GC20-1816-3
File No. S370-30

Systems

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

Release 3

IBM

GC20-1816-3
File No. S370-30

Systems

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

Release 3 PLC 8

This publication provides the users of the VM/370 Remote Spooling Communications Subsystem (RSCS) with the information necessary to operate the RSCS virtual machine and supported remote terminals and stations.
Topics covered include:

- Devices supported by RSCS
- Line connection procedures
- Data transmission and reception
- RSCS operator commands
- Remote operator commands
- VM/370 user commands
- Error recovery procedures

Prerequisite Publication

IBM Virtual Machine Facility/370: Introduction,
Order No. GC20-1800

IBM

Fourth Edition (March 1984)

This is a reprint of GC20-1816-2 incorporating changes released in Technical Newsletter: GN25-0430 (dated 31 August 1977)

This edition corresponds to *Release 4 PLC 1 (Program Level Change)* of the *IBM Virtual Machine Facility/370,* and to all subsequent releases unless otherwise indicated in new editions or Technical Newsletters.

Changes are periodically made to the specifications herein; before using this publication in connection with the operation of the IBM systems, consult the latest *IBM System/370 and 4300 Processors Bibliography, Order No. GC20-0001,* for the editions that are applicable and current.

Refernces in this publication to IBM products, programs, or services do not imply that IBM intends to make these available in all countries in which IBM operates.

Publications are not stocked at the address given below. Requests for copies of IBM publications should be made to your IBM representative or to the IBM branch office serving your locality.

A form for readers' comments has been provided at the back of this publication. If the form has been removed, address comments to IBM Corporation, VM/370 Publications, Department D58, Building 706-2, P.O. Box 390, Poughkeepsie, New York 12602. IBM may use or distribute whatever information you supply in any way it believes appropriate without incurring any obligation to you.

© Copyright International Business Machines Corporation 1975, 1976, 1977

Preface

This publication is for users of the VM/370 Remote Spooling Communications Subsystem (RSCS). It describes how to:

- Initialize the RSCS virtual machine.
- Start and terminate one or more remote spooling sessions.
- Handle the transmission and reception of spool files.
- Issue commands to control the movement of spool files through the system.
- Handle error recovery for communication adapters and unit record devices.

The publication contains four parts and two appendixes.

"Part 1. Introduction" presents an overview of the Remote Spooling Communications Subsystem (RSCS).

"Part 2. Components of RSCS" contains the following sections:

"RSCS Virtual Machine" discusses the initialization of the RSCS virtual machine, the commands available to the RSCS operator, and the procedures the RSCS operator uses to control the movement of spool files between VM/370 users and remote stations.

"Nonprogrammable Terminal (NPT) Line Driver" discusses the functions of the line driver that controls nonprogrammable remote terminals.

"Spool MULTI-LEAVING[1] (SML) Line Driver" discusses the functions of the line driver that either controls programmable remote stations or acts as a remote job entry system to a HASP/ASP type processor.

"Part 3. Nonprogrammable Remote Terminals" contains a section on each of the nonprogrammable remote terminals supported by RSCS. Each section covers the configuration of the terminal, establishing the line connection, terminal operation, and error recovery procedures.

"Part 4. Spool MULTI-LEAVING Remote Stations" contains a section on each of the programmable remote stations supported by RSCS acting as a host, and a section on RSCS 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.

"Appendix A: Remote Spooling Communications Subsystem Commands" contains detailed descriptions of the commands available to the RSCS operator. The subset of those commands available to the remote station operator is also identified.

"Appendix B: RSCS Message Summary" contains a listing of all the RSCS 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.

The term "3705" or "3704/3705" refers to the IBM 3704, 3705, and 3705-II Communications Controllers, unless otherwise specified. Information about the IBM 3705-II, the Type 4 Channel Adapter, and the IBM System/370 Models 135-3, 138, 145-3, and 148 is for planning purposes only until the availability of the product.

PREREQUISITE PUBLICATION

IBM Virtual Machine Facility/370: Introduction, Order No. GC20-1800

COREQUISITE PUBLICATIONS

IBM Virtual Machine Facility/370:

Planning and System Generation Guide, Order No. GC20-1801

System Programmer's Guide, Order No. GC20-1807

System Messages, Order No. GC20-1808

Terminal User's Guide, Order No. GC20-1810

CP Command Reference for General Users, Order No. GC20-1820

---

[1]Trademark of IBM

RELATED PUBLICATIONS

Note: The operating and error procedures for the RSCS supported remote terminals and stations contained in Parts 3 and 4 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, Order No. GA27-3013

Operating Procedures Guide:

IBM 3771 and 3773 Communication Terminals, Order No. GA27-3100

IBM 3774 and 3775 Communication Terminals, Order No. GA27-3094

IBM 3776 Communication Terminal, Order No. GA27-3107

IBM 3777 Communication Terminal, Order No. GA27-3124

IBM 2780 Data Transmission Terminal - Component Description, Order No. GA27-3005

Component Information for the IBM 3780 Data Communication Terminal, Order No. GA27-3063

- For Spool MULTI-LEAVING Stations

IBM System/360 and System/370 Attached Support Processor System (ASP) Version 2 Console Operator's Manual, Order No. GH20-0321

IBM System/360 and System/370 ASP Version 3 Asymmetric Multiprocessing System Operator's Manual, Order No. GH20-1289

OS/VS1 Release 2 RES Work Station User's Guide, Order No. GC28-6879

OS/VS2 HASP II Version 4 System Programmer's Guide, Order No. GC27-6992

OS/VS2 HASP II Version 4 Operator's Guide, Order No. GC27-6993

IBM System/3 Card System Operator's Guide, Order No. GC21-7513

IBM System/32 Operator's Guide, Order No. GC21-7591

- Miscellaneous

General Information - Binary Synchronous Communications, Order No. GA27-3004

NEW DEVICE SUPPORT

New: Device Support

The following CPUs are supported by SML as remote job entry stations into VM/370: IBM System/370 Models 135-3, 138, 145-3, and 148.

The IBM 3203 Printer Model 4 is now supported on the System/370 Models 138 and 148, only, as a part of the configuration of HASP MULTI-LEAVING remote station for RSCS.

IBM SYSTEM/32 SUPPORTED AS RSCS WORK STATION

New: Device Support

The System/32 MULTI-LEAVING Remote Job Entry Work Station (MRJE/WS) System Utility Program enables a System/32 to function as an RJE work station for submission of jobs to a central System/370. The System/32 MRJE/WS program communicates with the Remote Spooling Communications Subsystem (RSCS) of VM/370 using HASP work station protocol.

The System/32 appears like a System/3 to the VM/370 host computer, and VM/370 actually is generated specifying the System/3 as the supported terminal.

The work station program runs under control of the System/32 System Control Program and communicates with the VM/370 system over a point-to-point (switched or nonswitched) communication line via the Binary Synchronous Communications Adapter.

IBM SYSTEM/3 MODELS 6, 8, 10, 12, AND 15 SUPPORTED AS RSCS WORK STATIONS

New: Device Support

The IBM System/3 Models 6, 8, 10, 12, and 15, with the MULTI-LEAVING Remote Job Entry Work Station (MRJE/WS) System Utility Program, are now supported as RSCS work stations, in addition to the previously supported System/3 Model 10, using the RTPSYS3 workstation program.

The section "IBM System/3 and System/32 as Remote Stations" has been added for this support.

MISCELLANEOUS

Changed: Documentation Only

Some technical and editorial corrections and additions have been made to improve the clarity of this publication.

CHANGES TO COMMANDS

Change: Program and Documentation

The DRAIN COMMAND, when issued for a link whose I/O activity is being logged, will stop the logging and automatically initiate the printout of the log data. The MSG command now includes a "userid" operand; this allows RSCS to forward messages to specific VM/370 users.

LINE DROP RECOVERY

New: Program and Documentation

Error recovery for nonprogrammable terminals that are disconnected while processing data has been modified to increase transmission integrity. Operator procedures are discussed under each type of terminal in "Part 3. Nonprogrammable Remote Terminals."

MISCELLANEOUS

Changed: Documentation Only

Several technical changes have been made to the documentation supported devices and required features.

This Technical Newsletter contains other technical and editorial changes brought to our attention by Reader's Comment Forms and internal programming activity.

MISCELLANEOUS

Changed: Documentation Only

Some technical and editorial corrections have been made to improve the accuracy and clarity of this publication.

Contents

PART 1. INTRODUCTION 9

OVERVIEW OF RSCS 11
The RSCS Virtual Machine 11
Remote Stations. 13
RSCS Links 13
VM/370 Spool System Interface. 13

Part 2. COMPONENTS OF RSCS. 15

RSCS VIRTUAL MACHINE 17
Hardware Supported 17
RSCS Virtual Machine Configuration . . . 17
System Generation of RSCS. 18
VM/370 User Commands 18
  VM/370 Tag Command 18
  VM/370 SPOOL Command 19
  RSCS Usage of TAG and SPOOL Commands . 20
RSCS Operator Commands 21
  Link and Line Control Commands 21
  File Control Commands. 22
  Communication Commands 22
  Miscellaneous Commands 23
Initiating Line Drivers. 24
Remote Job Entry to CMS Batch. 24
  Input and Output Procedures. 24
  Job Accounting Considerations. 25
RSCS Messages. 25
Tracing Facilities 25
  TRACE Command. 25
  I/O Logging. 26
System Security and Integrity. 26

NONPROGRAMMABLE TERMINAL (NPT) LINE
 DRIVER. 27
Hardware Products Supported. 27
Supported Functions. 27
  RSCS Operator Functions. 27
  Remote Terminal Operator Functions . . 28
  Virtual Machine User Functions 28
  Input/Output Control 28
  Line Allocation. 28
Starting NPT 28
Signing on to NPT. 29
Input File Processing. 30
Output File Processing 30
Remote Terminal Operator Commands. . . . 30
  Link and Line Control Commands 31
  File Control Commands. 31
  Communicatcns Commands. 32
  Miscellaneous Commands 32
NPT Messages 32

SPOOL MULTI-LEAVING (SML) LINE DRIVER. . 33
Hardware Products Supported. 33
Supported Functions. 33
  RSCS Operator Functions. 34
  Remote Operator Functions. 34
  Virtual Machine User Functions 34
  Input/Output Control 34
  Line Allocation. 35
Starting SML 35
Signing on in RJE Mode 36
Signing on in HOST Mode. 36
File Processing (RJE Mode) 36
Input File Processing (HOST Mode). . . . 36
Output File Processing (HOST Mode) . . . 37
Remote Station Operator Commands 37
  Link and Line Control Commands 37
  File Control Commands. 38
  Communications Commands. 38
  Miscellaneous Commands 38
SML Messages 38

PART 3. NONPROGRAMMABLE REMCTE TERMINALS 39

IBM 2770 AS A REMOTE TERMINAL. 41
Supported Configuration. 41
2770 Operational Notes 41
Entering Commands. 41
Terminating a Session. 41
Error Recovery Procedures. 42
  Error Recovery for a Line Drop 42
  Error Recovery when Transmitting . . . 42
  Error Recovery when Receiving. 43

IBM 2780 AS A REMOTE TERMINAL. 44
Supported Configuration. 44
2780 Operational Notes 44
Entering Commands. 44
Terminating a Session. 44
Error Recovery Procedures. 44
  Error Recovery for a Line Drop 44
  Error Recovery when Transmitting . . . 45
  Error Recovery when Receiving. 46

IBM 3770 AS A REMOTE TERMINAL. 47
Supported Configuration. 47
3770 Operational Notes 48
Entering Commands. 48
Terminating a Session. 48
Error Recovery 48
  Error Recovery for a Line Drop 48

IBM 3780 AS A REMOTE TERMINAL. 49
Supported Configuration. 49
3780 Operational Notes 49
Entering Commands. 49
  Interrupting Output Processing 49
Terminating a Session. 49
Error Recovery Procedures. 49
  Error Recovery for a Line Drop 50
  Error Recovery when Transmitting . . . 50
  Error Recovery when Receiving. 50

PART 4. SPOOL MULTI-LEAVING REMOTE
 STATIONS. 53

IBM SYSTEM/360 AND SYSTEM/370 AS REMOTE
 STATIONS. 55
Configuration Specifications 55
Remote Terminal Processor (RTP) Program. 55
  Input Functions. 55
  Output Functions 56
  Communication Functions. 56
Operating Procedures 56
  Initial Program Load (IPL) 56
  Establishing a Communication Line. . . 56
  Output Processing. 57
  Input Processing 57

Operating a Combination Card Read Punch 57
Entering Commands. 58
ENTERING COMMANDS FROM CARDS 58
Terminating a Session. 58
Error Recovery 58
Communication Adapter Errors 58
Unit Record Errors 58.1
Remote Station Restart 60

IBM SYSTEM/360 MODEL 20 and IBM 2922 AS REMOTE STATIONS 61
Configuration Specifications 61
Remote Terminal Processor (RTP) Program. 61
Input Functions. 61
Output Functions 62
Communication Functions. 62
Operating Procedures 62
Initial Program Load (IPL) 62
Establishing a Communication Line. . . 62
Output Processing. 63
Input Processing 63
Operating a Combination Card Read Punch 63
Entering Commands. 64
ENTERING COMMANDS FROM CARDS 65
Terminating a Session. 65
Error Recovery 65
Communication Adapter Errors 65
Unit Record Errors 66
Remote Station Restart 67

IBM SYSTEM/3 AND SYSTEM/32 AS REMOTE STATIONS. 69

IBM SYSTEM/3 MODEL 10 CARD SYSTEM AS A REMOTE STATION. 70
Configuration Specifications 70
Remote Terminal Processor (RTP) Program. 70
Input Functions. 71
Output Functions 71
Communication Functions. 71
Operating Procedures 71
Initial Program Load (IPL) 71
Establishing a Communication Line. . . 72
Output Processing. 73
Input Processing 73
Operating a Combination Card Read Punch 73
Entering Commands. 74
Entering Commands from the 5471 Printer-Keyboard. 75
Entering Commands from the 5475 Data Entry Keyboard. 75
Entering Commands from Cards 75
System/3 Local Command Processing. . . 75
Terminating a Session. 76
Error Recovery 76
Communication Adapter Errors 76
Unit Record Errors 76
Remote Station Restart 78

IBM 1130 SYSTEM AS A REMOTE STATION. . . 79
Configuration Specifications 79
Remote Terminal (RTP) Processor Program. 79
Input Functions. 79
Output Functions 79
Communication Functions. 79
Operating Procedures 80
Initial Program Load (IPL) 80
Establishing a Communication Line. . . 80
Output Processing. 81
Input Processing 81
Entering Commands. 81
Entering Commands From Cards 81
Entering RSCS Commands 82
Entering Local Commands. 82
Terminating a Session. 82
Error Recovery 82
Communications Adapter Errors. 82
Unit Record Errors 83
Remote Station Restart 84
Local Message Summary. 85

RSCS AS A REMOTE JOB ENTRY STATION . . . 87
Configuration Specifications 87
SML as the Remote Terminal Processor (RTP) Program 87
Input Functions. 87
Output Functions 87
Operating Procedures 87
Starting the SML Line Driver 88
Establishing a Communication Line. . . 88
Signing onto the Remote System 88

APPENDIXES 89

APPENDIX A: REMOTE SPOOLING COMMUNICATIONS SUBSYSTEM COMMANDS . . . 91
Notational Conventions 91
General Command Usage. 93
RSCS Commands. 93
BACKSPAC 94
CHANGE 95
CMD. 96
DEFINE 97
DELETE 98
DISCONN. 98
DRAIN. 99
FLUSH. 100
FREE 101
FWDSPACE 101
HOLD 102
MSG. 102
ORDER. 103
PURGE. 103
QUERY. 104
START. 106
TRACE. 108

APPENDIX B: RSCS MESSAGE SUMMARY 109
RSCS Spontaneous Messages. 109
Messages Generated during the Sign-on Procedure 113
Messages Generated during System Generation and Initialization 113

INDEX. 115

Figures

Figure 1. Representative RSCS Installation.....12
Figure 2. Typical RSCS Virtual Machine Configuration.....17
Figure 3. Directory Entry for an RSCS Virtual Machine.....18
Figure 4. HASP/RTP360 Communication Adapter Error Messages.....59
Figure 5. HASP/RTP360 Unit Record Error Messages.....60
Figure 6. HASP/RTPM20 Local Commands....64
Figure 7. HASP/RTPM20 Communication Adapter Error Messages.....66
Figure 8. HASP/RTPM20 Action on Unit Record I/O Execution Errors..67
Figure 9. HASP/RTPSYS3 Communication Adapter Error Messages.....77
Figure 10. HASP/RTP1130 Communication Adapter Error Messages.....83
Figure 11 HASP/RTP1130 Unit Record Error Messages.....84
Figure 12. HASP/RTP1130 Loading Errors (RTPBOOT).....85
Figure 13. HASP/RTP1130 Loading Errors (RTPLOAD).....85
Figure 14. IBM 1130 Local Messages.....86

Part 1. Introduction

Part 1 is an introduction to the Remote Spooling Communications Subsystem (RSCS) as a component of VM/370. The following topics are introduced:

- Overview of RSCS
- The RSCS virtual machine
- Remote stations
- RSCS links
- VM/370 Spool System interface

The Remote Spooling Communications Subsystem (RSCS) is a component of 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.
- Remote stations and other remote stations
- VM/370 users and remote HASP/ASP type batch systems.
- Remote stations and HASP/ASP type batch systems.
- Remote stations and a CMS Batch virtual machine.

RSCS runs in a dedicated virtual machine under VM/370. This RSCS virtual machine is known as the local RSCS station. All remote stations and the local RSCS station are assigned a 1- to 8-character (alphameric) location identification.

The transmission path between the RSCS local station and any single remote station is defined as a link. A link definition consists of a linkid (identical to the location identification of the remote station) and other information unique to the transmission path to be used. A table of these link definitions is stored in the RSCS virtual machine.

VM/370 output spool files contain a 136-byte information field called the spool file tag. The data in this tag field is inserted, changed or queried via the CP TAG command. In order for RSCS to control the transmission of spool files from a VM/370 user to a remote location, the user must perform two functions:

- He must "tag" the file with the location identifier of the remote location.
- He must spool the file to the RSCS virtual machine.

RSCS searches the table of link definitions for a linkid that matches the location identifier and uses the associated link definition to initiate the transmission.

THE RSCS VIRTUAL MACHINE

The RSCS virtual machine, running under VM/370, operates as any other virtual machine. RSCS 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 stations. The telecommunication I/O facilities to be managed by RSCS operate in binary synchronous mode and are attached, temporarily or permanently, to the RSCS virtual machine. See Figure 1 for a representative VM/370 installation using RSCS.

Once RSCS has been initialized, the RSCS operator may disconnect his console and run in disconnected mode. RSCS is designed to operate normally without regular operator intervention. When disconnecting his console, the RSCS operator has the option of specifying another virtual machine console (usually the system console) to receive any RSCS console output. When not in disconnect mode, the RSCS operator can use the console to enter RSCS commands to alter normal file transmission and to monitor transmission activity.

RSCS consists of a multitasking supervisor, system control tasks, and line driver tasks.

The RSCS 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 RSCS, and the management of virtual storage required by each task.

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

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

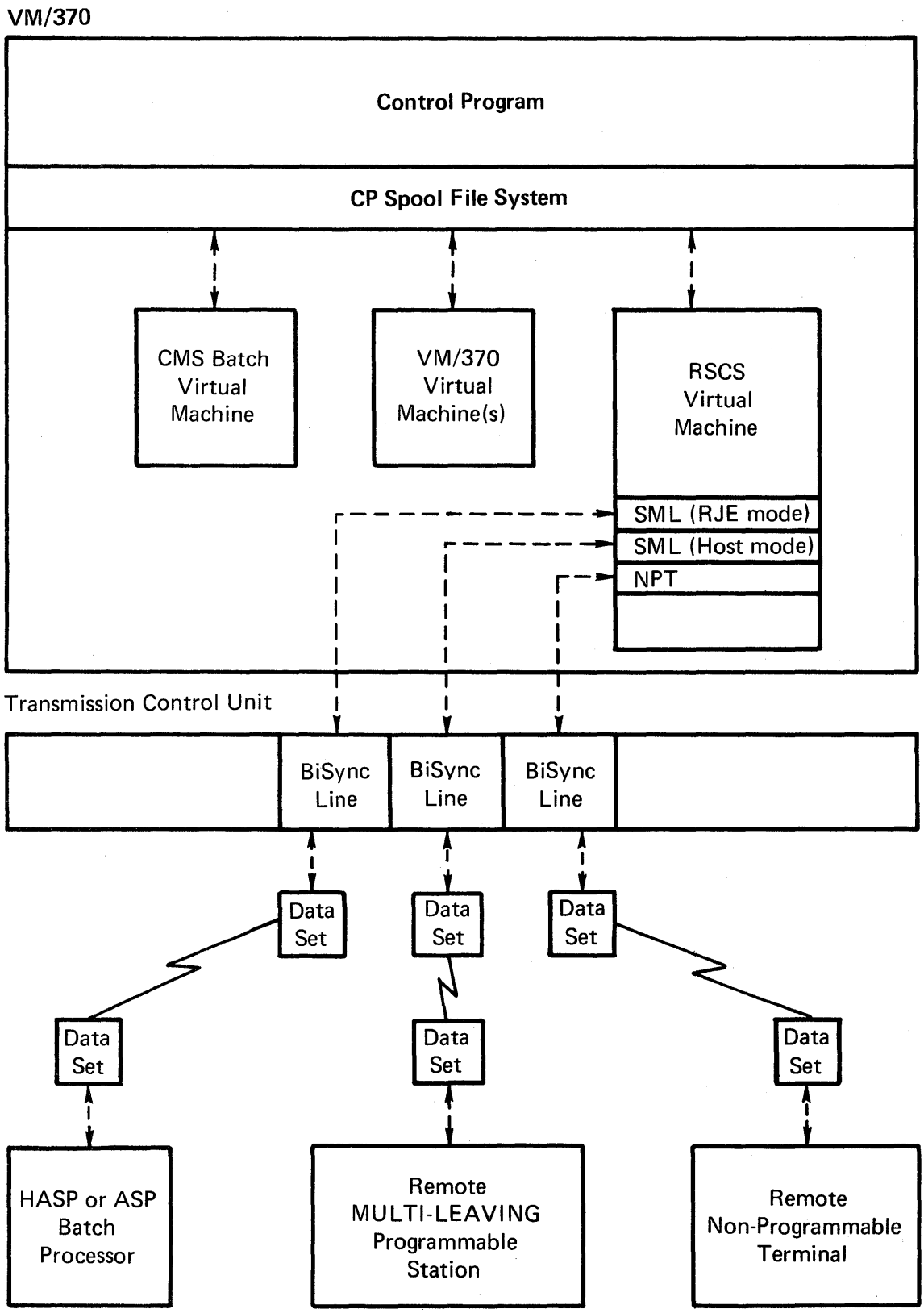


Figure 1. Representative RSCS Installation

REMOTE STATIONS

A remote station, in the context of RSCS, is any terminal or system on the other end of the link from the RSCS virtual machine. The RSCS virtual machine is also called the local RSCS station. RSCS supports two general types of I/O configurations used as remote stations: nonprogrammable and programable.

Nonprogrammable remote terminals, such as the IBM 2780, 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 RSCS.

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 RSCS as a remote job entry workstation. Both of these types of remote stations are managed by the Spool MULTI-LEAVING (SML) line driver of RSCS.

All stations, remote and local, must be assigned a 1- to 8-character (alphameric) location identification. This identification usually suggests the physical location of the station (HOUSTON, DEPT14, BLDG76, ACCNTNG, FLOOR1 are typical examples).

RSCS provides multiple concurrent line management support for up to 16 remote stations of the various supported types.

RSCS LINKS

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

linkid - a 1- to 8-character (alphameric) link identifier, identical to the location identifier of the remote station associated with the link.

type - a 1- to 8-character (alphameric) name designating the module (text deck) name of the line driver to be used to manage the transmission.

line - a virtual device address of a telecommunication port for exclusive use by this link. If not specified, RSCS 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'.

RSCS maintains a table of link definitions that are set up at RSCS system generation time. This is called the RSCS link table. Link definitions may be temporarily added, deleted, or modified using the RSCS 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 "RSCS Operator Commands") RSCS supports up to 64 link definitions; up to 16 links can be active at any one time.

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.

The tag contents of a closed spool file can be altered only by the user on whose reader queue the file is chained. The user, usually the RSCS operator, issues the TAG FILE command with new tag data.

When the TAG command is issued by a VM/370 user to tag a file destined for transmission by the Remote Spooling Communications Subsystem, 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 2.

All spool files to be transmitted by RSCS must be spooled to the RSCS virtual machine by the VM/370 user.

Part 2. Components of RSCS

Part 2 describes the three major components of RSCS: the RSCS control program, the Nonprogrammable Terminal (NPT) line driver, and the Spool MULTI-LEAVING (SML) line driver.

The discussion of the RSCS control program covers the virtual machine configuration, system generation, VM/370 user commands, RSCS operator commands, line drivers, RSCS messages, and system security and integrity.

The descriptions of the NPT and SML line drivers include hardware requirements, supported functions, file processing, remote terminal operator commands, and line driver messages.

HARDWARE SUPPORTED

The Remote Spooling Communications Subsystem of VM/370 supports the following hardware:

- System/370 models as supported by VM/370
- 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
- Remote stations as supported by the line drivers that run under the RSCS supervisor. (See the "Hardware Products Supported" sections in the individual discussions of the NPT and SML line drivers.)

RSCS VIRTUAL MACHINE CONFIGURATION

An RSCS virtual machine is configured like a CMS virtual machine with a few special requirements and exceptions.

It must be assigned a minimum of 512K bytes of virtual storage. The virtual storage size may be defined as large as 16 million bytes, in multiples of 4K.

RSCS dynamically defines and detaches virtual punches, printers, and readers whenever their use is required.

The ECMODE option must be specified to permit use of the clock comparator by the RSCS Supervisor.

The RSCS virtual machine is assigned a 5-cylinder read-only RSCS system disk volume to contain the RSCS nucleus, disk resident RSCS commands, and system library. RSCS supports any disk supported by CMS.

Although RSCS can run without operator intervention, a virtual console is required to perform the initial program load and to provide the RSCS operator with control over the movement of spool files through the system.

In order to accomplish its remote spooling functions, RSCS must be assigned a number of dedicated Binary Synchronous Communication (BSC) lines. RSCS supports the BSC equipped IBM 2701 and IBM 2703 transmission control units, and the equivalent adapters of the IBM 3704 and IBM 3705 programmable communications controllers in emulation mode or the emulation portion of partitioned emulation mode.

Figure 2 illustrates a typical RSCS virtual machine configuration utilizing three dedicated binary synchronous lines.

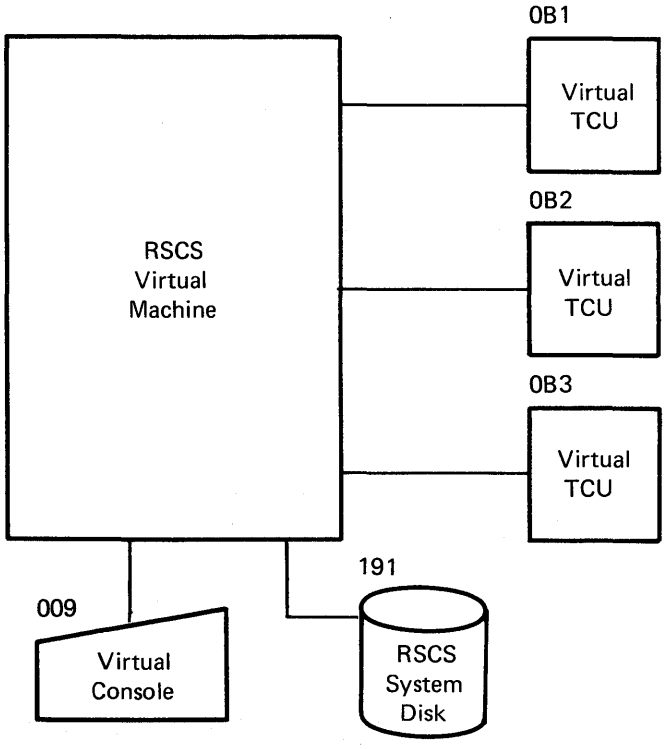


Figure 2. Typical RSCS Virtual Machine Configuration

The corresponding VM/370 directory entry for that RSCS virtual machine is shown in Figure 3. One minidisk, virtual address 191, is defined as a read-only system disk for RSCS. The last three entries define

three BSC lines (real addresses 078, 079 and 07A) as being dedicated to the RSCS virtual machine with virtual addresses of 0B1, 0B2, and 0B3.

```
USER RSCS REMOTE 512K
ACCOUNT 8669
OPTION ECMODE
CONSOLE 009 3215
MDISK 191 2314 020 005 CMSVL1 R
DEDICATE 0B1 078
DEDICATE 0B2 079
DEDICATE 0B3 07A
```

Figure 3. Directory Entry for an RSCS Virtual Machine

SYSTEM GENERATION OF RSCS

The data required to generate the Remote Spooling Communications Subsystem is located on the RSCS/IPCS tape of VM/370. This data consists of the text files for all the nucleus modules, the spool file access method supervisor task, the line allocator supervisor task, and the line driver modules. In addition, the MACLIB, EXEC, and CNTRL files necessary to the generation procedure are also included. For detailed RSCS system generation information, see the VM/370 Planning and System Generation Guide.

VM/370 USER COMMANDS

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

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 | DEv   Printer [tagtext]
    |       PUnch
    |       CONsole
    |       vaddr
    | FIle  spoolid [tagtext]
    | QUery DEv Printer
    |       PUnch
    |       CONsole
    |       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. 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, PRT — is the synonym for all printer class devices.

PUNCH, PCH — is the synonym for all punch class devices.

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 nonblank 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.

RSCS expects the syntax of tag text to be as follows:

```
linkid [userid] [priority]
```

where:

linkid is the location identifier of the link on which the file is to be transmitted.

userid is the identification of the remote virtual machine that is to receive the file.

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

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

The remainder of the 136-byte tag is ignored by RSCS.

TAG QUERY Command Responses:

```
                 ⎧PRINTER⎫
TAG QUERY DEV    ⎨PUNCH  ⎬
                 ⎩CONSOLE⎭
```

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

```
                                  ┐
   ⎧PRT  ⎫                        │ repeated for
   ⎨PUN  ⎬ vaddr TAG:             │ each device in
   ⎩CONS ⎭                        │ the specified
tagtext..............             │ 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.

VM/370 SPOOL COMMAND

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

```
┌──────────────────────────────────────────┐
│       │ ⎧Printer⎫                        │
│ SPool │ ⎨PUnch  ⎬ [TO] userid            │
│       │ ⎨CONsole⎬                        │
│       │ ⎩vaddr  ⎭                        │
└──────────────────────────────────────────┘
```

where:

PRINTER PRT denotes all printer class device output.

PUNCH PCH denotes all punch class device output.

CONSOLE denotes all console class device output.

vaddr — denotes all output from the specified virtual device address.

userid — is the ID of the virtual machine in which RSCS resides.

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

RSCS USAGE OF TAG AND SPOOL COMMANDS

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 RSCS 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 FILLER 10
SPOOL 00D TO NET
```

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

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

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

The EXEC would be invoked as follows:

```
SEND PALOALTO PRINT PROG LISTING
```

The EXEC executes as follows:

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

The TAG FILE command can only be used to alter the tag data of a spool file in the virtual reader of the user issuing the command. Use the CP command QUERY READER to obtain the spoolid of the file whose tag you wish to alter. This spoolid is then entered as the second operand of the TAG FILE command.

The TAG QUERY DEV command is used by a VM/370 user to display the contents of the tag associated with the specified device or class of device on his virtual machine.

The TAG QUERY FILE command is used to display the contents of tags associated with files that are enqueued on the user's virtual reader. It would typically be used by the RSCS operator to inquire about files that may either have been spooled to RSCS by a VM/370 user or transmitted to RSCS by a remote station.

RSCS Tag Slots

When a spool file is sent to the RSCS virtual machine for transmission, the spool file access function reads and validates the tag data associated with the file. If the tag contains an invalid destination linkid, the file is purged and the file originator is notified of the action. If the destination linkid is valid, RSCS then checks for an available tag slot associated with that linkid. If one is available, it is loaded with spool file information needed for transmission. This is done whether or not the linkid is active. If a tag slot for that link is not available, the spool file is flagged as being in a "pending" status and remains so until a tag slot does become available. As a file completes transmission, the tag slot representing that file is released and can be used to queue another file for transmission.

The number of tag slots assigned to each link is determined at system generation time. There is a minimum of two slots per link and a maximum of 512 slots for all links combined. The RSCS operator can use the RSCS DEFINE command to temporarily change the number of tag slots available for any linkid; the new value will hold only for the duration of the terminal session. Permanent changes of tag slot assignments can only be made as part of the RSCS system generation procedure described in the VM/370 Planning and System Generation Guide.

Note: When a file is in a "pending" status, it is not recognized by the RSCS command processors and cannot be referenced through RSCS functions. However, the RSCS operator

can use CP commands to manipulate these files since they are in his reader queue.

RSCS OPERATOR COMMANDS

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

- Manipulate the status, transmission priority, class and order of files owned by the RSCS 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 and stations.
- Send commands to remote batch processing systems.
- Query file, link or system information.
- Monitor link activity for any remote location.

File attributes and the parameters describing them in the RSCS command language have maximum and default values identical to those of the VM/370 command language. Because many of the RSCS operator commands are available to remote station operators, only brief descriptions of the commands that apply to the RSCS 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: Remote Spooling Communications Subsystem Commands."

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

LINK AND LINE CONTROL COMMANDS

There are six commands available to the RSCS operator to manage the links and lines used for file transmission: DEFINE, DELETE, START, DRAIN, HOLD, and FREE.

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 RSCS installation, or to temporarily redefine an existing link definition. (Permanent link definitions or redefinitions can only be made as part of the RSCS system generation procedure.) The maximum number of links that can be defined in the link table is 64. A link definition, with a link identifier equal to the location identifier of a remote station, must exist in the RSCS 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 RSCS link table. (Permanent link deletions can only be made as part of the RSCS system generation procedure.) 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 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 to reset a DRAIN operation before it has completed. If the START command is used to alter the class of files to be processed, note that "pending" files are not recognized for processing.

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.

If the link is currently logging I/O activity, the DRAIN command will terminate logging and automatically print the log output.

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.

FILE CONTROL COMMANDS

Files that are sent to the RSCS virtual machine for transmission are put into the file queue assigned to the particular link to which the file is addressed. The RSCS operator can use three commands to control these files while they are waiting to be processed: CHANGE, ORDER and PURGE. He can also use three other commands to control files that are currently being processed: FLUSH, BACKSPAC, and FWDSPACE.

The CHANGE Command

Use the CHANGE command to alter one or more file attributes of a file owned by the RSCS 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 can not be reordered.

The PURGE Command

Use the PURGE command to remove all or specified files for 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 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 RSCS 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 or to control the logging of line I/O activity for a particular link.

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

If the text portion is interpreted as a remote system command, it is made available to the line driver for the specified link. The functional meaning of the text depends on the type of line driver and the nature of the remote station that it supports. 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 ASP and HASP commands, refer to the appropriate ASP and HASP system manuals listed in the Preface.

If the text is LOG, RSCS outputs a printer spool file containing a one line record for each I/O transaction on the specified link. When NOLOG is entered, or the DRAIN command is issued for that link, logging is turned off and the log output is automatically printed.

The MSG Command

Use the MSG command to send a message (as opposed to a command) to a remote station operator. The text portion is made available to the line driver for the specified link.

MISCELLANEOUS COMMANDS

Three other commands are available to the RSCS operator: DISCONN disconnects the RSCS console from VM/370, QUERY obtains RSCS system status information, and TRACE monitors communication line activity.

The DISCONN Command

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

The QUERY Command

The QUERY command is used to request RSCS system status information to be printed on the RSCS operator console. 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, default 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.

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

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, destination location, spool file class, current transmission priority, and the number of records in the file.

FILE INFORMATION: For a specific file, the operator can request status information, RSCS-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.

RSCS-related attributes include originating location and userid, date and time of creation, destination location and userid, the link on which the file is enqueued, and the number of files in queue that precede the specified file.

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

SYSTEM INFORMATION: The RSCS operator can request a brief description of each link currently defined in the system. This includes the link identification (linkid), activity status, line address, and its HOLD status.

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 (over 3 seconds delay between write and read) that occurred on the line.

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

INITIATING LINE DRIVERS

Line drivers manage the transmission of files between the RSCS virtual machine and a particular class of remote terminals or stations. Two line drivers are supplied with RSCS. One, designated as DMTNPT, handles transmissions to and from nonprogrammable terminals such as the IBM 2780 and 3780; the other, designated as DMTSML, handles transmissions to and from other IBM systems operating either as remote programmable MULTI-LEAVING stations or as HASP/ASP type host processors using the MULTI-LEAVING telecommunication protocol.

The RSCS 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 RSCS when the link is activated.

Once the line driver is activated by the RSCS operator, the link for a leased line is ready for the 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.

REMOTE JOB ENTRY TO CMS BATCH

If both RSCS and CMS Batch are running under the same VM/370 system, a remote station can submit job stream files to RSCS for processing on a CMS Batch Facility. Furthermore, by including appropriate commands in the job stream, CMS Batch can direct printer and/or punch output back to the originating remote stations or to another remote station.

INPUT AND OUTPUT PROCEDURES

When a remote station transmits a file to RSCS, destined for a CMS Batch virtual machine, the ID card that precedes the card file deck must contain the userid of the CMS Batch machine. If no file control commands are included in the job stream, the output of the job is directed to the real printer and/or punch.

In order for a remote station to receive the output of a job submitted to CMS Batch, the job file must include appropriate SPOOL and TAG commands. Output devices must be spooled to the RSCS virtual machine. Spool files generated on the spooled devices must be tagged with the linkid of the remote station that is to receive the output.

For example, if a job file with printer output is sent from a remote station with a linkid of HOUSTON and the output is to be returned to the same station, the following commands and control cards are required:

```
ID CMSBATCH
/JOB RSCS HOUSTON PAYROLL [comments]
.
.
.
SPOOL PRINTER TO RSCS
TAG DEV PRINTER HOUSTON
.
.
.
/*
```

The userid and jobname (RSCS and PAYROLL) is the distribution data printed on the separator sheet of the output printed at the remote station.

JOB ACCOUNTING CONSIDERATIONS

The accounting routines in the VM/370 Control Program distribute system resource usage by the userid and account number specified in the /JOB card. In the preceding example, charges are distributed by the account number within the RSCS userid. If the account number is specified as the linkid of the originating remote station, system resources are charged directly to the remote station.

If system resource accounting is desired at a lower level, for example an individual job, the /JOB card can be specified as follows:

```
/JOB HOUSTON PAYROLL PAYROLL [comments]
```

In this example, charges are distributed to the PAYROLL job for the HOUSTON link. The userid and jobname (HOUSTON and PAYROLL) appears on the separator sheet of the output printed at the remote terminal.

Note, however, that in order to use HOUSTON as a userid, it must appear in the VM/370 directory. This can be accomplished by the system programmer entering HOUSTON as a NOLOG user in the directory.

RSCS MESSAGES

RSCS messages are issued in response to commands, and during system execution. The response message is delivered to the associated command originator, generally the RSCS local or remote operator, or both, depending on the availability of the remote station printer to serve as an operator console output medium. When RSCS 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. If this function is not specified, 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 RSCS messages, unsolicited or in response to commands, can be found in "Appendix B. RSCS Message Summary." For a detailed listing and description of all RSCS messages, see VM/370 System 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, AXS, INI, and xxx, where xxx is replaced with the code of the particular line driver module which is issuing the message: NPT, for the Nonprogrammable Terminal Line Driver, and SML for the Spool MULTI-LEAVING Line Driver. Printing of the ten-character message codes may be suppressed by the local RSCS operator by use of the SET EMSG command.

RSCS utilizes the Diagnose function of CP to handle console functions such as DEFINE and DETACH. The frequency of use of these commands by RSCS results in an excessive number of confirming messages being printed on the operator's console. The RSCS operator can issue the CP command SET IMSG OFF to suppress these informational messages.

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

TRACING FACILITIES

RSCS provides the RSCS operator with two methods of monitoring line activity on the system: the TRACE command and the LOG|NOLOG option of the CMD command.

TRACE COMMAND

The TRACE command provides the RSCS operator with a periodic summary of a link's line activity, printed on the RSCS operator's console. The information consists of three counts, accumulated during the recording period: total line transactions, line transactions ending in a line error condition, and timeouts while waiting for a response from the other station.

The frequency of TRACE messages depends on predefined thresholds that vary according to the type of line driver. For the NPT line driver, the threshold value is 20; for the SML line driver, it is 60. If the ALL operand of the TRACE command is specified, the TRACE message is issued whenever the count of total transactions or the count of timeouts on the line reaches the threshold value. If the ERRORS operand is specified, the TRACE message is issued whenever the count of line errors reaches the threshold value. The line statistics are reset after each TRACE message.

I/O LOGGING

The LOG operand of the CMD command provides the RSCS operator with a log of all I/O transactions that occur on a specified link. The logging output is a printer spool file containing a one-line record for each I/O transaction on the teleprocessing line. A transaction is defined as each time a teleprocessing buffer is sent or received.

Each NPT and SML log record contains:

- Selected teleprocessing buffer contents
- CSW information
- The sense byte
- The CCW associated with the I/O operation

In addition, the SML log record contains:

- The first three bytes of the RSCS synch lock for this operation.

For the format and examples of various log records, see the section "Logging I/O Activity" in Part 5 of the VM/370 System Programmer's Guide.

When logging is turned off via the NOLOG operand or the DRAIN command, the output is automatically printed with a distribution code equal to the linkid that was specified on the CMD command.

SYSTEM SECURITY AND INTEGRITY

The security of the Remote Spooling Communications Subsystem is provided by CP, the control program component of VM/370. CP ensures that all virtual machines operating under VM/370 are isolated from one another. RSCS can only be accessed by those persons authorized by the installation manager. Also, the RSCS supervisor does not execute user programs.

The integrity of user data is provided, in part, by the recovery and restart capabilities of VM/370. Since RSCS utilizes the VM/370 spool system as a hold area for files to be transmitted, the warm start and checkpoint start facilities of VM/370 also apply to RSCS. After a warm or checkpoint start, the RSCS file manager provides, to the line drivers, the functions necessary to restart transmission and reception of files that were active on the link and not yet closed at the time of the system failure that caused the restart. Processing is resumed at the point in the file where previous processing was interrupted.

The accountability for files transmitted by RSCS rests with independent end-to-end acknowledgement procedures that should be established between source and destination locations. If the user feels that the integrity of the system is insufficient for his particular situation, he should store his files on disk before transmitting them. Files should not be purged until the operator or the the user has confirmed that the files have arrived at their destination.

Nonprogrammable Terminal (NPT) Line Driver

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

- Remote users of VM/370 to enter source decks, data, and jobs, on cards, into the VM/370 spool system.
- VM/370 to send spcoled output of virtual machine sessions to remote card punches and printers.
- Remote RSCS 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.

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
- IBM 3780 Data Communications Terminal

Notes:

1. 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.
2. The 3770 keyboard is not supported; however, by using the IRS character, the 3770 keyboard may be used to simulate a card reader.
3. Define the 3770 and 3780 as 2770s.

SUPPORTED FUNCTIONS

NPT is a line driver task operating under the control of the RSCS 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 RSCS operator, identified with a destination name, and provided with a leased or switched telephone line. The communications line is identified either by the operator or derived from a table entry within RSCS. The line is then activated and the type of remote station and its configuration details are obtained from the SIGNON control card entered at the remote station, or from a table entry within RSCS.

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 RSCS 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 an RSCS table or SIGNON card accessed at initialization time. NPT functions are further described as follows:

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

RSCS OPERATOR FUNCTIONS

The RSCS operator controls the initiation and termination of the NPT task. He can control the spool files enqueued upon the RSCS 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 RSCS 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 RSCS and attached to the same VM/370 system.

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.

INPUT/OUTPUT CONTROL

NPT uses the RSCS 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 RSCS supervisor console support facility to write messages to and receive commands and information from the RSCS 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. To the extent that the remote terminal hardware is capable of it, long output files may be interrrupted to allow the card input of data or commands. When the input transmission is completed, output transmission is normally resumed from the point of interruption. For certain terminal types, such as the 3780, output lines that were in the buffer when printing or punching was interrupted will be lost.

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 invalid characters that would force a transparent wait state on a teleprocessing control unit in nontransparency mode.

LINE ALLOCATION

The Line Allocator in the RSCS supervisor allocates an available line to NPT as part of the execution of the RSCS START command. The line has either been designated in the START command, found in the RSCS link table, or selected by the Line Allocator from a pool of switched lines set up at system generation of RSCS. When the NPT task requests termination, the RSCS 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.

STARTING NPT

Before a remote terminal can sign on to NPT, the appropriate task for that link must have been started by the RSCS 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 passwd]                  |
|       |                                |
```

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 RSCS system. If a password is not supplied in the START command or in the RSCS 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: Remote Spooling Communications Subsystem Commands."

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 as the only card from the card reader at the remote terminal. After the signon message has been received at the remote terminal, the remote terminal operator may then enter other commands and data cards. The signon card is usually used only once in a session. In the event of a line drop, the SIGNON card must be reentered 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][LPRT][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:

Terminal	Default
2770	B128
2780	B170
3770	B256
3780	B512

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 this 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 RSCS. If no password was entered in the START command or contained in the RSCS link table, this operand is not required. The keyword, PWD=, is required if passwd is entered; a space may be inserted between the equal sign and the password.

INPUT FILE PROCESSING

The remote terminal submits input to the RSCS 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 station.

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 remote station. The format of this card is as follows:

```
Col 1              10
┌──────────────────────────────────────────┐
│   ID              userid      [tagtext]  │
└──────────────────────────────────────────┘
```

where:

userid
: is the userid of a virtual machine to receive the card deck that follows.

tagtext
: is an optional string of operands consistent with the use of the spool file tag field by RSCS.

If userid is the ID of the RSCS virtual machine, and if tagtext contains a valid RSCS linkid, RSCS transmits the input file to another remote terminal or station.

Note: 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, RSCS spools the punch file to the real punch and the originator is not informed.

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:

Col	Field	Meaning
1	llllllll	File origin location
13	vmvmvmvm	File origin virtual machine
25	mm/dd/yy	File origin date
37	hh:mm:ss	File origin time
55	WAS THE ORIGIN	

REMOTE TERMINAL OPERATOR COMMANDS

The remote terminal operator is allowed to use a subset of the RSCS 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 below, by functional grouping. A complete description of all commands, with detailed format, can be found in "Appendix A. Remote Spooling Communications Subsystem 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 RSCS.

LINK AND LINE CONTROL COMMANDS

The DRAIN Command

Use the DRAIN command to deactivate your link. If the link is currently processing a file, the link is deactivated as soon as the current file is processed. If no file is being processed, the link is deactivated immediately.

If the link is currently logging I/O activity, the DRAIN command will terminate logging and automatically print the log output.

The HOLD Command

Use the HOLD command to temporarily suspend file transmission on your 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 your link, previously in HOLD status.

FILE CONTROL COMMANDS

The CHANGE Command

Use the CHANGE command to alter one or more file attributes of a file enqueued on your link's file queue, and not currently active.

The ORDER Command

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

The PURGE Command

Use the PURGE command to remove all or specified files, enqueued on your link's file queue, 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 your link. The discontinued file is either purged or held, and processing continues with the next file enqueued for transmission on your link. If the COPY attribute for the file specified multiple copies, only that copy currently being processed is flushed, unless you also specify that all copies of the current file be flushed.

The BACKSPAC Command

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

The FWDSPACE Command

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

The START Command (for an active link)

Use the START command to change the classes of files that are processed on your link or to reset a DRAIN operation before it has completed.

COMMUNICATIONS COMMANDS

The MSG Command

Use the MSG command to send a message to the RSCS operator, a local VM/370 user, or to another remote station or terminal.

MISCELLANEOUS COMMANDS

The QUERY Command

Use the QUERY command to request RSCS system status information for a particular link, a specific file, or for the system in general.

NPT MESSAGES

A subset of the RSCS 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: RSCS Message Summary" for a key to the distribution of messages.

MULTI-LEAVING is a term used to describe a communication technique used by the SML line driver operating under RSCS. Basically, physical records that are input to MULTI-LEAVING are reduced to a series of character strings of two basic types: a variable length nonidentical 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 "Appendix B: MULTI-LEAVING" in the VM/370 System Programmer's Guide.

The SML line driver, operating as a task under the RSCS component of VM/370, 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 processors.
- 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 RSCS.
- Remote stations to send job streams to a CMS Batch virtual machine (operating under the same VM/370 as RSCS) and have the output returned to the originating or other remote station.
- Remote stations to submit source decks, data, and jobs, on cards, to another remote location running a HASP or ASP type batch processor.

Throughout this manual the term HASP/ASP refers to the following systems:

HASP II Version 3.1 (360D-05.1.014)
HASP II Version 4 (370H-TX-001)
ASP Version 3.1 (360A-CX-15X)
JES2 Component of VS2 Release 2
JES3 Component of VS2
RES Component of VS1 Release 2 and above

HARDWARE PRODUCTS SUPPORTED

The following systems are supported by SML 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 System/32

When SML 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 RSCS supervisor, functions in one of two modes, specified at the time the line driver task is initialized:

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

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

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

SML 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, determines the protocol to be followed. In HOST mode, SML follows a common protocol for all remote stations. The functional support is described below in the following categories:

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

RSCS OPERATOR FUNCTIONS

The RSCS operator controls the initialization and termination of the SML 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 SML. Using the TRACE command, he can monitor the activity on the communications line and have that data logged on his operator console.

If SML is in RJE mode, the RSCS operator can use the CMD command 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 in RJE mode) its functions with respect to SML are the same as they would be for any other HASP/ASP remote workstation. It accepts job streams for batch processing or commands affecting the processing from SML and directs job output, in punch or printer format, back to SML.

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

- Issue commands to SML 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 SML to and from another remote station supported by RSCS and attached to the same VM/370 system.

VIRTUAL MACHINE USER FUNCTIONS

When SML 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 SML, is directed to the real printer and punch.

When SML 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 enqueued on his virtual machine reader.

INPUT/OUTPUT CONTROL

SML uses the RSCS 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. SML uses the RSCS supervisor console support facility to write messages to and receive commands and information from the RSCS operator.

SML communications I/O comprises five separate operations:

1. Control of the line when the task is idle. When SML 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. Long output files may be interrupted to allow the card input of data or commands. When the input transmission is completed, output

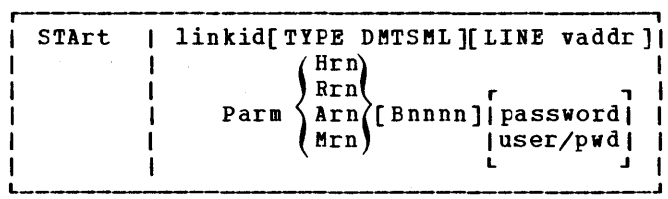
transmission is normally resumed from the point of interruption; deviations from this procedure will be covered in the sections on the individual terminals. Transmission to a remote punch device is performed in transparency mode. Printer files are always translated in order to eliminate invalid characters which would force a transparent wait state on a teleprocessing control unit in nontransparency mode.

LINE ALLOCATION

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

STARTING SML

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



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 indicates that SML operates as a remote job entry system into a remote HASP or JES2 system as remote number rn.

Rrn indicates that SML operates as a remote job entry station into the Remote Entry Subsystem (RES) of VS1 Release 2 as remote number rn.

Arn indicates that SML operates as a remote job entry system into a remote ASP or JES3 system as remote name rn.

Mrn indicate 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 fcllows:

- 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 1- to 8-character password. If the remote system is RES, identification consists of a 1 to 8-character userid followed by a slash character followed by a 1- to 8-character password for a maximum of 17 characters.
- In HOST mode, the identification consists of a 1- to 8-character password that the remote station must supply on its SIGNON card in order to connect to RSCS. 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, see "Appendix A: Remote Spooling Communications Subsystem Commands."

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 RSCS, 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:

```
Col 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 RSCS 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 RSCS.
- Remote terminals submitting card decks, through an NPT line driver with valid tag information in the ID card.
- Remote stations submitting card decks, through an SML line driver operating in HOST mode, with valid tag information in the ID card.

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.

INPUT FILE PROCESSING (HOST MODE)

The remote station submits input to the RSCS 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 station. 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 remote terminal or station. The format of this card is as follows:

```
Col 1       10
┌──────────────────────────────────┐
|  ID  |  userid [tagtext]          |
└──────────────────────────────────┘
```

where:

userid is the userid of a virtual machine to receive the card deck that follows.

tagtext is a string of parameters consistent with the use of the spool file tag field by RSCS.

If the userid is that of the RSCS virtual machine, and if the tagtext contains a valid RSCS linkid, RSCS transmits the input file to the remote terminal or station specified by the linkid.

Note: 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:

Col	Field	Meaning
1	llllllll	file origin location
13	vmvmvmvm	file origin virtual machine
25	mm/dd/yy	file origin date
37	hh:mm:ss	file origin time
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 RSCS commands. In general, the remote operator can issue commands that affect only his specific link. The commands are described below, by functional grouping. A complete description of all commands, with detailed format, can be found in "Appendix A: Remote Spooling Communications Subsystem Commands."

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

LINK AND LINE CONTROL COMMANDS

The DRAIN Command

Use the DRAIN command to deactivate your link. If the link is currently processing a file, the link is deactivated as soon as the current file is processed. If no file is being processed, the link is deactivated immediately.

If the link is currently logging I/O activity, the DRAIN command will terminate logging and automatically print the log output.

The HOLD Command

Use the HOLD command to temporarily suspend file transmission on your 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 your link, previously in HOLD status.

FILE CONTROL COMMANDS

The CHANGE Command

Use the CHANGE command to alter one or more file attributes of a file enqueued on your link's file queue, and not currently active.

The ORDER Command

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

The PURGE Command

Use the PURGE command to remove all or specific files enqueued on your link's file queue 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 your link. The discontinued file is either purged or held, and processing continues with the next file enqueued for transmission on your link. If the COPY attribute for the file specified multiple copies, only the copy currently being processed is flushed, unless you also specify that all copies of the current file be flushed.

The BACKSPAC Command

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

The FWDSPACE Command

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

The START Command (for an active link)

Use the START command with the CLASS operand to change the classes of files that are processed on your link or to reset a DRAIN operation before it has completed.

COMMUNICATIONS COMMANDS

The MSG Command

Use the MSG command to send a message to the RSCS operator, a local VM/370 user, or to another remote station or terminal.

MISCELLANEOUS COMMANDS

The QUERY Command

Use the QUERY command to request RSCS system status information for a particular link, a specific file, or for the system in general.

SML MESSAGES

A subset of RSCS 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: RSCS Message Summary."

Part 3. Nonprogrammable Remote Terminals

Part 3 contains operational information for each of the following remote nonprogrammable terminals supported by the NPT line driver operating under RSCS:

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

SUPPORTED CONFIGURATION

The IBM 2770 Data Communication System with the 2772 Multipurpose Control Unit (hereinafter called 2770) can be used as an NPT remote terminal. It can be connected to RSCS via a switched or leased point-to-point communication line.

The following devices and features 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 3590 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 RSCS is the same for all nonprogrammable terminals and is covered in "Part 2. Components of RSCS" under "Starting NPT" and "Signing on to NPT."

During all 2770 terminal sessions with NPT, the 2770 console switches should be set as follows:

Switch	Setting
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
MONITOR PRINT	as desired by installation, normally 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 COMMANDS

The remote terminal operator submits commands to RSCS 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, PROCEED, BID, SELN 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 RSCS 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 RSCS, normal line activity will resume. If receiving, activity will restart from the point of interruption. If transmitting, you can either restart 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, RSCS 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 RSCS 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 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 RCSC 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 RSCS virtual machine. Ask the RSCS 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.

SUPPORTED CONFIGURATION

The IBM 2780 Data Transmission Terminal, Models 1 and 2, used as NPT remote terminals, can be connected to RSCS via a switched or leased point-to-point line. EBCDIC Transmission, feature code 9762, is

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 RSCS is the same for all nonprogrammable terminals and is covered in "Part 2. Components of RSCS" under "Starting NPT" and "Signing on to NPT."

After having established the connection with RSCS, 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 RSCS 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 RSCS 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 RSCS, normal line activity will resume. If receiving, activity will restart from the point of interruption. If transmitting, you can either restart 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, RSCS 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 RSCS 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 RSCS operator either to restart the task, in order to send the correct SIGNON card, or to change the recorded configuration in the RSCS 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

There is a mechanical malfunction of the punch.

1. Press NPRO to run out the cards in the feed mechanism and discard them.
2. 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.

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 RSCS 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 IBM 2701, or an IBM 3704/3705 Communications Controller.

The 3770 keyboard is not supported; however, by using the IRS character, the 3770 keyboard can be used to simulate a card reader.

The following devices and features 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 IBM 2502 Card Reader, Model A1, A2, or A3; IBM 3501 Card Reader or IBM 3521 Card Punch with the Read feature installed.

The 3774 and 3775 programmable terminals are supported only for console printer output and for input (in card image format) from the diskette or keyed in from the keyboard. 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 standard on a 3770 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 BPS)
- WACK response
- Vertical form control
- Device selection
- Expanded print line (132 positions)
- Transmit/receive monitor print (the 2770 prints only after it receives positive acknowledgement from the line. The 3770 always prints.)

Other supported equipment and features are as follows:

- One IBM 3521 Card Punch
- One IBM 3784 Line Printer (standalone)
- Space compression/expansion
- Magnetic disks (#4901, 4902)

If installed, the magnetic disk 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 Console 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 console 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 RSCS is the same for all nonprogrammable terminals and is discussed in "Part 2. Components of RSCS" 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 Communication Terminals
Order No. GA27-3100

IBM 3774 and 3775 Communication Terminals
Order No. GA27-3094.

IBM 3776 Communication Terminal,
Order No. GA27-3107

IBM 3777 Communication Terminal,
Order No. GA27-3124.

ENTERING COMMANDS

The remote terminal operator submits commands to RSCS 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

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 position 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 RSCS 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 RSCS, normal line activity will resume. If receiving, activity will restart from the point of interruption. If transmitting, you can either restart 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, RSCS 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 RSCS 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.

SUPPORTED CONFIGURATION

The IBM 3780 Data Communications Terminal, used as an NPT remote station, can be connected to RSCS 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 IBM 3781 Card Punch
- Component Selection (1601, required for the 3781)
- EBCDIC Transparency (3601)
- Additional Print Positions (5701)
- Synchronous Clock (7705)

3780 OPERATIONAL NOTES

Establishing the connection with RSCS is the same for all nonprogrammable terminals and is covered in "Part 2. Components of RSCS" under "Starting NPT" and "Signing on to NPT".

During 3780 operations with NPT certain 3780 console switches should be set as follows:

Switch	Setting
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 RSCS 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 an 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 RSCS 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 RSCS, normal line activity will resume. If receiving, activity will restart from the point of interruption. If transmitting, you can either restart 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, RSCS 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 RSCS 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
BUFFER 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. Run out the cards in the feed mechanism and discard them. 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.

Part 4. Spool MULTI-LEAVING Remote Stations

Part 4 contains operational information for each of the following remote programmable MULTI-LEAVING stations supported by the SML line driver operating in HOST mode under RSCS:

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 RSCS 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."

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 RSCS 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 RSCS 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 RSCS.
- Queues blocked records for transmission to RSCS.

OUTPUT FUNCTIONS

HASP/RTP360 provides the following output functions at the remote station:

- Dequeues blocked records received from RSCS.
- 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 RSCS.
- Dequeues blocked input requests and transmits them to RSCS (upon request from RSCS).
- Provides backlog status flags, indicating the station's ability to receive the various output streams from RSCS.
- Receives output from RSCS 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 RSCS 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 (IPL)

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 RSCS 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 RSCS. HASP/RTP360 waits while communications are established with RSCS.

ESTABLISHING A COMMUNICATION LINE

The procedures for establishing communications with RSCS are as follows:

1. Ready the data set. This involves different actions, based on the type of data set. Readying 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 RSCS 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 RSCS 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 RSCS operator has not given the necessary command to authorize use of that communication line. Contact the RSCS operator and request that he issue the START command for your link.

2. When requested by RSCS, HASP/RTP360 begins the initial control sequence.

3. When the initial sequence is complete, the sign-on information is transmitted to RSCS. HASP/RTP360 "handshakes" with RSCS until the processing of job streams actually begins.

OUTPUT PROCESSING

The printing and punching of remote output is handled automatically by the RSCS - HASP/RTP360 system, except as controlled by the remote station operator or RSCS operator, via commands to RSCS.

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 a 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 RSCS.

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 RSCS.

4. Output error recovery -- attempting to recover from punch errors.

All 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 RSCS 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 RSCS 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 is as 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 commands entered into the 1052 operator's console via the keyboard are transmitted to RSCS for action. Although all commands transmitted to RSCS are listed on the RSCS 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.

ENTERING COMMANDS FROM CARDS

To send commands to RSCS 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 RSCS 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, 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 EOB control card consists of the characters "EOB" in card columns 2-4. It is used instead of the /*SIGON card when the default /*SIGNON card, assembled into the HASP/RTPSYS3 deck, is not to be overridden.

TERMINATING A SESSION

To terminate remote processing, the remote station operator should enter a DRAIN command or a /*SIGNOFF card which prevents RSCS 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 BSCA enters a check condition. For nonswitched lines, RSCS 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 console STOP.

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 RSCS 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 RSCS 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 4 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 RSCS 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 5).
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, RSCS is signaled to restart the job.
02000000	Negative reply received. A transmission block was not correctly received by RSCS.	The bad record is retransmitted.
03rrrr00	Unknown response received. An unrecognizable control character was received from RSCS. rrrr = first two characters received (if rrrr is correct sequence, ending sequence was bad).	RSCS is requested to retransmit the record.
04000000	Unit exception. Indicates receipt of an EOT character from RSCS (EOT is not utilized in MULTI-LEAVING).	RSCS 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, RSCS 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 4. HASP/RTP360 Communication Adapter Error Messages

Message	Description	Program Action
05ss0aaa	Unit check. Device with address "aaa" has unit check error described by sense byte "ss" and/or indicator lights on the device console. Sample sense byte settings: 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	 Wait for operator. Treat as data check. Depending on device: ignore, retry, or wait for operator. Ignore.
06cc0aaa	Unusual end. Previous I/O came to an unusual end. IBM customer engineer should be consulted. cc = CSW byte 5 aaa = device address	Treat as data check.
Note: 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.		

Figure 5. HASP/RTP360 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 support personnel of the malfunction, save material that can be used to determine the source of the failure, and prepare to restart the station as follows:

1. Notify the RSCS operator of the failure and, if necessary, request his assistance in preparing for restart.
2. Determine, from the RSCS operator's record, which deck was currently being transmitted to RSCS. The input stream, starting with that current deck, must be submitted to RSCS after restart.
3. Determine the loss of data on the output devices and inform the RSCS operator to backspace or restart the printer or punch, as necessary. (The RSCS 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.

IBM System/360 Model 20 and IBM 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 RSCS 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 RSCS remote station.

The following unit record devices are supported in any combination:

- IBM 2501 Card Reader
- IBM 2520 Card Read Punch
- IBM 2560 Multifunction Card Machine
- IBM 1442 Card Punch
- IBM 1403 Printer
- IBM 2203 Printer
- IBM 2152 Printer-Keyboard

Messages from the RSCS operator are sent to the System/360 Model 20 console when one is on line; however, when there is no console, the messages are sent to the Model 20 printer provided the printer is not busy. The RSCS operator messages are lost when there is no Model 20 console and the printer is busy. RSCS is unable to determine whether or not the Model 20 has a console or the state of the printer.

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 RSCS 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 for the IBM System/360 Model 20 and the IBM 2922 Programmable Terminal 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 RSCS 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 RSCS.
- Queues blocked records for transmission to RSCS.

OUTPUT FUNCTIONS

HASP/RTPM20 provides the following output functions at the remote station:

- Dequeues blocked records received from RSCS.
- 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 RSCS.
- Dequeues blocked input requests and transmits them to RSCS (upon request from RSCS).
- Provides backlog status flags, indicating the station's ability to receive the various output streams from RSCS.
- Receives output from RSCS 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 RSCS 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 RSCS environmental recording error printout (if the contents of main storage remain unchanged since the last time the program was run).
10. The BSCA indicator lights should show periodic transmit and receive activity.
11. The remote station is now ready to communicate with RSCS.

ESTABLISHING A COMMUNICATION LINE

The procedures for establishing communications with RSCS are as follows:

1. Ready the data set. This involves

different actions, based on the type of data set. Readying nonswitched lines only requires that the data set DATA pushbutton be pressed, if present. To ready a dial line data set, perform the following:

a. Press the TALK pushbutton, and lift the receiver off the data set.

b. Dial the assigned number for the remote station.

c. If the RSCS 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 RSCS 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 RSCS operator has not given the necessary command to authorize use of that communication line. Contact the RSCS operator and request that he issue the START command for your link.

2. When requested by RSCS, HASP/RTPM20 begins the initial control sequence.

3. When the initial sequence is complete, the sign-on function is transmitted to RSCS. HASP/RTPM20 "handshakes" with RSCS until the processing of job streams actually begins.

OUTPUT PROCESSING

The printing and punching of remote output is handled automatically by the RSCS - HASP/RTPM20 system, except as controlled by the remote station operator or RSCS operator, via commands to RSCS.

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 stream.

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 Card Read Punch 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 RSCS.

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 RSCS 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 RSCS 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 RSCS 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 RSCS. The operator should always press STOP on the combination 2560 prior to loading the input stream in the primary feed hopper since HASP/RMTM20 cycles the feed mechanism when it tests for input stream cards.

ENTERING COMMANDS

RSCS 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 RSCS for action. Although all commands transmitted to RSCS are listed on the RSCS 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 6 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 6. HASP/RTPM20 Local Commands

The operator should perform the following steps when entering commands:

1. Press the REQ pushbutton that is located to the right of the console typewriter keyboard. The request indicator (indicator marked "R" at the right of the REQ pushbutton) 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.

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.

ENTERING COMMANDS FROM CARDS

To send commands to RSCS 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 RSCS 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, 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 overriden.

TERMINATING A SESSION

To terminate remote processing, the remote station operator should enter a DRAIN command or /*SIGNOFF card indicating that RSCS 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, RSCS 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 console STOP.

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 RSCS 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 RSCS 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 7 indicates each possible communication error, its meaning, and the recovery action taken.

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, RSCS is signaled to restart the stream.
02000000	Negative reply received. A transmission block was not correctly received by RSCS.	The bad record is retransmitted.
03rrrr00	Unknown response received. An unrecognizable control character was received from RSCS. rrrr = first character received (if rrrr is in correct sequence, ending sequence was bad).	RSCS 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 RSCS in three seconds) A0 = transmission error C0 = ECT received	The failing operation is retried. If a write operation was in progress at the time of the error, the write is reissued; otherwise, RSCS is requested to retransmit.

Figure 7. HASP/RTPM20 Communication Adapter Error Messages

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
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 8 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 8).
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.

Device-Function	Action with Console	Action without Console
2501, 2520, 2560 - read	1. Display error message[1]. 2. Wait for .SR1 command. 3. Read.	1. STOP with device address in in ESTR register[2]. 2. Reread wher CPU started.
1442 - punch	1. Display error message[1]. 2. Wait for .SU1 command. 3. Repunch record in error.	1. STOP with device address in ESTR register[2]. 2. When CPU started, repunch record in error.
2520, 2560 - punch	1. Select out card in error. 2. Repunch record in error.	1. Select out card in error. 2. Repunch record in error.
2203, 1403 - print	Ignore error.	Ignore error.
2152 - write	1. Ignore first error. 2. Wait on next attempt to use device[3].	Not applicable.
2152 - read	1. Initiate reread. 2. Wait on next attempt to use device[3].	Not applicable.

[1]Error messages are of the form: 0500000a 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 8. HASP/RTPM20 Action on Unit Record I/O Execution Errors

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 support personnel of the malfunction, save material that may be of use in determining the source of the failure, and prepare for restarting the station, as follows:

1. Notify the RSCS operator of the failure and, if necessary, request his assistance in preparing for restart.
2. Determine the current job that was being transmitted to RSCS. (The RSCS operator has a record of the deck currently being submitted to RSCS.) The input stream, starting with that current deck, must be resubmitted to RSCS after restart.

3. Determine the loss of data on the output devices and inform the RSCS operator to backspace or restart the printer or punch, as necessary. (The RSCS 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.

The IBM System/3 Models 6, 8, 10, 12, and 15, and the IBM System/32 are supported as remote work stations by RSCS.

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 an RSCS MULTI-LEAVING remote station.

CONFIGURATION SPECIFICATIONS

The System/3 Model 10, with the following features, is supported as a RSCS remote MULTI-LEAVING workstation.

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 the 5203 Printer
- Any type or speed transmission line available for the System/3

Recommended features are:

- 24 or 36 extra print positions on the 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

There is a special program for the IBM System/3 Model 10 card system 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 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 RSCS 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 RSCS.
- Queues blocked records for transmission to RSCS.

OUTPUT FUNCTIONS

HASP/RTPSYS3 provides the following output functions at the remote station:

- Dequeues blocked records received from RSCS.
- 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 RSCS.
- Dequeues blocked input requests and transmits them to RSCS (upon request from RSCS).
- Provides backlog status flags, indicating the terminal's ability to receive the various output streams from RSCS.
- Receives output from RSCS 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 to be read.

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 RSCS 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 RSCS. The RSCS operator should already have issued the RSCS 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 RSCS.

If the communication line is switched, pick up the data set's telephone handset and depress the data set's TALK pushbutton. Dial the proper telephone number and listen for the ring. When the ring is answered (automatically by RSCS) you will hear a high-pitched tone, followed by silence. Press the data set's DATA key and hang up the handset. The System/3 initiates communications with RSCS 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 RSCS operator did not start the correct line. In the latter case, contact the RSCS 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 RSCS, printing starts automatically. When a user's printed output is complete, RSCS 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 LC; otherwise, it assumes character arrangement PN.

2. At initial program load time, the system sets the number of print lines per page to 66 (this 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 RSCS to start sending a job stream. When the system receives permission from RSCS, it continues reading cards and sending them to RSCS.

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 RSCS 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:

Condition	Stacker
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 RSCS 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 pushbutton 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 pushbutton 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 pushbutton 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 RSCS commands described previously under "Remote Station Operator Commands."

ENTERING COMMANDS FROM THE 5471 PRINTER-KEYBOARD

To type a command to RSCS, 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 RSCS, where it is executed (if valid) and printed along with the remote station number on the RSCS 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 RSCS, 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 RSCS. 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 RSCS 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 RSCS 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:

C0DE0000 Command completed satisfactorily

C0DE0001 Syntax error in command

C0DE0002 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 L= 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 RSCS 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, RSCS disconnects when all currently operating functions are complete. If you sign off before RSCS has started printing or punching some, or all of your files, RSCS 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 RSCS 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 pushbutton 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:

Device	uu
BSCA	00
1442	05
5203	0E
5424	0F

COMMUNICATION ADAPTER ERRORS

The communication technique used by RSCS 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 9, 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 RSCS.	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 RSCS, 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 9. HASP/RTPSYS3 Communication Adapter Error Messages

5424 Multi-Function Card Unit (MFCU)

The only MFCU error message generated is:

05ssss0F

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.

Code	Meaning
PRI	The primary (rightmost) card hopper needs attention
SEC	The secondary (leftmost) card hopper needs attention

The system attemps 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 05ssss0E, 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 05ssss05, 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 support personnel of the malfunction, save material that may be useful in determining the source of the failure, and prepare for restarting the station as follows:

1. Notify the RSCS operator of the failure and, if necessary, request his assistance in preparing for restart.
2. Determine the current deck that was being transmitted to RSCS. (The RSCS has a record of the current deck being submitted to RSCS.) The input stream starting with the current job must be submitted to RSCS after restart.
3. Determine the loss of data on the output devices and inform the RSCS operator to backspace or restart the printer or punch as necessary. (The RSCS link should be made available for a 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.

The following section contains instructions for operating an IBM 1130 System, equipped with a Binary Synchronous Communications Adapter, as a RSCS 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 RSCS 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 RSCS can be viewed as a logical extension of the VM/370 spool system. This program (HASP/RPT1130) 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 RSCS.
- Queues blocked records for transmission to RSCS.

OUTPUT FUNCTIONS

HASP/RTP1130 provides the following output functions at the remote station:

- Dequeues blocked records received from RSCS.
- 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 RSCS.
- Dequeues blocked input requests and transmits them to RSCS (upon request from RSCS).
- Provides backlog status flags, indicating the terminal's ability to receive the various cutput streams from RSCS.

- Receives output from RSCS 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 RSCS 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 RSCS 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 pushbutton be pressed. To ready a dial line data set, perform the following:
   a. Press the TALK pushbutton and lift the receiver on the data set.
   b. Dial the assigned number for the remote station.
   c. If the RSCS 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 RSCS 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 RSCS operator has not given the necessary RSCS command (START) to authorize use of that communication line. Contact the RSCS operator and request that he issue the START command for your link.
2. When the data set is ready, the BSC 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 RSCS 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 RSCS operator via commands to RSCS.

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 RSCS results in the destruction of data in the input cards.

ENTERING COMMANDS

RSCS 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 RSCS for action. Although all commands transmitted to RSCS are listed on the RSCS operator's console, only those designated as being available to the remote user are acted upon.

ENTERING COMMANDS FROM CARDS

To send commands to RSCS 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 RSCS 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, whether decks, commands, or just a /*SIGNOFF card is being read. This card may optionally be used on the 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.

ENTERING RSCS COMMANDS

The remote station operator should perform the following steps when entering RSCS commands:

1. Press the INT REQpushbutton 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 RSCS 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 processor STOP. 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 steps required for recovery.

COMMUNICATIONS ADAPTER ERRORS

Due to the design of the synchronization technique for RSCS 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 10.

Message	Meaning	Action Taken
FFrree00	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 timeout while attempting to synchronize an initial sequence.	SML is requested to retransmit the record.
04dddd00	Received timeout 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 beccme 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.
0ddddD00	No pad character following NAK.	SML is requested to retransmit the record.
Note: dddd = device status word received for the Synchronous Communication Adapter		

Figure 10. 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 RSCS Environmental Recording Error Printout Table and are displayed immediately on the 1052 operator's console.

When the error message is printed the operator should do the following:

1. Determine which device is in error (see Figure 11).
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	Unit check. Device with address "aaa" has unit check error described by sense byte "ss" and/or indicator lights on the device console. Sample sense byte settings: 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	 Wait for operator. Treat as data check. Depending on device: ignore, retry, or wait for operator. Ignore.
06cc0aaa	Unusual end. Previous I/O came to an unusual end. IBM customer engineer should be consulted. cc = CSW byte 5 aaa = device address	Treat as data check.
Note: 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.		

Figure 11. 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 support personnel of the malfunction. He should also save material that may be of use in determining the source of the failure and prepare for restarting the station, as follows:

1. Notify the RSCS operator of the failure and, if necessary, request his assistance in preparing for restart.

2. Determine the current deck being transmitted to RSCS. (The RSCS operator has a record of the current deck being submitted to RSCS.) The input stream, starting with that current deck, must be submitted to RSCS after restart.

3. Determine the loss of data on the output devices, and tell the RSCS operator to backspace or restart the printer or punch, as necessary. (The RSCS 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 sessicn 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 12 and 13 describe the unusual conditions that may occur in conjunction with RTPBOOT and RTPLOAD.

Condition Indication	Condition Description	Operator Action
System loop at location 'AA' with IAR displayed at location 'AB'.	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 IAR displaying location 'AF'. AC contains card code value of column in error. XR2 contains 2s complement of card column in error.	RTPBOOT detected illegal EBCDIC punch in RTPLOAD card just read, or the last four cards of RTPBOOT contain an illegal EBCDIC punch.	Loading of RTPLOAD is permanently terminated. Note card being processed, and contact system programmer or lead operator about problem.

Figure 12. 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'.	RTPLOAD-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 13. HASP/RTP1130 Loading Errors (RTPLOAD)

LOCAL MESSAGE SUMMARY

Messages that are printed on the console typewriter originate from the RSCS system or are generated by HASP/RTP1130, in conjunction with the station operation. Messages from RSCS 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 14 along with a detailed explanation of each message.

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. CAUTION: The RSCS 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 RSCS 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 14. IBM 1130 Local Messages

The RSCS virtual machine, through the use of an SML line driver operating in RJE mode, can perform the functions of a HASP or ASP type workstation. In this capacity, RSCS accepts job files that are either spooled to it by VM/370 virtual machines or received from RSCS 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 host 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 RSCS, can be used as a remote job entry station to access a HASP or ASP type 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 Conroller in emulation mode only

SML AS THE REMOTE TERMINAL PROCESSOR (RTP) PROGRAM

In order for a system or device to function as a HASP or ASP type 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 RJE mode, provides these functions for RSCS 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 RSCS virtual machine:

- Accesses job files received by RSCS from VM/370 virtual machines or remote stations.
- Accepts HASP or ASP commands entered at the RSCS 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 RSCS 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 RSCS operator's console.

OPERATING PROCEDURES

With the exception of the initialization and sign-on procedure, the operation of RSCS as a HASP or ASP workstation is similar to that described under the section "IBM System/370 as a Remote Station." Workstation procedures are also contained in the OS/VS2 HASP II Version 4 Operator's Guide.

STARTING THE SML LINE DRIVER

Once the RSCS virtual machine is logged on and the RSCS component is loaded, the RSCS 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 ca be issued as follows:

```
                  ┌   ┐
                  |Hrn|
START linkid Parm |Rrn| Bnnnn passwd
                  |Arn|
                  └   ┘
```

A description of the START command operands, including those that override previous definitions, can be found in the section "Starting SML" in "Part 2. Components of RSCS."

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 RSCS 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, rn is a five alphameric character name and the entry could look like: ANEWYK, ABURL5, 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 RSCS operator should perform the following:

1. Press the TALK pushbutton, and lift the receiver off the data set.
2. Dial the assigned number for the remote system.
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 command 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 ONTO THE REMOTE SYSTEM

The SML line driver builds a SIGNON record from the information contained in the RSCS 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.

Appendixes

- Appendix A: Remote Spooling Communications Subsystem Commands
- Appendix B: RSCS Message Summary

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 VM/370 commands can be entered with any combination of upper and lowercase letters.) The example below shows the format specification for the BACKSPAC command.

   ```
   BAckspac
   ```

   This representation means that BA, BAC, BACK, BACKS, BACKSP, BACKSPA, and BACKSPAC are all valid specifications for this command name.

   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.

   Abbreviations are shorter forms of command names, operands, and options. Abbreviations for command names are shown below the full name in the format box. Abbreviations for operands and options are shown in the description of the individual operands and options that follows the format box. For example, the operand READER has both a minimum truncation and an abbreviation. In the format box it is shown as:

   ```
   Reader
   ```

   indicating that the minimum truncation is R. In the discussion of the READER operand that follows, it is shown as:

   ```
   READER
   RDR
   ```

   indicating that the abbreviation is RDR. Thus, the acceptable specifications for the READER operand are: R, RE, REA, READ, READE, READER, and RDR.

   In some cases what appears to be a minimum truncation is really the only valid abbreviation. For example, the abbreviation for MEMBER is MEM. Only these two forms are valid and no truncations are allowed. The format box contains

   ```
   MEMBER {name}
          {  *  }
   ```

   and the description that follows the format box is

   ```
   MEMBER {name}
   MEM    {  *  }
   ```

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 BURLNGTN, CAMBRDGE, or HOUSTON.

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 either A, or 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

   indicates that you may enter A, or 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.

GENERAL COMMAND USAGE

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

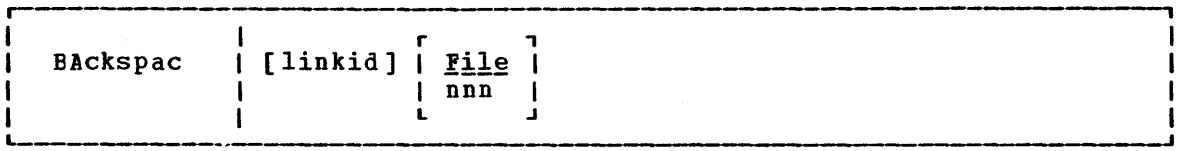
- CMD, DEFINE, DELETE, DISCONN, and TRACE can be issued only by the RSCS operator.
- START has limited capabilities when issued by a remote station operator (see command description).
- Commands, issued by a remote station operator, affect only the status of that station's link. With the exception of 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 RSCS 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 uppercase letters.

RSCS COMMANDS

This section describes the commands used in the RSCS environment.

The BACKSPAC command causes the current file being processed to be restarted or repositioned backward. The format of the BACKSPAC command is:



where:

linkid — is the 1- to 8-character link identifier for the link on which the current file being processed is to be repositioned. If the command is issued by the RSCS 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 processed 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.

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:

```
                                                                    [1]
 CHange     [linkid] spoolid  PRIority    nn
                              CLass       c
                              COpy        nn
                              [Hold   ]
                              [Nohold ]
                              DIst        distcode
                              Name {fn [ft]}
                                   {dsname }
```

[1] One of these operands must be chosen; however, more than one may be specified. They may be combined in any order except for NAME, which, if specified, must be the last entry in the command line.

where:

linkid — is the 1- to 8-character link identifier for the link on which the file to be changed is enqueued. If the command is issued by the RSCS 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 1-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 command 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 1- to 8-character identification to be associated with the file.

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

For RSCS Operator Only

The CMD command is available only to the RSCS operator. Used with the LOG and NOLOG keywords, it controls the logging of I/O activity on a specified link. When issued with a text operand, it passes the text data to the line driver for the specified link. The latter is available only when RSCS is functioning as a remote job entry station, and provides a mechanism by which the operator can exercise allowable control over functions performed by a remote system. The format of the CMD command is:

where:

linkid — is the 1- to 8-byte link identifier of the link whose active line driver is to receive the specified text line or whose line I/O activity is to be logged.

text — is an arbitrary string of alphameric characters comprising the text line to be presented to the specified link's line driver. 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 linkid.)

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 same function also occurs when the DRAIN command is issued for a link that has I/O logging in effect.

For RSCS Operator Only

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

Note: In order to temporarily add new links via the DEFINE command, blank link definitions (GENLINK macro entries) must have been specified when the RSCS system was generated.

The format of the DEFINE command is:

DEFine	linkid	CLass	c
		KEEP	holdslot
		LINE	vaddr
		TASK	name
		TYPE	driverid

[1] One of these operands must be specified; however, more than one may be entered.

where:

linkid — is the 1- to 8-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 that may be processed by the active link. c can be either an asterisk (*), meaning that all file classes may be processed, or from one to four file 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 0 to 16. 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 1- to 4-character alphameric 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 1- to 8-character name of the line driver to be used (DMTNPT or DMTSML). 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, this operand must be specified or an error condition is indicated.

DELETE

For RSCS Operator Only

The DELETE command causes a previously defined link to become temporarily undefined. Permanent deletion of a link can only be made as part of the system generation procedure. 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 1- to 8-byte link identifier for the link that is to be undefined.

DISCONN

For RSCS Operator Only

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

```
| DISConn | [ userid ] |
```

where:

userid — is the 1- to 8-character ID for the virtual machine that is to receive subsequent RSCS operator console output lines.

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.

Note: If the specified link has I/O logging in effect, it is terminated and the automatic printout of the log data is initiated.

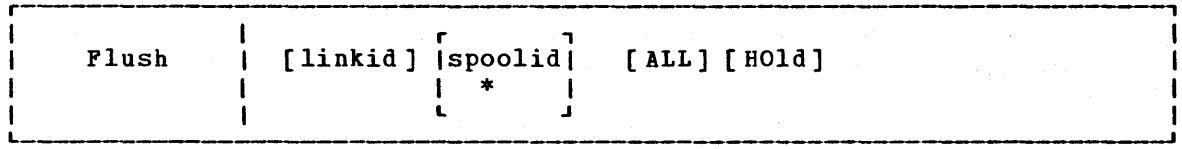
The format for the DRAIN command is:

```
| DRain | [linkid] |
```

where:

linkid — is the 1- to 8-character link identifier for the link that is to be deactivated. If the command is issued by the RSCS operator, this operand must be specified; if issued from a remote station, it must be omitted.

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



where:

linkid — is the 1- to 8-character link identifier for the link on which the file to be FLUSHed is being processed. If the command is issued by the RSCS 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 that 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 processed 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 processed 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 processed 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.

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 previously been suspended through the use of the HOLD command. The format for the FREE command is:

```
| FRee | [linkid] |
```

where:

linkid — is the 1- to 8-byte link identifier for the link on which file transmission is to be resumed. If the command is issued by the RSCS operator, this operand must be specified; if issued from a remote station, it must be omitted.

FWDSPACE

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

```
| FWdspace | [linkid] [ nnn ] |
```

where:

linkid — is the 1- to 8-character link identifier for which the current file being processed is to be repositioned. If the command is issued by the RSCS 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 that 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.

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 1- to 8-character link identifier of the link for which file transmission is to be suspended. If the command is issued by the RSCS 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.

MSG

The MSG command causes the message text typed by the operator, or entered via the card reader at a remote station, to be made available to the line driver for the specified link or to RSCS itself. The difference between the MSG command and the CMD command is that the variable text entered by the operator is a message to an operator or user in the former case, and can be a remote system command in the latter case. The format of the MSG command is:

```
| Msg | linkid [userid] msgtext |
```

where:

linkid — is the 1- to 8-character link identifier of the link whose active line driver is to receive the specified text line. If the message is for a local VM/370 user or for the RSCS operator, this operand is specified as the location identifier of the RSCS virtual machine.

userid — is the 1- to 8-character user identification of the virtual machine that is to receive the message. This operand must be specified if the message is destined for a local VM/370 user or the RSCS operator. It should be omitted if the message is being sent to a remote location. When the message is being sent to the RSCS operator, the userid may be "*" or "RSCS."

msgtext — is an arbitrary string of alphameric characters comprising the text line to be presented to the specified link's line driver. The maximum length of the character string is 120 characters.

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 1 to 8-byte link identifier for the link on which the file queue is to be reordered. If the command is issued by the RSCS operator, this operand must be specified; if issued from a remote station, it must be omitted.

spoolid1 [spoolid 2 ...]
: specifies the affected files, and defines the new order in which they are to be enqueued.

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 processing. The format of the PURGE command is:

```
| PURge | [linkid] { ALL                          }
|                  { spoolid1 [spoolid2 ...]      }
```

where:

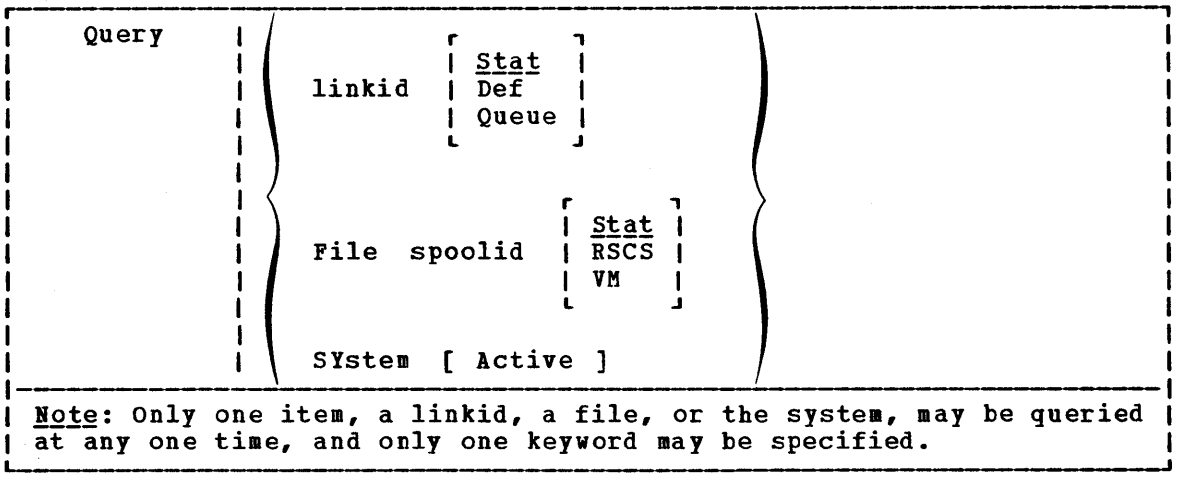
linkid
: is the 1- to 8-byte link identifier for the link on which the files to be removed are enqueued. If the command is issued by the RSCS operator, this operand must be specified; if issued from a remote station, it must be omitted.

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

spoolid1 [spoolid2 ...]
: specifies the particular file(s) to be removed from the system.

The QUERY command is used to display linkid, file, or system status information. If the command is issued by the RSCS operator, the response is directed to the RSCS 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 B: RSCS Message Summary." The format of the QUERY command is:



where:

linkid STAT — requests information pertaining to the active attributes and status of the link specified by the 1- to 8-character linkid. (See the text of messages DMTCMX651I and DMTCMX652I.)

linkid DEF — requests information pertaining to the defined default attributes of the link specified by the 1- to 8-character linkid. (See the text of message DMTCMX653I.)

linkid QUEUE — requests a list of brief descriptions of each file enqueued for transmission, in the current queue order, on the link specified by the 1- to 8- character linkid. (See the texts of messages DMTCMX654I and DMTCMX655I.)

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

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

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

SYSTEM	requests brief descriptions of each link currently defined in the system. (See the texts of messages DMTCMX670I, DMTCMX671I, DMTCMX672I, and DMTCMX673I.)
ACTIVE	is a qualifier used with the SYSTEM keyword to request that only information pertaining to active links is to be listed.

The START command, issued by the RSCS operator, can cause a specified inactive link to be activated. It can also be used by either the RSCS 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  │                      │
│              │              └                  ┘                      │
├──────────────────────────────────────────────────────────────────────┤
│ Note: Any combination of keywords with assorted options may be       │
│ entered in any order, except that the Parm keyword must be the       │
│ rightmost keyword if it is entered.                                  │
└──────────────────────────────────────────────────────────────────────┘
```

where:

linkid — is the 1- to 8-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 RSCS 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 an asterisk (*), meaning that all file classes may be processed, or from one to four file 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 that is to be used by the newly activated link. The value specified overrides a device address that 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, that overrides the name that may have been previously defined for the link. name is a 1- to 4-character alphameric 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.

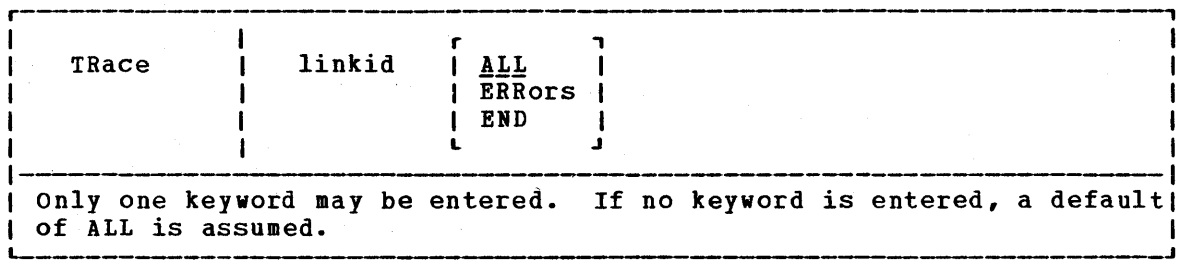
TYPE driverid designates the name of the line driver that is to be used for the link to be activated. driverid is a 1- to 8-character name of the line driver to be used with the newly activated link and must have been defined during RSCS generation. This keyword option is valid only when activating an active link. The line drivers supplied with RSCS are DMTNPT for nonprogrammable terminals and DMTSML for spool MULTI-LEAVING stations. This specification overrides the driver name that may have been previously defined for the link.

Note: If no driver 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 "Starting NPT" and "Starting SML" in "Part 2. Components of RSCS."

For RSCS 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 "Appendix B: RSCS Message Summary.") The purpose of this function is to provide operator assurance that the line service is functioning properly. The format of the TRACE command is:



where:

linkid — is the 1- to 8-byte link identifier of the link for which activity tracing is to be initiated or terminated.

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

ERRORS — is a keyword which specifies that the link's line driver is to report only line error events in a standard format.

END — is a keyword which specifies that the link's line driver is to cease reporting line activity.

Appendix B: RSCS Message Summary

RSCS messages are issued in response to commands and spontaneously during system execution. Messages issued in response to commands are issued to the command originator and, in certain cases, to the RSCS local operator. Spontaneous messages are issued to the RSCS 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.

The message codes listed conform to VM/370 standards. The first three characters (DMT) denote the RSCS component of VM/370. The next three characters denote the module origin of each message; the possible codes are REX, CMX, AXS, INI, NPT, and SML. 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 is 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 messsage
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:

RSCS - RSCS local operator's conscle
ORIG - Command originator
VMID - Virtual machine user
CPOP - VM/370 CP operator

RSCS SPONTANEOUS MESSAGES

RSCS	ORIG	VMID	CPOP	RSCS Spontaneous Messages
X				DMTREX000I RSCS (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				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 -- RSCS SHUTDOWN
X		X		DMTREX091T INITIALIZATION FAILURE -- RSCS SHUTDOWN
	X			DMTAXS101I FILE spoolid ENQUEUED ON LINK linkid
	X			DMTAXS102I FILE spoolid PENDING FOR LINK linkid
	X			DMTAXS103E FILE spoolid REJECTED -- INVALID DESTINATION ADDRESS
X	X			DMTAXS104I FILE SPOOLED TO userid2 -- ORG locid1 (name1) mm/dd/yy hh:mm:ss
X				DMTAXS105I FILE spoolid PURGED
X				DMTAXS106I FILE spoolid MISSING -- DEQUEUED FROM LINK linkid
X				DMTAXS107I nn PENDING FILES FOR LINK linkid MISSING
X		X		DMTxxx108E SYSTEM ERROR READING SPOOL FILE spoolid
X				DMTxxx141I LINE vaddr READY FOR CONNECTION TO LINK linkid
X				DMTxxx142I LINK linkid LINE vaddr CONNECTED
X				DMTxxx143I LINK linkid LINE vaddr DISCONECTED
X				DMTxxx144I RECEIVING: FILE FROM locid1 (name1) FOR locid2 (userid2)
X				DMTxxx145I RECEIVED: FILE FROM locid1 (name1) FOR locid2 (userid2)
X				DMTxxx146I SENDING: FILE spoolid ON LINK linkid, REC nnnnnn
X	X			DMTxxx147I SENT: FILE spoolid ON LINK linkid
X				DMTxxx149I LINK linkid LINE ACTIVITY: TCT= mmm; ERRS= nnn; TMOUTS= ppp
X				DMTxxx160I LINE vaddr DISABLED FOR linkid
	X			DMTxxx170I FROM linkid: (MSG message text)
X				DMTxxx190E INVALID SPOOL BLOCK FORMAT ON FILE spoolid
	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

RSC	ORG	VMD	CPO	
				General Command Responses
	X			DMTCMX200I RSCS
	X			DMTCMX201E INVALID COMMAND command
	X			DMTCMX202E INVALID LINK linkid
	X			DMTCMX203E INVALID SPOOL FILE ID spoolid
	X			DMTCMX204E INVALID KEYWORD keyword
	X			DMTCMX205E CONFLICTING KEYWORD keyword
	X			DMTCMX206E INVALID OPTION keyword option
	X			DMTCMX207E CONFLICTING OPTION keyword option
	X			DMTCMX208E INVALID USER ID userid
	X			DMTCMX300I ACCEPTED BY TASK task
	X			DMTCMX301E REJECTED BY TASK task -- PREVIOUS COMMAND ACTIVE
	X			DMTCMX302E LINK linkid IS NOT DEFINED
	X			DMTCMX303E LINK linkid IS NOT ACTIVE
	X			DMTCMX304E REJECTED BY TASK task -- NOT RECEIVING
				Specific Command Responses
				BACKSPAC:
	X			DMTxxx510I FILE spoolid BACKSPACED
	X			DMTxxx511E NO FILE ACTIVE ON LINK linkid
				CHANGE:
X	X			DMTAXS520I FILE spoolid CHANGED
X	X			DMTAXS521I FILE spoolid HELD FOR LINK linkid
X	X			DMTAXS522I FILE spoolid RELEASED FOR LINK linkid
X	X			DMTAXS523I LINK linkid QUEUE REORDERED
X	X			DMTAXS524E FILE spoolid ACTIVE -- NO ACTION TAKEN
X	X			DMTAXS525E FILE spoolid IS FOR LINK linkid -- NO ACTION TAKEN
X	X			DMTAXS526E FILE spoolid NOT FOUND -- NO ACTION TAKEN
				CMD:
X				DMTxxx530I COMMAND FORWARDED ON LINK linkid
				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				DMTCMX544E LINK linkid NOT DEFINED -- TYPE NOT SPECIFIED
				DELETE:
X				DMTCMX550I LINK linkid NOW DELETED
X				DMTCMX551E LINK linkid ACTIVE -- NOT DELETED
X				DMTCMX552E LINK linkid HAS A FILE QUEUE -- NOT DELETED

R S C S	O R I G	V M I D	C P O P	
				Specific Command Responses
				DISCONN:
X				DMTCMX560I RSCS 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
				FLUSH:
X	X			DMTxxx580I FILE spoolid PROCESSING TERMINATED
	X			DMTxxx581E FILE spoolid NOT ACTIVE
				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:
				No response.
				ORDER:
X	X			DMTAXS523I LINK linkid QUEUE REORDERED
X	X			DMTAXS524E FILE spoolid ACTIVE -- NO ACTION TAKEN
X	X			DMTAXS525E FILE spoolid IS FOR LINK linkid -- NO ACTION TAKEN
X	X			DMTAXS526E FILE spoolid NOT FOUND -- NO ACTION TAKEN

```
R O V C
S R M P
C I I O
S G D P
        Specific Command Responses

        PURGE:

X X     DMTAXS524E FILE spoolid ACTIVE -- NO ACTION TAKEN
X X     DMTAXS525E FILE spoolid IS FOR linkid -- NO ACTION TAKEN
X X     DMTAXS526E FILE spoolid NOT FOUND -- NO ACTION TAKEN
X X     DMTAXS640I nn FILE(S) PURGED ON LINK linkid


        QUERY linkid STAT:

  X     DMTCMX651I LINK linkid INACTIVE
  X     DMTCMX652I LINK linkid ACTIVE task type vaddr c {HO|NOH} {DR|NOD}
                     {TRA|TRE|NOT} Q=m P=n


        QUERY linkid DEF:

  X     DMTCMX653I LINK linkid DEFAULT task type vaddr c R=m


        QUERY linkid QUEUE:

  X     DMTCMX654I LINK linkid Q=m P=n
  X     DMTCMX655I FILE spoolid locid userid CL a PR mm REC nnnnnn {A|I}


        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 RSCS:

  X     DMTCMX662I FILE spoolid ORG locid1 userid1 mm/dd/yy hh:mm:ss
                   TO locid2 userid2
  X     DMTCMX664E FILE spoolid NOT FOUND


        QUERY FILE spoolid VM:

  X     DMTCMX663I FILE spoolid PR mm CL a CO nn {HO|NOH} DI distcode,
                   NA {fn ft|dsname}
  X     DMTCMX664E FILE spoolid NOT FOUND


        QUERY SYSTEM:

  X     DMTCMX670I LINK linkid ACTIVE -- LINE vaddr {HO|NOH}
  X     DMTCMX671I LINK linkid INACTIVE
  X     DMTCMX672I NO LINK ACTIVE
  X     DMTCMX673I NO LINK DEFINED
```

R S C S	O R I G	V M I D	C P O P	
				Specific Command Responses
				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
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
				TRACE:
X				DMTxxx801I LINK linkid ERROR TRACE STARTED
X				DMTxxx802I LINK linkid TRACE STARTED
X				DMTxxx803I LINK linkid TRACE ENDED
X				DMTxxx810E LINK linkid TRACE ALREADY ACTIVE
X				DMTxxx811E LINK linkid TRACE NOT ACTIVE
				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=parameter INVALID
X	X			DMTxxx905I SIGNON of LINKID linkid COMPLETE
	X			DMTNPT907E SIGNON TYPE PARAMETER MISSING
				Messages Generated during System Generation and Initialization
X				DMTINI402T IPL DEVICE READ I/O ERROR
X				DMTIN1406R SYSTEM DISK ADDRESS = ccu
X				DMTINI407R REWRITE THE NUCLEUS? (YES|NO)
X				DMTINI409R NUCLEUS CYL ADDRESS = nnn
X				DMTINI410R ALSO IPL CYLINDER 0? (YES|NO)
X				DMTINI431S IPL DEVICE WRITE I/O ERROR
X				DMTINI479E INVALID DEVICE ADDRESS -- REENTER
X				DMTINI480E INVALID CYLINDER NUMBER -- REENTER
X				DMTINI481E INVALID REPLY -- ANSWER "YES" OR "NO"
X				DMTINI482E SYSTEM DISK ERROR -- REENTER
X				DMTINI483E NUCLEUS WILL OVERLAY CMS FILES -- RECOMPUTE

Index

A
(No entries)

B
BACKSPAC
  command response 110
  format 94
  NPT operator command 31
  RSCS operator command 22
  SML operator command 38

C
CHANGE
  command response 110
  format 95
  NPT operator command 31
  RSCS operator command 22
  SML operator command 38
CMD
  command response 110
  format 96
  RSCS operator command 22
CMS Batch Facility
  job accounting considerations 25
  remote job entry with RSCS 24
command responses
  BACKSPAC 110
  CHANGE 110
  CMD 110
  DEFINE 110
  DELETE 110
  DISCONN 111
  DRAIN 111
  FLUSH 111
  FREE 111
  FWDSPACE 111
  general 110
  HOLD 111
  ORDER 111
  PURGE 112
  QUERY 112
  SIGNON 113
  specific 110
  START 113
  TRACE 113
communication commands
  NPT remote operator 32
  RSCS operator 22
  SML remote operator 38
components of RSCS 15
configuration of RSCS 17

D
DEFINE
  command response 110
  format 97
  RSCS operator command 21
DELETE
  command response 110
  format 98
  RSCS operator command 21
DISCONN
  command response 111
  format 98
  RSCS operator command 23
DRAIN
  command response 111
  format 99
  NPT operator command 31
  RSCS operator command 21
  SML operator command 37

E
entering commands
  IBM System/3 Model 10 74
  IBM System/360 58
  IBM System/360 Model 20 64
  IBM System/370 58
  IBM 1130 System 81
  IBM 2770 41
  IBM 2780 44
  IBM 2922 64
  IBM 3770 48
  IBM 3780 49
error recovery
  communication adapter
    IBM System/360 58
    IBM System/360 Model 10 76
    IBM System/360 Model 20 65
    IBM System/370 58
    IBM 1130 System 82
    IBM 2922 65
  receiving
    IBM 2770 43
    IBM 2780 46
    IBM 3770 48
    IBM 3780 50
  restart
    IBM System/3 Model 10 78
    IBM System/360 60
    IBM System/360 Model 20 67
    IBM System/370 60
    IBM 1130 System 84
    IBM 2922 67
  transmitting
    IBM 2770 42
    IBM 2780 45
    IBM 3770 48
    IBM 3780 50

unit record
IBM System/3 Model 10 76
IBM System/360 58
IBM System/360 Model 20 66
IBM System/370 58
IBM 1130 System 83
IBM 2922 66

F
files
control commands
NPT remote operator 31
RSCS operator 22
SML remote operator 38
processing in RJE mode 36
FLUSH
command response 111
format 100
NPT operator command 31
RSCS operator command 22
SML operator command 38
FREE
command response 111
format 101
NPT operator command 31
RSCS operator command 22
SML operator command 37
FWDSPACE
command response 111
format 101
NPT operator command 31
RSCS operator command 22
SML operator command 38

G
general command responses 110

H
hardware support
NPT line driver 27
RSCS virtual machine 17
SML line driver 33
HOLD
command response 111
format 102
NPT operator command 31
RSCS operator command 22
SML operator command 37
HOST mode, signing on to SML 36

I
IBM System/3 as a remote station 69
IBM System/3 Model 10 as a remote station
entering commands 74
error recovery
communication adapter 76
restart 78
unit record 76
operating procedures 71
remote terminal processor program 70
supported configuration 70
terminating a session 76
IBM System/32 as a remote station 69
IBM System/360 as a remote station
entering commands 58
error recovery
communication adapter 58
restart 60
unit record 58
operating procedures 56
remote terminal processor program 55
supported configuration 55
terminating a session 58
IBM System/360 Model 20 as a remote station
entering commands 64
error recovery
communication adapter 65
restart 67
unit record 66
operating procedures 62
remote terminal processor program 61
supported configuration 61
terminating a session 65
IBM System/370 as a remote station
entering commands 58
error recovery
communication adapter 58
restart 60
unit record 58
operating procedures 56
remote terminal processor program 55
supported configuration 55
terminating a session 58
IBM 1130 System as a remote station
entering commands 81
error recovery
communication adapter 82
restart 84
unit record 83
operating procedures 80
remote terminal processor program 79
supported configuration 79
terminating a session 82
IBM 2770 as a remote terminal
entering commands 41
error recovery
receiving 43
transmitting 42
operational notes 41
supported configuration 41
terminating a session 41
IBM 2780 as a remote terminal
entering commands 44
error recovery
receiving 46
transmitting 45
operational notes 44
supported configuration 44
terminating a session 44
IBM 2922 as a remote station
entering commands 64
error recovery
communication adapter 65
restart 67
unit record 66
operating procedures 62
remote terminal processor program 61
supported configuration 61

terminating a session 65
IBM 3770 as a remote terminal
entering commands 48
error recovery
receiving 48
transmitting 48
operational notes 47
supported configuration 47
terminating a session 48
IBM 3780 as a remote terminal
entering commands 49
error recovery
receiving 50
transmitting 50
operational notes 49
supported configuration 49
terminating a session 49
ID control card
NPT 30
SML in HOST mode 36
initiating line drivers 24
input file processing
NPT 30
SML in HOST mode 36
input/output control
NPT 28
SML 34
interface, VM/370 spool system 13
introduction to RSCS 9
I/O logging 26

K
key to message distribution 109

L
line allocation
NPT 28
SML 35
line control commands
NPT remote operator 31
RSCS operator 21
SML remote operator 37
link
class 13
definition 13
line 13
linkid 13
table 13
type 13
link control commands
NPT remote operator 31
RSCS operator 21
SML remote operator 37

M
messages
NPT 32
SML 38
messages and responses 109
general command 110
key to distribution 108
sign-on 113
specific command 110
spontaneous 109
system generation 113
system initialization 113
miscellaneous commands
NPT remote operator 32
RSCS operator 23
SML remote operator 38
MSG
format 102
NPT operator command 32
RSCS operator command 23
SML operator command 38
MULTI-LEAVING Remote Job Entry Work Station (MRJE/WS) Program 69

N
nonprogrammable remote terminals 39
nonprogrammable terminal (see NPT)
nonprogrammable terminal line driver 27
notational conventions fcr RSCS commands 91
NPT line driver
input file processing 30
input/output control 28
line allocation 28
output file processing 30
remote operator functions 27
RSCS operator functions 27
signing on 29
starting 28
supported functions 27
supported hardware 27
VM/370 user functions 28
NPT messages 32
NPT operational notes
IBM 2770 41
IBM 2780 44
IBM 3770 47
IBM 3780 49
NPT remote operator, commands, file control 31
NPT remote operator commands
BACKSPAC 31
CHANGE 31
communication 32
DRAIN 31
FLUSH 31
FREE 31
FWDSPACE 31
HOLD 31
line control 31
link control 31
miscellaneous 32
MSG 32
ORDER 31
PURGE 31
QUERY 32
START on active link 31

O
operating procedures
IBM System/3 Model 10 71
IBM System/360 56

IBM System/360 Model 20 62
IBM System/370 56
IBM 1130 System 80
IBM 2922 62
RSCS as an RJE station 87
ORDER
command response 111
format 103
NPT operator command 31
RSCS operator command 22
SML operator command 38
output file processing
NPT 30
SML in HOST mode 37
overview of RSCS 11

P
PURGE
command response 112
format 103
NPT operator command 31
RSCS operator command 22
SML operator command 38

Q
QUERY
command response 112
format 104
NPT operator command 32
RSCS operator command 23
SML operator command 38

R
remote, operator commands, SML in HOST mode 37
remote job entry to CMS Batch Facility 24
remote operator
commands, NPT 30
functions
NPT 27
SML 34
Remote Spooling Communications Subsystem (see RSCS (Remote Spooling Communications Subsystem))
remote stations 13
IBM System/3 69
Model 10 card system 70
IBM System/32 69
IBM System/360 55
IBM System/360 Model 20 61
IBM System/370 55
IBM 1130 79
IBM 2922 61
remote terminal processor program
IBM System/3 Model 10 70
IBM System/360 55
IBM System/360 Model 20 61
IBM System/370 55
IBM 1130 System 79
IBM 2922 61
RSCS as an RJE station 87
remote terminals
IBM 2770 41
IBM 2780 44
IBM 3770 47
IBM 3780 49
RJE mode, signing on to SML 36
RSCS (Remote Spooling Communications Subsystem)
as an RJE station 87
operating procedures 87
remote terminal processor program 87
supported configuration 87
command format
BACKSPAC 94
CHANGE 95
CMD 96
DEFINE 97
DELETE 98
DISCONN 98
DRAIN 99
FLUSH 100
FREE 101
FWDSPACE 101
HOLD 102
MSG 102
ORDER 103
PURGE 103
QUERY 104
START 106
TRACE 108
commands
general usage 93
notational conventions 91
components 15
links 13
message summary 109
messages 25
operator commands 21
BACKSPAC 22
CHANGE 22
CMD 22
communications 22
DEFINE 21
DELETE 21
DISCONN 23
DRAIN 21
file 22
FLUSH 22
FREE 22
FWDSPACE 22
HOLD 22
line control 21
link control 21
miscellaneous 23
MSG 23
ORDER 22
PURGE 22
QUERY 23
START 21
TRACE 23
operator functions
NPT 27
SML 34
overview 11
tag slots 20
usage of SPOOL command 20
usage of TAG command 20
virtual machine 11
configuration 17
supported hardware 17
system generation 18

S
signing on
  to the NPT line driver 29
  to the SML line driver
    in HOST mode 36
    in RJE mode 36
SIGNON card
  NPT 29
  SML 36
sign-on messages 113
slots, tag 20
SML lie driver, signing on in HOST mode 36
SML line driver
  file processing in RJE mode 36
  HOST mode 33
  input file processing, HOST mode 36
  input/output control 34
  line allocation 35
  output file processing, HOST mode 37
  remote operator functions 34
  RJE mode 33
  RSCS operator functions 34
  signing on in RJE mode 36
  starting 35
  supported functions 33
  supported hardware 33
  VM/370 user functions 34
SML messages 38
SML remote operator commands
  communication 38
  file control 38
  line control 37
  link control 37
  miscellaneous 38
SML remote operator commands (HOST mode)
  BACKSPAC 38
  CHANGE 38
  DRAIN 37
  FLUSH 38
  FREE 37
  FWDSPACE 38
  HOLD 37
  MSG 38
  ORDER 38
  PURGE 38
  QUERY 38
  START on active link 38
specific command responses 110
spontaneous messages 109
SPOOL command 19
  RSCS usage 20
spool file tag 13
spool MULTI-LEAVING (see SML)
  line driver 33
  remote stations 53
START
  command response 113
  format 106
  NPT operator command 31
  RSCS operator command 21
  SML operator command 38
starting the NPT line driver 28
starting the SML line driver 35
supported configuration
  IBM System/3 Model 10 70
  IBM System/360 55
  IBM System/360 Model 20 61
  IBM System/370 55
  IBM 1130 System 79
  IBM 2770 41
  IBM 2780 44
  IBM 2922 61
  IBM 3770 47
  IBM 3780 49
  RSCS as an RJE station 87
supported functions
  NPT line driver 27
  SML line driver 33
system generation messages 113
system generation of RSCS 18
system initialization messages 113
system integrity 26
system security 26

T
tag, spool file 13
TAG command
  format 18
  responses 19
  RSCS usage 20
tag slots 20
terminating a session
  IBM System/3 Model 10 76
  IBM System/360 58
  IBM System/360 Model 20 65
  IBM System/370 58
  IBM 1130 System 82
  IBM 2770 41
  IBM 2780 44
  IBM 2922 65
  IBM 3770 48
  IBM 3780 49
TRACE
  command response 113
  format 108
  RSCS operator command 23
tracing facilities
  I/O logging 26
  TRACE command 25

V
VM/370 spool system interface 13
VM/370 user commands 18
VM/370 user functions
  NPT 28
  SML 34

READER'S COMMENTS

Title: IBM Virtual Machine Facility/370: Remote Spooling Communications Subsystem (RSCS) User's Guide

Order No. GC20-1816-3

Please check or fill in the items; adding explanations/comments in the space provided.

Which of the following terms best describes your job?

☐ Customer Engineer	☐ Manager	☐ Programmer	☐ Systems Analyst
☐ Engineer	☐ Mathematician	☐ Sales Representative	☐ Systems Engineer
☐ Instructor	☐ Operator	☐ Student/Trainee	☐ Other (explain below)

How did you use this publication?

☐ Introductory text ☐ Reference manual ☐ Student/ ☐ Instructor text

☐ Other (explain) _____

Did you find the material easy to read and understand? ☐ Yes ☐ No (explain below)

Did you find the material organized for convenient use? ☐ Yes ☐ No (explain below)

Specific criticisms (explain below)

Clarifications on pages _____

Additions on pages _____

Deletions on pages _____

Errors on pages _____

Explanations and other comments:

Thank you for your cooperation. No postage necessary if mailed in the U.S.A.

Trim Along This Line

Cut or Fold Along Line

YOUR COMMENTS PLEASE . . .

Your views about this publication may help improve its usefulness; this form will be sent to the author's department for appropriate action. Using this form to request system assistance and/or additional publications or to suggest programming changes will delay response, however. *For more direct handling of such request, please contact your IBM representative or the IBM Branch Office serving your locality.* Your comments will be carefully reviewed by the person or persons responsible for writing and publishing this material. All comments and suggestions become the property of IBM.

Fold Fold

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 40 ARMONK, N.Y.

POSTAGE WILL BE PAID BY ADDRESSEE:

International Business Machines Corporation
Department D58, Building 706-2
PO Box 390
Poughkeepsie, New York 12602

Attn: VM/370 Publications

Fold Fold

IBM®

READER'S COMMENTS

Title: IBM Virtual Machine Facility/370: Remote Spooling Communications Subsystem (RSCS) User's Guide

Order No. GC20-1816-3

Please check or fill in the items; adding explanations/comments in the space provided.

Which of the following terms best describes your job?

☐ Customer Engineer	☐ Manager	☐ Programmer	☐ Systems Analyst
☐ Engineer	☐ Mathematician	☐ Sales Representative	☐ Systems Engineer
☐ Instructor	☐ Operator	☐ Student/Trainee	☐ Other (explain below)

How did you use this publication?

☐ Introductory text ☐ Reference manual ☐ Student/ ☐ Instructor text

☐ Other (explain) _____

Did you find the material easy to read and understand? ☐ Yes ☐ No (explain below)

Did you find the material organized for convenient use? ☐ Yes ☐ No (explain below)

Specific criticisms (explain below)

Clarifications on pages _____

Additions on pages _____

Deletions on pages _____

Errors on pages _____

Explanations and other comments:

Thank you for your cooperation. No postage necessary if mailed in the U.S.A.

Trim Along This Line

Cut or Fold Along Line

YOUR COMMENTS PLEASE . . .

Your views about this publication may help improve its usefulness; this form will be sent to the author's department for appropriate action. Using this form to request system assistance and/or additional publications or to suggest programming changes will delay response, however. *For more direct handling of such request, please contact your IBM representative or the IBM Branch Office serving your locality.* Your comments will be carefully reviewed by the person or persons responsible for writing and publishing this material. All comments and suggestions become the property of IBM.

Fold Fold

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 40 ARMONK, N.Y.

POSTAGE WILL BE PAID BY ADDRESSEE:

International Business Machines Corporation
Department D58, Building 706-2
PO Box 390
Poughkeepsie, New York 12602

Attn: VM/370 Publications

Fold Fold

IBM®

GC20-1816-3

IBM VM/370: RSCS User's Guide

Printed in U.S.A.

GC20-1816-3

IBM

GC20-1816-3

1027219