

**Operations
Manual**

**A Series
CANDE**

(Relative to the Mark 3.6 System Software Release)
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CONTENTS

1	INTRODUCTION	1
	RELATED DOCUMENTS.	1
2	GENERAL INFORMATION.	3
	NETWORK CONTROL COMMANDS	3
	STATION IDENTIFICATION	4
	DLS and DL	4
	LSN (Logical Station Number)	5
	LSN Range.	5
	Station Name	6
	STATION HANDLING	7
	LOGIN Stations	7
	Control Stations	7
	CANDE Log Stations	8
	Borrowed Stations.	9
	Pseudo-Stations and COMS Window Dialogs.	9
	Security Features.	10
	DATACOMM ERRORS.	10
	DYNAMIC DATACOMM CHANGES	11
	FAULTS AND CANDE ERRORS.	12
	Faults	12
	Errors	14
	USERDATAFILE	17
	REMOTE FILES	18
	TANKFILE	22
	RECOVERY FILES	22
	RECONFIGURATION COMMANDS	24
3	NETWORK CONTROL COMMANDS	25
	?ABORT and ?QUIT	26
	?ADD and ?MOVE	27
	?ATTACH.	28
	?AUTOANSWER and ?NOAUTOANSWER.	29
	?BUG	30
	?CLEAR	34
	?COMPILESPERCENT	35
	?CONTROL	37
	?DEPTH	38
	?DISABLE	39
	?ENABLE.	40
	?FACTOR.	41
	?GRINDLIMIT.	42
	?INFO.	43
	?LAISSEZFILE	44
	?LGSTA and ?DSLSTA and ?LGOP.	46
	?MAXGRINDS	57
	?MAXSTATIONS	58
	?MAXTASKS.	59
	?NEWS.	60

	?OP.	62
	?READY	67
	?RELEASE	68
	?SAVE.	69
	?SCHEDULE.	70
	?SS.	74
	?SUBTRACT.	77
	?SWAP.	78
	?TANKING	79
	?TRANSFER.	80
	?WHERE	81
	?WHO	83
4	OPERATIONAL CHARACTERISTICS.	85
	ORGANIZATION	85
	SEMIDEPENDENT TASKS.	86
	Visibility Attribute	86
	Operational Considerations	87
	PROGRAM PARAMETERS	88
	Workers.	88
	Tasks.	88
	SYSTEM ENVIRONMENT	89
	Initiation	89
	Running Characteristics.	89
	System Program Requirements.	89
	SWAPPER Interface.	90
	UNDERSTANDING RAILROAD DIAGRAMS	91
	GLOSSARY.	101
	INDEX	119

1 INTRODUCTION

This manual contains information about CANDE for two classes of individuals: those interested in operational control of CANDE and its datacomm network and those interested in tailoring CANDE to the specific requirements of an installation.

The commands available to alter the state of the network and change various parameters are discussed in the "Network Control Commands" section. The "General Information" section and the "Operational Characteristics" section give general information about the datacomm network and specific information about CANDE, respectively. "Understanding Railroad Diagrams" describes the notation used to represent the syntax of CANDE commands. The glossary contains definitions for many of the terms and acronyms that appear in this manual.

RELATED DOCUMENTS

Document -----	Form No. -----
ALGOL Reference Manual	1169844
CANDE Reference Card	5014533
CANDE Reference Manual	1169869
DCALGOL Reference Manual	5014574
I/O Subsystem Reference Manual	1169984
Network Definition Language (NDL) Reference Manual	1176690
Network Definition Language II (NDLII) Reference Manual	1169604
Operator Display Terminal (ODT) Reference Manual	1169612
System Software Site Management Reference Manual	1170008
Work Flow Language (WFL) Reference Manual	1169802

2 GENERAL INFORMATION

In a datacomm environment involving many users interacting with the system, information about the current status of any or all users being serviced is necessary. Also required is the ability to (1) recover a user whose station or line has encountered error situations and subsequently been made NOT READY and (2) dynamically alter the logical datacomm subsystem to accommodate new requirements.

NETWORK CONTROL COMMANDS

Commands to accomplish CANDE control functions may be exercised by a station with CONTROL status. CONTROL status is recommended for selected stations that act as network commanders, that is, stations that monitor or regulate the activity of the CANDE Message Control System (MCS) and its users. Network control commands may also be entered through the Operator Display Terminal (ODT) using the SM (Send to MCS) ODT command.

Stations can be marked as control stations through an existing control station (see CONTROL command in Section 3).

The initiator of a network control command is notified of the successful or unsuccessful completion of the command. If a command results in an error termination, the requesting station receives an appropriate message describing the problem.

A network control command must be preceded by a control character, which is normally defined to be a "?". All commands described in this manual are network control commands unless otherwise specified.

STATION IDENTIFICATION

Many commands require the initiator to designate a station; stations may be specified in one of three ways: dls and dl, lsn, or station names.

DLS and DL

The <dls> identifies a station by the Data Communications Processor (DCP) or Network Support Processor (NSP) number, line number, and relative station number within the line as specified in the Network Definition Language or Network Definition Language II (NDL/NDLII) definition for the line to which the station is assigned.

Syntax

<dls>

```
--<integer1>-- : --<integer2>-- : --<integer3>--|
```

<dl>

```
--<integer1>-- : --<integer2>--|
```

Explanation

Integer1, integer2, and integer3 represent the Data Communications Processor/Network Support Processor (DCP/NSP), line, and station numbers, respectively. All three must be specified to identify one station on a multidrop line. The <dl> form, where ": <integer3>" is omitted, may be used in place of <dls> when designating a line with only one station or for reconfiguration situations when all stations on a line are to be designated.

To determine the <dls> or <dl> for a given station, the following information is required:

1. The relative DCP/NSP number.
2. The line number is computed by multiplying the cluster or relative Line Support Processor (LSP) number by 16 and then adding the adaptor number.
3. Station numbers on a line are numbered 0 through n-1, where n is the number of stations assigned to the line.

General Information

Example

Assume the following NDL description for a line:

```

LINE L04:

ADDRESS = 1:4:9.

STATION = TC5AA, TC5BB, TC5CC.

MODEM   = SUPERMODEM.

```

The DCP number is 1. Multiplying the cluster number by 16 gives 64; adding the adaptor number gives 73 for the line number. Station numbers start at 0; thus, TC5AA has <dls> 1:73:0; TC5BB has <dls> 1:73:1; and TC5CC has <dls> 1:73:2.

LSN (Logical Station Number)

The <lsn> is a unique integer assigned by NDL/NDLII to each station defined for a network. LSN stands for Logical Station Number. Designation of a station by <lsn> is the most efficient method of station designation.

<lsn>

```
--<integer>--|
```

LSN Range

An <lsn range> refers to a group of one or more <lsn>s. If a range is defined, the lower <lsn> must precede the higher <lsn>.

<lsn range>

```

--<lsn>-----|
      |         |
      |- - --<lsn>-|

```

Station Name

The station name is a unique identifier chosen by the installation for each station that is a member of the network. Station names in NDL/NDLII follow the same syntactic conventions as file titles within the system, because any station may be assigned to a REMOTE file.

<station name>

```
|<-/13\--- / --|  
|                 |  
----<identifier>----|
```

General Information

STATION HANDLING

Stations in the datacomm network may have one or more special attributes. CANDE treats each station differently depending on these attributes. Special handling is given to stations with these attributes: LOGIN, CONTROL, LOG, and BORROWED.

LOGIN Stations

A CANDE station is a LOGIN station if it is a switched station and DIALLOGIN or ALLLOGIN is set or if LOGIN=TRUE is declared in the NDL/NDLII for that station. DIALLOGIN and ALLLOGIN are CANDE operator options that may be set using the ?OP network control command.

A LOGIN station requires a user to be logged on before any REMOTE file can be opened. In addition, CANDE requests a usercode of any LOGIN station whenever communication is established between CANDE and the station. CANDE disconnects a switched single-station LOGIN line if log on is not completed within two to three minutes. The specification may be made by classification at run time or by specification for individual stations (or station defaults) in NDL/NDLII.

The effect of the DIALLOGIN or ALLLOGIN is apparent only when stations are initialized by CANDE. This process takes place (1) at CANDE initialization for stations assigned to lines and controlled by CANDE, (2) when a station is received by transfer from another MCS, and (3) when a station SAVED (using the ?SAVE network control command) by the operator or a station inhibited by errors is made READY by a ?READY network control command.

Control Stations

A control station is one authorized for entry of CANDE network control commands. The ODT, via the SM (Send to MCS) ODT command, is effectively a control station. Any control station may designate any other station as a control station via the ?CONTROL network control command. Stations with SPO=TRUE in their NDL/NDLII description are control stations.

CANDE Log Stations

A CANDE log station is a station that receives CANDE log messages and (if LGSP0 is enabled) receives messages directed to the ODT by means of the ?SS network control command (using the form "?SS SPO"). Any control station can become a log station by entry of a ?LGSTA network control command at that station; a ?DSLGSTA network control command cancels the log station. Up to 30 stations may be designated as CANDE log stations, each with all or its own subset of possible logging functions set. Three network control commands (?LGSTA, ?DSLGSTA, and ?LGOP) initiate, terminate, interrogate, or change the logging functions of a designated station. The syntax, explanation, and examples of these commands are given in Section 3 of this manual. The SM (Send to MCS) ODT command can also be used to cancel a log station. (Refer to the "Operator Display Terminal (ODT) Reference Manual" for further information.)

If a log station exists, it is noted in the tankfile. CANDE attempts to re-establish the log station from the tankfile at initialization time.

Typical information directed to a log station includes the following:

1. Station attachment.
2. Security errors. The display indicates whether LOGONCHECK (an entry in the SECURITYSUPPORT library) is going to clear, save, or disconnect a station where a security violation attempt has occurred. Violations can be the result of an invalid attempt at logging on, changing an accesscode, or changing a password.
3. Station log on.
4. Station log off.
5. Stations whose error retry limit is exhausted.
6. Network changes resulting from reconfiguration requests.
7. User messages sent to the ODT via the ?SS network control command (using the form "?SS SPO") if the option LGSP0 is set. Otherwise, a log station is addressed and identified by its LSN when the log station sends messages.
8. Information about the initiation, termination, or change of logging options for log stations.

General Information

Log information is identified by a hyphen (-) as the first message character followed by the time of day, LSN, usercode (where applicable), and a descriptive message of the activity being reported, such as the following:

```
-10:17:31(15) MPS LOGGED ON.  
- 9:14:02(3) RETRY LIMIT EXCEEDED.
```

Borrowed Stations

CANDE recognizes that a station is "borrowed", meaning that the station was declared in NDL/NDLII as belonging to some other MCS. CANDE transfers such a station to its declared owner when a user session is terminated through a BYE or station disconnect or when CANDE service is terminated by a ?QUIT or ?ABORT network control command. (The KEEPSTA option can be used to defeat this action. Refer to the ?OP network control command.)

Pseudo-Stations and COMS Window Dialogs

The Communications Management System (COMS) MCS is a Burroughs product which, among other features, provides multiple logical connections between CANDE and a single physical station. CANDE treats each logical connection as an individual station (implemented as a datacomm pseudo-station). COMS calls each connection a dialog of the CANDE window.

CANDE treats these pseudo-stations (which are also used for stations transferred from a foreign host across a BNA network) almost identically to physical stations. However, because all input to and output from such stations is filtered through another MCS (for example, COMS), there can be differences in behavior. In particular, commands intended for CANDE might instead be intercepted and acted upon by COMS, and output for the station might be queued by COMS, which can alter the usual pattern of flow control. For example, this may nullify the tanking specifications for the remote file. Refer to the "I/O Subsystem Reference Manual" for a discussion of tanking.

If any control commands do not yield normal results when entered from a COMS window dialog, the problem can be resolved by using an extra control character (usually a question mark [?]). For example, COMS intercepts a "?WRU" command, but entering "??WRU" directs the command to CANDE. Sometimes abbreviating the command can be helpful (COMS does not recognize abbreviations). For example, a "?PURGE" command will go to COMS, but "?PURG" will go to CANDE.

When a dialog of the CANDE window is opened, COMS notifies CANDE of the usercode and if privileged or control status should apply. If the usercode does not require that a chargecode or accesscode be entered, CANDE then automatically logs on the user in a new session. The CANDE "HELLO" command can be used to change to a different usercode.

Security Features

There are four CANDE security options available to restrict the use of privileged user status. Privileged user status means that security checking is not done for a particular usercode.

The restriction of privileged user status is based on the types of stations available to users (that is, dial-in stations, COMS pseudo-stations, and non-COMS pseudo-stations). The following options allow a site to prevent a usercode from assuming privileged status, even though the usercode is marked as privileged in the USERDATAFILE:

SECALL	Denies privileged user status to all users on all stations.
SECIALIN	Denies privileged user status to all users on dial-in stations.
SECPSEUDO	Denies privileged user status to all users on pseudo-stations.
USECOMSPRIV	Bases privileged user status on the COMS station configuration setting. (USECOMSPRIV overrides SECALL and SECPSEUDO settings.)

Each of the four security features is an option of the CANDE "?OP" network control command. For a more complete discussion of these options, refer to the CANDE "?OP" network control command in this manual.

DATA COMM ERRORS

Datacomm error recovery in CANDE is designed to maintain maximum usability of the station, while avoiding the overhead of processing many error results from useless stations. Some error results, such as break-on-output or switched-line-disconnect, are unequivocal and cause unconditional recovery or unconditional session termination. Other errors indicate something amiss with the datacomm network and require a more heuristic recovery approach.

General Information

If four errors occur within approximately two minutes with no intervening valid input, CANDE marks an active station as no longer usable and aborts any session. For an inactive station, four errors over any time period render the station unusable. If, when inactive, an unusable station produces no additional errors, it remains READY so that subsequent valid input is detected without operator intervention. (For example, a direct-wire, current-loop circuit for a teletype or similar device generates errors if the circuit is open when CANDE attempts to send an initial identification message. Once CANDE recalls the outstanding messages and sends no additional messages, the station remains quiet. Completing the circuit and sending input from the terminal then causes the station to become usable.) If errors persist on the unused station at a rate greater than approximately two per minute, the station is left NOT READY. It cannot be used until the problem has been corrected and the operator has explicitly readied the station with a ?READY or ?CLEAR network control command. (This situation is typical of polled lines where the modem is not connected to the system.)

If CANDE is taking action as a result of errors on a line containing more than one station, the action is taken for all stations on that line under CANDE control. The line is always left READY unless CANDE receives an error notice for a station that has been left NOT READY.

Datacomm errors are displayed on a CANDE log station (if it is active and has the LGERROR log option set) and are recorded in the system summary log. This logging occurs only for the first of a group of consecutive errors except when a string of errors causes an active station to be aborted, then the last error is also logged. When the station is active, an error occurring more than five minutes after the previous one begins a new sequence.

DYNAMIC DATACOMM CHANGES

If the Interactive Datacomm Configurator (IDC) is used to change attributes for a station while it is logged on to CANDE, the new values for the changed attributes are immediately reflected in the system datacomm files. However, CANDE is not aware of the changes until the station signs off and then signs on.

If IDC is used to move a station that is logged on to CANDE to another line, the station is logged off during the move.

FAULTS AND CANDE ERRORS

When a fault or error is detected, CANDE attempts to minimize its effect. If the problem can be ascribed to a particular user, that user is notified and the current operation terminated, while service to other users continues. (In some cases, it is impossible or unsafe to continue processing, and CANDE must terminate.) In the current context, a "fault" is defined as an illegal situation detected by the hardware (such as indexing outside the bounds of an array). An "error" is defined as an illegal situation detected by the CANDE MCS (such as a violation of buffer-allocation protocol). Faults and errors are handled alike except for the messages reporting them:

FAULT MESSAGE: #CANDE FAULT FF @LLLLLLLL

ERROR MESSAGE: #CANDE ER:EEEEEE@LLLLLLLL

FF represents a two-digit fault code, EEEEEEE an error literal, and LLLLLLLL a line number in CANDE. These cryptic messages refer to problems in CANDE only, not a user program. (If lineinfo is unavailable, the LLLLLLLL is replaced by an address, AA:AAA:A.)

Recovery from a fault or error condition generally proceeds as follows. The message is displayed on the central operator console. A program dump and other diagnostic information is written from the CANDE stack encountering trouble; this procedure may be seen as a pause in CANDE response. If the problem can be associated with a user station, the message is sent there; the message is also sent to any CANDE log stations that are active and have LGFAULT set. The interrupted operation is terminated and appropriate housekeeping functions are performed to return to a neutral state.

Faults

Faults are trapped by "on anyfault" statements in the outer blocks of each CANDE stack, as well as in certain special environments. (Some procedures contain ON statements for selected faults that can arise due to excessive input data. These faults are treated as normal user errors rather than as CANDE problems.)

The following table lists faults by fault number, with a corresponding description. Except as noted, these faults can occur when executing any program. (Note that the meaning of each fault number is standardized, regardless of which program is executing or on what type of machine [within the A Series and B 5000/B 6000/B 7000 Series systems] it is running.)

General Information

<u>FAULT</u>	<u>DESCRIPTION</u>
01 DIVIDEBYZERO	The program attempted an arithmetic division with a divisor value of 0 (see NOTE 1).
02 EXPOVERFLOW	An arithmetic evaluation resulted in an exponent too large to fit in the exponent field.
03 EXPUNDERFLOW	An arithmetic evaluation resulted in an exponent too large to fit in the exponent field.
04 INVALIDINDEX	An attempt was made to index out of the bounds of an array.
05 INTEGEROVERFLOW	An attempt was made to use an integer value not in the range $\{-2^{39}+1$ to $2^{39}-1\}$ for single-precision or $\{-2^{78}+1$ to $2^{78}-1\}$ for double-precision.
06 INACTIVEQ	An attempt was made to perform on an inactive DCALGOL queue an operation that requires that the queue be active (see NOTE 2).
08 INVALIDOP	The tag of a word does not match its attempted use. In the vast majority of cases, this is caused by attempting to use a pointer variable without first having initialized it to point somewhere.
09 LOOP	This hardware-detected fault indicates an effectively infinite loop by the processor while executing an operator.
10 MEMORYPARITY	An uncorrectable memory error occurred.
11 SCANPARITY	This generally indicates a problem with some component of the system software or hardware, not with the user's program or the CANDE MCS.
12 INVALIDADDRESS	This generally indicates a problem with some component of the system software or hardware, not with the user's program or the CANDE MCS.
14 STRINGPROTECT	An attempt was made to skip or scan a pointer out of the bounds of the array to which it points.

CANDE OPERATIONS MANUAL

<u>FAULT</u>	<u>DESCRIPTION</u>
15 PROGRAMMEDOP	This generally indicates a problem with some component of the system software or hardware, not with the user's program or the CANDE MCS.
18 INVALIDPCW	This generally indicates a problem with some component of the system software or hardware, not with the user's program or the CANDE MCS.

NOTE 1

CANDE deliberately causes this fault when an internal error is detected. (See "Errors" below.)

NOTE 2

This fault can only occur when executing a program written in DCALGOL.

Boolean variables are used in all stacks to prevent recursive fault situations or inhibit recovery action at critical points. Faults at such times cause normal or abnormal termination of the GRIND stacks, and normal termination of the primary stack, so that datacomm activity restarts CANDE.

The program dumps and other diagnostic data from recoverable faults and errors may be suppressed by using the "?OP-DUMPOK" form of the ?OP network control command; they may be reinstated with the "?OP+DUMPOK" command form. Installations are urged to run with the option set (by default) because the remaining CANDE problems are likely to be elusive and difficult to reproduce. A potential problem with fault recovery is that trouble spots become tolerated annoyances and go unreported (and hence, uncorrected).

Errors

CANDE errors are transformed into faults; the EBCDIC string representing the error literal is divided by zero. Thus, the literal appears just below the divide-by-zero interrupt in the program dump. In some cases, a second parameter appears just below the literal. The errors defined in CANDE are listed in the following paragraphs, along with brief descriptions of the problems.

General Information

<u>ERROR</u>	<u>DESCRIPTION</u>
BADLSN	An interstack (CANDE internal) message contained an invalid LSN.
BUFCNT	The buffer counter for the primary stack is nonzero after all buffers have been deallocated.
CHAIN	Blocks in the tankfile are incorrectly chained.
CHAOS	An attempt was made to access a tankfile block that is already in use.
COMS M	The CONTROLLER is sending COMS MODE messages to CANDE. This might indicate a problem with some other piece of system software.
CTF=0	The control information describing changes to the workfile appears to have a null entry. The second parameter is an index into the control block.
DIDDLE	A bad file/directory manipulation request was generated.
DIOERR	An unexpected direct-I/O error was reported. The second parameter is the value of the IOERRORTYPE attribute.
DISCER	An invalid switched line state was reported during initialization.
ENTERF	An error other than duplicate file occurred when CANDE tried to enter the schedule output file in the directory.
HUNG	CANDE could not clear all of its stations following the entry of a ?QUIT or ?ABORT command, or the termination of datacomm.
MIXUP	The Station Table Locator (STL) is invalid.
NOBUF	The tank buffer pool is exhausted (in spite of a discipline that assures this situation cannot occur).
NO STL	A message was received from a line that CANDE does not know about.
NOTSCH	A non-schedule station logged on as a schedule station.
ORPHAN	On completion of an operation, not all buffers were returned to the pool.

CANDE OPERATIONS MANUAL

<u>ERROR</u>	<u>DESCRIPTION</u>
QTYPE	An invalid request was placed in the worker queue.
SCHEDQ	A message from SCHEDQ indicates a CANDE error.
SCHLSN	A message was received from an unscheduled LSN.
SCHNAM	An error was detected in the schedule file name built by CANDE.
SCHST	An invalid station scheduled state exists.
SCHSTA	A bad message was received from a schedule station.
STACNT	The count of active stations is incorrect.
STATE	A switched GO TO statement on the station state failed.
STAX=0	A message was received in a state that normally cannot occur.
SWAPPER	STACKSWAPPER reported an error; the second parameter is the error code.
TANK	The tankfile data for recovery is unusable.
TODOX	TODO INDEX is out of range.
USURP	A reference was made to a buffer not acquired by that stack or worker.
VERBSW	The verb type is out of range.
XSBUF	A given stack or worker acquired more than two buffers.
1	An error occurred during workfile recovery.

The following error messages were originally devised to notify the user of an internal CANDE problem but are, in fact, caused by inconsistent software levels or improper user input:

FILE LABEL EQUATION ERROR (previously FILECD)

An error was detected in the file cards built by CANDE for user task or compiler initiation.

FILEKIND OF WORKFILE INCOMPATIBLE WITH THIS MCP (previously UTLTSK)

An error was detected in the file cards built by CANDE for utility task initiation.

General Information

USERDATAFILE

CANDE obtains certain default settings at log-on time from the USERDATAFILE. (Refer to the "SYMBOL/USERSTRUCTURE" subsection of the MAKEUSER documentation in the "System Software Site Management Reference Manual.") Some of these USERDATAFILE settings may be changed by the user of a CANDE station for a particular session by entering CANDE commands. When beginning a new CANDE session, CANDE initializes these features from the USERDATAFILE settings. A couple of CANDE commands can actually alter the USERDATAFILE. A list of USERDATAFILE settings that may be altered or temporarily overridden by CANDE commands follows (the CANDE commands mentioned below are more fully documented in the "CANDE Reference Manual"):

<u>USERDATAFILE SETTING</u>	<u>DESCRIPTION</u>
PASSWORD	Contains the password used to log on to CANDE. The PASSWORD command alters the USERDATAFILE password list for the user who invokes the command.
ACCESSCODE	Contains the accesscodes and corresponding accesscode passwords for each user. The APASSWORD command alters the USERDATAFILE setting for the accesscode password(s) for a particular user.
USEDEFAULTCHARGE	Contains an instruction to automatically invoke a particular chargecode for a particular user at log-on time. This default chargecode may, however, be overridden if the user invokes the CHARGE command after logging on and specifies that a different chargecode be assigned to the session.
ACCESSCODENEEEDED	Requires that an accesscode be specified at log-on time. This setting may be overridden by the ACCESS command after logging on. The ACCESS command allows the user to assign a null accesscode to the session.
CANDEGETMSG	Contains the default setting for the message option. This setting can be altered for a particular session by the CANDE commands SO and RO (also available as ?SO and ?RO).
CANDEQWAIT	Contains the default setting for the QWAIT option. This setting can be altered for a particular session by the CANDE commands SO and RO (also available as ?SO and ?RO).

<u>USERDATAFILE SETTING</u>	<u>DESCRIPTION</u>
CANDECONTCHAR	Contains the default continuation character. This setting can be altered for a particular session by the CANDE command CONTINUE.
CANDEDESTNAME	Contains the default DESTNAME. This setting can be altered for a particular session by the CANDE command DESTNAME, or for a particular task by the CANDE commands RUN, EXECUTE, UTILITY, COMPILE, BIND, LFILES, DCSTATUS, LOG, and BACKUPPROCESS.
FAMILY	Contains the default family specification. This setting can be altered for a particular session by the CANDE command FAMILY.

REMOTE FILES

REMOTE files are files with KIND=REMOTE that permit programs to communicate with datacomm stations. A station can be a member of more than one file; a file can comprise more than one station. Only one file at a CANDE station can be capable of input (MYUSE=IN or IO); CANDE allows a station to be assigned to as many as 100 files at one time.

When a program opens a file, the MCS is informed and must respond before the program can read from or write to the station. Among the possible responses are the following:

1. Allow the request (assign the station to the file).
2. Deny the request.
3. Postpone the request (with allowance or denial to come later).

CANDE always allows assignment to files from tasks run by CANDE from the terminal (via such CANDE commands as RUN, COMPILE, or LFILES) unless the limits on the number of files have been exceeded or the session has been aborted. These tasks are all characterized by having the CANDE session as their job number.

General Information

Tasks that are not of this session are considered "foreign"; they may come from WFL jobs or from CANDE sessions at other stations. Foreign files are subject to special treatment at installation option. For example, they may be announced at the station by identifying messages, they may be limited to a single job at a time (for all stations or for logged-on stations), or a logged-on user may be asked for permission to assign his station to the file. These options are selected by the value of LAISSEZFILE. (Refer to the LAISSEZFILE command in Section 3 of this manual.) Possible values for LAISSEZFILE are the following:

- 0: Announce; limit all stations; ask logged-on stations
- 1: Announce; limit logged-on stations; ask logged-on stations
- 2: Announce; limit all stations; do not ask
- 3: Announce; limit logged-on stations; do not ask
- 4: Do not announce; limit all stations; do not ask
- 5: Do not announce; limit logged-on stations; do not ask
- 6: Do not announce; do not limit; do not ask

LAISSEZFILE=1 provides full limiting on logged-on stations but permits multiple jobs to have output on a common nonlogged-on station. A message appears at the station announcing that a task is opening the station; if a user is logged on at the station, the user is asked to "OK" or "DENY" the request.

LAISSEZFILE=0 provides the same capabilities as LAISSEZFILE=1 but limits the use of all stations to a single task at a time.

LAISSEZFILE=6 eliminates all postponement; therefore, multiple tasks can open any station without asking permission or announcing the open.

Foreign files are announced with messages like the following:

- 1. #FILE REM OPEN: USER=ZERO PROG=THUNDER/BOLT.
- 2. #OUTPUT FILE CHIT/CHAT OPEN: PROG=DISCOURSE.

The message displays the word OUTPUT (for an output-only file), the file name, the usercode (if any), and the name of the program opening the file. The file name is the title attribute unless it is too long or is identical to the station name. In those cases, the INTNAME attribute is shown. When a file that has been announced is subsequently closed, a message like "#FILE REM CLOSED" is sent unless the file has been explicitly denied by the terminal user.

CANDE OPERATIONS MANUAL

When limiting is selected, the station may be assigned to files from only one job at a time. If the station is busy processing a CANDE command or a file from one job is already open and allowed, files from any other job are postponed. An attempt to read from a file that has all its stations postponed causes the program to wait indefinitely unless a timeout has been specified for the postponement. An attempt to write to a postponed station causes end-of-file (EOF) action. The program can discover the reason for the EOF action by examining the disposition attribute or field [24:8] of either the WRITE value or the STATE file attribute. For more information, refer to the "I/O Subsystem Reference Manual."

Before assigning a logged-in station to a foreign file, CANDE may ask permission of the user by sending a file-open announcement followed by the message, "#RESPOND 'OK' OR 'DENY'".

If OK is transmitted, the assignment is allowed and usually the message "#?" (for an input or I/O file) is returned, or an output line from the program is displayed. If "DENY" is the response, the assignment is denied and a "#" acknowledgement is sent. If any other response is entered, the RESPOND message is repeated and the input ignored. Once a file from a job has been allowed or denied, other files from the same job are also allowed or denied without further interaction as long as any file from that job remains open. Files being automatically allowed are announced; those being automatically denied are not.

When the station has been assigned to any foreign file, normal CANDE functions are unavailable. Input goes to the input file if one is assigned; if only output files are assigned, the input is rejected with a "#STATION ASSIGNED TO FILE" message.

An MCS may deny assignment to a file at any time. CANDE does so under certain circumstances:

1. The ?DENY network control command denies all files currently open at the station (including postponed files not yet announced).
2. The ?END network control command denies the current input file, if any.
3. All files are denied at the termination of a session.

General Information

A schedule session is run with a dummy datacomm station provided for that purpose; the schedule station behaves programmatically like a real station for most purposes. Specifically, any tasks processed from the schedule session have their REMOTE files associated with the schedule station by default. As with any session, this linkage is accomplished through the STATION task attribute; it may be overridden by explicit user action. By setting STATION to a valid LSN, or by setting it to 0 and equating the file TITLE appropriately, a task of a schedule session can attempt to open a file on a genuine datacomm station, subject to the same constraints as any other foreign user of a station. On the other hand, only tasks of the particular schedule session may open REMOTE files to a schedule station.

TANKFILE

CANDE maintains a file called TANKFILE/SYSTEM/CANDE for Halt/Load recovery purposes. This file contains option settings, configuration information, and workfile recovery information. The tankfile resides on the same family as the CANDE CODE file.

RECOVERY FILES

When a workfile has been updated, its data reside in a TEXT file. A compiled workfile object exists as a CODE file. All other information about an active workfile, including any changes since the last update, are kept in the tankfile. A recovery file is created by transcribing from the tankfile the information that pertains to the station whose session was aborted. This transcription is performed immediately if CANDE was functioning at the time of the abort (station disconnect, operator ?QUIT network control command and so forth). In a catastrophe (external DS of CANDE, system Halt/Load), the tankfile data are transcribed when CANDE is next initiated.

The workfile title is CANDE/TEXT<recovery number>; the workfile object code has the title CANDE/CODE<recovery number>. The recovery number to be used at any session is determined at the beginning of the session, and this number is suffixed to the TEXT and CODE files created by updating and compiling the workfile. The most commonly encountered recovery file has the title CANDE/RECV<recovery number>. In the following discussion, the term "recovery file" refers to the CANDE/RECV<recovery number> file. The <recovery number> consists of the logical station number (in decimal) followed by one digit to distinguish multiple recovery files from the same station.

The scheme imposes a limit of ten recovery files from the same station and a total of 25 recovery files under any one usercode. (The second limit is an arbitrary define, MAXRECFILES, that the installation may modify by compiling CANDE; its upper bound is 149.) If 25 or more recovery files exist, only the first 25 are listed at log-on time or by the RECOVER command and any attempt to get or make another workfile is rejected with the message:

```
#RECOVER OR DISCARD A WORKFILE.
```

General Information

For example, if ten recovery files exist for LSN 23, any GET or MAKE or an attempt to recover a file created from another station is rejected with a message like the following:

```
#RECOVER OR DISCARD A WORKFILE IN THE RANGE 230-239.
```

A high level of consistency checking is applied to recovery files to screen out files harmful to CANDE. When an invalid recovery file is detected, the following actions are taken. The contents of the recovery file are listed in the taskfile to permit diagnosis of the failure. The file is then purged. If a TEXT workfile exists (that is, if the file was updated since a GET or MAKE command), then that file is recovered. The result of such a recovery is as follows:

```
#WORKFILE IS NOT NAMED:  ALGOL, 347 RECORDS
```

If no text existed or if its recovery failed, the message is

```
#INVALID RECOVERY FILE; NAME AND ANY CHANGES WERE LOST
```

If a CANDE fault or error occurs in a workfile editing or output operation (a CANDE "WORKER"), the following actions are taken to invoke the consistency checking of CANDE workfile recovery:

1. The tankfile data are saved in a recovery file as though the station has disconnected.
2. CANDE displays "#AUTORECOVERY INITIATED".
3. The action of a RECOVER command is taken using the appropriate recovery file.

If the consistency checking fails, normal invalid recovery file action follows.

Recovery information consists of one to three files. A RECOVERY file contains any workfile changes since the last update, plus the title and other attributes of the workfile. If the workfile has been updated but not yet saved, a TEXT file results. If the workfile has been compiled but not yet saved, a CODE file results. A TEXT or CODE file is generated at update or compilation time and is written on the workfile family. The recovery file is generated if the session is aborted and may be written either of two places: (1) if possible, on the default workfile family (defined as the workfile family established at log-on time by any USERDATA family specifications), or (2) if that family is not available, on the family containing the CANDE CODE file.

CANDE OPERATIONS MANUAL

The RECOVER command displays and recovers recovery files in up to three places in the following order of precedence: the USERDATA default workfile family, the CANDE CODE file family, and the current workfile family. The DISCARD command removes recovery, TEXT, and CODE files with the specified number(s) from all three of these families.

A recovery-data display is grouped according to the family containing the recovery files. If a recovery file pertains to a workfile on a different family, the phrase "ON <family>" appears in the display.

Recovering a workfile sets the session family specifications to those in effect at the time the workfile was saved; the new specifications are displayed if different from those in effect before recovery.

If the file part of a recovered workfile is not present, the recovery action is aborted with an appropriate message, but the recovery file is not purged. The missing file may be made present and the recovery attempted again.

RECONFIGURATION COMMANDS

Reconfiguration commands update the tables belonging to the DCP/NSP operating system and the datacomm controller both in core and in the DCPCODE file on disk. Thus, reinitialization of the datacomm system following successful completion of a reconfiguration request reflects the new configuration. Reconfiguration commands are the ?ADD, ?MOVE, ?SUBTRACT, ?SWAP, and ?TRANSFER network control commands. For all reconfiguration commands, "#RECONFIGURING" is printed at initiation of the reconfiguration. At the conclusion of the reconfiguration, a message informing the user of the result of the reconfiguration is printed.

3 NETWORK CONTROL COMMANDS

This section describes the network control commands that may be used to alter or determine the status of the CANDE network. The commands are valid only when entered from a control station or from the ODT via the SM (Send to MCS) ODT command. Exceptions are noted in the appropriate places. The syntax diagrams use a "?" to represent the current control character for the station.

?ABORT and ?QUIT**Syntax**

```
-- ? --- ABORT ----|
      |                |
      |- QUIT --|
```

Explanation

The ?ABORT and ?QUIT commands cause termination of the CANDE MCS.

These commands cause CANDE to do the following:

- A. Stop all worker activity.
- B. Discontinue all tasks.
- C. Update all user tankfiles for later recovery.
- D. Logoff all users.
- E. Abort all schedule sessions.
- F. Terminate.

If "?ABORT" is specified, all CANDE stacks do a program dump before terminating, and CANDE will not be automatically initiated in response to normal datacomm activity (it must then be explicitly run to be restarted).

Examples

```
?ABORT
```

```
?QUIT
```

Network Control Commands

?ADD and ?MOVE

Syntax

```

      |<----- , -----|
      |                     |
---- ? -- ADD -----<lsn>----- TO ---<d1>-----|
      |                     |                     | | | |
      |- ? -- MOVE -|   |-<station name>-|   | - SAVE -|
      |                     |                     |
      |-<dls>-----|

```

Explanation

The ?ADD and ?MOVE commands allow a user to add one or more stations that previously had no line assignment to a line or to move one or more stations from one line to another. The designated station(s) must be attached to the CANDE MCS, or the ?ADD or ?MOVE command cannot be honored.

The SAVE option causes the ADDED or MOVED station(s) to be left NOT READY after the request has been satisfied.

Example

```

?STATUS 5
TTY3(3)NOLINE UNRDY ENAB ATT

?ADD 5 TO 0:12
#RECONFIGURING
#MOVE LINE OK.

?STATUS 5
TTY3(5)=0:12:0 RDY ENAB ATT

```

?ATTACH**Syntax**

```

-- ? -- ATTACH |<----- , -----|
                |
                |-----<lsn range>-----|
                |
                |-----<dls>-----|
                |
                |-----<station name>-----|

```

Explanation

The ?ATTACH command allows the CANDE MCS to gain control of a new station, provided that CANDE has been defined as the controlling MCS for the station in the NDL/NDLII definition. The attachment is a logical one only; no attempt is made to dial out to a station to which dial-out is possible. The state of the station is left unaltered.

Examples

```
?ATTA 3:0:1, M336
```

```
? ATTACH BIDS01, 15
```

Network Control Commands

?AUTOANSWER and ?NOAUTOANSWER

Syntax

```

                                     |<----- , -----|
                                     |                               |
-- ? --- AUTOANSWER -----<lsn range>-----|
      |                               |                               |
      |- NOAUTOANSWER -|         |-<dls>-----|
                                     |                               |
                                     |-<station name>-|

```

Explanation

These commands allow the setting or resetting of AUTOANSWER for lines declared as dial-in in the NDL/NDLII.

If AUTOANSWER is specified, the datacomm subsystem will answer the phone for all dial-in lines.

If NOAUTOANSWER is specified for DCP dial-in lines, the datacomm subsystem will notify CANDE that the phone is ringing and CANDE will respond with an ANSWER THE PHONE message. The DCP will then answer the phone.

If NOAUTOANSWER is specified for NSP dial-in lines, the datacomm subsystem will not answer the phone.

For additional information, refer to the "ANSWER THE PHONE" and "SET/RESET AUTO-ANSWER" DCWRITE messages in the "DCALGOL Reference Manual," and the "LINE ANSWER STATEMENT" definition in the "Network Definition Language (NDL) Reference Manual."

Examples

```
?AUTOANSWER 15
```

```
?NOAUTOANSWER TD65
```

```
?AUTO 0:5:0
```

?BUG**Syntax**

```

|<-----|
|
-- ? -- BUG ----->
|
| - ALL -----|
| - NONE -----|
| -----<number>--|
|
| - + -|
|
| - - -|
|
>-----|
|
| |<-----| | |
| | |<-----| |
| | |
| --- [ -----<lsn>----- ] ---|
|
| -<station name>-|
| -<dls>-----|
| - * -----|
|
| - 0 -----|

```

Explanation

The ?BUG command allows different activities within CANDE to be monitored to an output file.

This command may be used only if the option \$DEBUG is compiled into CANDE.

If no input specifications are provided, the hexadecimal representation of the word containing the current BUG option is printed.

Network Control Commands

The option ALL sets the option word to all ones and resets to zero any following options. NONE resets the option word to all zeros and any following options to ones. <number> may be any value 0 through 47 and when used, resets the option word to all zeros and sets any following options. "+ <number>" sets and "- <number>" resets that option and any others following. A station list may be supplied in square brackets. An "*" indicates that the BUG applies to the originating station. A "0" specifies the global BUG option word. (This word is used when no station determination can be made.)

"?BUG NONE" (or any combination that results in a zero option word) closes the printer file of monitor data. The file may then be printed.

The following list contains BUG options with meanings:

- 0: Write and read blocknumbers
- 1: Dump of output messages for DCWRITE and INTERCOMQ insertion
- 2: Dump of input from PRIMARYQUEUE, HOLDQ, DCWRITE-return messages
- 3: Dump of disk reads and writes
- 4: Notable occurrences - login, verb
- 5: Buffer locks and allocations
- 6: Block locks, allocations, and returns
- 7: Get all good results
- 8: GRIND flow
- 9: GRIND disk I/O
- 10: GRIND file allocations
- 11: GRIND file setups
- 12: Line-by-line: GETSEQ, GETLINE, make line
- 13: GRIND sequence-number finding
- 14: Task control
- 15: Interstack messages
- 16: GRINDSETUP and UPDATER details

CANDE OPERATIONS MANUAL

- 17: STL changes
- 18: Scanners
- 19: Recovery reads, recovery writes, GETSTATUS results, and block table
- 20: HOLDQ insertions
- 21: Contents of TSK. HISTORY
- 22: Logging info
- 23: Identify change of worker
- 24: Time interval processing
- 25: File open/close bookkeeping
- 26: DIDDLE (directory manipulations)
- 27: FILER'S GETSTATUS calls
- 28: Stack control (STKINFO)
- 29: Work control (TODO)
- 30: SCHEDULER I/O
- 31: SCHEDULER insertions to PRIMARYQUEUE
- 32: SCHEDULER removals from SCHEDQ
- 33: SCHEDULER I/O contents
- 34: Schedule doings (miscellaneous)
- 35: SCHEDULER control values (as message is removed from SCHEDQ)
- 36: Trace information (stack, procedure entry/exit)
- 37: Monitor
- 46: Error-messages programdump

Network Control Commands

Examples

```
?BUG ALL 46 3
#BUGWORDS=BFFFFFFFFF7

?BUG 20 27 [*]
#BUGWORD[17]=000008100000
```

?CLEAR**Syntax**

```

-- ? -- CLEAR -----<lsn range>-----|
                |<----- , ----->|
                |-----<dls>-----|
                |-----<station name>-----|

```

Explanation

The ?CLEAR command causes CANDE to discard the indicated station.

This command causes the station to be made NOT READY and outstanding messages for the station to be recalled. For a switched line, CANDE disconnects the line only if the line has room for no more than one station. The state of the line for the specified station remains unchanged.

The action of this command is identical to the effect of the BYE command in CANDE; that is, a session is terminated. Active tasks initiated from the station are DSed.

Examples

```
?CLEAR CONBF, TC5DD, 12
```

```
?CLEAR 10, 13, 17
```

Network Control Commands

?COMPILESPERCENT**Syntax**

```

-- ? -- COMPILESPERCENT -----|
                                |
                                |-----<integer>--|
                                |
                                |-- = -|

```

Explanation

The ?COMPILESPERCENT command, if an <integer> is specified, defines the percentage of the maximum number of CANDE tasks that may be compiler tasks. If no <integer> is specified, the current percentage is displayed. The <integer> must be greater than or equal to 0 and less than or equal to 100. The default value is 100.

If the number of active CANDE tasks is greater than or equal to MAXTASKS or if the number of CANDE compile tasks is greater than or equal to the COMPILESPERCENT of the MAXTASKS when CANDE is asked to compile a task, then CANDE displays the message "#WAITING FOR AVAILABLE COMPILE TASK".

The value for COMPILESPERCENT saved in the tankfile is preserved over a Halt/Load. When a new tankfile is created, the default value is 100.

Examples

```

? COMP
#COMPILESPERCENT = 100 %

```

```

? COMP 25
#COMPILESPERCENT = 25

```

CANDE OPERATIONS MANUAL

In the following example, the number of compiles exceeds the COMPILESPERCENT of MAXTASKS.

```
?COUNT  
#29 TASKS (15 COMPILES), 6 WORKERS; 62 STATIONS ACTIVE, 191 ATTACHED
```

```
E  
#UPDATING  
#WAITING FOR AVAILABLE COMPILE TASK  
#COMPILING 8796  
#ET=37.8 PT=16.0 IO=6.2  
#WAITING FOR AVAILABLE TASK  
#RUNNING 8807  
#ET=12.4 PT=5.1 IO=9.1
```


?DEPTH**Syntax**

```

-- ? -- DEPTH -----|
          |                |
          |-----<number>-|
          |                |
          |-- = -|

```

Explanation

The operator may set the depth of the "saved text" queue from 0 to 20 via the ?DEPTH command. If no <number> is specified, then the value of the saved text depth is displayed; otherwise, it is changed. The saved text depth is saved in the tankfile and preserved over a Halt/Load. When creating a new tankfile, the default value for the saved text depth is zero.

Example

```

?DEPTH
#SAVED TEXT DEPTH = 7

```

Network Control Commands

?DISABLE**Syntax**

```

      |<----- , -----|
      |                     |
-- ? -- DISABLE -----<lsn range>-----|
      |                     |
      |-<dls>-----|
      |                     |
      |-<station name>-|

```

Explanation

The ?DISABLE command causes the DCP/NSP to ignore input from the indicated station. A disabled station is not polled.

The station must be ATTACHED for the DISABLE command to be effective.

"?DISABLE" is rejected with a "#STATION IN USE" message if the station is active with a user logged on or logging on or an OBJECT file open.

Example

```

?STATUS 5
TTY3(5)=0:12:0 RDY ENAB ATT

?DISABLE 5
#

?STATUS 5
TTY3(5)=0:12:0 RDY DISABL ATT

```

?ENABLE**Syntax**

```

      |<----- , -----|
      |                     |
-- ? -- ENABLE -----<lsn range>-----|
      |                     |
      |-<dls>-----|
      |                     |
      |-<station name>-|

```

Explanation

The ?ENABLE command causes the DCP/NSP to accept input from the indicated station. Polling of the station begins where appropriate. The frequency is set to the NDL/NDLII declared value.

The station must be READY and ATTACHED for the ?ENABLE command to be effective.

Example

```
?STATUS 5
TTY3(5)=0:12:0 RDY DISABL ATT
```

```
?ENABLE 5
#
```

```
?STATUS 5
TTY3(5)=0:12:0 RDY ENAB ATT
```


?GRINDLIMIT**Syntax**

```

-- ? -- GRINDLIMIT -----|
|                               |
|-----<number>-----|
|                               |
| - = - |

```

Explanation

The ?GRINDLIMIT command allows the operator to limit the number of GRIND stacks used. This value must be between 1 and the value of MAXGRINDS. This command is immediately effective and does not require CANDE termination. The value for GRINDLIMIT is saved in the tankfile and is preserved over CANDE termination. When creating a new tankfile, the default value for GRINDLIMIT is 1. If <number> is not specified, the current state of GRINDLIMIT is displayed.

Example

```

?GR
#GRINDLIMIT = 2

```

Network Control Commands

?INFO

Syntax

```
-- ? -- INFO --|
```

Explanation

The ?INFO command causes the current settings of CANDE options and parameters to be displayed.

Example

```
?INFO

#OPTIONS SET: DUMPOK DOSWAPTO DOWAITGO DIALLOGIN ALLMSG SCATTER
      SWAPALL
#OPTIONS RESET: KEEPSTA ALLLOGIN CATDEFAULT CATALOGOK SECIALIN
      SECPSEUDO SECALL USECOMSPRIV NOSUBSPACES
#THERE ARE NO LOGSTATIONS
#MAXSTATIONS=120; MAXTASKS=50; COMPILESPERCENT=100%
      MAXGRINDS=13; GRINDLIMIT=5; FACTORS - WORK=80, QUIT=19; SAVED
      TEXT DEPTH=10; LAISSEZFILE=1; TANKING=ASYN
#CANDE NEWSFILE IS (ERA)NEWS.
#HEADLINE:
      (7/12)GENERAL MEETING; 10AM CONFERENCE ROOM;PLANNING
#SCHEDULE LIMIT=5 NO USERLIMIT
```

If the LOGONCHECK entry point to the SECURITY SUPPORT library is enabled, the following message is displayed:

```
#WILL USE LOGONCHECK ENTRY POINT IN SECURITY SUPPORT LIBRARY
```

?LAISSEZFILE**Syntax**

```

-- ? -- LAISSEZFILE -----|
                |           |
                |-----<number>-|
                |           |
                |- = -|

```

Explanation

The ?LAISSEZFILE command allows a control station to regulate how object files of programs that originate outside a session interact with remote stations in the network, as follows:

- A. Announced (identified) at the terminal.
- B. Limited to one job at a time.
 - 1. For all stations.
 - 2. For all stations logged on.
- C. Subject to OK/DENY response by logged-in user.

If <number> is not specified, the current setting for LAISSEZFILE is displayed. <number> must be in the range 0 through 6. Meanings for LAISSEZFILE values are the following:

- 0: Announce; limit all stations; ask logged-on stations
- 1: Announce; limit logged-on stations; ask logged-on stations
- 2: Announce; limit all stations; do not ask
- 3: Announce; limit logged-on stations; do not ask
- 4: Do not announce; limit all stations; do not ask
- 5: Do not announce; limit logged-on stations; do not ask
- 6: Do not announce; do not limit; do not ask

Refer to the discussion of REMOTE files.

Network Control Commands

See also

.. REMOTE FILES. 18

Example

```
?LAISSEZFILE  
#LAISSEZFILE = 0
```


Network Control Commands

<option list>

```

|<----- , -----|
|
----- LGATTACH -----|
|
| - LGON -----|
| - LGOFF -----|
| - LGCHARGE -|
| - LGERROR --|
| - LGBOT -----|
| - LGEOT -----|
| - LGSECURE -|
| - LGFAULT --|
| - LGUNABLE -|
| - LGSABORT -|
| - AUTOINFO -|
| - LGSP0 -----|
| - LGLOGSTA -|

```

Explanation

The ?LGSTA Command

The ?LGSTA command is used to make the designated control stations into CANDE log stations. It is valid only through a control station.

```
?LGSTA
?LGSTA : ALL
?LGSTA : <option list>
```

These forms of the command are valid only from a control station; they are not valid from the ODT. They cause the station from which the message originates to be designated a CANDE log station. If the station is already a log station, the error message "#<lsn> ALREADY A LOGSTATION" is returned. If the "?LGSTA" form is used, all options are reset. If the ": ALL" syntax is used, the logging bits for all options in the option list are set. If the ": <option list>" syntax is used, the logging bits for the specified option(s) are set.

```
?LGSTA <station list>
?LGSTA <station list> : ALL
?LGSTA <station list> : <option list>
```

These forms of the command are valid both from a control station and from the ODT. They cause the station(s) specified to be made a log station. If no such station exists or the station is already a log station, an error message is returned. If the "?LGSTA <station list>" form is used, all options are reset. If the ": ALL" syntax is used, the logging bits for all the options in the <option list> are set. If the ": <option list>" syntax is used, the logging bits for the specified options are set.

The ?DSLGSTA Command

The ?DSLGSTA command causes termination of the designated station(s) as a log station(s).

```
?DSLGSTA
```

"?DSLGSTA" is valid from a control station only; it is not valid from the ODT. It terminates the station from which the message originates as a log station. If the originating station is not a log station, an error message is returned.

```
?DSLGSTA <station list>
```

"?DSLGSTA <station list>" is valid from a control station or the ODT. It terminates the designated stations as CANDE log stations.

```
?DSLGSTA ALL
```

"?DSLGSTA ALL" is valid from a control station or the ODT. It terminates all CANDE log stations as log stations.

Network Control Commands

The ?LGOP Command

The ?LGOP command is used to furnish the capability of interrogating the setting or resetting of any or all of the logging options for the specified log stations. Options may be independently specified for each log station.

```
?LGOP
?LGOP +
?LGOP -
?LGOP : <option list>
```

These forms of the ?LGOP command interrogate the logging functions of the station from which the message originates. These forms must be used from a log station. None are valid from the ODT. "?LGOP" displays the complete list of logging functions with their current values (for example, set or reset). "?LGOP +" and "?LGOP -" display the list of set and reset options, respectively. "?LGOP : <option list>" displays the current setting for the options specified by <option list>.

```
?LGOP + <station list>
?LGOP - <station list>
?LGOP <station list>
?LGOP <station list> : <option list>
```

These forms of the ?LGOP command interrogate the logging functions of the stations specified by <station list>. These forms are valid from a control station and the ODT. In each case, if any station specified is not a log station, an error message is displayed. "?LGOP + <station list>" and "?LGOP - <station list>" display the list of set and reset options, respectively, for the stations specified. "?LGOP <station list>" displays the complete list of logging functions with their current values for the stations specified. "?LGOP <station list> : <option list>" displays the current setting of the options specified by <option list> for the stations specified.

```
?LGOP + <station list> : <option list>
?LGOP - <station list> : <option list>
```

These commands are used to set or reset a list of options for the stations specified by <station list>. These commands are valid from a control station and the ODT. If the station specified is not a log station, an error message is displayed. If a "+" is entered, the specified options are set. If a "-" is entered, the specified options are reset.

CANDE OPERATIONS MANUAL

?LGOP + : <option list>

?LGOP - : <option list>

These commands are used to set or reset a list of options for the station from which the command is entered. These commands are valid from a control station only; they are not valid from the ODT. If the station is not a log station, an error message is displayed. If a "+" is entered, the specified options are set. If a "-" is entered, the specified options are reset.

?LGOP + ALL

?LGOP - ALL

?LGOP ALL

?LGOP ALL : <option list>

Each of these forms of the ?LGOP command is used for interrogation of all CANDE log stations. These command forms are valid from a control station or the ODT. The presence of a "+" or "-" causes only the set or reset options to be displayed for all log stations. The presence of the ": <option list>" syntax causes only the specified options to be displayed.

?LGOP + ALL : <option list>

?LGOP - ALL : <option list>

These commands are valid from a control station or the ODT. If no log stations exist, an error message is displayed. The commands cause the specified options to be set (+) or reset (-) for all CANDE log stations.

The log station options are defined below. The event associated with each option is noted at each log station with the specified option set.

<u>Option</u>	<u>Event</u>
LGATTACH	Station attachment
LGON	User log on
LGOFF	User log off
LGCHARGE	Chargecode change
LGERROR	Datacomm error
LGBOT	Beginning of user task
LGEOT	End of user task
LGSECURE	Security violation

Network Control Commands

<u>Option</u>	<u>Event</u>
LGFAULT	CANDE fault
LGUNABLE	CANDE service unavailable
LGSABORT	Abnormal termination of a CANDE SCHEDULE session
AUTOINFO	Display of various CANDE options on the CANDE ODT at initialization time (refer to the ?INFO command in this section)
LGSP0	"?SS" messages addressed to the ODT
LGLOGSTA	Change of logging status for any log station

The ?DSLGSTA command is valid when used through the SM (Send to MCS) ODT command, but certain forms of the ?LGSTA command are not.

If the ?LGSTA command is used to initiate logging on a station that had been a log station when it was disconnected from CANDE, and no options are specified in the command, then that station will have its log options restored to what they were previously, instead of having them reset to default values.

When designating a station as a log station and choosing the logging options, the type of terminal and system load should be considered. If the terminal is not one appropriate for logging functions (for example, a screen or a slow printer), and the system load and selected options result in a large amount of log messages being directed to the station, then serious system degradation could result from a backlog of undelivered output in save memory. (Note that this is not a problem for pseudo-stations with a fully participating MCS that performs flow control.)

CANDE monitors the level of undelivered log messages and suspends logging for stations that exceed a limit. In addition, it discards all pending output for those stations, including output from remote files or any other sources. BREAK notification is sent to remote files. If a suspended log station is later enabled to receive output, the station is sent a warning message noting the suspension, and logging is resumed.

Installation managers are cautioned against relying on this log suspension as flow control for inappropriate terminals. The margin that CANDE assumes for unknown circumstances, and the fact that only a control station (or the ODT) can initiate logging, means that CANDE may allow a backlog of log messages that could cumulatively have a serious effect on overall system performance.

CANDE OPERATIONS MANUAL

CANDE allows a maximum of 30 stations to be designated as log stations.

Only a control station may create a CANDE log station; however, the station being made a log station need not be a control station. A noncontrol CANDE log station cannot terminate itself as a log station.

The ?WHERE and ?WHO network control commands can be used to report whether a station is a control or a log station. (For further information, see the ?WHERE and ?WHO commands.)

The input to the ?LGSTA, ?DSLSTA and ?LGOP commands may specify an LSN, station name, or <dls>. However, the information returned from these commands is always prefaced by a station name(s).

See also

?INFO	43
?WHERE.	81
?WHO.	83

Examples

For the following examples, station name T17 is the same as LSN 13; station name T12 is the same as LSN 8.

```
?LGSTA
```

```
#T17 LG OPTIONS: -=LGLOGSTA -=AUTOINFO -=LGFAULT -=LGSABORT
                 -=LGUNABLE -=LGSPO -=LGSECURE -=LGEOT -=LGBOT -=LGERROR
                 -=LGCHARGE -=LGOFF -=LGON -=LGATTACH
```

```
?LGSTA
```

```
#13 ALREADY A LOG STATION
```

```
?LGSTA:LGON,LGOFF,LGCHARGE
```

```
#T17 LG OPTIONS: -=LGLOGSTA -=AUTOINFO -=LGFAULT -=LGSABORT
                 -=LGUNABLE -=LGSPO -=LGSECURE -=LGEOT -=LGBOT -=LGERROR
                 +=LGCHARGE +=LGOFF +=LGON -=LGATTACH
```

Network Control Commands

?LGSTA T17,8

#T17 LG OPTIONS: -=LGLOGSTA -=AUTOINFO -=LGFAULT -=LGSABORT
 -=LGUNABLE -=LGSP0 -=LGSECURE -=LGEOT -=LGBOT -=LGERROR
 +=LGCHARGE +=LGOFF +=LGON -=LGATTACH

#T12 LG OPTIONS: -=LGLOGSTA -=AUTOINFO -=LGFAULT -=LGSABORT
 -=LGUNABLE -=LGSP0 -=LGSECURE -=LGEOT -=LGBOT -=LGERROR
 -=LGCHARGE -=LGOFF -=LGON -=LGATTACH

?LGSTA T17:LGERROR,LGFAULT

#T17 LG OPTIONS: -=LGLOGSTA -=AUTOINFO +=LGFAULT -=LGSABOT
 -=LGUNABLE -=LGSP0 -=LGSECURE -=LGEOT -=LGBOT +=LGERROR
 +=LGCHARGE +=LGOFF +=LGON -=LGATTACH

?LGSTA:ALL

#T17 LG OPTIONS: +=LGLOGSTA +=AUTOINFO +=LGFAULT +=LGSABORT
 +=LGUNABLE +=LGSP0 +=LGSECURE +=LGEOT +=LGBOT +=LGERROR
 +=LGCHARGE

?DSLSTA 8,13

#T12(8) DISCONTINUED AS LOGSTATION
 #T17(13) DISCONTINUED AS LOGSTATION

?DSLSTA ALL

#ALL LOGSTATIONS DISCONTINUED

?DSLSTA

#T17(13) DISCONTINUED AS LOGSTATION.

?LGOP

#T17 LG OPTIONS: +=LGLOGSTA +=AUTOINFO +=LGFAULT +=LGSABORT
 +=LGUNABLE +=LGSP0 +=LGSECURE +=LGEOT +=LGBOT +=LGERROR
 +=LGCHARGE +=LGOFF +=LGON +=LGATTACH

?LGOP:LGFAULT

#T17 LG OPTIONS: +=LGFAULT

?LGOP -

#T17 LG OPTIONS RESET: [NONE]

CANDE OPERATIONS MANUAL

?LGOP +

#T17 LG OPTIONS SET: LGLOGSTA AUTOINFO LGFAULT LGSABORT
 LGUNABLE LGSPO LGSECURE LGEOT LGBOT LGERROR LGCHARGE
 LGOFF LGON LGATTACH

?LGOP-:LGBOT

#T17 LG OPTIONS RESET: LGBOT

?LGOP

#T17 LG OPTIONS: +=LGLOGSTA +=AUTOINFO +=LGFAULT +=LGSABORT
 +=LGUNABLE +=LGSPO +=LGSECURE +=LGEOT -=LGBOT +=LGERROR
 +=LGCHARGE +=LGOFF +=LGON +=LGATTACH

?LGOP+:LGBOT

#T17 LG OPTIONS SET:LGBOT

?LGOP T12

#T12 LG OPTIONS: -=LGLOGSTA +=AUTOINFO -=LGFAULT +=LGSABORT
 -=LGUNABLE +=LGSPO -=LGSECURE +=LGEOT +=LGBOT -=LGERROR
 -=LGCHARGE -=LGOFF -=LGON +=LGATTACH

?LGOP T17:LGON

#T17 LG OPTIONS: -=LGON

?LGOP-T12

#T12 LG OPTIONS RESET: LGLOGSTA LGFAULT LGUNABLE LGSECURE
 LGERROR LGCHARGE LGOFF LGON

?LGOP+T12

#T12 LG OPTIONS SET: AUTOINFO LGSABORT LGSPO LGEOT LGBOT
 LGATTACH

?LGOP T17

#T17 LG OPTIONS: +=LGLOGSTA +=AUTOINFO -=LGFAULT +=LGSABORT
 -=LGUNABLE +=LGSPO -=LGSECURE +=LGEOT +=LGBOT -=LGERROR
 -=LGCHARGE -=LGOFF -=LGON +=LGATTACH

Network Control Commands

?LGOP-T17:LGSP0

#T17 LG OPTIONS RESET: LGSP0

?LGOP T17

#T17 LG OPTIONS: +=LGLOGSTA +=AUTOINFO -=LGFAULT +=LGSABORT
 -=LGUNABLE -=LGSP0 -=LGSECURE +=LGEOT +=LGBOT -=LGERROR
 -=LGCHARGE -=LGOFF -=LGON +=LGATTACH

?LGOP+T17: LGSP0

#T17 LG OPTIONS SET: LGSP0

?LGOP T17

#T17 LG OPTIONS: +=LGLOGSTA +=AUTOINFO -=LGFAULT +=LGSABORT
 -=LGUNABLE +=LGSP0 -=LGSECURE +=LGEOT +=LGBOT -=LGERROR
 -=LGCHARGE -=LGOFF -=LGON +=LGATTACH

?LGOP ALL

#T17 LG OPTIONS: +=LGLOGSTA +=AUTOINFO -=LGFAULT +=LGSABORT
 -=LGUNABLE +=LGSP0 -=LGSECURE +=LGEOT +=LGBOT -=LGERROR
 -=LGCHARGE -=LGOFF -=LGON +=LGATTACH
 #T12 LG OPTIONS: -=LGLOGSTA +=AUTOINFO -=LGFAULT +=LGSABORT
 -=LGUNABLE +=LGSP0 -=LGSECURE +=LGEOT +=LGBOT -=LGERROR
 -=LGCHARGE -=LGOFF -=LGON +=LGATTACH

?LGOP - ALL

#T17 LG OPTIONS RESET: LGFAULT LGUNABLE LGSECURE LGERROR
 LGCHARGE LGOFF LGON
 #T12 LG OPTIONS RESET: LGLOGSTA LGFAULT LGUNABLE LGSECURE
 LGERROR LGCHARGE LGOFF LGON

?LGOP-ALL:AUTOINFO,LGSP0

#T17 LG OPTIONS RESET: AUTOINFO LGSP0
 #T12 LG OPTIONS RESET: AUTOINFO LGSP0

?LGOP ALL

```
#T17 LG OPTIONS: +=LGLOGSTA --AUTOINFO --LGFAULT +=LGSABORT
--LGUNABLE --LGSP0 --LGSECURE --LGEOT --LGBOT --LGERROR
--LGCHARGE --LGOFF --LGON +=LGATTACH
#T12 LG OPTIONS: --LGLOGSTA --AUTOINFO --LGFAULT +=LGSABORT
--LGUNABLE --LGSP0 --LGSECURE --LGEOT --LGBOT --LGERROR
--LGCHARGE --LGOFF --LGON +=LGATTACH
```

Network Control Commands

?MAXGRINDS**Syntax**

```

-- ? -- MAXGRINDS -----|
|                               |
|-----<number>--|
|               |
|-- = --|

```

Explanation

The ?MAXGRINDS command allows the operator to set the maximum number of GRIND stacks to be used the next time CANDE is initialized with the current tankfile. The minimum value for MAXGRINDS is 1 and the maximum is 13. Changing MAXGRINDS is not effective until CANDE is terminated and reinitialized. The default value for MAXGRINDS when creating a new tankfile is 1. If <number> is not specified, the current state of MAXGRINDS is displayed.

Example

```

?MAXG = 4
#MAXGRINDS = 5, NEW VALUE = 4

```

?MAXSTATIONS**Syntax**

```

-- ? -- MAXSTATIONS -----|
      |                         |
      |-----<number>-----|
      |                         |
      |-- = --|

```

Explanation

The ?MAXSTATIONS command allows the maximum number of stations that CANDE simultaneously supports to be changed dynamically.

If <number> is not specified, the state of MAXSTATIONS is displayed.

The new value of MAXSTATIONS is saved in the CANDE tankfile and becomes the value for MAXSTATIONS the next time CANDE is initialized with that tankfile.

When the tankfile is lost or CANDE is moved to a different disk family, CANDE initializes with 25 as the value for MAXSTATIONS. If a different value is desired, the operator must change MAXSTATIONS to the desired value and QUIT CANDE.

Example

```

?MAXSTATIONS = 30
#MAXSTATIONS = 25, NEW VALUE = 30

```

Network Control Commands

?MAXTASKS

Syntax

```

-- ? -- MAXTASKS -----|
          |                   |
          |-----<number>--|
          |                   |
          |- = -|

```

Explanation

The maximum number of tasks that can occur simultaneously is specified as MAXTASKS. The value of this variable is controlled by the ?MAXTASKS command.

If no <number> is specified, CANDE displays the present value of MAXTASKS. If a <number> is specified, CANDE replaces the present value of MAXTASKS with <number> if <number> is an allowed value for MAXTASKS. The default value of MAXTASKS is the maximum number of stations CANDE can service (MAXSTATIONS). MAXTASKS may not exceed MAXSTATIONS.

If CANDE is asked to process a task and the number of active CANDE tasks is presently greater than or equal to MAXTASKS, the message "#WAITING FOR AVAILABLE TASK" is displayed. CANDE processes the task when a task is available. The value for MAXTASKS is saved in the tankfile and is preserved over a Halt/Load. The default value when creating a new tankfile is 25 (this is also the default for MAXSTATIONS when creating a new tankfile).

Example

```

?MAXT
#MAXTASKS = 25

```

?NEWS**Syntax**

```

-- ? -- NEWS -----|
|                       |
|-----|
|-----<file title>--|
|                       |
|-----|
|-----|

```

Explanation

The ?NEWS command is used to enable, disable, or interrogate the NEWS facility.

The "?NEWS" form causes CANDE to reaccess a previously named news file and read its headline. This command may be used to make CANDE update the news file headline image if the news file has been altered or replaced by another file of the same name. If no news file title has been specified or if the news file is not available, an error message is generated and the NEWS feature is turned off.

The "?NEWS-" form causes the NEWS feature to be turned off and the news file title to become undefined.

The "?NEWS = <file title>" and "?NEWS <file title>" forms indicate that a news file exists and has the specified <file title>. CANDE finds the file and reads its first record as the headline. CANDE retains both the filename and the headline in its tankfile; the file is not accessed again except to service user NEWS commands. If the named news file is not available, an error message is generated and the NEWS feature is turned off. The <file title> may take any valid form; an "*" or a usercode prefix and an "ON <family>" suffix are optional. If the ?NEWS command is entered through a station that is logged on, the usercode and any family substitution specification are ignored in locating the file.

The news file may be of any CANDE recognized type. SEQDATA is most appropriate if 72-character terminals such as teletypes are present on the network, since the full text of each line may be transmitted without folding. On networks that have only wider terminals, a wider text field might be desired; JOBSYMBOL could be used.

Network Control Commands

If the NEWS feature is active and the headline is not entirely blank, the headline is transmitted to each user logging on to the system. No identification or embellishment is provided by CANDE; the headline in the news file should be self contained. The mode of a news file must be EBCDIC.

The NEWS feature may be used in any fashion found convenient; one suggestion follows. The headline should show some identification, the date and time at which the news file was last updated, and a brief indication of the most important item. The remainder of the file should contain the text of the message. Earlier messages (with their headlines) may be retained in the file as long as they remain useful; they should appear in order of increasing age, so that a user may break the listing when all the messages that are new have been read.

Example

```
MAKE NEWS
#WORKFILE NEWS: SEQ
  100 CANDE NEWS (WED 9/17 1430):  NEW HOURS NEXT WEEK
  200 EFFECTIVE MONDAY SEPTEMBER 22, 1975 THE TIMESHARING SERVICE
  300 WILL BE AVAILABLE BETWEEN ...
  ...

SAVE
#WORKSOURCE NEWS SAVED

?NEWS=(JER)NEWS ON SYSPACK
#CANDE NEWS FILE IS (JER)NEWS ON SYSPACK.
#HEADLINE:
  CANDE NEWS (WED 9/17 1430):  NEW HOURS NEXT WEEK
```


Network Control Commands

Explanation

The ?OP command allows interrogation, setting, or resetting of any or all CANDE options.

```
?OP
?OP +
?OP -
```

These command forms are valid from a control station and the ODT. "?OP" causes a complete list of the CANDE options with their current settings to be displayed. "?OP +" and "?OP -" cause the current list of SET and RESET options, respectively, to be displayed.

```
?OP + <option list>
?OP - <option list>
```

These command forms are valid from the ODT and from a control station. They cause the designated options to be set (+) or reset (-).

The following is a list of the CANDE options and their respective meanings:

<u>OPTION</u>	<u>DESCRIPTION</u>
ALLOGIN	When this option is set, all stations must log on with a usercode and password.
ALLMSG	When this option is set, it will allow a user to receive messages from his batch job even if he is not on the same LSN that started the job. However, he only receives messages that he has specifically requested via job query commands (for example, ?J and ?MSG), and then only from tasks running under the usercode on which he is currently logged. He will not receive messages spontaneously generated by jobs (for example, DISPLAYS) without requesting them in this manner.
CATALOGOK	When this option is set, files that are created can be cataloged if desired.
CATDEFAULT	This option signifies that "saved" files are cataloged.
DIALLOGIN	This option signifies that all dial-in stations must log in with a usercode and password.

CANDE OPERATIONS MANUAL

<u>OPTION</u>	<u>DESCRIPTION</u>
DOSWAPTO	This internal debugging option, which should not be set during normal operation, is defined only when CANDE is compiled with the \$DEBUG option.
DOWAITGO	This internal debugging option, which should not be set during normal operation, is defined only when CANDE is compiled with the \$DEBUG option.
DUMPOK	When this option is set, CANDE causes a program dump on an internal fault.
INTBACKUTIL	When this option is set, CANDE always executes the pre-Mark 3.6 Release version of the backup processor utility (the internal version) in response to the BACK command, even if CANDE is running under a Mark 3.6 Release or later MCP. If reset, the MCP level alone determines which utility is used.
KEEPSTA	When this option is set, a station released to CANDE stays with CANDE until a Halt/Load or until it is released.
NOSUBSPACES	<p>This option can be set to prevent CANDE's automatic default assignment of the SUBSPACES attribute for CANDE-initiated tasks. The effect of the NOSUBSPACES option and its interaction with the SWAPALL option are summarized as follows:</p> <p>If NOSUBSPACES is set, SWAPALL is ignored and no SUBSPACES assignment is made.</p> <p>If NOSUBSPACES is reset and SWAPALL is set, CANDE assigns SUBSPACES=3 (SWAPALL) to all tasks.</p> <p>If both are reset (the default behavior), CANDE assigns</p> <p style="padding-left: 40px;">SUBSPACES=1 (SWAPREENTRANT) to COMPILE, LFILE, and all other intrinsic UTILITY tasks,</p> <p style="padding-left: 40px;">or</p> <p style="padding-left: 40px;">SUBSPACES=2 (SWAPSTANDARD) to EXECUTE and UTILITY tasks.</p>
SCATTER	When this option is set, tasks executed from CANDE are spread through any "box" (not just the one that CANDE is operating in). (Refer to Section 4 for additional information on the SCATTER option.)

Network Control Commands

<u>OPTION</u>	<u>DESCRIPTION</u>
SECALL	<p>When this option is set, no user logged on to CANDE is recognized as a privileged user unless all of the following conditions are met:</p> <ol style="list-style-type: none"> 1. He is using a COMS window. 2. The USECOMSPRIV option is set. 3. His COMS station is configured in COMS as having privileged access. 4. His usercode is marked as privileged in the SYSTEM/USERDATAFILE.
SECDIALIN	<p>When this option is set, users of dial-in stations do not have privileged user status, even if the user logs on with a usercode marked as privileged in the SYSTEM/USERDATAFILE.</p>
SECPSEUDO	<p>When this option is set, a user of a pseudo-station does not have privileged user status unless all of the following conditions are met:</p> <ol style="list-style-type: none"> 1. He is using a COMS window. 2. The USECOMSPRIV option is set. 3. His COMS station is configured in COMS as having privileged access. 4. His usercode is marked as privileged in the SYSTEM/USERDATAFILE.
SWAPALL	<p>When this option is set and NOSUBSPACES is reset, then SUBSPACES=3 and all the code and data for a task are swapped if SWAPPER is running.</p>
USECOMSPRIV	<p>When this option is set, CANDE uses the COMS station configuration setting to determine whether or not users of a COMS window to CANDE have privileged user status. This overrides the SECPSEUDO and SECALL option settings.</p>
USEOLDWFL	<p>There is a new WFL and an old (pre-Mark 2.9 Release) WFL. ADD, COPY, and WFL statements are sent to the new WFL unless USEOLDWFL is set. An exception to this setting is that a WFL statement of the form "WFL JOB J; BEGIN..." is always sent to old WFL, while a message of the form "WFL BEGIN JOB;..." is always sent to the new WFL, regardless of the option setting.</p>

Examples

```
?OP-  
#OPTIONS RESET: KEEPSTA DIALLOGIN ALLLOGIN CATDEFAULT  
CATLOGOK SWAPALL
```

```
?OP+  
#OPTIONS SET: DUMPOK DOSWAPTO DOWAITGO ALLMSG
```

```
?OP+  
#OPTIONS SET: DUMPOK DOSWAPTO DOWAITGO
```

```
?OP+SWAPALL  
#OPTIONS SET: SWAPALL
```

```
?OP+  
#OPTIONS SET: DUMPOK DOSWAPTO DOWAITGO SWAPALL
```

Network Control Commands

?READY**Syntax**

```

      |<----- , -----|
      |                     |
-- ? -- READY -----<lsn range>-----|
      |                     |
      |-<dls>-----|
      |-<station name>-|

```

Explanation

The ?READY command is used to recover stations whose NDL/NDLII request logic terminated with an error, causing the station, and possibly the line, to be made NOT READY. The ?READY command also restores a station that has been saved.

Example

```

?STATUS 5
TTY3(5)=0:12:0 UNRDY ENAB ATT

```

```

?READY 5
#

```

```

?STATUS 5
TTY3(5)=0:12:0 RDY ENAB ATT

```

?RELEASE**Syntax**

```

      |<----- , -----|
      |                     |
-- ? -- RELEASE -----<lsn range>----- TO --<file title>--|
      |                     |
      |-<dls>-----|
      |                     |
      |-<station name>-|

```

Explanation

The ?RELEASE command causes control of a station to be passed to another MCS, which is designated by <file title>. The MCS does not have to be running before issuance of this instruction but must be present on disk, and it must not have previously terminated abnormally. CANDE activity cannot continue on the station following completion of this command until the station is passed back to CANDE for control.

?RELEASE is rejected with a "#STATION IN USE" message if the station is active and a user is logged on or is logging on, or an OBJECT file is open.

Examples

```
?STA 5
TTY3(5)=0:12:0 RDY ENAB ATT
```

```
?RELEASE 5 TO SYSTEM/DIAGNOSTICMCS ON PACK
#
```

```
?STA 5
TTY3(5)=0:12:0 RDY ENAB ATT[SYSTEM/DIAGNOSTICMCS ON PACK]
```

Network Control Commands

?SAVE

Syntax

```

      |<----- , -----|
      |                       |
-- ? -- SAVE -----<lsn range>-----|
      |                       |
      |-<station name>-|
      |-<dls>-----|

```

Explanation

The ?SAVE command causes the indicated station to be made NOT READY. All inputs from the station are ignored; polling ceases for a polled station.

The ?SAVE command may be entered at any time to make the station NOT READY. However, if the station is active with a user logged on or logging on, or an OBJECT file is open, CANDE responds with a "#STATION IN USE" message (as a warning) and does not abort the session or OBJECT file at the affected stations. A ?READY command then causes the session or file activity to be resumed from the point of interruption. If the station is inactive, the ?SAVE command causes CANDE to record the station as unusable.

Example

```

?STATUS 5
TTY3(5)=0:12:0 RDY ENAB ATT

?SAVE 5
#

?STA 5
TTY3(5)=0:12:0 UNRDY ENAB ATT

```

?SCHEDULE**Syntax**

```

-- ? -- SCHEDULE -----|
|<limit>-----|
| ALL -----|
| QUEUED -----|
| ACTIVE -----|
| HEAD ---<schednum>-----|
| TAIL -|          | OVERRIDE ---|
| STOP ---<schednum>-----|
| FIND -----|
| USERLIMIT -----<user limit>--|
|          | | |
| - = - | | - NONE -----|

```

Explanation

The system operator manages the processing of schedule sessions with the ?SCHEDULE command.

The simplest form, "?SCHEDULE", is the same as the user control command. If no user is logged on at the station where the command is entered, only the summary is produced; no schedule sessions are shown.

<limit> sets the limit on the number of schedule sessions to be processed simultaneously; <limit> must be a positive integer. If the new limit is greater than the old, schedule stations are sought from the MCP. If they are unavailable, the operator is informed and the limit reduced accordingly. If the new limit is less than the old, unused schedule stations are returned to the MCP. If not enough unused stations exist to effect the reduction, other stations are returned as their sessions terminate. Thus, the limit may be less than the number in use during a period of transition. The default limit is zero. The limit is retained in the CANDE tankfile. Setting a limit to nonzero causes initialization of the schedule facility, if necessary.

Network Control Commands

ALL, QUEUED, and ACTIVE display more detailed information about scheduled sessions. "?SCHEDULE ALL" displays, for each schedule session, the schedule number, a status indicator, and the usercode. The status indicator is as described for the user ?SCHEDULE command. (Refer to the ?SCHEDULE command in the "CANDE Reference Manual" for further information.) "?SCHEDULE QUEUED" displays only those schedule sessions entered but not yet active. "?SCHEDULE ACTIVE" displays only the active schedule sessions.

HEAD and TAIL change the position of a scheduled session in the queue. Each one acts on the schedule session whose schedule number is specified. The command is rejected if that session is no longer scheduled. OVERRIDE must be specified to move a pending session (one with an AFTER <time> specified that has not yet been reached). "?SCHEDULE HEAD" moves the specified session to the head of the queue, to be started next. "?SCHEDULE TAIL" moves the specified session to a position later than all other READY sessions but before those pending. TAIL causes a "promotion" of a pending session but a "demotion" of a READY session.

The STOP syntax terminates or discards an active or scheduled session whose schedule number is specified.

The FIND syntax causes CANDE to search for any schedule input files and enter them into the schedule. This function is performed automatically when the schedule facility is initialized; it may be performed manually if schedule files have been entered by library maintenance.

WARNING

Copying of old schedule input files may cause overwriting of new files with the same schedule number.

If <user limit> is specified, it must be a nonzero, unsigned integer. It may be larger than <limit>; however, if it is larger than the maximum number of schedule stations that CANDE can service, CANDE lowers the <user limit> accordingly. Specifying a USERLIMIT other than NONE prevents CANDE from starting a schedule session for any user who already has <user limit> or more schedule sessions currently active. Schedule sessions in excess of the <user limit> remain scheduled until a current session for that user finishes or until the operator raises the value of USERLIMIT.

CANDE OPERATIONS MANUAL

When USERLIMIT is set to NONE, CANDE starts schedule sessions in the order scheduled without regard to the number of schedule sessions already running for any user. (This procedure is the manner in which schedule sessions were started prior to Mark 3.0 CANDE.)

The value of USERLIMIT is saved in the CANDE tankfile and preserved over a Halt/Load. NONE is the default setting for USERLIMIT when creating a new tankfile or using a tankfile created by a pre-Mark 3.0 CANDE.

The ?WHERE network control command returns the same information for schedule sessions as for interactive sessions.

The ?STATUS <lsn> control command returns relevant data about schedule stations; the schedule stations have aliases like SCHED#002. (For further information, refer to the ?STATUS control command in the CANDE Reference Manual.)

Any other station-oriented control command is rejected if it specifies the LSN of a schedule station.

Schedule sessions generate the same messages on a CANDE log station that an interactive session generates: LOGOFF, BOT, EOT, and so forth.

The ?QUIT and ?ABORT network control commands terminate all schedule sessions as well as all interactive sessions.

Termination of the DCP(s)/NSP(s) causes the termination of any active schedule sessions as well as all interactive sessions. (CANDE cannot continue processing because it is no longer marked as an MCS.)

Schedule input files reside on the same family as the CANDE CODE file and tankfile. Their names are generated by appending the MCS name and the schednum to *SCHEDULE, for example,

*SCHEDULE/SYSTEM/CANDE/00031 ON DISK.

Schednum assignment starts at 1 whenever CANDE is initiated with no schedule input files present, or if it exceeds 65,535. No new input file gets the same schednum as an existing file on the CANDE family.

SYSTEM/CANDE is released with the capability of handling up to ten schedule stations at a time. This limit may be changed by recompilation of CANDE.

Network Control Commands

The MCP reserves a certain number of LSNs beyond those established in the NDL/NDLII description for schedule stations. The default number is ten. Any MCS, such as SYSTEM/CANDE, may request that a schedule station be assigned to it; the requests are honored as long as schedule stations are available. The total number of schedule stations available may be changed by recompiling the MCP. The MCS may release schedule stations to the MCP, which returns them to the available pool.

See also

?ABORT and ?QUIT. 26
 ?WHERE. 81

Examples

```
?SCHEDULE
#SCHEDULE LIMIT=5 NO USERLIMIT
```

```
?SCH USERLIMIT = 1
#USERLIMIT=1
```

```
?SCH
#SCHEDULE LIMIT=5 USERLIMIT=1
```

```
?SCH
#SCHEDULE LIMIT=5 USERLIMIT=1 ACTIVE=3 READY=3
```

```
?SCH ALL
#00054 SN=3884 USERA
#00060 SN=4217 USERB
#00059 SN=4197 USERC
#00055 WAITING USERA
#00056 WAITING USERA
#00057 WAITING USERA
#SCHEDULE LIMIT=5 USERLIMIT=1 ACTIVE=3 READY=3
```

?SS**Syntax**

```

-- ? -- SS --- SPO -----<text>--|
    |
    |- ALL -----|
    |
    |<----- , -----|
    |
    |-----<lsn range>-----|
    |
    |-----<dls>-----|
    |
    |-----<station name>-----|

```

Explanation

The ?SS command provides the capability for transmitting a message to a designated station or to all active attached stations (via the option ALL).

The message received as the result of the ?SS command is

```
#<time> FROM <usercode> ON <lsn>:<text>
```

<lsn> identifies the sending station. Messages from the ODT (sent via the ODT "SM" command) are identified by SPO rather than <lsn>. Messages from the MCP (such as automatic power-off warnings) are identified by MCP rather than <lsn>.

All messages originating from a log station say "FROM <user> ON <lsn>", exactly like messages from all other stations. If a message is sent to a log station, the <lsn> of that station must be specified. Log stations can receive messages sent to the SPO when LGSPO (an option of the "?LGSTA" and "?LGOP" CANDE commands) is set.

If the destination <lsn> is 1, then the message goes to the system ODT via a DISPLAY action.

Network Control Commands

Examples

?SS 3:5:2 HI

?SS 5 PLEASE LOG OFF

?SS ALL 5 MINS LEFT TO USE CANDE

The output at a receiver's terminal of the preceding message would be

#14:23 FROM OPS ON 252: 5 MINS LEFT TO USE CANDE

In this example, OPS is a usercode and 252 is an LSN.

[For information on the ?STATUS command, see the
"CANDE Reference Manual."]

Network Control Commands

?SUBTRACT**Syntax**

```

      |<----- , -----|
      |                     |
-- ? -- SUBTRACT -----<lsn range>-----|
      |                     |
      |-<dls>-----|
      |-<station name>-|

```

Explanation

The ?SUBTRACT command provides a user with the ability to remove a station or group of stations from a line. The station is left NOT READY.

Example

```

?STATUS SHERRI
SHERRI(16)=0:10:1 RDY ENAB ATT

?SUBTRACT SHERRI
#RECONFIGURING
#MOVE LINE OK.

?STATUS SHERRI
SHERRI(16)NOLINE UNRDY ENAB ATT

```

?SWAP**Syntax**

```

-- ? -- SWAP ---<lsn>----- WITH ---<lsn>----->
          |                               |
          |-<dl>-----|                 |-<station name>-|
          |                               |
          |-<station name>-|             |-<dl>-----|
          |                               |
----->
          |                               |
          |- SAVE -|

```

Explanation

The ?SWAP command allows two lines to be logically swapped.

Even though the <lsn> and <station name> forms are valid, the line to which the station belongs is being swapped and not the station. If a <station name> is specified and more than one station is on the line, all stations are swapped. The SAVE option causes the lines to be left NOT READY after completion of the SWAP.

Example

```

?STATUS 4,5
COMPUTER/ROOM(4)=0:11:0 RDY ENAB ATT
TTY3(5)=0:12:0 RDY ENAB ATT

?SWAP 4 WITH 5
#RECONFIGURING
#LINE SWAP OK.

?STATUS 4,5
COMPUTER/ROOM(4)=0:12:0 RDY ENAB ATT
TTY3(5)=0:11:0 RDY ENAB ATT

```

Network Control Commands

?TANKING

Syntax

```

-- ? -- TANKING -----|
|                               |
|----- UNSPECIFIED -|
|   |   |   |   |   |   |   |
| - = - | | - NONE -----|
|                               |
|   |   |   |   |   |   |   |
| - SYNC -----|
|                               |
|   |   |   |   |   |   |   |
| - ASYNC -----|

```

Explanation

The TANKING attribute controls whether or not a tankfile is created for a given file and the manner in which it is created. The I/O Subsystem Reference Manual describes the file attribute TANKING.

For REMOTE files with a TANKING attribute value of UNSPECIFIED, CANDE may assign a value for the TANKING attribute. This command allows the installation to specify which value CANDE assigns by default for the TANKING attribute.

UNSPECIFIED	No value is assigned to the attribute.
NONE	No tanking is done.
SYNC	All tanked output must be sent before closing the file.
ASYNC	All tanked output need not be sent before closing the file.

Example

```

?TANKING
#TANKING = NONE

```

?TRANSFER**Syntax**

```

      |<-----,-----|
      |                   |
-- ? -- TRANSFER ---<number1>-----|
      |                   |   |   |
      | - : --<number2>- |   | - SAVE - |

```

Explanation

On DCP machines, this command causes the CANDE MCS to attempt to transfer control of one or all clusters currently being controlled by a DCP to the DCP with which it is exchanged. The descriptions of the DCPs in NDL must reflect their exchange capabilities or else the transfer cannot be performed. <number1> is a DCP number and <number2> is a cluster number. If <number2> is omitted, control of all clusters by the designated DCP is transferred to the DCP with which it is exchanged; otherwise, only the specified cluster is transferred.

On Network Support Processor/Line Support Processor (NSP/LSP) machines, this command causes the CANDE MCS to attempt to transfer control of any or all of the LSPs currently being controlled by an NSP. Control of an LSP is transferred to one of the NSPs in the <LSP alternates> definition declared for that LSP in the NDLII source. (Refer to the NDLII Reference Manual for a definition of <LSP alternates>.) <number2> is the relative number of the LSP on that NSP. If <number2> is omitted, CANDE attempts to transfer all of the LSPs controlled by the designated NSP; otherwise, only the specified LSP is transferred. In either case, transfer of an individual LSP will not succeed if an <LSP alternates> definition does not exist or if none of the NSPs in the <LSP alternates> definition has a path to the LSP.

The SAVE option causes lines on the transferred cluster or LSP to be left NOT READY. The default (when SAVE is omitted) is to leave the lines READY after reconfiguration is completed.

Examples

```

? TRAN 3:2, 3:3, 2
? TRANSFER 7
? TRAN 3:0 SAVE

```

Network Control Commands

?WHERE

Syntax

```
-- ? -- WHERE --|
```

Explanation

The ?WHERE command provides information about all stations currently logged on to CANDE. The general form of the information provided in response to this command follows:

```
C L <session #> <station activity> + <usercode> ON <station name> <lsn>
      >n
      <n
      :<command name>
      :<mix number>
```

C Indicates that the station is a control station.

L Indicates that the station is a log station.

<session #>

The session number for a logged-on station. If the station has not yet logged on, there is no session number.

<station activity>

The type of activity at the station. "I/O" indicates that the station is assigned to a REMOTE file of a job other than that session's; this situation may arise whether or not the station is logged on. "LOGON" indicates that the station is in the log-on sequence but is not yet logged on.

>n It has been more than n minutes since the station was busy. (Because the timing facility is limited to 15 minutes, n is less than or equal to 14.)

<n It has been less than n minutes since the station was busy (where n is less than or equal to 15).

CANDE OPERATIONS MANUAL

- <command name>
The name of a CANDE command the station is processing, or the word BUSY (also indicating a CANDE command is being processed).
- <mix number>
The mix number of a CANDE-processed task.
- + Indicates that workfile changes for that station have been entered but are not yet recorded in the tankfile.
- <usercode>
The usercode of the station.
- <station name>
The station name.
- <lsn> The LSN of the station, in parentheses.

Example

?WHERE

```

1234 <1    + AX41J ON TTY7(2)
1247:1406  CINDERELLA ON PUMPKIN(7)
C L 1308:REPL  JULIET ON BALCONY(41)
.... LOGON ON OMATOPOEIA(12)
1193 I/O    WHITE ON WHITE(14)
C  1168 >14  "SLEEPING-BEAUTY" ON ICE(19)
.... I/O ON M333(24)

```


4 OPERATIONAL CHARACTERISTICS

To efficiently utilize CANDE, an installation manager must understand the effect and response of CANDE in the system operating environment and the system and operational functions required by CANDE. These features and requirements are presented in the following text.

ORGANIZATION

SYSTEM/CANDE is a DCALGOL program that contains two major functional sections referred to internally as BUMP and GRIND. BUMP is the main block of the program, and GRIND is an internal procedure that runs as an asynchronous process. Briefly, BUMP handles most of the datacomm activity, initial scanning of user input, and a few CANDE functions that are normally of short duration; it completes each activity before proceeding to another. GRIND is a multi-user procedure that performs the bulk of the CANDE verbs including all activities that normally require time-consuming I/O activity. These processes relate to each other by using normal tasking and interprogram communication techniques.

CANDE may be run with more than one GRIND stack to achieve greater throughput. The maximum number of GRIND stacks is controlled by the user-settable variable GRINDLIMIT.

If GRINDLIMIT is greater than two, one GRIND stack performs task initiation, one GRIND stack performs session log on and directory manipulation, and the rest of the GRIND stacks perform file updating chores (these are called working stacks). If GRINDLIMIT is equal to two, one GRIND stack performs task initiation, session log on, and directory manipulation; the other GRIND stack performs file updating chores. If GRINDLIMIT is equal to one, one GRIND stack performs all necessary functions.

The GRIND stacks are named CANDE/STACKxx, where xx is a number from 1 to 13. If CANDE is compiled with \$DEBUG set, this name is prefaced by the version and the date and time of compilation (for example, "29.100[07120830]/CANDE/STACKxx").

SEMIDEPENDENT TASKS

A semidependent task is a dependent task that has no access to data of the parent, apart from the TASK variable itself. A task has access to data in its parent only via globals or parameters, so a task may be semidependent if it is external (separate codefile, hence no shared globals) and if no parameters are passed to it by reference or name.

Semidependent tasks can be run in a different memory subsystem from the parent, subject to certain visibility constraints. The tasks generated from CANDE meet these requirements. However, certain actions must take place in order to allow the system to run these offspring to the fullest advantage. These actions are described in the succeeding paragraphs. The term "offspring" refers to user tasks such as COMPILE, EXECUTE, and UTILITY.

Visibility Attribute

The task attribute VISIBILITY is used to ensure that a stack is sufficiently global to provide visibility from any expected offspring or client stacks. The four VISIBILITY states are described below:

UNSPECIFIED	This state is the default. Although UNSPECIFIED is treated the same as the MINIMAL state in most situations, it is treated the same as the SUBSYSTEM state for (1) databases, (2) MCSs initiated by the datacomm subsystem, and (3) libraries initiated by the linker with SHAREDYALL or DONTCARE specified.
MINIMAL	This state signifies that no visibility requirements are imposed. The stack goes as local as possible.
SUBSYSTEM	This state causes the stack to become global if the SUBSYSTEM specification contains more than one member or is specified. The stack is local if a single local processor is specified.
GLOBAL	This state causes the stack to go into a shared memory environment.

The VISIBILITY task attribute can be specified as a run-time task modifier, for example, "RUN X; VISIBILITY=GLOBAL". Values for the attribute are checked by the MCP intrinsic ATTRIBSEARCHER.

Operational Characteristics

Operational Considerations

CANDE may be run in a local box for two reasons: (1) to limit CANDE and all of its offspring to the local box in order to permit the other local boxes to run free of interference from the source, and (2) to maximize the performance of CANDE with the intent to run user-initiated offspring in the most optimal part of the B 6800 Multiprocessor system.

In each of these cases, the site must take some overt action to allow or prevent the scattering of the offspring. Because of the current explanation of the SUBSYSTEM attribute as applied to CANDE, the default is to run the offspring in the same local box as CANDE and the run-time option SCATTER is SET to allow the offspring to run in other local boxes.

If SCATTER is SET, CANDE sets the SUBSYSTEM of the worker stack to null. Thus, the MCP picks an appropriate subsystem at task initiation time. If the option is RESET, CANDE sets the SUBSYSTEM of the worker stack to the main CANDE stack value.

The minimum abbreviation for SCATTER is SCAT. The setting of this option is maintained in the tankfile in the same manner as the other options. If the value of SCATTER is changed, the effect of the change does not occur until the next initiation of the worker stack.

The following are five possible ways to run CANDE to achieve various results. The method selected is controlled by site management to achieve optimum performance in the environment.

1. CANDE may be run in shared memory, with both the worker stacks and the user tasks scattered to the local boxes. This method remains the default system.
2. CANDE may be run in shared memory, with the offspring scattered in some local boxes. CANDE should then be compiled with an appropriate multiprocessor subsystem specification with the default VISIBILITY.
3. CANDE and all the workers may be run in any one of several local boxes, with the user tasks scattered among all those boxes. CANDE should be compiled with an appropriate multiprocessor subsystem specification and with VISIBILITY=MINIMAL.
4. CANDE and all offspring may be run in a single local box. CANDE should be compiled with an appropriate single-processor subsystem specification with the default VISIBILITY.

5. CANDE and the workers may be run in a single local box with the user tasks scattered across the system. In this case, method 3 or 4 should be used with the SCATTER option SET to avoid propagating the SUBSYSTEM attribute of CANDE.

PROGRAM PARAMETERS

The operational capability and visual characteristics of CANDE are determined by several values within CANDE that specify critical parameters. These considerations are discussed in the following paragraphs.

Workers

The number of GRIND functions that can simultaneously be executed by one GRIND stack is limited by the number of workers or MAXWORKS. Increasing the number of GRIND stacks is more efficient than increasing the number of workers that a particular GRIND stack can have. Therefore, the MAXWORKS define in CANDE should not be changed. Only users currently executing a TEXT editing command or an update need a worker. Those users executing programs and those not actively requiring CANDE service to execute a command do not require a worker.

Certain activities, such as session log on, file or directory manipulations (for example, REMOVE and SECURITY), and overhead associated with initiating or terminating a user program, require a special worker. This worker, known as "worker zero," is reserved for such activities; that is, it cannot be used for text editing commands or file updates.

There might be one or two worker zeros available, depending on the setting of GRINDLIMIT. However, each GRIND STACK can only have one worker zero. Because this worker is not considered a true worker, its status is not reflected in the ?COUNTS display. Refer to the ?GRINDLIMIT command in this manual, and the ?COUNTS command in the "CANDE Reference Manual" for more information.

Tasks

CANDE uses the tasking and interprogram communications feature of the operating system to initiate user compiles, object programs, and various internal functions (for example, LOG, DCSTATUS). The maximum number of such activities that can occur simultaneously is specified as MAXTASKS. The value of this variable is controlled by the ?MAXTASKS command.

Operational Characteristics

SYSTEM ENVIRONMENT**Initiation**

CANDE is a standard system MCS and, as such, may be automatically initiated by the operating system. The MCP initiates CANDE in response to any new station activity if CANDE has previously gone to a normal end-of-job and the system option AUTODC is SET; otherwise, CANDE must be executed by control card (for example, "RUN SYSTEM/CANDE"). Refer to the "Operator Display Terminal (ODT) Reference Manual" for information on using the OP command to set the AUTODC system option.

If CANDE must be started manually, it might be preferable to use an ODT "primitive" command, such as "??RUN SYSTEM/CANDE". An ODT primitive command is processed directly by the MCP, thereby avoiding the job queues. Refer to the "Primitive Commands" section of the "Operator Display Terminal (ODT) Reference Manual" for more information.

Running Characteristics

The CANDE MCS runs in one stack titled SYSTEM/CANDE and usually one or more stacks titled CANDE/STACKnnn (see "Organization" at the beginning of this section). These programs are normal tasks in the mix competing for system resources with all other active jobs. The CANDE MCS should be specified as a control program via the CP (Control Program) ODT command to ensure that the CANDE stacks are never scheduled or suspended by the operating system during heavy system usage. While schedule stations are active, a CANDE stack named SCHED/CANDE remains in the mix.

System Program Requirements

Several functions performed through CANDE require the presence of other system programs. A list of these CANDE commands and the corresponding system file follows:

<u>CANDE COMMAND</u>	<u>SYSTEM FILE</u>
BACK	SYSTEM/PRINT/BACKUP/PROCESSOR
COMPILE	SYSTEM/<compiler name>
DCSTATUS	SYSTEM/DCSTATUS
LFILES	SYSTEM/FILEDATA

CANDE OPERATIONS MANUAL

<u>CANDE COMMAND</u>	<u>SYSTEM FILE</u>
LOG	SYSTEM/LOGANALYZER
RESEQ (type BASIC files)	SYSTEM/RESEQBASIC

These system files should always be present when CANDE is running to provide normal user capability.

SWAPPER Interface

All program executions initiated by CANDE (user object programs and system programs that perform CANDE functions) are normally set up to run with SWAPPER; that is, CANDE sets the SUBSPACES task attribute prior to initiating an object program. Individual task, utility, and compile requests may override these values. If SWAPPER is not running, these tasks run as non-swap jobs without alteration.

If NOSUBSPACES and SWAPALL are both reset, tasks initiated by the EXECUTE and UTILITY commands have SUBSPACES set to 2; COMPILE tasks, LFILE tasks, and all other intrinsic UTILITY tasks have SUBSPACES set to 1. If NOSUBSPACES is RESET and SWAPALL is SET, then all SUBSPACES values are set to 3. However, if NOSUBSPACES is set, SWAPALL is ignored and no SUBSPACES value is assigned.

For a discussion of SWAPPER and the SUBSPACES attribute, refer to the SWAPPER section in the "System Software Support Reference Manual."

This command tells the painter to paint a designated room in the color you specify.

The example introduces two important features of railroad diagrams:

- Constants
- Variables

Constants

Constants are items that you cannot vary. You must enter a constant as it appears in the diagram, either in full or abbreviated. If you abbreviate a constant, you must enter everything that is underlined in the railroad diagram, optionally followed by one or more of the remaining characters.

You can recognize constants in railroad diagrams by the fact that they are never enclosed in angle brackets.

In the example, the word PAINT is a constant. You could enter PAINT in full or abbreviate it to PAI or PAIN, but not to PA or PAN. If no part of the constant is underlined, you cannot abbreviate it at all.

Variables

Variables are items that you can replace with other data to suit a particular situation; that is, you can vary the information you enter in place of the variable, subject to rules defined for the particular command or statement.

Variables appear in a railroad diagram enclosed in angle brackets (<>).

In the example, <color> is a variable item. If the description of the PAINT command defines the allowable colors as BLUE, GREEN, PINK, and YELLOW, you can enter any one of these in your command.

Understanding Railroad Diagrams

FOLLOWING THE PATHS OF A RAILROAD DIAGRAM

The paths of a railroad diagram lead you through the diagram from beginning to end. They are represented by horizontal and vertical lines.

A path shows the allowable syntax. Some diagrams have just one path that goes from the beginning to the end of the diagram. Others contain several paths, each covering a part of the diagram. A path shows which items you can include in a command or statement, which you can omit, and the number of times you can include a particular item or group of items.

To follow a path through a railroad diagram, you need to understand the items you may encounter along the way. These items are

- Required items and punctuation
- Optional items
- Loops

A description of each item follows.

Required Items and Punctuation

Required items and punctuation must be entered in the command or statement; you cannot omit them. A required item appears by itself in a path (horizontal line). A required item can be either a constant or a variable. For example, if a railroad diagram indicates

```
-- PAINT -- BEDROOM --<color>--|
```

the words PAINT and BEDROOM are required constants, and <color> is a required variable. You could correctly enter

```
PAINT BEDROOM BLUE
```

but not

```
PAINT BEDROOM
```

because the required item <color> would be missing.

Optional Items

Optional items appear one below another in a vertical list. You can choose any one of the items in the list. If the list also contains an empty path (all dashes), you can omit the item entirely. An optional item can be either a variable or a constant. The PAINT command in the example contains two lists. The first is

```
-----|
|      |
|- THE -|
```

which gives you two options:

- Enter the constant THE
- Omit it (because there is an empty path)

The second list has five optional constants:

```
---- LIVING ROOM ----|
|                       |
|- DINING ROOM -|
|                       |
|- BEDROOM ----|
|                       |
|- BATHROOM ----|
|                       |
|- KITCHEN ----|
```

You must enter one of the optional items (LIVING ROOM, DINING ROOM, BEDROOM, BATHROOM, or KITCHEN) because there is no empty path in this list.

Loops

A loop is an item or group of items that you can repeat. The number of repetitions allowed is controlled by an item called the bridge.

Understanding Railroad Diagrams

A loop can span all or part of a railroad diagram. It always consists of at least two horizontal lines, one below the other, like this:

```

|<----- <return character> -----|
|                                     |
-----<bridge>--<content of the loop>-----

```

or

```

|<-- <bridge> -- <return character> --|
|                                     |
----- <content of the loop> -----

```

The bridge shows the maximum number of times you can go through the loop. The bridge can precede the contents of the loop, or it can precede the return character on the upper line of the loop to specify the number of times the right-to-left path can be traversed. The bridge is an integer enclosed in sloping lines, / \, for example, /4\. Not all loops have bridges. Those that do not can be repeated any number of times.

The top line is a right-to-left path that contains information about repeating the loop. The return character is the character to use before each repetition of the loop (often, a comma). Not all loops contain a return character; if none is shown, just enter one or more spaces before repeating the loop.

The other lines show the content of the loop (the data you enter each time you go through the loop). This can be any combination of optional items, required items, lists, and even other loops. The content of a loop can range from simple (one item), to very complex (many items, lists, and loops).

Example 1. A Simple Loop

The PAINT command as first shown is of limited usefulness. To tell the painter to do several rooms, you need a separate command for each room. It would be much easier if you could tell him to do several rooms in one command.

CANDE OPERATIONS MANUAL

You can do that by making the list of rooms into a loop. The command would then look like this:

```

      |<----- , -----|
      |                     |
-- PAINT -----/5\--- LIVING ROOM -----<color>---|
      |         |         | |
      |- THE -|         |-- DINING ROOM -|
      |         |         |
      |         |         |-- BEDROOM -----|
      |         |         |-- BATHROOM -----|
      |         |         |
      |         |         |-- KITCHEN -----|

```

The bridge has a value of 5, so you can go through the loop up to five times, for a total of five rooms. The return character is a comma, which you must enter before repeating the loop content.

You can now enter

```
PAINT THE LIVING ROOM, BEDROOM, KITCHEN YELLOW
```

or

```
PAINT DINING ROOM, BEDROOM, BATHROOM BLUE
```

or

```
PAINT BEDROOM PINK
```

or

```
PAINT BEDROOM, BATHROOM, BEDROOM, BEDROOM BLUE
```

or any other valid combination.

This simple loop makes the PAINT command more versatile, but a significant drawback remains. Although you can include up to five rooms in a command, you cannot specify different colors.

Understanding Railroad Diagrams

Example 2. A More Complex Loop

If the content of the loop were to include the color, you could specify a different color for each room.

```

      |<----- , -----|
      |
-- PAINT -----/5\--- LIVING ROOM ---<color>-----|
      |         |         |         |
      |- THE -|         |- DINING ROOM -|
      |         |         |         |
      |         |         |- BEDROOM ----|
      |         |         |- BATHROOM ----|
      |         |         |- KITCHEN ----|

```

The content of the loop now consists of the

- List of optional constants that indicate rooms
- Required variable <color>

The bridge value is 5, and the return character is a comma. Given this railroad diagram, some valid PAINT commands would be

PAINT THE BEDROOM PINK

PAINT THE LIVING ROOM BLUE, DINING ROOM GREEN, KITCHEN YELLOW

PAINT BEDROOM GREEN, KITCHEN BLUE

and so on.

Example 3. Another Loop

In some bridges an asterisk follows the number. For example,

```

                                     |<-/4*\----- , -----|
                                     |                               |
-- PAINT -----|----- LIVING ROOM ---<color>-----|
      |         |         |         |         |
      |- THE -|         |- DINING ROOM -|
      |         |         |         |         |
      |         |         |- BEDROOM -----|
      |         |         |         |         |
      |         |         |- BATHROOM -----|
      |         |         |         |         |
      |         |         |- KITCHEN -----|

```

The asterisk means you must take the right-to-left path at least once. You cannot, for example, enter PAINT BEDROOM BLUE; you must tell the painter at least two rooms to paint. The maximum number of rooms to be painted is still five: the first time through the loop with up to four repetitions.

A valid form of the command would be

```
PAINT BEDROOM BLUE, KITCHEN YELLOW
```

Example 4. Another Use of the Bridge

A bridge can also control the number of times you take an individual path within a loop. For example, another command to the painter might be:

```

-- WORK -----|
      |         |         |         |         | |
      | |<-----|         |         |         |
      | |         |         |         |         |
      |-----/1\ - EVENINGS -----|
      |         |         |         |         |
      |-/1\ - WEEKENDS -|         |         |
      |         |         |         |         |
      |-/1\ - HOLIDAYS -|         |         |

```

Understanding Railroad Diagrams

Each bridge /1\ indicates you can take that path once or not at all. That is, you can enter each of the items EVENINGS, WEEKENDS, and HOLIDAYS once at most. Some valid commands are

WORK EVENINGS WEEKENDS HOLIDAYS

WORK WEEKENDS

WORK HOLIDAYS EVENINGS

but

WORK EVENINGS EVENINGS

is invalid.

A FINAL WORD

To familiarize you with railroad diagrams, this explanation describes the elements of the diagrams and gives a few simplified examples. Some of the actual diagrams you will encounter in a book may be considerably more complex.

However, the principles are the same no matter how complex the diagram. The more you work with railroad notation, the more easily you will understand even the most complex diagrams.

GLOSSARY

accesscode

An identification code subordinate to a <usercode> that can be specified in the USERDATAFILE as required along with a usercode/password combination (and, sometimes, with an associated password of its own) when logging on to a Message Control System (MCS). An accesscode is used to further establish a user's identity, control security, and restrict access to files.

address

The identification of a location in storage.

asynchronous (transmission mode)

A mode of data transmission in which the time of the occurrence of each character or block of characters is arbitrary. Once started, the time of occurrence of each signal representing a bit within the character or block has the same arbitrary relationship to significant instants of a fixed time frame.

attached

The adjective used to describe a station that is under the control of CANDE.

beginning-of-job (BOJ)

The point that marks the beginning of a job.

beginning-of-task (BOT)

The point that marks the beginning of a task.

block

A group of physically adjacent records that are packaged together so that they can be transferred to or from a physical file as a group.

BNA

See "Burroughs Network Architecture."

BOJ

See "beginning-of-job."

borrowed station

A station that CANDE recognizes as belonging to another Message Control System (MCS).

BOT

See "beginning-of-task."

buffer

A device used for temporary storage during the transfer of data from one device to another.

BUMP

The main block of the SYSTEM/CANDE program (which executes as its own stack). BUMP handles most datacomm activity, scanning of user input, and a few CANDE functions of brief duration. Each activity is completed before proceeding to another activity.

See also "GRIND," "GRIND stack," and "workers."

Burroughs Network Architecture (BNA)

The proprietary network architecture used on A Series systems to connect multiple, independent Burroughs computer systems into a network. BNA gives users the same type of access to remote resources as they have to local resources.

CANDE

See "Command AND Edit (CANDE) language."

Glossary

CANDE/STACKxx

The name assigned to each GRIND stack initiated by SYSTEM/CANDE, where xx is a number between 1 and 13.

character

A digit, symbol, or letter.

circuit

The configuration of equipment used in transmitting data from one location to another. A circuit may involve more than one type of facility.

cluster

A group of 16 lines connecting to stations.

Command AND Edit (CANDE) language

A Burroughs Message Control System (MCS) that provides generalized file preparation and updating capabilities in an interactive, terminal-oriented environment.

compiler

A program that converts computer instructions written in a source language into machine code.

continuation character

A character entered at the end of a line of terminal input to allow that line to be continued on the next line.

control character

- (1) A functional character that controls or facilitates transmission of information over communication networks. The characters are usually unprintable and are referenced by their mnemonic.
- (2) A character that indicates a message is a control command. The character is generally a normal graphic to which special significance has been attached in the context of a command text.

See also "control command" and "message."

control command

A CANDE input message that begins with the defined control character (usually a "?") and is used to control or interrogate the CANDE operating environment. A control command can be entered from any attached CANDE station. It will be directed to the controlling Message Control System (MCS), not to a remote file, and will be processed at once, rather than queued. The defined control character must be the first character in the message.

Control commands are unrestricted; that is, they can be entered from control stations and normal stations. Network control commands, however, are restricted. They can be entered only from control stations.

See also "control character," "control station," and "network control command."

control station

A station that allows restricted CANDE network control commands to be entered.

Data Circuit-terminating Equipment (DCE)

The functional unit of a data station that establishes, maintains, and releases a connection and provides code and signal conversion between the data terminal equipment and the transmission line.

Glossary

Data Communications ALGOL (DCALGOL)

A high-level Burroughs language used to write Message Control Systems (MCSs) and other specialized system programs.

Data Communications Processor (DCP)

A piece of hardware that interfaces between peripherals such as terminal cables and telephone hookups at remote sites and the central computer.

DCALGOL

See "Data Communications ALGOL."

DCE

See "Data Circuit-terminating Equipment."

DCP

See "Data Communications Processor."

dial-in

Use of a dial or push-button data set (such as a telephone) to establish a switched connection. (Synonymous with "dial-up.")

EBCDIC

See "Extended Binary Coded Decimal Interchange Code."

enabled

The adjective used to describe a CANDE station that can send input to the system.

end-of-file (EOF)

The point that marks the end of a file.

end-of-job (EOJ)

The point that marks the end of a job.

end-of-task (EOT)

The point that marks the end of a task.

EOF

See "end-of-file."

EOJ

See "end-of-job."

EOT

See "end-of-task."

Extended Binary Coded Decimal Interchange Code (EBCDIC)

An 8-bit code representing 256 graphic characters.

family

The disk or diskpack on which a physical file is located. The family name of a file is given by the value of the FAMILYNAME file attribute.

file attribute

A system-defined variable that describes a characteristic of a logical or physical file. (Refer to the I/O Subsystem Reference Manual for a description of file attributes and their uses.)

GETSTATUS

An intrinsic that allows control over the type and amount of information that can be obtained from the job or task mix, the status of peripheral and disk units, and the status of the operating system and mainframe configuration.

Glossary

GRIND

An internal, multiple-user procedure in the SYSTEM/CANDE program that performs most CANDE verbs, including tasks that normally require lengthy input/output (I/O) activity.

See also "BUMP," "GRIND stack," and "workers."

GRIND stack

The GRIND procedure in the SYSTEM/CANDE program that is initiated as a stack (that is, an asynchronous, dependent task). Depending on the value the user assigns to the GRINDLIMIT parameter, SYSTEM/CANDE can be run with more than one GRIND stack to improve throughput. Each GRIND stack has a name of the form CANDE/STACKxx, where xx is a number between 1 and 13.

See also "GRIND," "BUMP," and "workers."

GRINDLIMIT

The variable in SYSTEM/CANDE to which the user assigns a value to control the maximum number of GRIND stacks that can run.

If the value assigned to GRINDLIMIT is greater than 2, one stack performs session log on and directory manipulation, one stack performs task initiation, and the remaining stacks (known as the "working stacks") perform file updating chores.

If the value assigned to GRINDLIMIT is 2, one stack performs log on, directory manipulation, and task initiation, and one stack performs file updating chores.

If the value assigned to GRINDLIMIT is 1, a single stack performs all necessary functions.

See also "GRIND stack," "log on," and "task."

Halt/Load

A system initialization procedure that terminates all system activity, and then loads a fresh version of the Master Control Program (MCP) from disk or pack to main memory.

IDC

See "Interactive Datacomm Configurator."

input/output (I/O)

An operation in which the system reads data from or writes data to a peripheral device such as a disk drive.

Interactive Datacomm Configurator (IDC)

A Burroughs interactive, menu-driven utility that allows the user to create, interrogate, and modify datacomm network configurations.

interrupt

An interruption in the normal system or program flow that allows the flow to be resumed later at the point of interruption.

I/O

See "input/output."

job

A process that initiates one or more programs (that is, tasks) and controls the flow of execution of the tasks. User jobs are written in the Burroughs Work Flow Language (WFL).

See also "task" and "stack."

line

A data transmission line linking two computers or a computer and its associated terminals.

line adaptor

The device that performs physical line control, including byte assembly and disassembly, buffering of data, synchronization of data, and control of modems and auto-call equipment.

Glossary

Line Support Processor (LSP)

A datacomm subsystem processor that controls the physical lines and performs polling, selecting, and sending and receiving of data. The LSP is capable of interfacing up to 16 half or full-duplex datacomm lines to the host system.

log station

A CANDE station designated to receive logging information. This information can include station attachment, security errors, station log on and log off, network changes caused by reconfiguration requests, and user messages sent to the Operator Display Terminal (ODT).

See also "log on," "Operator Display Terminal," and "station."

log off

The process by which a user is disconnected from a Message Control System (MCS), such as CANDE. To become a valid user of an MCS again, the log-on process must occur.

log on

In CANDE, the process by which a user is identified as a valid user by entering a valid usercode/password and, in some cases, a valid chargecode and accesscode/accesscode password combination.

Logical Station Number (LSN)

A unique integer assigned in Network Definition Language (NDL) and Network Definition Language II (NDLII) to each station in a network.

LSN

See "Logical Station Number."

LSP

See "Line Support Processor."

Master Control Program (MCP)

The name of Burroughs proprietary operating system that controls the operations of the computing system (for example, memory assignments, program segmentation, and subroutine linkages). The use of the MCP eliminates many arduous programming tasks that are likely to produce errors.

MAXSTATIONS

The parameter in SYSTEM/CANDE that determines the maximum number of stations that CANDE can support. The value of this parameter can be changed using the CANDE "?MAXSTATIONS" network control command; by default, this value is 25.

See also "station."

MAXTASKS

The parameter in SYSTEM/CANDE that determines the maximum number of user tasks (including program executions, compilations, and various internal functions) that can be performed through CANDE at one time. By default, the value of this parameter is the same as the value of the MAXSTATIONS parameter. The value of MAXTASKS can be changed using the CANDE "?MAXTASKS" network control command; however, this value cannot exceed the value of MAXSTATIONS.

See also "MAXSTATIONS."

MAXWORKS

The define in SYSTEM/CANDE that determines how many worker functions can be performed simultaneously by a single GRIND stack.

See also "GRIND stack" and "workers."

MCP

See "Master Control Program."

MCS

See "Message Control System."

Glossary

message

A sequence of bits arranged in a form suitable for conveying information from an originator to one or more destinations or addresses. A message contains the information (known as the "text" portion of the message) and may, in addition, contain communication information to aid in the routing or handling of the message (known as the "header" of the message).

Message-Level Interface Processor (MLIP)

The input/output processor associated with a central processing unit.

Message Control System (MCS)

A special purpose DCALGOL program that controls the flow of messages between terminals and the main system. Burroughs MCSs include SYSTEM/COMS, SYSTEM/CANDE, SYSTEM/RJE, SYSTEM/GEMCOS, and SYSTEM/DIAGNOSTICMCS.

MLIP

See "Message-Level Interface Processor."

modem

A device that modulates and demodulates signals transmitted over communications facilities.

NDL

See "Network Definition Language."

NDLII

See "Network Definition Language II."

network control command

A CANDE command that begins with the defined control character (usually a question mark [?]) and is used to alter or determine the status of the CANDE network. A network control command can be entered only from a CANDE control station. Control commands, however, can be entered from control stations and normal stations.

See also "control character," "control command," and "control station."

Network Definition Language (NDL)

The Burroughs language used to physically, logically, and functionally describe the datacomm subsystem on Data Communications Processor (DCP) based systems.

Network Definition Language II (NDLII)

The Burroughs language used to physically, logically, and functionally describe the datacomm subsystem on Message-Level Interface Processor (MLIP) and Host Dependent Unit (HDU) systems.

Network Support Processor (NSP)

A module that controls the interface between the host system and the datacomm peripherals. It executes the code generated by the Network Definition Language II (NDLII) compiler for line control and editor procedures.

NSP

See "Network Support Processor."

object file

See "remote file."

ODT

See "Operator Display Terminal."

Glossary

Operator Display Terminal (ODT)

The system console device that allows the operator to enter commands directly to the system to perform various functions.

password

One of a list of names associated with each usercode or accesscode in the USERDATAFILE, identifying the user as a valid user and sometimes required along with a usercode when logging on to a Message Control System (MCS).

polling

The process of inviting data stations to transmit, one at a time.

pseudo-station

A virtual station that can be attached to, and controlled by, a Message Control System (MCS) in a manner similar to a "real" station. Unlike a real station, however, a pseudo-station is not declared in the Network Definition Language (NDL) and Network Definition Language II (NDLII), has no line assigned, and does not need a corresponding physical terminal on the local host. Pseudo-stations are used by stations using Burroughs Network Architecture (BNA) to reach a foreign host.

record

A collection of logically related information that is the basic unit of a file manipulated through the Input/Output (I/O) subsystem by programs that access that file. A file can contain strings of characters, groups of binary words, or both.

See also "character" and "word."

recovery file

A file used to recover a workfile in the event that a CANDE session on a particular station is aborted. The recovery file is created by transcribing information pertaining to that station from the tankfile. The recovery file is called "CANDE/RECV<recovery number>".

remote file

A file with a KIND attribute equal to REMOTE. A remote file enables object programs to communicate interactively with a datacomm station. Any program that involves interactive data entry to update records utilizes remote files to allow one or more stations to enter new data into the program.

schedule file

A file containing all CANDE commands and program input for a schedule session.

schedule session

A CANDE session that runs independently of the user's session and station, and executes all CANDE commands and program input that are present in a previously specified schedule file.

schedule station

A dummy datacomm station provided by CANDE to run schedule sessions and open remote files. The schedule station behaves programmatically like a real station for most purposes.

session

The period of time between the time a CANDE user enters a valid usercode/password combination and the time that user enters a CANDE SPLIT, BYE, or HELLO command. Each CANDE session is assigned a unique number, and every printout produced during a session is held until the session is ended.

See also "password" and "usercode."

SPO

See "Supervisory Printer Output."

Glossary

stack

A special array of words occupying a fixed, logical location in memory. Entries in a stack are always addressed as displacements from the fixed location known as "bottom of stack."

On a Burroughs A Series system, all tasks are structured as stacks (stack architecture); therefore, the terms "task" and "stack" are often used interchangeably. However, while every task can be considered a stack, not every stack is a task.

New stacks allocated to CANDE tasks are initiated by the CANDE "GRIND" procedure as new tasks are introduced. The number of new CANDE GRIND stacks that can be activated to handle CANDE verbs is limited by the setting called GRINDLIMIT.

See also "word," "task," "job," and "GRINDLIMIT."

station

The functional units constituting a data terminal, the Data Circuit-terminating Equipment (DCE), and their common interface.

See also "Message Control System" and "station."

Supervisory Printer Output (SPO)

- (1) An obsolete term for Operator Display Terminal (ODT).
- (2) An attribute in the Network Definition Language (NDL) and Network Definition Language II (NDLII) used to specify control station status.

switched line

A line on which a temporary communication channel can be established, such as a telephone line.

See also "dial-in."

tankfile

The file that CANDE maintains to store option settings, configuration information, and workfile recovery information (including all changes made since the workfile was last updated). The tankfile is used for CANDE recovery in the event of a Halt/Load.

See also "Halt/Load" and "recovery file."

task

A job, or any process initiated by a job, including a compilation, program run, or library maintenance operation.

See also "job" and "stack."

terminal

An input/output (I/O) device designed to receive or send source data in a datacomm network.

text field

A portion of each workfile record that is defined to contain the program text or other symbolic information.

TITLE attribute

A file attribute with a value that is the external name of a file.

See also "file attribute."

usercode

An entry in the USERDATAFILE identifying the user as a valid user and identifying files in the user's library.

USERDATAFILE

A system database that defines valid usercodes and contains various data about each user (such as accesscodes, passwords, and chargecodes) and the population of users for a particular installation.

WFL

See "Work Flow Language."

word

A unit of computer memory. On Burroughs A Series systems, a word consists of 48 bits used for storage plus three tag bits and one parity bit.

Work Flow Language (WFL)

The Burroughs language used to write jobs that control the flow of programs and tasks on the system.

See also "job" and "task."

workers

Logical sub-stacks in each physical GRIND stack that are used to perform text editing or file updates through CANDE. The number of these functions that can be performed simultaneously in each working stack is determined by the value of the MAXWORKS parameter.

See also "GRIND stack," "MAXWORKS," and "stack."

workfile

A file that the user accesses using the CANDE "GET" command or creates using the CANDE "MAKE" command. All editing commands entered through CANDE can make changes only to the current workfile.

Index

- ABORT network control command, 26
- ACCESSCODE, 17
- ACCESSCODENEEEDED, 17
- ADD network control command, 27
- Adding stations
 - ADD network control command, 27
- ALLLOGIN option, 62
- ALLMSG option, 62
- ATTACH network control command, 28
- AUTOANSWER network control command, 29

- BADLSN, error description, 15
- Borrowed stations, 9
- BUFCNT, error description, 15
- BUG
 - network control command, 30
 - options, 31

- CANDE
 - errors, 12
 - initiating, 89
 - log stations, 8
 - operational characteristics, 85
 - options, 63
 - program parameters, 88
 - security features, 10
 - terminating, 26
- CANDECONTCHAR, 18
- CANDEDESTNAME, 18
- CANDEGETMSG, 17
- CANDEQWAIT, 17
- CATALOGOK option, 62
- CATDEFAULT option, 62
- CHAIN, error description, 15
- CHAOS, error description, 15
- CLEAR network control command, 34
- Commands
 - network control, 3, 25
 - reconfiguration, 24
- COMPILESPERCENT network control command, 35
- COMS M, error description, 15
- CONTROL network control command, 37
- Control stations, 7
 - designating
 - ?CONTROL network control command, 37
 - removing control status from
 - ?CONTROL network control command, 37
- CTF=0, error description, 15

Datacomm

- dynamic changes, 11
- errors, 10
- DEPTH network control command, 38
- DIALLOGIN option, 62
- DIDDLE, error description, 15
- DIOERR, error description, 15
- DISABLE network control command, 39
- DISCER, error description, 15
- Displaying options and parameters
 - ?INFO network control command, 43
- DIVIDEBYZERO, fault description, 13
- <dl>, 4
- DL, 4
- <dls>, 4
- DLS, 4
- Documents, related, 1
- DOSWAPTO option, 62
- DOWAITGO option, 62
- DSLGSTA network control command, 46
- DUMPOK option, 62

- ENABLE network control command, 40
- ENTERF, error description, 15

Errors

- CANDE, 12
- Datacomm, 10
- EXPOVERFLOW, fault description, 13
- EXPUNDERFLOW, fault description, 13

- FACTOR network control command, 41
- FAMILY, 18
- Fault descriptions, 13
- Faults, 12

File

- foreign, 18
- recovery, 22
- remote, 18
- tankfile, 22
- <file title>, 60
- FILECD, 16

GRIND stacks

- limiting number
 - ?GRINDLIMIT network control command, 42
- setting maximum number
 - ?MAXGRINDS network control command, 57

GRINDLIMIT network control command, 42

Index

HUNG, error description, 15

Identification, station, 4, See also Station identification

INACTIVEQ, fault description, 13

INFO network control command, 43

Information, general CANDE operations, 3

Initiating

 CANDE, 89

 system environment, 89

INTBACKUTIL option, 62

INTEGROVERFLOW, fault description, 13

INVALIDADDRESS, fault description, 13

INVALIDINDEX, fault description, 13

INVALIDOP, fault description, 13

INVALIDPCW, fault description, 14

KEEPSTA option, 62

LAISSEZFILE

 network control command, 44

 values, 19

LGOP network control command, 46

LGSTA network control command, 46

<limit>, 70

Log station option list, 50

Logical Station Number, 5

LOGIN stations, 7

LOOP, fault description, 13

<lsn>, 5

LSN, 5

<lsn range>, 5

LSN range, 5

MAXGRINDS network control command, 57

MAXSTATIONS network control command, 58

MAXTASKS network control commands, 59

MEMORYPARITY, fault description, 13

Message transmitting

 ?SS network control command, 74

MIXUP, error description, 15

Monitoring CANDE activities

 ?BUG network control command, 30

MOVE network control command, 27

Moving stations

 ?MOVE network control command, 27

Network control commands, 3, 25

 ?ABORT, 26

Network control commands (cont.)

- ?ADD, 27
- ?ATTACH, 28
- ?AUTOANSWER, 29
- ?BUG, 30
- ?CLEAR, 34
- ?COMPILESPERCENT, 35
- ?CONTROL, 37
- ?DEPTH, 38
- ?DISABLE, 39
- ?DSLGSTA, 46
- ?ENABLE, 40
- ?FACTOR, 41
- ?GRINDLIMIT, 42
- ?INFO, 43
- ?LAISSEZFILE, 44
- ?LGOP, 46
- ?LGSTA, 46
- ?MAXGRINDS, 57
- ?MAXSTATIONS, 58
- ?MAXTASKS, 59
- ?MOVE, 27
- ?NEWS, 60
- ?NOAUTOANSWER, 29
- ?OP, 62
- ?QUIT, 26
- ?READY, 67
- ?RELEASE, 68
- ?SAVE, 69
- ?SCHEDULE, 70
- ?SS, 74
- ?SUBTRACT, 77
- ?SWAP, 78
- ?TANKING, 79
- ?TRANSFER, 80
- ?WHERE, 81
- ?WHO, 83

NEWS network control command, 60
NO STL, error description, 15
NOAUTOANSWER network control command, 29
NOBUF, error description, 15
NOSUBSPACES option, 62
NOTSCH, error description, 15

Object files, regulating foreign use

- ?LAISSEZFILE network control command, 44

OP network control command, 62

Operational characteristics, 85

- organization, 85
- program parameters, 88
- semidependent tasks, 86
- system environment, 89

Index

<option list>, 47
Options
 BUG, 31
 CANDE, 63
 display
 ?INFO network control command, 43
 log station, 50
Organization, 85, See also Operational characteristics
ORPHAN, error description, 15

Parameters, display
 ?INFO network control command, 43
PASSWORD, 17
Problems, CANDE, 12
Program parameters
 tasks, 88
 workers, 88
Program requirements, system, 89
PROGRAMMEDOP, fault description, 14
Pseudo-Stations, 9

QTYPE, error description, 16
QUIT network control command, 26

Railroad diagrams, explanation, 91
Range, LSN, 5
READY network control command, 67
Reconfiguration commands, 24
Recovering stations
 ?READY network control command, 67
Recovery files, 22
RELEASE network control command, 68
Remote files, 18
 regulating foreign use
 ?LAISSEZFILE network control command, 44
Removing stations
 ?SUBTRACT network control command, 77
Requirements, system program, 89
Running characteristics, 89

SAVE network control commands, 69
SCANPARITY, fault description, 13
SCATTER option, 62
SCHEDQ, error description, 16
SCHEDULE network control command, 70
SCHLSN, error description, 16
SCHNAM, error description, 16
SCHST, error description, 16
SCHSTA, error description, 16

- SECALL option, 62
- SECDIALIN option, 62
- SECPSEUDO option, 62
- Security features, 10
- Settings, USERDATAFILE, 17
- SS network control command, 74
- STACNT, error description, 16
- STATE, error description, 16
- Station
 - adding stations
 - ?ADD network control command, 27
 - borrowed, 9
 - control, 7
 - LOGIN, 7
 - moving stations
 - ?MOVE network control command, 27
 - passing control
 - ?RELEASE network control command, 68
 - recovering
 - ?READY network control command, 67
 - removing stations
 - ?SUBTRACT network control command, 77
 - setting maximum number
 - ?MAXSTATIONS network control command, 58
- Station handling, 7
 - borrowed stations, 9
 - CANDE log station, 8
 - control stations, 7
 - LOGIN stations, 7
- Station identification, 4
 - DL, 4
 - DLS, 4
 - LSN, 5
 - LSN range, 5
 - station name, 6
- <station name>, 6
- Station name, 6
- Stations
 - CANDE log, 8
- STAX=0, error description, 16
- STRINGPROTECT, fault description, 13
- SUBTRACT network control command, 77
- SWAP network control command, 78
- SWAPALL option, 62
- SWAPPER
 - error description, 16
 - interface, 90
- System environment, 89
 - initiating, 89
 - program requirements, 89
 - running characteristics, 89
 - SWAPPER interface, 90
 - terminating, 26

Index

System program requirements, 89

Table, "on anyfault" fault, 13
 Table, CANDE errors, 15
 TANK, error description, 16
 Tankfile, 22
 creating tankfiles
 ?TANKING network control command, 79
 TANKING network control command, 79
 Task
 compiler, defining percentage
 ?COMPILESPERCENT network control command, 35
 program parameter, 88
 semidependent
 definition, 86
 operational considerations, 87
 visibility attribute, 86
 setting maximum number of
 ?MAXTASKS network control command, 59
 Telephone answering
 ?AUTOANSWER network control command, 29
 Terminating CANDE
 ?ABORT and ?QUIT network control commands, 26
 TODOX, error description, 16
 TRANSFER network control command, 80

USECOMSPRIV option, 62
 USEDEFAULTCHARGE, 17
 USEOLDWFL option, 62
 <user limit>, 70
 USERDATAFILE, 17
 settings, 17
 ACCESSCODE, 17
 ACCESSCODENEEEDED, 17
 CANDECONTCHAR, 18
 CANDEDESTNAME, 18
 CANDEGETMSG, 17
 CANDEQWAIT, 17
 FAMILY, 18
 PASSWORD, 17
 USEDEFAULTCHARGE, 17
 USURP, error description, 16
 UTLTSK, 16

VERBSW, error description, 16
 Visibility attribute, 86

WHERE network control command, 81
 WHO network control command, 83

Workers, 88

XSBUF, error description, 16