BOB KOLK

WANG LABORATORIES, INC.

MEMORANDUM

TO: Distribution
FROM: Fritz Eberle
DATE: June 5, 1975
SUBJECT: Bisync System Reference Manual

Enclosed is a draft of the 2200 Bisync System Reference Manual. Any comments or criticism of it are invited. Being written are appendices detailing the line discipline and throughput characteristics. The major variations of emulated terminal characteristics are being implemented in the following order:

1. EBCDIC 2780
2. EBCDIC 3780
3. ASCII 2780
4. ASCII 3780

with the first expected to be completed in early July and the last about a month later.

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WANG 2200 SYSTEM
IBM-BISYNC TERMINAL EMULATOR PROGRAM
REFERENCE MANUAL
(PRELIMINARY)

1. INTRODUCTION

The IBM-Bisync terminal emulator program enables a 2200/2228 system to transmit and receive data over dial-up or leased communications lines (using IBM Binary Synchronous communication protocol). Specifically it permits a 2200 system emulate the communication functions of an IBM 2780 or 3780 terminal. The system is not, however, an IBM 3270 replacement. The system can transmit and receive data at speeds up to 4800 baud using modems of, for example, the Bell 201 type. System throughput will normally be limited by the speed of the 2200 peripherals rather than the transmission speed. Bisync protocol allows for slow peripherals by delaying transmission of message blocks/acknowledgement handshakes until the data/next-block buffer space is available so that 2200 systems can be configured for Bisync communications using most available peripherals. This manual assumes that cassette is used for input and line printer for output and does not address other configurations.

2200 System Requirements

The BISYNC communication program requires the facilities of a 2200C CPU with option II, 8K bytes of memory, an input device (cassette), an output device (printer), and a 2228 communications controller. An appropriate modem must be connected to the output connector on the 2228 and the communication line. The operator uses function keys on the 2200 keyboard to control the system and receives status information on the 2200 CRT.

Modem Requirements

The modem used by the BISYNC communication system may be rented from the telephone company or purchased from one of several modem vendors. The modems used at both ends of the line must be compatible. The modem connector on the 2228 controller uses the pin connections and voltage levels specified by EIA standard RS-232C. The system requires that the modem provide transmitter and receiver clock signals (EIA designations Transmitter Signal Element Timing and Receiver Signal Element Timing). Modems which may be used include the following:

- Bell 201A for 2000 baud operation over the public telephone network

- Bell 201B for 2400 baud operation over 2 or 4-wire leased lines
- Bell 201C for 2400 baud operation over the public network or 2 or 4-wire leased lines
- Bell 208B for 4800 baud operation over the public network.

Input Data Requirements

Data files to be transmitted should be created according to the Wang Telecommunication File Standard.

(Standard to be defined)

Emulated Terminal Characteristics

Several characteristics of the emulated terminal must be specified by the customer before the BISYNC communication program and 2228 microprogram can be generated by Wang Laboratories. Generation is accomplished by a utility program which modifies a standard version of the system according to answers to the following questions. (Standard options are underlined)

1. What emulated terminal is desired?

   (a) 2780
   (b) 3780

2. Is multirecord feature desired (applicable to 2780 only)

   (a) yes (up to 7 records/block will be transmitted)
   (b) no (1-2 records/block will be transmitted)

3. What combination of transparency feature and transmission code set is desired?

   (a) EBCDIC code set with transparency
   (b) ASCII code set with transparency
   (c) ASCII code set without transparency

4. What type of line control is desired?

(a) point-to-point contention with primary terminal priority (Terminal is master)
(b) point-to-point contention with secondary terminal priority (Terminal is slave)
(c) centralized multipoint - NOT CURRENTLY AVAILABLE

5. Is the extended retry feature desired because of noisy lines or an overloaded slow response computer?

(a) no (3 retransmissions)
(b) yes (up to 15 retransmissions)

6. On what type of data-link will the system be used?

(a) the public dial network
(b) a 2-wire dedicated line
(c) a 4-wire dedicated line

II. OPERATING PROCEDURES

The BISYNC communication system is designed to be simple to operate. This chapter describes the procedures for operating a cassette/printer system. Other system configurations will require some modification of these procedures.

Loading the System

The system resides on a tape cassette as a program file followed by a data file. The data file is the 2228 microcode and is loaded into the 2228 automatically by the 2200. The following steps are required to load the system.

1. Key RESET
   CLEAR (EXEC)
   1 LOAD (EXEC)
   RUN (EXEC)

2. When the message 'REMOVE PROGRAM TAPE' appears, remove the program tape from the drive.

Establishing a Connection (Applicable to dial network use only)

If the message 'ESTABLISH MODEM CONNECTION' appears, the modem must be placed in the Data mode following either (a) dialing a remote computer or terminal or (b) receiving a call on the modem from an operator of a remote terminal. When the message 'CONNECTION ESTABLISHED' appears the system is on the air.

Transmitting a File

The following steps are required to transmit a file:

1. Insert input tape in cassette drive and rewind cassette.

2. If transparency is installed and transparent transmission is desired set transparent mode using special function key 3. Transparent mode will be indicated on the CRT screen.

3. If compressed transmission is desired (applicable to 3780 only) set compress mode using special function key 4. Compress mode will be indicated on the CRT screen. Compressed transmission and transparent transmission are mutually exclusive.

4. Initiate transmission by keying special function key 2. The system will transmit the cassette file and display the message 'TRANSMISSION COMPLETE' when finished. Transmission of a file may be delayed in order to receive a transmission on systems with secondary terminal priority, but will be resumed automatically when reception is complete.

Receiving a File

In order to receive a file the printer must be powered on, enabled, and contain paper. Printing of any received data will proceed automatically when the remote computer/terminal initiates transmission. The system will display the message 'RECEPTION COMPLETE' when finished.

III. TRANSMISSION MONITORING FACILITIES

The BISYNC communications system provides status information which facilitates installation and problem diagnosis. These facilities are optional.

Modem Signal Display

The values of the following modem signals (EIA designations) are displayed on the CRT:

- Received Line Signal Detector (CAR)
- Data Set Ready (DSR)
- Clear to Send (CTS)
- Received Data (RCD)
- Request to Send (RTS)
- Data Terminal Ready (DTR)

Current Message Transmission/Reception Status Display

The current cumulative total of the following information about the message being/having been transmitted/received is displayed on the CRT:

- number of records transmitted/received

Also in non-transparent mode the first 64 bytes of the record most recently transmitted/received is displayed on the CRT. In transparent mode the display is in hexadecimal format.

IV. PROGRAM STRUCTURE

The BISYNC communication program is structured into five sections with the most critical sections having the lowest statement numbers and, therefore, the fastest execution speed.

1. Main Section (lowest statement numbers) performs all I/O with the 2228 (except loading the microcode), input data formatting, output data formatting, and frequently required interaction with the operator via the keyboard and CRT.

2. Output Subroutine processes a record of output data. Processing consists of outputting the record to the printer and deletion of any device selection codes.

3. Input Subroutine obtains a record of data from the input device. It reads a block of data from the cassette if necessary and obtains the next logical record.

4. Attention Subroutine performs any device-dependent operator-initiated functions. This routine may clear the CRT screen and redefine the function keys. Examples of functions performed by this subroutine are manual printer carriage control and opening disk files.

5. Initialization Subroutine performs all system initialization including loading the 2228 microcode from the program tape cassette. This routine must be modified for disk systems.

Input Data Formatting

After a record is obtained from the input file and before it is output to the 2228 for transmission it is formatted in the following way:

1. Records longer than 80 bytes are truncated to 80 byte card image size. Transparent mode records are padded with blanks to equal exactly 80 bytes.

2. The EM character is concatenated to the end of a non-transparent record which is shorter than 80 bytes.

3. Code translation is performed if in non-transparent mode. Code translation replaces the data-link control characters ETB, ETX, ITB, DLE, NAK, EOT, ENQ, and SYN by blanks. STX and SOH are not replaced.

4. If compressed transmission is selected, space compression is performed on the record by replacing strings of 2 or more (up to 63) consecutive spaces by the sequence (GS, n) where n is a space count character defining the number of spaces removed. The character n is an offset binary number equal to 64 plus the number of spaces replaced and ranges from hex (42) to hex (7F).

Output Data Formatting

After a non-transparent record is input from the 2228 and before it is processed by the output subroutine it is formatted in the following way:

1. Space decompression is performed on non-transparent records, if applicable, by replacing the sequence (GS, n) by n-64 blanks. Legal values of n range from '42' to '7F'.

2. Code translation is performed with ASCII being the target code.

3. Trailing blanks are deleted.

4. If the last byte of the record is an EM character it is deleted.

5. All ESC sequences are decoded and processed.

   (a) Device selection sequences are deleted.

   (b) Horizontal format control records which define tab settings are processed to update the current horizontal format variables. These records are not passed to the output subroutine. A horizontal format record begins with the sequence ESC, HT. The remainder of the record contains blanks or HT codes, with the HT codes defining columns of tab stops.

   (c) IBM 2780 and 3780 terminals use printers which have 12 columns of vertical carriage control. The printers used by the Wang 2200 have 2. Therefore ESC sequences which define the function 'skip to channel N' are translated to VT codes for N=0 and to FF codes for N=1 to 12. The vertical format ESC sequences are different in the EBCDIC and ASCII versions.

   (d) Vertical line spacing control sequences which specify single, double, or triple spacing are deleted from the record and the current vertical format record updated.

6. HT codes are replaced by strings of blanks according to the current stored horizontal format. HT codes for which the stored horizontal format does not define replacement are not replaced.

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TECHNICAL SERVICE BULLETIN
SECTION: HardWare Technical

NUMBER: HWT 5105 REPLACES: _____ DATE: 05/14/85 PAGE 1 OF 3

MATRIX ID. 7301 PRODUCT/RELEASE# 2228D/E/F TC Controllers

TITLE: 2200 Data Communication Controller Options

PURPOSE:

To publish to the Field an up-to-date listing of Model 2228D data communications controllers available, what each controller can be used for and the part numbers.

EXPLANATION:

There has been some confusion about the uses of the Model 2228D and Option 28D Data Communications Controllers used in the 2200 systems. The model numbers for the controllers are in themselves confusing, in that previously released hardware and software documents may refer to the 2228E and the 2228F:

The 2228E refers to the 2228D-4E
2228D-4A
2228D-4X and

The 2228F refers to the 2228D-8E
2228D-8A
2228D-8X

The following is a chart of Model numbers, Modem interfaces (M.B.), Ram size (D.B.), type of support and part numbers.

Model Numbers LVP-VP-MVP	Model Numbers SVP	Interface M.B.	Ram Size D.B.	Type of Support
2228D-4E	OP28D-4E	RS232/366	64K	ICS, 2780/3780 RWN, ASYNC
2228D-4X	OP28D-4X	X.21	64K	International
2228D-4A	OP28D-4A	RS449/366	64K	Special order only
2228D-8E	OP28D-8E	RS232/366	128K	SNA, 3274, RWN

GROUP: Telecommunications Networking Support Group MAIL STOP: 0115A

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TECHNICAL SERVICE BULLETIN
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NUMBER: HWT 5105 REPLACES: _____ DATE: 05/14/85

MATRIX ID. 7301 PRODUCT/RELEASE# 2228D/E/F TC Controllers

TITLE: 2200 Data Communication Controller Options

EXPLANATION (cont'):

Model Numbers LVP-VP-MVP	Model Numbers SVP	Interface M.B.	Ram Size D.B.	Type of Support
2228D-8X	OP28D-8X	X.21	128K	International
2228D-8A	OP28D-8A	RS449/366	128K	Special order only
2228D-4	OP28D-4	RS232	64K	IBM 3271 BSC Only. No RWN, 2780 or 3780

PART NUMBERS

Model Numbers	Controller	Mother Board	Daughter Board
2228D-4E	212-2228DE *	210-7858-A	210-7659-3C
2228D-4X	212-2228DG	210-7859-A	210-7659-3C
2228D-4A	212-2228DF	210-7857-A	210-7659-3C
2228D-8E	212-2228DH *	210-7858-A	210-7855-A
2228D-8X	212-2228DK	210-7859-A	210-7855-A
2228D-8A	212-2228DJ	210-7857-A	210-7855-A
OP28D-4E	212-2228DE *	210-7858-A =232/ACU SVP Ext.	210-7659-3C
OP28D-4X	212-2228DG	210-7859-A =X.21 SVP Ext.	210-7659-3C
OP28D-4A	212-2228DF	210-7857-A =449/ACU SVP Ext.	210-7659-3C
OP28D-8E	212-2228DH *	210-7858-A =232/ACU SVP Ext.	210-7855-A
OP28D-8X	212-2228DK	210-7859-A =X.21 SVP Ext.	210-7855-A
OP28D-8A	212-2228DJ	210-7857-A =449/ACU SVP Ext.	210-7855-A

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NUMBER: HWT 5105 REPLACES: _____ DATE: 05/14/85 PAGE 3 OF 3

MATRIX ID. 7301 PRODUCT/RELEASE# 2228D/E/F TC Controllers

TITLE: 2200 Data Communication Controller Options

EXPLANATION (cont'):

PART NUMBERS (cont')

Model Numbers	Controller	Mother Board	Daughter Board
2228D-4	212-2228DI *	210-7658-A	210-7659-3A

NOTE: 210-7658-A is the old mother board
210-7858-A is the new mother board

The old mother board cannot be used with the 128K daughter board.

M.B. = Mother Board
D.B. = Daughter Board

* Are the only boards in stock. Use the 212-xxxxxx number when ordering any of these boards.

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