COMMUNI-CATIONS REFERENCE MANUAL
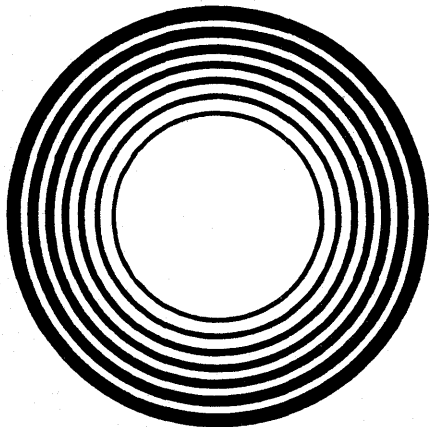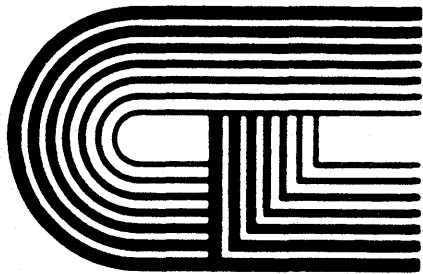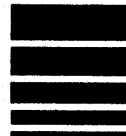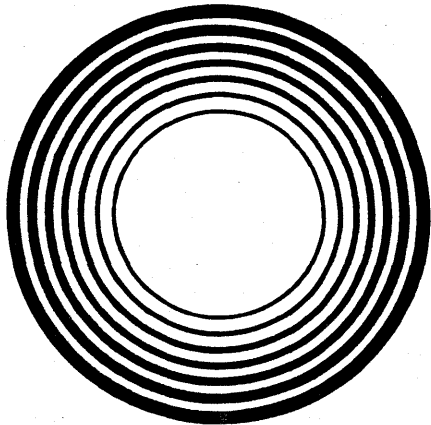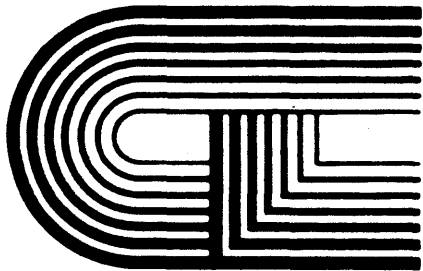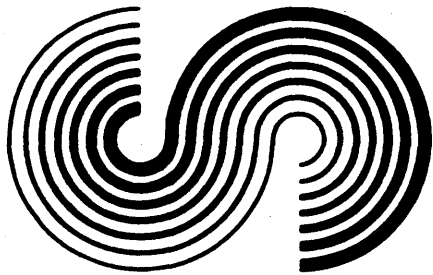
OPERATING SYSTEM SOFTWARE

MAKES MICROS RUN LIKE MINIS

P PHASE ONE
SYSTEMS, INC.

COMMUNI-CATIONS REFERENCE MANUAL

Second Edition

Revised

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Software by: Timothy S. Williams

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PHASE ONE
SYSTEMS, INC.

PREFACE

This manual describes the OASIS communications programs and provides the detailed information necessary to use these programs.

This manual, named COMM , like all OASIS documentation manuals, has the manual name and revision number (if applicable) in the lower, inside corner of each page of the body of the manual. In most chapters of the manual the last primary subject being discussed on a page will be identified in the lower outside corner of the page.

Referenced or Related Material

The following manuals provide information describing other programs that may be required for the use of the communications programs:

OASIS System Reference Manual

OASIS Text Editor Reference Manual

OASIS EXEC Language Reference Manual

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CHAPTER 1

INTRODUCTION

The OASIS operating system includes three programs designed for inter-system communications.

Two of the communications programs are designed to be used to transfer files between two OASIS operating systems. These programs, SEND and RECEIVE, are the logical complements of each other, and have the capability of transmitting and receiving any data or program file that the OASIS operating system supports.

The third communications program, TERMINAL, provides the capability of using the OASIS system and its console as a terminal to another computer system. This program also has the capability of transmitting or receiving sequential format files using the data base of the OASIS system.

CHAPTER 2

RECEIVE COMMAND

The RECEIVE command provides an easy means of receiving files from another OASIS system. The format of the command is:

RECEIVE [<file-name> [<file-type]] <fd> [(COMMn[)]]

Where:

file-name   Indicates the file name to be given to the file received. When this field is omitted the name of the file sent will be used.

file-type   Indicates the file type to be given to the file received. When this field is omitted the type of the file sent will be used.

fd   Indicates the disk to be used to save the file received. This field is required.

COMMn   Indicates the logical device name to be used for the communication link. When this option is not specified the COMM1 device will be used.

Specifying only the receiving disk indicates that the files received are to have the same file name and file type as the source file description. (The SEND command always transmits the file description of the file being sent.)

RECEIVE Examples:

>RECEIVE DATA FILE A
Waiting for Sending Station

Receiving DATA.FILE:A

Segment 1

End of File Received

End of Transmission

>RECEIVE A
Waiting for Sending Station

Receiving TEST.DATA:A

Segment 23

End of File Received

Receiving TEST1.FILE:A

Segment 92

End of File Received

End of Transmission

>

CHAPTER 3

SEND COMMAND

The SEND command provides an easy means of transmitting a file from one OASIS system to another. The format of the command is:

SEND <file-desc> [(<option>...[)]]

Where:

file-desc Indicates the file to be sent. Wildcards are permitted.

SEND Options:

NOEOT   Indicates that the End of Transmission character is not to be transmitted to the receiving system at the end of the file transmission. This option is convenient when several files are to be transmitted because the receiving system will not disconnect at the end of each file.

COMMn   Indicates the logical device name to be used for the communication link. When this option is not specified the COMM1 device will be used.

QUERY   Indicates that the operator is to be queried on a file by file basis for each file that matches the file-desc specified.

NOQUERY   Indicates that the operator is not be asked on a file by file basis.

PUBLIC   Indicates that public files are to be included in the directory search for files matching the file-desc specified.

TALK   This option allows you to send a literal message to the receiving station after the files have been sent. When the receiving station is another OASIS system with the RECEIVE command the literal message will be displayed on that system's console.

    When the SEND program is finished sending files and this option was specified the operator will be prompted with the following instruction: 'Enter TALK messages, terminated by an empty line.' At this time enter as long a message as you like and it will be transmitted to the receiving station.

SEND Examples:

```
>SEND TEST FILE S
Waiting for Receiving Station

Segment 1

End of File

>SEND * BASICOBJ A (TALK

Sending: PROG1.BASICOBJ:A
End of File

Sending: PROG2.BASICOBJ:A
End of File

Sending: PROGX.BASICOBJ:A
End of File

Enter TALK messages, terminated by an empty line.
That is all of the files that I am sending.
Pick up the telephone receiver--I want to tell you about
the changes that have been made.


>
```

The TERMINAL command provides a means of using the system (and its console) as a terminal to another, possibly foreign, system. The format of the command is:

TERMINAL [(<option>...[)]]

Terminal Options:

COMMn   Indicates the logical device name to be used for the communication link. When this option is not specified the COMM1 device will be used.

AUTOLF   Indicates that a LF is to be displayed after receipt and display of a CR. This option may be changed by a menu function.

HALFDUP   Indicates that the host system expects the terminal to be in half duplex mode. This option may be changed by a menu function.

In the default FULL DUPLEX operation every character typed is transmitted to the host system but not displayed. In this mode it is assumed that the host system "echos" back to you each character that it receives.

In the optional HALF DUPLEX operational mode every character typed or sent to the host system will be displayed just as if it had been "echoed" by the host system. This mode is useful when are using the options RDRON, RDROFF, PCHON, or PCHOFF because you can type the character desired and it will be as if the host system had sent it.

RUB nn   Indicates that the host interprets the character, whose value is nn, as the RUBOUT character. The default value for the RUBOUT character is 127.

ESC nn   Indicates that the host system interprets the character, whose value is nn, as the escape character. The default value for the escape character is 27.

CTL   Indicates that all control characters (values less than 32 or greater than 127) are to be displayed in their graphic equivalents. This option may be changed by a menu function.

NULL   Indicates that the TERMINAL program is to ignore all null or filler characters. This option may be changed by a menu function.

PCHON nn   Indicates that the host system uses the character whose value is nn to turn the punch device on. When this character is received from the host system (and a receive file has been defined) the TERMINAL command will "turn on" the punch, i.e., subsequent characters will be written to the receive file.

PCHOFF nn   Indicates that the host system uses the character whose value is nn to turn the punch device off. When this character is received by the TERMINAL command (and a receive file has been defined) the characters previously received since the PCHON character will be physically written to the receive file. Until this character is received the characters are only saved in memory.

It is not necessary to specify a PCHOFF character. When no PCHOFF character is specified the entire file sent by the host will be saved in memory. Upon receipt of an end-of-file mark (character value 26 = CONTROL/Z) the TERMINAL command will write its buffer to the file and close it. For small files this method is the most efficient.

When receiving large files (files too large to be saved in their entirety in memory) the PCHOFF character should be specified. The host system should place this character at the end of each logical record (or group of logical records) and wait a sufficient period of time for the TERMINAL command to write the records to the receive file. This period of time is primarily dependant upon the access speed of the device holding the file.

RDRON nn   Indicates that the host system uses the character whose value is nn to turn the reader device on. When the TERMINAL command receives this character (and a send file has been defined) the file will be sent to the host system.

RDROFF nn   Indicates that the host system uses the character whose value is nn to turn the reader device off. When this character is received by the TERMINAL command (and a send file has been defined and is currently in the

process of being sent) the transmission of the file will be suspended until another RDRON character is received.

BEEHIVE   Indicates that the host system is programmed with the expectation of having a BEEHIVE 100 connected as the terminal device. This option may be changed by a menu function.

ADDS   Indicates that the host system is programmed with the expectation of having an ADDS 580 connected as the terminal device. This option may be changed by a menu function.

ADM3A   Indicates that the host system is programmed with the expectation of having an ADM3A connected as the terminal device. This option may be changed by a menu function.

SOROC   Indicates that the host system is programmed with the expectation of having a SOROC IQ connected as the terminal device. This option may be changed by a menu function.

HAZEL   Indicates that the host system is programmed with the expectation of having a HAZELTINE 1500 connected as the terminal device. This option may be changed by a menu function.

VDM   Indicates that the host system is programmed with the expectation of having a Polymorphic type VDM connected as the terminal device. This option may be changed by a menu function.

The TERMINAL command transmits and receives all data to/from the host system via the logical device named COMM1 (or COMMn when COMMn option specified). If the COMM1 device is not attached when the TERMINAL command is executed an error message is displayed and the command is exited.

The receive and send files mentioned above may be defined external to the TERMINAL command or from within the command by using a menu function. To define the files externally use the ASSIGN command. Channel 1 should be assigned to the send file; channel 2 should be assigned to the receive file.

Only sequential format files are allowed as the send or receive files.

When the TERMINAL command is executed its menu is displayed:

```
          OASIS Terminal Emulator - version n.n

       Modes:  Duplex=F  Autolf=N  Ctl=N  Null=N  Class=0

       Receive file =                    ( ON=    ,OFF=    )
       Send file    =                    ( ON=    ,OFF=    )

          1 - Assign receive file
          2 - Assign send file
          3 - Define translate table
          4 - Change Modes
          5 - Begin Emulation
          6 - Quit (return to OASIS)

       Enter function:
```

TERMINAL Menu Functions

1 Assign receive file. This function allows you to change the file description of the receive file. The PCHON and PCHOFF characters cannot be changed with this function.

2 Assign send file. This function allows you to change the file desciption of the file to be sent. The RDRON and RDROFF characters cannot be changed with this function.

3 Define translate table. This function allows you to define the translation table to be used for translating characters or character sequences received from the communications link.

When this function is entered the screen will be cleared and you will be asked the question 'Enter existing translate file name:'. If you wish to use a previously saved translate file enter its file description at this time.

If you do not wish to use a saved translate file enter a carriage return and the

following message will be displayed: 'Enter input sequence, ESC, C; output sequence, ESC,C. Followed by next input sequence, etc. Indicate no more input sequence s by ESC,C.'. Then you will be asked for the input and output sequence of characters. Enter as many sequences as you need according to the instructions.

When you are finished entering all of the input and output sequences enter an ESC,C when the next input sequence is requested. You will then be asked for the file description to save the translation table as. It is not necessary to save the translation table unless you plan to use it again.

The sequence of defining the input character sequences may be important when one input sequence is identical to part of another input sequence (i.e., the sequence 'AB' is part of another sequence 'ABCDEF'). When this is the case define the larger sequence first.

During terminal emulation (function 5) the translate table is used to provide auto reply capability. When the TERMINAL command recognizes a match between characters received from the communications link and the defined translate table the output sequence is transmitted to the communications link just as if it had been entered from the keyboard at that time.

4 Change modes. When this function is specified the cursor positions to the mode line and allows you to change any of the modes (duplex, autolf, ctl, null, and class). For any function that you do not wish to change enter a space.

The modes only affect how characters are displayed; they have no impact on the transmission or receipt of data (with the exception of the NULL option).

5 Begin emulation. This function invokes the terminal emulation mode of the command. When this function is entered the screen will be cleared and a message will be displayed informing you that the method of exiting from the emulation mode and returning to the menu is the program cancel key.

During emulation mode the TERMINAL command checks the OASIS system and the communications link for input, one character at a time. Where the OASIS system's input comes from and where the communications link's input goes to is determined by the status of the send and receive files defined and the RDRON, RDROFF, PCHON, and PCHOFF options specified.

> System input always goes to the communications link output and to the display if HALFDUP is set on.

> System input comes from the terminal keyboard when any of the following conditions exist: send file not defined; send file defined but at end of file; send file defined and RDRON character defined but reader is off (RDROFF character received).

> System input comes from disk when a send file is defined and not at end of file and any of the following conditions exist: RDRON character not defined; RDRON character defined and reader is on.

> The reader is turned off when no send file is defined or when the RDROFF is defined and received, or when the send file is at end of file.

> Communications link input always goes to the terminal display.

> Communications link input goes to the receive file when it is defined and any of the following conditions exist: PCHON character not defined; PCHON character defined and punch is on.

> The punch is turned off when no receive file is defined or when PCHOFF is defined and received, or when the end of file is received (ASCII SUB character).

6 Quit. This function aborts the TERMINAL command, returning control to OASIS.

SEND/RECEIVE PROTOCOL

The SEND and RECEIVE commands are designed to work together, transferring a file from one OASIS system to another OASIS system. However, this is not always the case -- frequently a user needs to send or receive a file from a foreign operating system. To do this he would have to write his own programs at each end of the communications link or he can merely write the complementary program of the OASIS SEND/RECEIVE program on the foreign system. The following protocol information is provided to assist the user in this task.

1. The SEND/RECEIVE communication is a master/slave relationship with message records transmitted between sender and receiver. The sender is the master of the communications link.

2. The master sends the following four types of message records to the slave:

    (a) ENQ   Haven't received any acknowledge for awhile.
    (b) STX,msg,ETX,lrcc,RUB   Text record.
    (c) EOT   End of transmission--disconnect.
    (d) BEL,msg,EOT   TALK message (see SEND command).

3. The slave sends the following four types of message records to the master:

    (a) NAK   Negative acknowledge - didn't receive properly.
    (b) ENQ   Enquire - haven't received anything for awhile.
    (c) DLE,'0'   Acknowledge 0 - received okay.
    (d) DLE,'1'   Acknowledge 1 - received okay.

    The slave alternates the acknowledge 0 and the acknowledge 1 to give the master an indication of whether the slave is acknowledging the same record as sent (prevents the loss of an odd number of consecutive records).

    If the master receives the wrong acknowledge (i.e., receives DLE,'1' when DLE,'0' expected) the master will send an ENQ record. This will be repeated up to five times and, if the response is still wrong the master will disconnect.

4. Text messages include a Longitudinal Redundancy Check Code (LRCC) which is the eight bit sum of all characters transmitted in the record, including all control characters. The sum is logically ORed with C0H and transmitted at the end of the message as indicated above.

5. Text messages contain, as the first character of the message, a letter indicating the action to be taken by the slave:

    Letter   Type   Action
    ------   ------ ---
      O   OPEN   Message is an OASIS directory entry (32 bytes).
      W   WRITE   Message is a file record.
      C   CLOSE   Message indicates end of file.

6. Messages are sent in transparent mode. This means that the message text may contain embedded control characters. Control characters that are not to be treated as text are always preceded by the DLE character (Device Link Escape -- decimal value 16). (Note: if a DLE character is to be included as part of the text then it is preceded with another DLE. Therefore, the sequence of characters A,B,DLE,SO,C will be sent as A,B,DLE,DLE,SO,C.)

7. Message characters are always transmitted as seven bit ASCII characters. Message characters that, upon receipt, are to have their eighth bit turned on will be surrounded by SI and SO. For example, the sequence of characters 81H,0FEH,8FH,23H will be transmitted as: DLE,SI,01H,7EH,0FH,DLE,SO,23H.

8. Message text may have repetitive character compression. When the master recognizes that the text contains four or more consecutive repititions of a character the characters will be compressed as follows: <character>,VT,<count>. As an example, six consecutive spaces will be transmitted as: SP,DLE,VT,DLE,06H. (The commas are not transmitted, they are only separators for this documentation; the 06H indicates the character whose value is 6 hexadecimal.)

9. Because many systems, including OASIS, perform special action upon receipt of the ESC character (decimal value 27) messages that are to contain the ESC character will convert it to a CAN character. This translation applies to the count of a character compression.

10. The RUB character, when received outside of a framed message, is ignored.

SEND/RECEIVE Example

The following file, named TEST.SEND:A, is sent:

This is record one.
This is the second record.
And, finally, this is the last record.

```
===========================================================================================
SEND:       ENQ
RECEIVE:    DLE,30H
SEND:       DLE,STX,4FH,04H,54H,45H,53H,54H,20H,20H,20H,20H,53H,45H,4EH,44H,20H,
            20H,20H,20H,03H,00H,01H,00H,DLE,SI ,00H,DLE,SO ,00H,26H,00H,43H,DLE,
            SI ,CAN,DLE,SO ,00H,00H,00H,DLE,SI ,00H,DLE,SO ,00H,DLE,ETX,5EH
RECEIVE:    DLE,31H
SEND:       DLE,STX,57H,54H,68H,69H,73H,20H,69H,73H,20H,72H,65H,63H,6FH,72H,64H,
            20H,6FH,6EH,65H,2EH,0DH,54H,68H,69H,73H,20H,69H,73H,20H,74H,68H,65H,
            20H,73H,65H,63H,6FH,6EH,64H,20H,72H,65H,63H,6FH,72H,64H,2EH,0DH,41H,
            6EH,64H,2CH,20H,66H,69H,6EH,61H,6CH,6CH,79H,2CH,20H,74H,68H,69H,73H,
            20H,69H,73H,20H,74H,68H,65H,20H,6CH,61H,73H,74H,20H,72H,65H,63H,6FH,
            72H,64H,2EH,0DH,SUB,DLE,VT ,7EH,DLE,VT ,29H,00H,00H,DLE,ETX,4BH
RECEIVE:    DLE,30H
SEND:       DLE,STX,43H,DLE,ETX,68H
RECEIVE:    DLE,31H
SEND:       DLE,EOT
===========================================================================================
```