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**INTERACTIVE TERMINAL
SUBSYSTEM
VERSION 2
REFERENCE MANUAL**

**CONTROL DATA®
MP-32
COMPUTER SYSTEMS**

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PREFACE

This manual describes the Interactive Terminal Subsystem (ITS) for the MPX Operating System (MPX/OS). Information presented here is intended to provide the reader with an understanding of the use of the ITS from port establishment/disestablishment to command job execution.

For more in depth information concerning the ITS, the following documentation may be studied:

<u>Title</u>	<u>Pub. No.</u>
MP-60 Computer System MPX/OS V3 Reference Manual	17329125
MP-60 Computer System MPX/OS V3 Installation Handbook	17329115
MP-60 Computer System Utility Reference Manual	14063800
MP-32 Computer System MPX/OS V3 Operator's Guide	17329145



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ITS OVERVIEW

The Interactive Terminal Subsystem (ITS) supports a wide variety of terminal devices. Terminals can be configured as local hardwired terminals or can be temporarily connected to the system through telephone lines and modems.

The ITS V2.0 provides the terminal user with several facilities to monitor and control the MPX/OS. These facilities allow users to:

- Communicate with jobs in the system.
- Control remote and local input and output devices.
- Monitor the system dayfile.
- Control the system input, output, and execution queues.
- Monitor file usage.
- Monitor and control external peripheral devices.

PORT ESTABLISHMENT

In order to establish communication with the Interactive Terminal Subsystem, the terminal user must successfully complete a log-on sequence. The user connects his terminal to the computer via a phone dial-in or a hard wired connection. Upon ITS detection of terminal connection or activity, a banner message is output to the terminal.

This message identifies the system and gives the current date, time, and system message if one exists. The user is then prompted for username and password entry.

Once a username and password have been entered, the user validation file is scanned for a matching username/password pair. This file has been previously prepared and contains all valid username/password pairs (see appendix B, Port Configuration and Validation). If a match occurs, the entries are considered valid.

If an entry is invalid, the user is so notified and given two more chances to enter the correct information. If these attempts also result in invalid entries, the terminal is disconnected and the user must reinitiate the above sequence to gain access to the system.

If both the username and password are valid, the terminal is established as a logical port in the system and the user has access to the Interactive Terminal Subsystem features.

The user can change passwords at any time following log on by entering the PASSWORD command. This command replaces the old password on the user validation file with a new password (see page 2-12).

The validation check portion of this feature restricts system access to those users supplying a valid username and password pair. Continued system security requires discretion on the part of system users to prevent unauthorized access to the system.

A typical port log-on sequence proceeds as follows:

Banner Message: CONTROL DATA MPX/OS
04/13/79 17:39:24 FNOC.32A R2-L3 SC=03 Mem A/U=107/007

where FNOC.32A = mainframe identifier
R2 = MPX/OS resident edition
L3 = MPX/OS library edition
03 = system security level
107 = memory pages available
007 = memory pages used

System Message

Line: You'll Have A Good Day

Username prompt: Enter username:

User entry: JOHNSON

Password prompt: Enter password:

User entry: 8533635

At this point communication has been established between the terminal and the Interactive Terminal Subsystem and system features can be utilized. Alternatively, both the username and the password, separated by a comma, can be entered in response to the username prompt.

The following sequence illustrates failure to gain system access:

Banner Message: CONTROL DATA MPX/OS
04/13/79 17:39:24 FNOC.32A R2-L3 SC=03 Mem A/U=107/007

System Message
Line: Block Time at 12:00AM

Username prompt: Enter username:
User entry: JOHNSSON

Password prompt: Enter password:
User entry: 8533635

Error Message: Improper login, please try again.

Username prompt: Enter username:
User entry: JOHNSON

Password prompt: Enter password:
User entry: 8533636

Error Message: Improper login, please try again.

Username prompt: Enter username:
User entry: JONSON

Password prompt: Enter password:
User entry: 8533635

Error Message: Invalid user.
(Telephone Line Disconnected)

The user failed to enter a valid username and password in three attempts and was disconnected from the system. If another attempt is desired, the user must reestablish connection of the terminal to the system.

The message "Improper login, please try again." is output for two user attempts to enter the correct login information. On the third failure to correctly input username and password, the message "Invalid user." is output and the user is disconnected from the system.

PORT DISESTABLISHMENT

Port disestablishment is the disconnection of a terminal from the Interactive Terminal Subsystem.

A logical port can be disestablished in four ways: by input of the QUIT command, by entry error during the validation check, by loss of communications with the system, or by operator command.

At any time during the terminal session, the user can enter the QUIT command (see page 2-13) to terminate the session and disconnect the terminal from the Interactive Terminal Subsystem. A logoff message is output to the terminal to indicate the terminal disconnection. After this command is entered, any jobs in the system which attempt to communicate with this port are notified that the port has been disconnected.

Loss of communication with the system or operator "port down" command result in one of two actions: if the port was not in communication with any jobs in the system, the effect is the same as entering the QUIT command. However, if the port was in communications with one or more jobs in the system, the port is placed in a recoverable condition. All PORT/JOB linkage information is retained and any outstanding and subsequent input/output requests are saved for future recovery of the port. The recovery information is retained within the system for a predefined period of time. When this retention period has elapsed, if the port has not been recovered, all tasks trying to communicate with the port are notified that the port has become disconnected.

The Interactive Terminal Subsystem provides a central point in MPX/OS which handles all data transfers to and from terminals. This provides the means to standardize terminal input/output formats for both the terminal user and tasks within the system.

When the Interactive Terminal Subsystem is prepared to receive data, the terminal user is prompted with a line feed. The line feed can be transmitted immediately preceding output and therefore may not be apparent to the user. Since the Interactive Terminal Subsystem will not transmit data to the terminal until it is prepared to receive data, any transmission of data to the terminal also serves as a user prompt.

In the default mode, a data entry is terminated by a carriage return (\$0D). Following the entry of a line, the Interactive Terminal Subsystem performs some simple editing of the received data to make it correspond to what appears at the user's terminal. This includes processing backspace (\$08), forward skip (\$15), and cancel (\$18) characters. The cancel character causes all previous characters to be ignored, therefore producing the same result as backspacing to the beginning of the line. The user also has the ability to select either the 96 or 64 ASCII character set and parity.

It is also possible for a specific port to be initialized in "transparent mode" or placed in "transparent mode" by a linked task. Data entered in transparent mode is passed directly to the linked task without editing.

Following data entry and any preliminary editing, the first character is examined. If this character is the ITS command character, the received data is folded into uppercase and processed as an ITS command. The character string immediately following the ITS command character and up to, but not including, the first nonalphabetic character must be one of the following ITS commands or an error message results.

ACTIVE	HELP	PASSWORD
BATCH	JOB	PORT
CLASS	KEEP	QUIT
DELAY	LINK	RECOVER
DISPOSE	MESSAGE	SETUP
FACILITY	PAGE	

The ITS command character is dependent on installation but is normally a right bracket (\$50). A right bracket is used for all examples in this manual.

The terminal user need not enter the entire command word but must enter enough unique characters to identify the command. For commands which accept parameters, a space or comma must separate the command word from the parameters.

If an ITS command is entered incorrectly, the message "Invalid Command" results.

If the first character is not the ITS command character, the received data is passed to the appropriate facility to be processed.

If the terminal user enters more than the maximum number of characters allowed in line mode, the message "Line too long" is output.

Line editing, prompting, and terminal display formats have been chosen to be compatible with most terminal hardware types. Currently available Control Data terminal types 751, 752, and 756 are among the compatible terminals.

ITS COMMANDS

ACTIVE

The ACTIVE command produces an abbreviated display for all active ports in the system.

Information generated by the ACTIVE command is depicted in figure 2-1, ITS Active Display.

The format of the ACTIVE command is:

]ACTIVE or]ACTIVE,ALL

where ALL, if present, causes the display to include manned and unmanned active ports. If absent, only manned active ports will be displayed. The user must be validated to use the ALL parameter.

04/27/79 15:13:27 FNOC.32A R2-L3 SC=00 Mem A/U=026/025
THE MP32 WILL BE PAINTED TOMORROW.

PN	Username	TC	Log-on	FAC	Task	Linkages
1	Jones	16	14:32:17	ICF	*ED	
2	Smith	16	14:28:50	OCF		
6	Johnson	16	14:37:46	ICF	ED	*PCC
8+	Doe	16	14:31:42	ICF	*USRTSK	

where FNOC.32A = Mainframe identifier
R2 = MPX/OS Resident edition
L3 = MPX/OS Library edition
00 = System security level
026 = Memory pages available
025 = Memory pages used
PN = Port number
TC = Terminal class
Log-on = Time logged-on
FAC = Facility

Port 8 has experienced a communication loss or operator "port down" command and is being held in anticipation of a RECOVER command as denoted by the "+". ED, PCC, and USRTSK are linked tasks, the asterisk (*) denoting the current task.

Figure 2-1. ITS Active Display

BATCH

The BATCH command is used to submit jobs which do not interact with the terminal. The Batch command attempts to place the job in the named file into immediate execution. If the job cannot be placed into immediate execution, then the file is added to the system input queue. If the file cannot be placed into the queue, a diagnostic message is produced which indicates the difficulty. A job submitted using the BATCH command does not carry the originating port information.

The format of the BATCH command is:

```
]BATCH fname,fo,fed,fak,printdisp,punchdisp,sl
```

<u>Parameter</u>	<u>Default</u>	<u>Definition</u>
fname	BATCH- DEFAULT	Name of the cataloged job file.
fo	JOBS	Owner of the cataloged job file.
fed	01	Edition of the cataloged job file.
fak	fo	Access key of the cataloged job file.
printdisp	PR	Any legal MPX/OS output disposition code.
punchdisp	SC	Disposition code for punched output.
sl	0	Job security level.

When the operation is complete, the following message results:

```
Seq = YY Output = ZZ
```

where YY is the unique sequence number of the job and ZZ is the output file disposition. If the disposition does not specify a currently active printer, the job sequence number YY can be used to dispose the file with the DISPOSE command (see page 2-6).

If the specified cataloged job file cannot be accessed, the message "File error." results.

Examples of the default field usage are as follows:

]BATCH

Results in the file BATCH-DEFAULT,JOBS,01,JOBS being submitted with the output disposition of PR.

]BATCH MYJOB,,,GX

Results in the file MYJOB,JOBS,01,JOBS, being submitted with the output disposition of GX.

]BATCH MYJOB,FDR

Results in the file MYJOB,FDR,01,FDR being submitted with the output disposition of the PR.

CLASS

The user can declare the terminal to be of a different terminal class at any time by entering the CLASS command.

The format of the CLASS command is:

]CLASS n

Where n represents one of the following ITS terminal classes:

Unmanned Classes:

- 1 - Mode 4 Line (200UT)
- 2 - X.25 Packet Network line
- 3 - CPU-CPU Async Protocol (undefined)
- 4 - Undefined
- 5 - Undefined
- 6 - AWN Network Line
- 7 - NEDN Network Line
- 8 - NMC Network Line
- 9 - ID50 Network Line
- 10 - Undefined
- 11 - 200UT Card reader (RBTMGR)
- 12 - 200UT Line printer (RBTMGR)
- 13 - Output only port (RO terminal)
- 14 - Input only terminal (Sensor/CR)
- 15 - Undefined

Manned Classes:

- 16 - Generic - "GLASS TELETYPE"
- 17 - Generic - "PRINTING TERMINAL"
- 18 - CDC751
- 19 - CDC752
- 20 - CDC756
- 21 - Undefined
- 22 - Undefined
- 23 - 200UT Console (RBTMGR)
- 24 - X.25 Packet Assembly/Disassembly
- 25 - CYBER Virtual Terminal (OPFMGR)

Unmanned classes are given for reference only. The CLASS command cannot change a terminal port to an unmanned class.

DELAY

The user can request a time delay between outputs by entering the DELAY command. This allows time for the carriage return on terminals which produce a hard copy.

The format of the DELAY command is:

```
]DELAY n
```

where n specifies the delay time in hundredths of a second and is a value between 0 and 99.

DISPOSE

The DISPOSE command allows a terminal user to route a file to the system output queue or release a file which is no longer needed. The file being disposed can be either a conventional file or an output file created by BATCH or JOB commands whose disposition was to mass storage. In either case the file cannot be disposed if it is open. Once a file has been disposed, its name is changed to a system-defined name and it is no longer accessible to the user.

The format of the DISPOSE command is:

```
]DISPOSE disp,seq  
]DISPOSE disp,fname,fo,fed,fak
```

<u>Parameter</u>	<u>Default</u>	<u>Definition</u>
disp	none	MPX/OS file disposition code.
seq	none	Sequence number of the output file.
fname	none	Name of the job file.
fo	none	Owner of the job file.
fed	01	Edition of the job file.
fak	fo	Access key of the job file.

When the operation is complete, the following message results:

SEQ = YY OUTPUT = ZZ

where YY is the unique sequence number of the job and ZZ is the output file disposition.

If the specified job file cannot be accessed, the error message "File error." results.

FACILITY

The FACILITY command enables the user to switch facilities at any time following log-on. The terminal user must be validated to communicate with the requested facility.

The format of the FACILITY command is:

]FACILITY facname

where facname is a facility name as follows:

BCF	- Batch Control Facility
DCF	- Device Control Facility
DMF	- Dayfile Management Facility
FCF	- File Control Facility
ICF	- Interactive Communications Facility
OCF	- Operator Control Facility

If facname is omitted, ICF is assumed.

Successful completion of the FACILITY command results in a message consisting of facname followed by a period. If entering the ICF facility with an active linkage, the linkage name is displayed rather than "ICF".

HELP

The HELP command allows users to get immediate assistance from the Interactive Terminal Subsystem. Information about various subjects of interest to the MPX/OS ITS user.

The format of the HELP command is:

```
]HELP subj  
]HELP
```

where subj specifies the subject for which information is desired.

If no subj parameter is specified, a list of subjects with a brief description about each is displayed.

If the subject specified is not valid, the message "Invalid command." results.

JOB

The JOB command is intended for use in submitting jobs which will interact with the terminal. The JOB command will place the job contained in the named file into immediate execution if the resources required by the job's SCHED cards are available. If the job cannot be placed into immediate execution or if a submission error occurs, a diagnostic message is produced indicating the difficulty. A job submitted using the JOB command has the originating port information.

The format of the JOB command is:

```
]JOB fname,fo,fed,fak,printdisp,punchdisp,sl
```

<u>Parameter</u>	<u>Default</u>	<u>Definition</u>
fname	JOB- DEFAULT	Name of the job file.
fo	JOBS	Owner of the job file.
fed	01	Edition of the job file.
fak	fo	Access key of the job file.
printdisp	SC	Any legal MPX/OS output disposition code.
punchdisp	SC	Disposition code for punched output.
sl	0	Job security level.

When the operation is complete, the following message is output:

```
Seq = YY Output = ZZ
```

where YY is the unique sequence number of the job and ZZ is the output file disposition.

If the specified job file cannot be accessed, the error message "File error." results. If the user is connected to a facility other than ICF, the message "Invalid command under this facility." results.

KEEP

The KEEP command allows the terminal user to specify that a linkage which is awaiting connection become the current linkage (see USER/JOB LINKAGE). The previous current linkage is saved for later terminal communications.

The format of the KEEP command is:

```
]KEEP linkagename
```

where linkagename is the name of the linkage to which a connection is desired. If linkagename is omitted, "ED" is assumed.

If no linkage with the specified name exists, the message "No linkagename" results. A successful connection is indicated by the message "linkagename".

If the user is connected to a facility other than ICF, the message "Invalid command under this facility." results.

LINK

The LINK command allows the terminal user to specify that a linkage which is awaiting connection become the current linkage (see USER/JOB LINKAGE). The previous current linkage is removed, allowing no further communications between the terminal and the connected task to occur, and the task is informed that the linkage has been removed. The KEEP command should be used if there is a desire to save the previous current linkage.

The format of the LINK command is:

```
]LINK linkagename
```

where linkagename is the name of the linkage to which connection is desired. If linkagename is omitted, "ED" is assumed.

A successful connection is indicated by the message: "linkagename".

An unsuccessful connection is indicated by the message: "No linkagename".

If the user is connected to a facility other than ICF, the message "Invalid command under this facility" results.

MESSAGE

Communication between terminal users is accomplished via the MESSAGE command.

A terminal user can send messages to other ports and receive messages from other ports. The user can utilize the ACTIVE command to determine which ports are active and which user is logged-on to each port. Messages cannot be sent to an inactive port.

The format of the MESSAGE command is:

]MESSAGE nn,mt

<u>Parameter</u>	<u>Definition</u>
nn	Number of the receiving port, "*" if the message is to be sent to all active terminals, or "!" to change the System Message line.
mt	Message text in upper and lower case. If omitted, the System Message line is cleared if n is "!". Otherwise, only the time and port number are displayed to the receiving port.

The format of a received message is as follows:

HH:MM/nn message text

where nn is the number of the port which sent the message and HH:MM is the time it was sent in hours and minutes.

If received on a terminal properly equipped, HH:MM/nn will blink and a bell will sound.

The user must be properly validated to:

- a. receive messages.
- b. broadcast messages or change the System Message line.

PAGE

The PAGE command allows the user to define the terminal display size and enables paged output. When paged output is enabled, consecutive outputs will be halted when the terminal display is full (a page has been output) and will continue when the user enters a carriage return.

The format of the PAGE command is:

```
]PAGE n,m
```

<u>Parameter</u>	<u>Definition</u>
n	Number of lines in a page
m	Page width in characters

The maximum number of lines per page is 63 and the page width must be between 1 and 136. Paging is disabled by setting the number of lines per page to 0.

PASSWORD

The PASSWORD command enables terminal users to change passwords at any time following log-in.

The format of the PASSWORD command is:

```
]PASSWORD opass,npass
```

<u>Parameter</u>	<u>Definition</u>
opass	Old password (alphanumeric, 0-8 characters)
npass	New password (alphanumeric, 0-8 characters).

If opass is not the current password or npass is greater than 8 alphanumeric characters, the message "Invalid parameter" results.

PORT

The PORT command produces a display of the user's port number, username, log-on time, terminal class, facility, and connected linkages.

Information generated by the PORT command is depicted in Figure 2-2, ITS Port Display.

The format of the PORT command is:

]PORT

PN	Username	TC	Log-on	FAC	Task	Linkages
6	Johnson	7	14:37:46	ICF	ED	*PCC

where PN = Port number
TC = Terminal connection number
Log-on = Time logged-on
FAC = Facility

ED and PCC are linked tasks. The asterisk (*) denotes the current task.

Figure 2-2. ITS Port Display

QUIT

The QUIT command provides the capability to disconnect the terminal from the system.

The format of the QUIT command is:

```
]QUIT
```

Whenever the terminal is disconnected from the system, the following message containing the current time of day and total connect time is produced:

```
Logoff at   hh:mm:ss  
Connect time   mmm.ss
```

RECOVER

After establishing the terminal as a logical port within the Interactive Terminal Subsystem, the user can enter the RECOVER command to attempt recovery of a previously interrupted terminal session. The user must not have any linkages when the recovery is attempted, and the user's username must match that of the port to be recovered. The user can recover an interrupted terminal session from any terminal; therefore, the user must specify the number of the logical port to be recovered.

Recovery is limited to ports which had linkages at the time of communications loss, and the port recovery must be initiated within a limited time interval (see Port Disestablishment). Ports which are candidates for recovery display a "+" following the port number on the ACTIVE command display.

The format of the RECOVER command is:

```
]RECOVER n
```

where n is the number of the port to be recovered.

A typical port recovery scenario proceeds as follows:

```
Recovery Command:      ]RECOVER 2  
Response:              Recovery complete.
```

At this point, the user has regained control of the interrupted terminal session. However, since recovery of a terminal session can be made from any terminal, the baud rate, parity, and duplex are not recovered.

Unsuccessful recovery is indicated by the message "Recovery impossible".

SETUP

The user can display or change the port setup information by entering the SETUP command. The port setup is used to control the mode of data transmission for those port validations which allow variable transmission mode selection.

The format of the SETUP command is:

```
]SETUP p1,p2...pn
```

<u>Parameter</u>	<u>Definition</u>
p1,p2...pn	Any of the parameters from the following list, in any order:
HALF - half duplex	110 - 110 baud
FULL - full duplex	300 - 300 baud
ODD - odd parity	600 - 600 baud
EVEN - even parity	1200 - 1200 baud
NONE - no parity	2400 - 2400 baud
96 - 96-character set	4800 - 4800 baud
64 - 64-character set	9600 - 9600 baud
	19.2 - 19200 baud

If two or more parameters conflict, the last parameter is used. If an invalid parameter is entered, the entire command is considered invalid and no changes are made. If no parameters are present, the SETUP command produces a display of the current port setup information similar to the following:

```
Char: 64  
Baud: 9600  
Duplex: FULL  
Parity: EVEN
```

JOB SUBMISSION

Two commands are provided to perform job submission from the terminal: the BATCH command and the JOB command. These commands require job file identification and allow the specification of the standard output file disposition.

At the time of submission, disposition of output files can be specified. Files disposed to mass storage can be retained on the system for future use or can be printed or otherwise disposed.

The command which submits a job file to the system determines whether the job can be placed into the system input queue and whether the job has an originating port. The terminal user can create job files with the text editor or other utility programs.

If an output file is created with mass storage disposition (MS), a message is produced giving the name by which the file can be retrieved. These files are not accessible through the normal file management job control statements, because they have special file identifications.

USER/JOB LINKAGE

In order for communications between a job and a terminal to begin, a logical linkage must be established between the terminal and the job. Normally, for this linkage to be established, action is required by both the job and the terminal user.

The establishment of the job and terminal linkage begins with a terminal request by the job. The job uses the DEVICE control card or DEVICEQ ESR to initiate the terminal request. The ability of the job to place restrictions upon the port, terminal, and user is also supplied by the DEVICE control card or DEVICEQ ESR. Before the job regains control of the CPU the terminal request parameters are validated.

The DEVICE control card and the DEVICEQ ESR descriptions are contained in the MPX/OS Reference Manual.

If the job requested immediate connection to a port, the job can begin communications with the terminal. If the job did not request immediate connection to the port then communications with the terminal will be delayed until the user requests connection with job. Meanwhile, the job can output to the port but the output operation will not complete until the user is linked with the job.

The terminal user can have more than one task-linkage associated with his port. Only one of these can be the current linkage, and it alone can communicate with the terminal. The LINK and KEEP commands are used to manipulate task-linkages.

A task can become the current linkage of a port through one of the following sequences of events:

1. The *DEVICE control statement is encountered with immediate connection requested.
2. The job requests immediate connection to a port through the DEVICEQ ESR.
3. The job requests connection to a port with the *DEVICE control statement or the DEVICEQ ESR, without requesting immediate connection, and the terminal user requests connection to the job using the LINK or KEEP ITS commands.
4. The LINK or KEEP commands request that a linkage become the current linkage.

The terminal user can disconnect from a linkage by using the LINK command to connect to another linkage.

The *CLOSE job control statement causes the specified logical units (established by DEVICE or DEVICEQ) to be unlinked from the port. If no logical units remain linked, the job disconnects itself from the port.

INTERACTIVE JOB PROCESSING

Interactive job processing provides for the entry of job control statements and the display of standard job output at the terminal. Whenever the standard input (logical unit 63) of the job is linked to the terminal, job control statements are read from the terminal; and whenever the standard output (logical unit 62) of the job is linked to the terminal, standard job output is routed to the terminal.

Connection of standard input to the terminal allows the terminal user to directly enter job control statements to the Job Manager. Each statement is executed immediately after entry.

While the standard output connection exists, no information is written on the standard job output file.

All MPX/OS job control statements can be entered from the terminal with the following exceptions:

- *JOB
- *RJOB
- *SCHED

These statements must come from the job file prior to linkage establishment.

The statement *CLOSE(62) causes standard job output to be reconnected to the original output file.

In the event of job termination, either normal or abnormal, all job logical units linked to the terminal are automatically unlinked and the job terminates as if no terminal had been linked. If the standard job output is connected to a terminal at the time of an abnormal job termination, the following abort message is output to the terminal before the disconnection is performed:

JOB ABORTED ABORT TYPE = XX ABORT CODE = YY TASK = ZZZZZZZZ

where XX is the abort type, YY is the abort code, and ZZZZZZZZ is the task identification (default is DUMYTASK). Appendix D of the MPX/OS Reference Manual further explains the abort types and codes.



Each of the following facilities provides the terminal user with a different interface to the system and has its own commands.

- Batch Control Facility (BCF)
- Device Control Facility (DCF)
- Dayfile Management Facility (DMF)
- File Control Facility (FCF)
- Interactive Communications Facility (ICF)
- Operator Control Facility (OCF)

Following log-on, the terminal user is in communications with his default facility. However, the terminal user may switch facilities at any time by entering the FACILITY command. If the terminal user is not validated to communicate with the requested facility the command is considered invalid and an error message is output.

ITS facilities process all data received from the terminal which does not constitute an ITS command.

The user must enter enough unique characters to identify the particular command under the current facility. A space or comma must separate the command from the parameter (a space is used for all the examples). The parameters are separated by commas and are order-dependent. An error in entering a command results in the message "Illegal Command."

BATCH CONTROL FACILITY

The Batch Control Facility (BCF) allows the terminal user to control files which are currently being read or printed.

The valid BCF commands are:

BSP	REPEAT	SUPPRESS
END	REWIND	

BSP - Backspace File

For an output file, BSP causes the file corresponding to the specified sequence number to be backspaced the specified number of 1920 character blocks, or rewound and restarted if the backspace count is greater than the current block number. For an input file, the file transmission is stopped and the file is evicted.

The format of the BSP command is:

BSP seqno,ss

<u>Parameter</u>	<u>Definition</u>
seqno	Sequence number of job.
ss	Number of 1920 character logical blocks to be backspaced; default value is 1.

END - End File Transmission

END halts the transmission of the file corresponding to the specified sequence number and then evicts that file.

The format of the END command is:

END seqno

where seqno is the sequence number of the job.

REPEAT - Repeat Output

Repeat causes the file corresponding to the specified sequence number to be repeated the specified number of times.

The format of the REPEAT command is:

REPEAT seqno,n

<u>Parameter</u>	<u>Definition</u>
seqno	Sequence number of the job.
n	Number of additional copies desired (default is one copy).

REWIND - Rewind File

Rewind causes the output queue file corresponding to the specified sequence number to be rewound and restarted if no new priority is specified. If a new priority is specified, the file is rewound and returned to the output queue with the specified priority.

The format of the REWIND command is:

REWIND seqno
REWIND seqno,p

<u>Parameter</u>	<u>Definition</u>
seqno	Sequence number of the job.
p	New priority for the job.

SUPPRESS - Suppress Carriage Control

Suppress causes all carriage control characters in the file corresponding to the specified sequence number to be disregarded.

The format of the SUPPRESS command is:

SUPPRESS seqno

where seqno is the sequence number of the job.

DEVICE CONTROL FACILITY

The Device Control Facility (DCF) allows the terminal user to control the state of certain peripheral devices.

The valid DCF commands are:

GO	PDN	SETDC
OFF	PUP	STATUS
ON	READ	WAIT

The parameter definitions for the DCF commands are as follows:

<u>Parameter</u>	<u>Definition</u>
pdc	Primary disposition code, consisting of two alphanumeric characters unique to the device. Primary disposition codes are determined by installation parameters.
sdc	Secondary disposition code, consisting of two alphanumeric characters input by the user with the SETDC command. The secondary disposition code can be used instead of the primary disposition code to dispose output data with the BATCH, DISPOSE, and JOB commands.
sysport	System ITS port number, as given in the]ACTIVE Output.

GO - Resume Suspended File Transmission

GO causes file transmissions on the device corresponding to the specified primary disposition code to be resumed, negating the effect of the WAIT command.

The format of the GO command is:

GO pdc

OFF - Turn Peripheral Logically Off

OFF turns the device corresponding to the specified primary disposition code logically off. Any file transmission in progress on that peripheral continues until end-of-file is reached. No new transmissions will be initiated, however, until the peripheral is turned logically on.

The format of the OFF command is:

OFF pdc

ON - Turn Peripheral Logically On

ON turns the device corresponding to the specified primary disposition code logically on, negating the effect of the OFF command.

The format of the ON command is:

ON pdc

PDN - "Down" an ITS port

PDN causes any user of the specified port to be disconnected (and placed in recovery, if linkages were present.) The port remains "Down" and will not respond to further input.

The format of the PDN command is:

PDN sysport

PUP - "Up" an ITS port

PUP reinitializes an ITS port. All port initialization that is performed at MPX/OS deadstart is performed again on the specified port. The port must be "DOWN" before it can be "UP"ed.

The format of the PUP command is:

PUP sysport

READ - Read Input From Peripheral

READ causes a deck to be read from the device corresponding to the specified disposition code.

The format of the READ command is:

READ pdc

SETDC - Set Secondary Disposition Code

SETDC allows the user to define a secondary disposition code for a device.

The format of the SETDC command is:

SETDC pdc,sdc

STATUS - List Status of Peripherals

STATUS lists the configuration and status of devices currently defined in the system. The output created by this command is depicted in figure 3-1, DCF Status Display, and figure 3-2, DCF Status Display (P Option).

The format of the STATUS command is:

```
STATUS [E]  
STATUS P
```

<u>Parameter</u>	<u>Definition</u>
E	Information about the configuration and status of all peripheral equipment is displayed. This is the default option.
P	Information about the configuration and status of all ports is displayed.

WAIT - Suspend File Transmission

WAIT causes file transmissions on the device corresponding to the specified primary disposition code to be suspended. The GO command is used to resume transmissions.

The format of the WAIT command is:

```
WAIT pdc
```

Device	Unit	HT	Owner	Up/Dn	SC	PDC	SDC	R/W	On/Off
File	0	1	SYS	Up	00				
FDD	0	10		Up	00				
CARD	1	0	3 SYS	DOWN	00	C1	PR	R	On
LINE	1	0	5 SYS	Up	00	L1	PR	W	On
MT9	0	0	2 USER	Up	00	MT9	0		ASSIGNMENT REQUESTED.
MT9	1	1	2	Up	00				
CRT	0	0	6 SYS	Up	00				
BCLA	0	0	17 SYS	Up	00				
MPCLA	0A	0	18 SYS	Up	00				
MPCLA	0B	1	18 SYS	Up	00				
MPCLA	1A	0	18 SYS	Up	00				
MPCLA	1B	1	18 SYS	Up	00				
CCC	0	0	11	Up	00				
SYSTEM01	0	5	SYS	Up	00				

End of List.

where HT = Hardware type
 SC = Security level
 PDC = Primary Disposition Code
 SDC = Secondary Disposition Code
 R/W = Read or Write device

The Owner column serves two purposes. When an entry is present, it indicates device is assigned and whether it is a system or user device. When entry is blank, device is available to a user but is not currently assigned.

Figure 3-1. DCF Status Display

Device	DP/PN	TC	Username	Up/Dn	SC	PDC	SDC	R/W	On/Off
CRT	0	00/00	19 OPR	Up	08				
BCLA	0	00/01	20 MTYLP	DOWN	07	0	MM	W	On
BCLA	0	01/02	20	Up	07				
BCLA	0	02/03	20	Up	07				
BCLA	0	03/04	20 GES	Up	07				
BCLA	0	04/05	20	Up	07				
BCLA	0	05/06	20 GES	Up	07				
MPCLA	0A	00/07	00	DOWN	00				
MPCLA	0B	01/08	06 AWNO	Up	00				
MPCLA	1A	00/09	00	DOWN	00				
MPCLA	1B	01/10	06 AWNC	Up	00				

where DP/PN = Port on device and system port number
 TC = Terminal class

Figure 3-2. DCF Status Display (P Option)

DAYFILE MANAGEMENT FACILITY

The Dayfile Management Facility (DMF) allows the terminal user to display the system dayfile, selectively dump the System Dayfile, and reset the System Dayfile. Upon entering the Dayfile Management Facility, System Dayfile messages will begin appearing on the terminal as they are processed. In order to avoid degrading system performance, however, at high message entry rates, not all DAYFILE messages may be displayed.

The valid DMF commands are as follows:

ARCHIVE
DUMP
TYPE

The format of a System Dayfile entry is as follows:

<u>Character Position</u>	<u>Definition</u>
0	Blank
1-8	Time in the format hh:mm:ss
9	Period (.)
10-15	Job identifier
16-17	Sequence number
18	Comma (,)
19-26	Taskname
27	Period (.)
28	Message identification code.
29	Event code.
30-31	Action code.
32	Comma.
33	Blank.
34-135	Dayfile message.

ARCHIVE - Archive Dayfile Entries to File

Archive causes the current dayfile to be closed and renamed, and a new DAYFILE to be opened.

The format of the ARCHIVE command is:

ARCHIVE

DUMP - Dump Dayfile Entries to File

Dump causes entries in the dayfile that were logged during the specified time period and which match criteria selected under the TYPE command to be copied to the specified mass storage file. If no TYPE command has been entered, all dayfile messages logged during the specified time period are dumped.

The format of the DUMP command is:

DUMP fname,fo,fed,fak,sydt,eydt

<u>Parameter</u>	<u>Default</u>	<u>Definition</u>
fname	none	Name of the dump file.
fo	none	Owner of the dump file.
fed	01	Edition of the dump file.
fak	fo	Access key of the dump file.
sydt	0.001.0000	Start time of specified time period in the format Y.DDD.HHMM
eydt	9.365.2359	End time of specified time period in the format Y.DDD.HHMM

where Y is the last decimal digit of year, DDD is the day of year, HH is hours, and MM is minutes.

TYPE - Set Dayfile Message Types

Type allows the user to specify the selection criteria for dayfile messages to be displayed or dumped. Once defined, only messages matching the selection criteria will be displayed at the user's terminal or dumped with the DUMP command. The parameters are order-independent. If a parameter is not specified, no selection criteria for that item is used.

The format of the TYPE command is:

```
TYPE ALL
TYPE JN=jn,TN=tn,ID=id,EV=ev,AC=ac
```

<u>Parameter</u>	<u>Definition</u>
ALL	Display all messages from the dayfile.
jn	Job name for which dayfile messages are to be displayed.
tn	Task Identification for which dayfile messages are to be displayed.
id	Identification Code of dayfile messages to be displayed.
ev	Event Code of dayfile messages to be displayed.
ac	Action Code of dayfile messages to be displayed.

FILE CONTROL FACILITY

The File Control Facility (FCF) allows a terminal user to display status information about mass storage files.

The valid FCF commands are as follows:

LIST
RELEASE

LIST - Display Owner File Information

LIST provides a display of owner files on a particular disk pack which are either open or allocated. Information generated by this command is depicted in figure 3-3, FCF List Display (O and A options) and figure 3-4, FCF List Display (D option).

The format of the LIST command is:

LIST O,owner,pack
LIST A,owner,pack
LIST D

<u>Parameter</u>	<u>Definition</u>
O	Information about files currently open is displayed.
A	Information about allocated files is displayed.
D	The device identifier of each system mass storage unit and related utilization data are displayed.
owner	Owner name (default is all owner names).
pack	Disk pack identification (default is all disk packs).

Own	File Name	Ed Acc	Cr-Date	LU-Date	Du-Date	Allo	Used	Device
TST	TEMP	01 TST	1 1 80	1 1 80	1 11 80	12	3	SYSTEM01
TST	TEMP	02 TST	1 5 80	1 10 80	1 11 80	25	24	SYSTEM02
TST	AFILE	01 FLE	1 5 80	1 12 80		12	1	SYSTEM01

End of list.

where Own = File owner name
 Ed = File edition
 Acc = File access key
 Cr-Date = Creation date
 LU-Date = Last Used date
 Du-Date = Dump date
 Allo = Number of allocated blocks
 Used = Number of used blocks
 Device = Disk pack identification

Figure 3-3. FCF List Display (O and A Options)

Device	Avail	Used	%Used
SYSTEM01 S	900	1164	56
SYSTEM02	1214	770	37

where Device = Disk pack identification
 Avail = Number of available blocks
 Used = Number of used blocks
 $\%Used = (Used \times 100) / (Avail + Used)$

and the S indicates it is a system reserved device.

Figure 3-4. FCF List Display (D Option)

RELEASE - Release Specified File

Release causes the file specified by the user to be released.

The format of the RELEASE command is:

RELEASE fn,owner,ed,ak,rc

<u>Parameter</u>	<u>Definition</u>
fn	Name of the file to be released.
owner	Owner of the file.
ed	Edition of the file.
ak	Access key of the file.
rc	Release code. Either 0 (default) or R. Zero (0) causes the release of the entire file. R causes release of only the unused portion of the file.

INTERACTIVE COMMUNICATIONS FACILITY

The Interactive Communications Facility (ICF) does not process any commands. All data received by the ICF is passed to the current task, providing there exists a task with a read request pending.

When in communication with the ICF, write requests from the current task are output to the terminal.

There is no command interface between the terminal user and the ICF. The task interface to the terminal user consists of data received from the terminal (not an ITS command) and data output to the terminal due to a write request from the current task.

If data is received and the terminal user has no current task, the message "No task currently linked." results.

If data is received and the current task has no read request pending, the message "No read from linked task." is produced.

OPERATOR CONTROL FACILITY

The Operator Control Facility (OCF) provides the terminal user with the capability to monitor and alter the MPX/OS input, output, and execution queues, display and alter memory, and respond to operator messages.

Messages are divided into two categories: Operator Messages and Informative Messages.

Operator Messages must be answered before the issuing task can continue execution. When a task issues a CTOC or CTOR Executive Service Request (ESR), it is suspended until it receives a response from the Operator via the ACCEPT or REJECT commands. Messages resulting from a CTOC ESR are denoted on the Message Display by a C; messages resulting from a CTOR ESR are denoted by an R.

Informative Messages do not require an operator response. When a task issues a CTOI ESR, a message is sent to the Operator but the task is not suspended. Informative Messages are denoted on the Message Display by an I, and can be removed from the Display via the CLEAR command.

The valid OCF commands are:

ACCEPT	LASTPAGE	SET
CLEAR	MESSAGE	TERM
DISPLAY	NEXTPAGE	UPDATE
EVICT	PRIORITY	WATCH
GO	QUEUE	
IDLE	REJECT	

ACCEPT - Accept Operator Message

Accept causes a response to be returned to the task which issued the Operator Message. The response indicates the message was accepted and includes a message from the Operator when provided.

The format of the ACCEPT command is:

ACCEPT seqno,tid,message

<u>Parameter</u>	<u>Definition</u>
seqno	Job sequence number.
tid	Task identification.
message	Message to be included with response (optional).

After this command is processed or an error detected, any remaining messages to the Operator are displayed.

CLEAR - Clear Informative Messages

Clear causes all informative messages on the OCF Message Display to be deleted.

The format of the CLEAR command is:

CLEAR

DISPLAY - Display Memory

Display causes data in the memory area specified to be displayed. Output created by the DISPLAY command is depicted in figure 3-5, OCF Memory Display.

The format of the DISPLAY command is:

DISPLAY sadd,eadd

<u>Parameter</u>	<u>Definition</u>
sadd	Start address for memory display.
eadd	End address for memory display (if omitted, only the content of the address specified by sadd is displayed).

The sadd and eadd parameters can be arithmetic expressions. Arithmetic operators are restricted to "+" and "-", however.

```
0000 BD001478 00000000 00000000 00000000 00000000 00000000 00000000 00000000
0008 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
0010 BD3000A6 BD3000A6 BD3000A6
```

where the first column specifies a memory address and the other columns are the contents of consecutive memory locations. All numbers are displayed in hexadecimal. The maximum number of locations which can be displayed is controlled by terminal display size. The number varies according to how many locations can be displayed on a single page (screen). Display size is controlled by terminal class or as altered by the ICF PAGE command.

Figure 3-5. OCF Memory Display

EVICT - Evict From Queue

Evict removes a file from the input or output queue.

The format of the EVICT command is:

EVICT seqno,q

<u>Parameter</u>	<u>Definition</u>
------------------	-------------------

seqno	Job sequence number.
-------	----------------------

q	The first initial of the queue in which the job currently resides. Valid q parameters are:
---	--

I	Input queue
O	Output queue
H	Hold queue

GO - Resume Task Execution

GO allows the user to resume execution of a task within a job, negating the effect of the IDLE command.

The format of the GO command is:

GO seqno,tid

<u>Parameter</u>	<u>Definition</u>
------------------	-------------------

seqno	Job sequence number.
-------	----------------------

tid	Task identification.
-----	----------------------

IDLE - Suspend Task Execution

IDLE allows the user to suspend task execution within a job. The GO command can be used to restart the task at a later time.

The format of the IDLE command is:

IDLE seqno,tid

<u>Parameter</u>	<u>Definition</u>
------------------	-------------------

seqno	Job sequence number.
-------	----------------------

tid	Task identification.
-----	----------------------

LASTPAGE - Display Last Page of Memory

LASTPAGE allows the user to display a full page (screen) of memory locations preceding the first location shown with the previous DISPLAY, LASTPAGE, NEXTPAGE, or SET command. If none of those commands were previously entered, a full page (screen) of memory locations preceding location \$FFFF will be displayed. The format of output created by the LASTPAGE command is depicted in figure 3-5, OCF Memory Displays. Terminal display size, the full page (screen) referred to, is controlled by terminal class and the ICF PAGE command.

The format of the LASTPAGE command is:

```
LASTPAGE
```

MESSAGE - Display Message List

MESSAGE causes any outstanding messages to the Operator to be displayed.

Output created by the MESSAGE command is depicted in figure 3-6, OCF Message Display.

The format of the MESSAGE command is:

```
MESSAGE
```

NEXTPAGE - Display Next Page of Memory

NEXTPAGE allows the user to display a full page (screen) of locations following the last location shown with the previous DISPLAY, LASTPAGE, NEXTPAGE, or SET command. If none of those commands were previously entered, a full page (screen) of memory locations started from location \$0 will be displayed. The format of output created by the NEXTPAGE command is depicted in figure 3-5, OCF Memory Displays. Terminal display size, the full page (screen) referred to, is controlled by terminal class and the ICF PAGE command.

The format of the NEXTPAGE command is:

```
NEXTPAGE
```

```
C 01 YOURJOB 08.00.04 PAUSE CONTROL CARD MESSAGE APPEARS HERE.  
R 02 MYJOB 08.00.07 EQUIP  
  
I 01 YOURJOB 08.00.00 THIS IS A TEST
```

where first column = message type
= C - CTOC ESR
= I - CTOI ESR
= R - CTOR ESR

second column = Job Sequence number
third column = Task identifier
fourth column = Time message issued
fifth column = Message text

Figure 3-6. OCF Message Display

PRIORITY - Alter Queue Priority

PRIORITY changes the queue priority of a job.

The format of the priority command is:

PRIORITY seqno,q,p

<u>Parameter</u>	<u>Definition</u>
seqno	Job sequence number.
q	First initial of the queue on which the job currently resides. Valid q parameters are: I Input queue O Output queue H Hold queue
p	New priority to be assigned to the job.

QUEUE - Display Queue Data

Queue allows the user to display information for the various job queues: Input, Output, and Hold. Output created by the Queue command is depicted in figure 3-7, OCF Input Queue Display, figure 3-8, OCF Output Queue Display, figure 3-9, OCF Hold Queue Display, and figure 3-10, OCF Queue Display.

The format of the Queue command is:

QUEUE
QUEUE q

<u>Parameter</u>	<u>Definition</u>
q	First initial of the queue to be displayed. Valid q parameters are: I INPUT queue O OUTPUT queue H HOLD queue

If q is omitted, data from all job queues will be displayed.

Seq	Job Name	Prty		
02	NXTJOB	18		3
03	BNCHMRK	18	ABCD0123	7
05	QUICKONE	120	ABCD1234	3

Figure 3-7. OCF Input Queue Display

Seq	Job Name	Prty	Size			
01	MYJOB	28	162	ABCD0123	PR	1
02	TESTJOB	20	12	ABCD0123	L1	3

Figure 3-8. OCF Output Queue Display

Seq	Job Name	Time	
00	WAIT	1300	ABCD1234
07	LASTJOB	2359	ABCD0000

Figure 3-9. OCF Hold Queue Display

I-N-P-U-T			O-U-T-P-U-T			H-O-L-D			
Seq	Job Name	Prty	Seq	Job Name	Prty	Size	Seq	Job Name	Time
02	NXTJOB	18	01	MYJOB	28	162	00	WAIT	1300
03	BNCHMRK	18	04	TESTJOB	20	12	07	LASTJOB	2359
05	QUICKONE	10							

Figure 3-10. OCF Queue Display

where Seq = Job sequence number
 Prty = Queue priority
 Size = Number of blocks used by output file
 Time = Time of day job scheduled to be moved to input queue
 ABCD0123, ABCD1234, and ABCD0000 are account numbers
 PR and L1 are output disposition codes

REJECT - Reject Operator Message

Reject causes a response to be returned to the task which issued the Operator Message. The response indicates the message was rejected and includes a message from the Operator when provided.

The format of the REJECT command is:

REJECT seqno,tid,message

<u>Parameter</u>	<u>Definition</u>
seqno	Job sequence number.
tid	Task identification.
message	Message to be included with response (optional).

After this command is processed or an error is detected, any remaining messages to the Operator are displayed.

SET - Set Memory

SET modifies contiguous memory words beginning at a specified address. Altered memory is then displayed as in figure 3-5, OCF Memory Display.

The format of the SET command is:

SET add,val,val,val...
SET add,rep*val,rep*val...

<u>Parameter</u>	<u>Definition</u>
add	Absolute address of first memory word to be modified.
rep	Repeat count representing the number of consecutive words to set to val (optional).
val	Hexadecimal value to be placed in the next storage location.

TERM - Terminate Job

TERM allows the user to abort a specified job.

The format of the TERM command is:

```
TERM seqno
```

where seqno is the job sequence number.

UPDATE - Update Memory, Queue, and Watch Displays

UPDATE causes the Memory, Queue, and Watch displays to be updated on a periodic basis. After one of the Memory, Queue, or Watch displays is selected, the UPDATE command will cause that same display to be output at timed intervals until the next valid OCF command is entered. The time intervals used are defined during system installation. If no Display, Lastpage, Nextpage, Queue, Set, or Watch command has been entered, the Watch display is selected.

The format of the UPDATE command is:

```
UPDATE
```

WATCH - Display Job Status

WATCH displays the status of jobs and tasks in execution. Output created by the OCF Watch command is depicted in figure 3-11, OCF Watch Display, and figure 3-12, OCF Watch Job Display.

The format for the WATCH command is:

```
WATCH  
WATCH seqno  
WATCH seqno,tid
```

<u>Parameter</u>	<u>Definition</u>
seqno	Job sequence number.
tid	Task identification.

If no job sequence number is specified, status information is displayed for all jobs in execution. If a job sequence number but no task identifier is specified, status information is displayed for all tasks within the job. If a task identifier is specified, status information is displayed for that task only.

```

03/24/81    13:48:08  FNOC.32A B2-L3    SC=00  Mem A/U=048/032
The MP-32 will be painted today
Name--JOB--Seq Submittor  Time On    Memory  Used--TIME--Sched
MPX/OS      *0          08:12:12    0  0    137.7
EDITOR      00 GES       10:05:00    3  3     .3      9990
ITS2.0      *1          08:12:12    0  0     .3

```

where:

```

FNOC.32A = Mainframe identifier.
  B2 = MPX/OS Resident edition.
  L3 = MPX/OS Library edition.
  00 = System Security level.
  048 = Memory Pages available.
  032 = Memory Pages used.
Name = Job identifier.
Seq = Job sequence number. If the first character is an "*",
    the job is a system job.
Submittor = Username of job submittor.
Time On = Time job began execution.
Memory = Memory pages allocated and used.
Used = Execution time in decimal seconds.
Sched = Maximum allowable execution time in decimal seconds.

```

Figure 3-11. OCF Watch Display

STNIO 02 GES 13:48:08 5 4 1.3 9990

Taskname	Time	Prty	Status	State	P
STDIO	.0	257	12	1 *	3D63
ICF	.1	520	12	1 2	4133 C , *RUN
BCF	.0	515	12	1 *	532C
OCF	.0	515	1	1 5	40C8
LOF	.1	515	12	1 4	47F4

where:

STNIO = Job name
02 = Job sequence number
GES = Username of job submitter
13:48:08 = Time job submitted
5 = Memory allocated
4 = Memory used
1.3 = Execution time in decimal seconds
9990 = Maximum allowable execution time in decimal seconds

Taskname = Task identifier
Time = Execution time in decimal seconds
Prty = Priority
Status = CPU Status of the task. See TSTATUS ESR description in MPX/03 V3 Reference Manual.
State = First digit is CPU number assigned to the task. Second digit is state number within the CPU. If the state is "*", the task is not currently assigned a state.
P = Execution address

Figure 3-12. OCF Watch Job Display



APPENDIX A

COMMAND SUMMARY

<u>Command</u>	<u>Description</u>
]active,all	Show active ports.
]batch fn,own,ed,ak,odisp	Place Job file in Input Queue.
]class n	Change terminal class.
]delay n	Set delay between outputs.
]dispose disp,fid	Change disposition of MS output queue file.
]dispose disp,fn,own,ed,ak	Place file in output queue.
]facility facname	Change to new facility.
]help	Display subject index.
]help subj	Display specific information.
]job fn,own,ed,ak,odisp	Place Job file in Execution; connect terminal.
]keep linkagename	Switch to new task-linkage; keep previous task-linkage.
]link linkagename	Switch to new task-linkage; release previous task-linkage.
]message n, ...text...	Send message to active port.
]page n,m	Set lines-per-page, page-width.
]password old,new	Change password.
]port	Display port information.
]quit	Logoff.
]recover n	Recover disconnected port.
]setup dplx,parity,speed,cset	Set port parameters.

BATCH CONTROL FACILITY

bsp seqno,blks
end seqno
repeat seqno,times
rewind seqno,prior
suppress seqno

Backspace a file on a device.
Terminate transmission of a file.
Cause repeated transmission.
Rewind and return to queue.
Suppress carriage control.

DEVICE CONTROL FACILITY

go pdc
off pdc
on pdc
pdc sysport
pup sysport
read pdc
setdc pdc,sdc
status
status p
wait pdc

Resume "waited" file transmission.
Turn equipment logically off.
Turn equipment logically on.
Bring port "down".
Bring port "up".
Read input from peripheral.
Set secondary disposition code.
List equipment status.
List port status.
Suspend file transmission.

where pdc = 2 characters, installation defined, unique to equipment

DAYFILE MANAGEMENT FACILITY

archive
dump fn,own,ed,ak,sydt,eydt

type JN=jn,TN=tn,ID=id,EV=ev,AC=ac
type all

Save current dayfile.
Select dayfile entries between
sydt and eydt at YDDD.HH.MM.
Set selection criteria for dump.

where jn = job name (8 characters)
tn = task ident (8 characters)
id = ident code (1 character)

ac = action code (2 characters).
ev = event code(1 character).

FILE CONTROL FACILITY

list O,own,pack
list A,own,pack
list D
release,fn,own,ed,ak,R
release,fn,own,ed,ak

Open files.
All files.
Device idents and % full.
Release unused space.
Release whole file.

OPERATOR CONTROL FACILITY

accept seqno,taskid,message
clear
display fwa,lwa
evict seqno,q
go seqno,taskid
idle seqno,taskid
lastpage
message

nextpage
priority seqno,q,prior
queue
queue,q
reject seqno,taskid,message
set adr,val,val,val....
set adr,rep*val,rep*val...
term seqno
update
watch
watch seqno
watch seqno,taskid

Accept a message.
Clear Informative messages.
Display memory.
Remove file from queue (q= I,O,H).
Resume an "idle" task.
Idle a task.
Display previous memory.
Display Operator and Informative messages.
Display next sequential memory.
Alter file priority (q= I,O,H).
Display state of all queues.
Display specific queue (q= I,O,H).
Reject a message.
Change memory.
Change memory, rep= num of words.
Terminate a job.
Repeated execution of last cmd.
Display state of executing jobs.
Display state of job and its tasks.
Display state of single task.

APPENDIX B

PORT CONFIGURATION AND VALIDATION

PORT CONFIGURATION AND VALIDATION

The ability to reconfigure the Interactive Terminal Subsystem is provided by the port setup file.

The port setup file, PORT.FILE, owner name MPXS, edition 00, access key ****, contains one record for each physical port in the system. The format of each record is as follows:

```
did,port,class,mask,username,dfltps,p1,p2, ... Pn
```

<u>Parameter</u>	<u>Definition</u>
did	Device identification (e.g. 'BCLA 0').
port	Port number on the device.
class	ITS terminal class as defined for the CLASS command (see page 2-5).
mask	String of 0 to 32 hexadecimal characters defining the port's validation mask. See figure B-1, Port/User Validation Mask.
username	If non-null, port is to be auto logged-on with the specified user name. The user name must have a corresponding entry in the user file.
dfltps	A 8-character hexadecimal number or null. If non-null, it contains the initial contents of the port-setup word in the Remote Terminal Table (RTT). See figure B-2, Port Setup Word.
p1,p2...pn	Represents a string of port setup parameters as defined for the SETUP command (see page 2-14). These parameters are optional and are only needed if the terminal's default port setup is to be different than the standard default port setup.
p1 (mpcla)	When the did field specifies an MPCLA, then p1 is a 2-character edition identifier that indicates the edition of the file that contains the program to be down-loaded into this MPCLA.

The comment character for port setup file entries is the sharp (#), and literals must be delimited by single quotes ('). Parameters can be delimited by a comma (,) or blank ().

The standard default port setup for all terminals is an installation parameter.

The contents of the port setup file are dependent upon the terminal system configuration.

An error in a port setup file record causes that record to be ignored and renders that port inoperative. A message is sent to the operator: "Port setup error nn, in PORT.FILE line mm." Port setup error codes (nn) are given in figure B-3. Line Numbering (mm) includes comment-only lines.

USER VALIDATION

The user validation scheme is based on the Interactive Terminal Subsystem user validation file and user input of username and password.

Each time a terminal user attempts to log-on, the user validation file is read to validate the username and password and obtain the user's validation mask.

The user validation file, USER.FILE, owner name MPXS, edition 00, access key ****, contains one record for each user allowed access to the Interactive Terminal Subsystem. The fixed-field format of each record is as follows:

		1	2	2
Column 1	9	6	0	4
userx	passx	fac	dc	mask

<u>Parameter</u>	<u>Definition</u>
userx	A valid username consisting of 1 to 8 alphanumeric characters, blank filled.
passx	The password associated with the username which consists of 0 to 8 alphanumeric characters, blank filled.
fac	3-character default facility name which determines the facility connected after log-on. BCF - Batch Control Facility DCF - Device Control Facility DMF - Dayfile Management Facility FCF - File Control Facility ICF - Interactive Control Facility OCF - Operator Control Facility
dc	Disposition code. Default code used when STDIO-driven devices are defined.
mask	A string of 0 to 32 hexadecimal characters defining the user's validation mask. See figure B-1, Port User Validation Mask.

If the user validation file cannot be opened during a user validation sequence, the username is considered invalid.

Errors are not detected in the user validation file.

The contents of the user validation file are site dependent.

Each port has associated with it a validation mask that defines which ITS features can be utilized from that port. The validation mask consists of four words where each set bit indicates an ITS feature that is accessible from that port.

Associated with each user name is a validation mask which is identical in format to the port validation mask. It serves to define what ITS features a user can access.

The features a user can access can vary depending upon the port that the user is using, since the accessibility of a feature is determined by the logical product of both the port and user validation masks. The validation mask is defined by the MASK parameters in the port setup file and the user validation file. The mask data is left justified and zero filled. The correlation of mask bits to ITS features is described in figure B-1, Port/User Validation Mask.

- | | | | |
|--------|-----|------|--|
| Word 1 | bit | 0 | - Interactive Communications Facility.
Users of this facility will always be validated for the following commands: FACILITY, HELP, QUIT, RECOVER. |
| | | 1 | - Batch Control Facility.
Users of this facility will always be validated for the following commands: BACKSPACE, REWIND. |
| | | 2 | - Device Control Facility.
Users of this facility will always be validated for the following command: STATUS. |
| | | 3 | - Dayfile Management Facility.
Users of this facility will always be validated for the following command: TYPE. |
| | | 4 | - File Control Facility.
Users of this facility will always be validated for the following command: LIST. |
| | | 5 | - Operator Control Facility.
Users of this facility will always be validated for the following commands: MESSAGE, QUEUE, WATCH. |
| | | 6-15 | - Reserved. |
| | | 16 | - Account number not required. |
| | | 17 | - "Quiet" flag (turn off "noisy" messages). |

Figure B-1. Port/User Validation Mask (Sheet 1 of 3)

- 18 - Candidate for STUDIO connection.
- 19-23 - Reserved.
- 24-31 - Security level.

Words 2-4 contain the validation bits for commands within individual facilities.

Word 2 Bits 0-15 are used by the Interactive Communications Facility.

- Bit 0 - CLASS, DELAY, PAGE, PASSWORD commands.
- 1 - ACTIVE, PORT commands.
- 2 - BATCH, DISPOSE, JOB, KEEP, LINK commands.
- 3 - MESSAGE command.
- 4 - SETUP command.
- 5-12 - Reserved.
- 13 - Message broadcast allowed.
- 14 - Message reception allowed.
- 15 - Display "All" active ports allowed.

Bits 16-31 are used by the Batch Control Facility.

- Bit 16 - SUPPRESS command.
- 17 - REPEAT command.
- 18 - END command.
- 19-30 - Reserved.
- 31 - Priority change allowed (option on REWIND command).

Word 3 Bits 0-15 are used by the Device Control Facility.

- Bit 0 - GO, WAIT commands.
- 1 - OFF, ON commands.
- 2 - READ, SETDC commands.
- 3 - PDN, PUP commands.
- 4-13 - Reserved.
- 14 - Redefine Disposition Code allowed.
- 15 - Allow change of another port's Disposition Code.

Figure B-1. Port/User Validation Mask (Sheet 2 of 3)

Bits 16-31 are used by the Dayfile Management Facility.

Bit	16	- DUMP command.
	17	- ARCHIVE command.
	18-25	- Reserved.
	26	- All types allowed.
	27	- Job name allowed.
	28	- Task name allowed.
	29	- Identification Code allowed.
	30	- Event Code allowed.
	31	- Action Code allowed.

Word 4

Bits 0-15 are used by the File Control Facility.

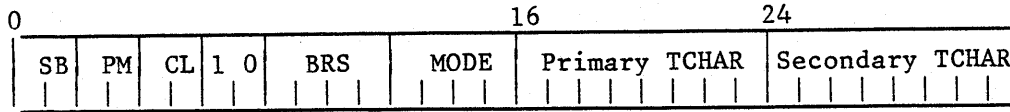
Bit	0	- RELEASE command.
	1-12	- Reserved.
	13	- List allocated files allowed.
	14	- List device utilization allowed.
	15	- List open files allowed.

Bits 16-31 are used by the Operator Control Facility.

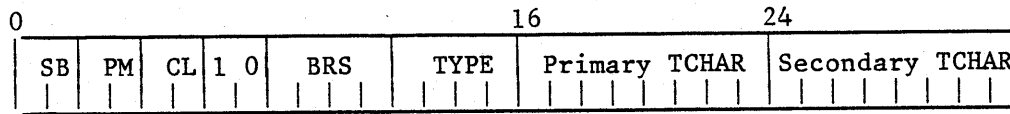
Bit	16	- DISPLAY, LASTPAGE, NEXTPAGE commands.
	17	- UPDATE command.
	18	- ACCEPT, CLEAR, REJECT commands.
	19	- EVICT, PRIORITY, TERM commands.
	20	- GO, IDLE commands.
	21	- SET command.
	22-31	- Reserved.

Figure B-1. Port/User Validation Mask (Sheet 3 of 3)

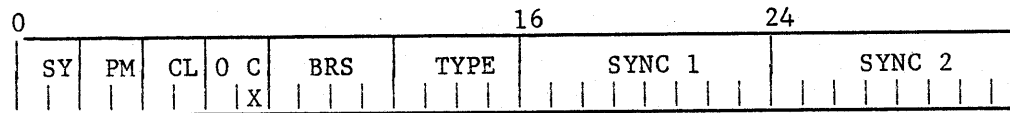
BCLA Port Setup (Asynchronous)



MPCLA Port Setup (Asynchronous)



MPCLA Port Setup (Synchronous)



SB - Stop bits	PM - Parity Mode
00 - invalid	00 - No Parity
01 - One stop bit	01 - Odd Parity
10 - 1.5 Stop bits	10 - No Parity
11 - 2 Stop bits	11 - Even Parity

CL - Character Length	SY - Sync type
00 - 5 bits	00 - One Sync character
10 - 6 bits	01 - Two Sync characters
01 - 7 bits	10 - Reserved
11 - 8 bits	11 - External Sync

CX - clock control

0 - internal clock generator
1 - external clock signal

Figure B-2. Port Setup Word (Sheet 1 of 2)

BRS - Baud Rate Select (CX=0)

	Async	Sync
0000	50 BPS	800 BPS
0001	75	1200
0010	110	1760
0011	134.5	2152
0100	150	2400
0101	300	4800
0110	600	9600
0111	1200	19200
1000	1800	24743.0
1001	2000	31916.8
1010	2400	38400
1011	3600	57825.8
1100	4800	76800
1101	7200	114306
1110	9600	153600
1111	19200	307200

MODE

- XXX0 - Echoplex off (half)
- XXX1 - Echoplex on (full)

TYPE

- 0 - Debug mode
- 1 - Diagnostic mode (transparent)
- 2 - AWN
- 3 - NEDN
- 4 - Mode 4A
- 5 - NMC
- 6 - ID-50
- 7-15 - Reserved

Primary TCHAR - primary termination character
Secondary TCHAR - secondary termination character

SYNC1 & SYNC2 - two possible SYNC characters that are used when SY = 0 or 1.

For AWN PROTOCOL Only:

- SYNC1 FIELD: 01 Selects Receive SYNC pattern 7106
- 02 Selects Receive SYNC pattern 0606
- SYNC2 FIELD: 01 Selects Transmit SYNC pattern 7106
- 02 Selects Transmit SYNC pattern 0606

Figure B-2. Port Setup Word (Sheet 2 of 2)

<u>Error Code</u>	<u>Description</u>
01	Can't open PORT.FILE
02	PICK error on PORT.FILE
03	Can't find Port file
04	DID too long
05	Bad Port # format
06	Bad Port # range
07	Port is still UP
08	Bad Terminal Class format
09	Term Class range or convert
10	Bad Val-Mask format
11	Bad Val-Mask conversion
12	Bad Username format
13	Bad Port Setup format
14	Bad Port Setup conversion
15	Bad Edition Number format
16	Error in CPS params
20	Can't open MPCLA.FILE
21	Reject on CLEAR to smux
22	Reject on ULOC to disk
23	Reject on READ to disk
24	Reject on UST to smux
25	Reject on WRITDS to smux

Figure B-3. Port Setup Error Message Codes

COMMENT SHEET

TITLE: Interactive Terminal Subsystem (ITS)

Version 2.0 Reference Manual

PUBLICATION NUMBER: 17329140

REVISION: A

NAME:

COMPANY:

STREET ADDRESS:

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