keyboard is supported as a limited remote operator console. Any standard communication line (switched or nonswitched) of any speed is supported. The RPQ feature that allows the use of high-speed communication facilities is not supported.

Remote Terminal (RTP) Processor Program

A special program exists for the IBM 1130 that allows it to operate as a remote workstation for MULTI-LEAVING operating systems such as HASP and ASP. For details on generating the appropriate workstation program, see the publication OS/VS2 HASP II Version 4 System Programmer's Guide, Order No. GC27-6992. An 1130 System under control of this program and communicating with VNET can be viewed as a logical extension of the VM/370 spool system. This program (HASP/RTP1130) performs input, output and communication functions.

HASP/RTP1130 can read, print, and punch data concurrently, depending on the options selected by the installation and the capabilities of the unit record devices.

Due to the use of blocking and character compression to minimize line transmission time, the speed at which the 1130 unit record devices operate is dependent on the data being transmitted and the number of concurrent functions. Certain job mixes, because of their data characteristics, enable HASP/RTP1130 to operate the unit record devices at near maximum speed. Other job mixes can cause the devices to operate in short bursts because of contention on the communications line.

INPUT FUNCTIONS

HASP/RTP1130 provides the following input functions at the remote station:

- Reads from the attached card reader(s).
- Recognizes operator requests, and reads from the attached console.
- Identifies, compresses, and blocks card images and commands for transmission to VNET.
- Queues blocked records for transmission to VNET.

OUTPUT FUNCTIONS

HASP/RTP1130 provides the following output functions at the remote station:

- Dequeues blocked records received from VNET.
- Identifies the device required for output of the records.
- Deblocks and decompresses output records, queueing the images for printing, punching, or typing.
- Prints, punches, and types the output records, as required.
- Sets status flags, indicating backlog conditions on the output devices.

COMMUNICATION FUNCTIONS

HASP/RTP1130 provides the following communication functions at the remote station:

- Establishes and maintains synchronization with VNET.
- Dequeues blocked input requests and transmits them to VNET (upon request from VNET).
- Provides backlog status flags, indicating the terminal's ability to receive the various output streams from VNET.
- Receives output from VNET and queues the blocked records for processing.

OPERATING PROCEDURES

The following sections provide information for initiating and operating the HASP/RTP1130 program during the remote job stream processing session.

The initiation of a remote job stream processing session involves initial program loading of the HASP/RTP1130 program deck, establishment

of the communication lines, and exchange of initial control information between VNET and the HASP/RTP1130 program. The initial control sequence ends with the passing of the sign-on information from the remote station.

Initial Program Load (IPL)

The following steps should be taken to perform the initial program loading of the HASP/RTP1130 program deck:

1. Ready the HASP/RTP1130 deck in the primary card reader (do not place decks behind the HASP/RTP1130 deck). If two cards readers exist, be sure the second is not in ready status.
2. Ready all printers.
3. Set the STR/BSC switch to BSC.
4. Set the line speed control to the appropriate value (1200, 2000, 2400, etc.).
5. Verify that the rotary CPU control switch is set to the RUN position.
6. Press IMM STOP, RESET, and PROGRAM LOAD on the 1130 console.
7. After the last card has been read, the card reader goes out of ready status. Ready the card reader (press START on the reader until it becomes ready) and press START on the 1130 console. The last card should be the END card of the HASP/RTP1130 deck, a /*SIGNON card or a REP card. All unidentified cards are ignored.
8. Establish the communications line.

Note: The message DATA SET NOT READY is printed after the execution of Item 7 if the data set is not ready and establishing the communications line is not possible.

9. Processing can then begin in the full MULTI-LEAVING mode.

Establishing a Communication Line

The procedures for establishing communications with VNET are as follows:

1. Ready the data set. This involves different actions, depending on the type of data set. For nonswitched lines when the BSC RDY indicator is on, no action is required. Certain nonswitched lines require that the data set DATA button be pressed. To ready a dial line data set, perform the following:
 - a. Press the TALK button and lift the receiver on the data set.
 - b. Dial the assigned number for the remote station.
 - c. If the VNET line is available, the central system answers with a high pitched tone. Press DATA and replace the receiver immediately (the data set is now ready).

- d. If the VNET line is in use, a busy signal is received. Replace the receiver and try again later, or dial an alternate communications line number.
 - e. If the call is not answered, the VNET operator has not given the necessary VNET command (START) to authorize use of that communication line. Contact the VNET operator and request that he issue the START command for your link.
2. When the data set is ready, the ESC RDY indicator is on. When requested, HASP/RTP1130 begins the initial control sequence. The REC and TSM lights alternate during normal operation.
 3. When the initial sequence is complete, control information is transmitted to VNET and "handshaking" (with the REC and TSM lights alternating) continues. In addition, the message:

COMMUNICATION LINE ESTABLISHED

is printed on the console typewriter.

OUTPUT PROCESSING

The printing and punching of remote output is handled automatically by the HASP/RTP1130 system, except as controlled by the remote station operator or VNET operator via commands to VNET.

Output Processing on the 1442 Card Read Punch

A system with the 1442 defined as a punch-only device requires no operator action other than a ready condition and blank cards in the hopper.

INPUT PROCESSING

Submission of card decks can be initiated at any time, depending on the capabilities of the card reader/punch attached to the 1130 System.

The 2501 Card Reader allows the cards to be placed in the hopper as desired. The reader stops after reading the last card in the hopper and the message INTERVENTION REQUIRED ON 2501 is printed on the console printer. The operator may then press START on the reader to terminate the input stream or load more cards in the hopper, press START and continue the input stream. The intervention message is typed whenever the 2501 goes from a ready condition to a not ready condition.

The input reader to HASP/RTP1130 is considered always "hot"; that is, it is continually testing the reader and attempting to read cards.

Input Processing on the 1442 Card Read Punch

The function of the 1442 Card Read Punch is defined via operator action at the keyboard/console. Initially, the 1442 Card Read Punch is considered to be a card reader. When punch data is transmitted to the 1130 System, a message is printed:

PUNCH PROCESSOR WAITING FOR 1442

The operator may then define the 1442 as a punch by entering the command:

.DPUNCH (or .DP) This specification is necessary for each job that transmits punch data to the station.

Once defined as a reader by issuing the command

.DREADER (or .DR)

the 1442 retains the assignment until a .DPUNCH is given. As a reader the 1442 operates in the same manner as the 2501 Card Reader.

Note that during input processing on the 1442 Card Read Punch:

- The .DPUNCH and .DREADER commands result in no action if the opposite function is active at the time the command is issued.
- Defining the 1442 Card Read Punch as a punch with input cards in the hopper and punch data available from VNET results in the destruction of data in the input cards.

ENTERING COMMANDS

VNET commands, as well as local commands, may be entered at the remote station's console. Any message entered at the keyboard, which is not recognized as a local command, is transmitted to VNET for action. Although all commands transmitted to VNET are listed on the VNET operator's console, only those designated as being available to the remote user are acted upon.

Entering VNET Commands

The remote station operator should perform the following steps when entering VNET commands:

1. Press the INT REQ button which is located to the right of the console typewriter keyboard.
2. When the K.B. Select indicator comes on, type in the command, and press EOF.
3. If a typing error is noticed before pressing EOF, press the ERASE FIELD key, and repeat step 1.

Note that the BACKSPACE key is processed in the same manner as the ERASE FIELD key.

Entering Local Commands

The following local commands can be entered at the remote station's console:

- .DR Defines the combination 1442 Card Read Punch as a reader. This definition remains in effect until a .DP command is entered and accepted.
- .DP Defines the combination 1442 Card Read Punch as a punch. This definition remains in effect for one output only. The function next assigned is dependent on the entering of another .DP or .DR.

Local Commands are identified by a period in the first available type position. No blanks are allowed in the body of a command. Acceptance of a console command is signaled by the message:

OK!

Rejection is signaled by the message:

WHAT?

TERMINATING A SESSION

To terminate remote processing, the remote station operator can send a /*SIGNOFF card through the card reader input stream or issue the DRAIN command. This tells VNET not to initiate the sending of any more remote output and to release the communication line (if DIAL) when the current print or punch stream is finished. The RDY light on the data set goes out, and an SCA log message Code 3 is released periodically. The operator should ensure that printing and punching of output streams have successfully terminated and then press STOP on the CPU. To start a new session, the operator must perform the steps described previously, starting with the Initial Program Load of HASP/RTP1130.

ERROR RECOVERY

The following sections indicate some of the common error conditions that can arise and the necessary steps required for recovery.

Communications Adapter Errors

Due to the design of the synchronization technique for VNET remote stations, no errors are expected during a processing session. The occurrence, therefore, of any error condition is an unusual condition resulting from either system or communication facility malfunction or operational conditions. In general, the display of error messages is only informational, since HASP/RTP1130 will automatically initiate the appropriate recovery action. A list of error messages that may be displayed on the console printer is shown in Figure 14.

Message	Meaning	Action Taken
FFrrree00	Block sequence check. A transmission block was duplicated or lost. rr = received block number EE = expected block number	If duplicate, the received block is ignored. If the block is lost, SML is signaled to restart the job.
02dddd00	Abnormal read complete. The number of bytes requested have been read, but no end sequence was detected.	SML is requested to retransmit the record.
03dddd00	Received tirecut while attempting to synchronize an initial sequence.	SML is requested to retransmit the record.
04dddd00	Received tirecut while reading data.	SML is requested to retransmit the record.
05dddd00	BCC compare error after normal read complete condition.	SML is requested to retransmit the record.
06dddd00	Data overrun error. Program unable to read data before next character is received from transmission line.	SML is requested to retransmit the record.
07dddd00	Data set not ready. Discovered at interrupt time.	HASP/RTP1130 waits for data set to become ready and then resumes operation on the line.
08dddd00	Error on initial read. First character not SOH, DLE, ENQ, or NAK ...or... SOH-STX, DLE-STX, DLE-ACK0 pair not found.	SML is requested to retransmit the record.
09dddd00	NAK received.	Last data recorded is retransmitted to SML.
0Bdddd00	Single DLE found in transparent data.	SML is requested to retransmit the record.
0Cdddd00	ENQ received after initial sign-on sequence.	SML is requested to retransmit the record.
0dddd00	No pad character following NAK.	SML is requested to retransmit the record.
Note: dddd = device status word received for the Synchronous Communication Adapter		

Figure 14. HASP/RTP1130 Communication Adapter Error Messages

Unit Record Errors

Many of the unit record device errors that can occur during processing allow HASP/RTP1130 to continue processing without operator intervention. Some errors, such as DATA check and END OF FORM, require operator assistance before use of the device can be continued. In any event, all errors occurring on unit record devices are logged in the VNET Environmental Recording Error Printout Table and are displayed immediately on the 1052 operator's console.

When the error message is printed the operator should perform the following:

1. Determine which device is in error (see Figure 15).
2. Note the device status; if HASP/RTP360 continues to use the device, the error message is informative in nature.
3. Correct the error in accordance with procedures prescribed for the device.
4. Ready the device to resume operation.

Message	Description	Program Action
05ss0aaa	<p>Unit check. Device with address "aaa" has unit check error described by sense byte "ss" and/or indicator lights on the device console.</p> <p>Sample sense byte settings:</p> <p>40 = Intervention required 10 = Equipment check 08 = Data check - card read, card punched, or line printed incorrectly. 01 = Carriage control tape channel 9 encountered on printer</p>	<p>Wait for operator. Treat as data check. Depending on device: ignore, retry, or wait for operator. Ignore.</p>
06cc0aaa	<p>Unusual end. Previous I/O came to an unusual end. IBM customer engineer should be consulted.</p> <p>cc = CSW byte 5 aaa = device address</p>	<p>Treat as data check.</p>
<p><u>Note:</u> Printing on a line that has a carriage control tape channel 9 or 12 punch appears as an error and is logged as an error. The installation should place these punches in line positions that do not contain print information. Do not eliminate the punches from the carriage tape.</p>		

Figure 15. HASP/RTP1130 Unit Record Error Messages

REMOTE STATION RESTART

In the event of an untimely interruption of the remote station operation (such as a machine, program, communications, or environmental failure), the remote station operator should notify appropriate maintenance personnel of the malfunction. He should also save material that may be of use in determining the source of the failure and, with the aid of the VNET operator, should prepare for restarting the station, as follows:

1. Notify the VNET operator of the failure and, if necessary, request his assistance in preparing for restart.

2. Determine the current deck being transmitted to VNET. (The VNET operator has a record of the current deck being submitted to VNET.) The input stream, starting with that current deck, must be submitted to VNET after restart.
3. Determine the loss of data on the output devices, and inform the central operator to backspace or restart the printer or punch, as necessary. (The VNET link should be made available for a subsequent session with the remote station or other stations within the system.)
4. When the remote station is available, restart the session beginning with the Initial Program Load of HASP/RTP1130.

Load Process Unusual Conditions

The first eight cards of the 1130 remote station deck comprise a bootstrap loader (RTPBOOT), that loads the main loader (RTPLOAD) into upper 1130 storage. RTPLOAD then loads the main station deck (HASP/RTP1130), processes REP cards (if any), and processes the /*SIGNON card (if included).

Figures 16 and 17 describe the unusual conditions that may occur in conjunction with RTPBOOT and RTPLOAD.

LOCAL MESSAGE SUMMARY

Messages that are printed on the console typewriter originate from the VNET system or are generated by HASP/RTP1130, in conjunction with the station operation. Messages from VNET may be identified by the three-character 'DMT' prefix and by the fact that they are printed in red if the red/black typewriter ribbon is installed.

Local messages (typed in black) are listed in Figure 18 along with a detailed explanation of each message.

Condition Indication	Condition Description	Operator Action
System loop at location 'AA' with IAR displayed at location 'AP'.	RTPBOOT-computed sum (checksum) of columns 1-72 of last card read does not match value in columns 73-74, previously computed during RTPLOAD generation.	Loading of RTPLOAD is permanently terminated. Note card being processed, and contact system programmer or lead operator about problem.
System loop at location 'AE' with IAP displaying location 'AF'. AC contains card code value of column in error. XR2 contains 2s complement of card column in error.	RTPBOOT detected illegal EECIC punch in RTPLOAD card just read, or the last four cards of RTPBOOT contain an illegal EECIC punch.	Loading of RTPLOAD is permanently terminated. Note card being processed, and contact system programmer or lead operator about problem.

Figure 16. HASP/RTP1130 Loading Errors (RTPBOOT)

Condition Indication	Condition Description	Operator Action
System wait at location '0010'. AC displays value 'FFF3'.	The last REP card read contained a format error.	Loading is terminated permanently. Note that a card is in error, and notify system programmer or lead operator.
System wait at location '0010'. AC displays value 'FFF2'.	FTPLOAD-computed sum (checksum) of columns 1-72 of last HASP/RTP1130 card read does not match value in columns 73-74, previously computed.	Loading may be resumed by pressing start on 1130 console. Unpredictable results may occur. Best action is to note card in error and notify system programmer or lead operator.
System wait at location '0010'. AC displays value 'FFF1'.	This is not an error. The last card has been read by the 2501 or 1442, and operator action is required.	To commence HASP/RTP1130 processing, press START on the card reader until ready; then press START on the 1130 console.

Figure 17. HASP/RTP1130 Loading Errors (RTPLOAD)

VNET AS A REMOTE JOB ENTRY STATION

The VNET virtual machine, through the use of an SML line driver operating in RJE mode, can perform the functions of a MULTI-LEAVING workstation. In this capacity, VNET accepts job files that are either spooled to it by VM/370 virtual machines or received from VNET supported remote stations. It then transmits the job files, via the SML line driver, to the remote batch system for processing. Output, received from the remote system is directed to the real printer or punch of the directly connected VM/370 system.

Configuration Specifications

Any of the System/370 Models 135, 135-3, 138, 145, 145-3, 148, 155 II, 158, 165 II, and 168, with at least 240K of processor storage, a minimum of two direct access storage devices, and equipped with a transmission control unit supported by VNET, can be used as a remote job entry station to access a remote batch processor. The supported transmission control units are:

- Integrated Communications Adapter (ICA) with Synchronous Data Adapter Type II on the System/370 Model 135
- IBM 2701 Data Adapter Unit with Synchronous Data Adapter Type II
- IBM 2703 Transmission Control Unit with Synchronous Terminal Control
- IBM 3704 Communications Controller in emulation mode only
- IBM 3705 Communications Controller in emulation mode only

Message	Explanation/Action
INTERVENTION REQUIRED ON xxxx	Where xxxx is 1442, 2501, 1403, or 1132. This message indicates that the indicated device has gone from a ready to a "not ready" condition, usually because the device was manually stopped or because the device requires operator action (for example, cards or paper). The device should be serviced as required and made ready to continue operation.
PUNCH PROCESSOR WAITING FOR 1442	This message is issued whenever punch data is waiting to be punched on a system equipped with a combination 1442 Card Read Punch. If the 1442 is defined as a reader, it must complete the read function before it can be defined as a punch. If the 1442 is defined as a punch, no further action (other than providing blank cards and making the device ready) is necessary.
DATA SET NOT READY	This message is issued when the communications adapter signals HASP/RTP1130 that the attached telephone data set is in a "not ready" condition. The program does not attempt to use the communication adapter until a "ready" condition is detected. All other functions (card input, typewriter, etc.) continue until they require the service of the data set. If the data set was made "not ready" by manual intervention, operation may be resumed by making it ready. <u>CAUTION:</u> The VNET machine may print error messages that could cause the operator to restart the communications line. In this event, the HASP/RTP1130 program must be reloaded.
SCA LOG xxxxxx00	Indicates an unusual condition associated with the SCA (Synchronous Communication Adapter).
COMMUNICATION LINE ESTABLISHED	Issued when the HASP/RTP1130 program is initialized and when communications have been established with the VNET machine.
WHAT?	Response to any local command not recognized or accepted by HASP/RTP1130.
OK!	Response to any local command recognized or accepted by HASP/RTP1130.

Figure 18. IBM 1130 Local Messages

SML AS THE REMOTE TERMINAL PROCESSOR (RTP) PROGRAM

In order for a system or device to function as a MULTI-LEAVING workstation, a Remote Terminal Processor (RTP) program must be loaded to provide the software functions of input, output, and communication according to the protocol established by the host batch processor. An SML line driver task, operating in RJF mode, provides these functions for VNET when it is to act as a workstation for a remote batch system.

Input Functions

The SML line driver, operating in RJE mode, provides the following input functions at the VNET virtual machine:

- Accesses job files received by VNET from VM/370 virtual machines or remote stations (either WORKSTATIONS or remote NJI/NJE systems).
- Accepts batch system commands entered at the VNET operator console.
- Compresses and blocks card images and commands into transmission records according to the protocol requirements of the receiving batch system.
- Transmits the blocked records to the remote batch system.

Output Functions

The SML line driver, operating in RJE mode, provides the following output functions at the VNET virtual machine:

- Deblocks and decompresses transmission records received from the remote system.
- Identifies the device required for output.
- Spools the output to the real printer and/or punch.
- Directs messages from the remote batch system to the VNET operator's console.

Operating Procedures

With the exception of the initialization and sign-on procedure, the operation of VNET as a MULTI-LEAVING workstation is similar to that described under the section "IBM System/370 as a Remote Station."

Starting the SML Line Driver

Once the VNET virtual machine is logged on and the VNET component is loaded, the VNET operator can start the SML line driver.

Issue the START command for the link to the remote batch system.

If the link attributes in the link table are appropriate for this session, the START command can be issued as follows:

```
START linkid Parm [Hrn] Ennnn passwd  
                  [Rrn]  
                  [Arn]
```

A description of the START command operands, including those that override previous definitions, can be found in the section "Starting SML" in "Part 3: VNET System Operation".

The Hrn, Rrn, and Arn operands specify the type of remote batch system (HASP, RES, or ASP) and the workstation number or name that was assigned to VNET at the time the remote system was generated.

For HASP (or JES2), rn is a number from 1 through 99 and the entry could look like: H3, H20, or H43.

For RES, rn is also a number from 1 through 99 and the entry could look like: R2, R50, or R77.

For ASP (or JES3), rn is a five alphanumeric character name and the entry could look like: ANEWYK, APURL5, APOK16, or A62121.

The successful execution of the START command results in the following message:

```
DMTSML141I LINE 'vaddr' READY FOR CONNECTION TO LINK 'linkid'
```

Establishing A Communication Line

If the line identified by vaddr in the previous message is a nonswitched line, the line connection is automatically completed and the following message is issued:

```
DMTSML142I LINK 'linkid' LINE 'vaddr' CONNECTED
```

If the line is a switched line, the VNET operator should perform the following:

1. Press the TALK button, and lift the receiver off the data set.
2. 194800
3. If the line is available, the remote system answers with a high pitched tone. Press DATA and hang up immediately; the data set is now ready and the DMTSML142I message is issued.
4. If the line is in use, a busy signal is heard. Hang up and try later, or dial an alternate communication line number.
5. If the call is not answered, the remote system operator has not given the necessary ccommand to authorize use of that communication line. Contact the remote system operator and request that he issue the appropriate START command for your workstation.

When requested by the remote system, the SML line driver begins the initial control sequence. When the initial sequence is complete, the sign-on procedure is performed.

Signing On to The Remote System

The SML line driver builds a SIGNON record from the information contained in the VNET START command. This record is then transmitted to the remote system for validation. When accepted, the SML line driver "handshakes" with the remote system until processing of job streams and output data actually begins.

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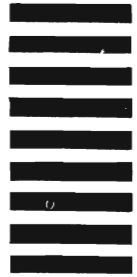
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