Wang 3320 Data Cassette Drive

(There was no page 1 among the originals,
and the numbering of the pages other than two
is uncertain.)

The last two pages, "62" and "63", are from another manual,
and describe the higher level cassette data block format
used by the 3300 software.

AO Ready

A1 Error

A2 End of Tape

A3 File Protect On

A4 End of Block

A5 Read Mode

A6 Write Mode

A7 Beginning of Tape

The significance of bits AO and Al depends upon whether the input or output address is used with the TIAJ command.

Status Bit	Meaning	How Set
AO (input address)	0 = Ready	Set to 0 by assembly of a byte in the Input Buffer
	1 = Not Ready	Reset to 1 by an RDDJ, FORWARD SPACE, or HALT commands. Also set to 1 by End of Block.
AO (output address)	**If Writing:**	
	0 = Ready	Set to 0 by emptying of an Output Buffer.
	1 = Not Ready	Reset to 1 by a WRDJ command. Also reset to 1 by the CLEAR button.
	If performing a function:	
	0 = Ready	Set to 0 by completion of the functions HALT, REWIND, FAST FORWARD, FORWARD SPACE, BACKSPACE, WRITE GAP, and START READ or START WRITE
	1 = Not Ready	Set to 1 by any CIO (Control) command.

Status Bit	Meaning	How Set
A1 (input address)	1 = Input Error 0 = No Error	Set to 1 by a RDDJ command while not ready. Set to 0 by any CIO command or the CLEAR button.
A1 (output address)	1 = Output Error 0 = No Error	Set to 1 by a WRDJ command while not ready. Set to 0 by any CIO command or the CLEAR button.
A2	1 = EOT – End of Tape 0 = Not EOT	Set to 1 by signal from a photo cell as tape approaches the End of Tape leader. Set to 0 by the absence of the same signal.
A3	1 = FPN – File Protect Switch on 0 = Not on	Set to 1 by CIO – Rewind and File Protect command or by a mechanically protected cassette. Set to 0 by File Protect switch on front panel only.
A4	1 = EOB – End of Block 0 = Not EOB	Set to 1 by a predetermined number of bit times without a flux reversal in either READ, FORWARD SPACE, or BACKSPACE modes. Set to 0 by any subsequent Control Command.

3320 STATUS BITS

Status Bit	Meaning	How Set
A5	1 = Read Mode on	Set to 1 by completion of the CIO – START READ command.
	0 = Read Mode off	Set to 0 by the HALT and FORWARD SPACE commands and by EOB
A6	1 = Write Mode on	Set to 1 by completion of the CIO – START WRITE command.
	0 = Write Mode off	Set to 0 by a Write Buffer empty signal which occurs after the last data bit has been written.
A7	1 = BOT, Beginning of Tape	Set to 1 by a signal from a photocell as the tape approaches the Beginning of Tape leader.
	0 = Not BOT	Set to 0 by the absence of the same signal.

Command	Function	Status Bits	Description
CIO A = 40 Z = Input or Output Address	Rewind	Sets bit AO (output address) to 1 for not ready. Resets bit AO to 0 following completion of the Rewind. Turns on BOT.	Command sets the tape in high speed motion in the reverse direction. Beginning-of-tape is sensed by a photocell. Sensing BOT automatically generates the HALT command. If in Interrupt mode, completion of the automatic HALT command generates an output interrupt.
CIO A = 60 Z = Input or Output Address	Rewind & Set File Protect	Same as Rewind, but additionally sets FFN, File Protect on.	Command does the same as rewind but additionally sets the File Protect flip-flop. The FF can be reset only by a switch on the 3320 front panel.
CIO A = 20 Z = Input or Output Address	Fast Forward	Sets bit AO (output address) to 1 for not ready., Resets AO to 0 following completion of the command. Turns on EOT.	Command sets the tape in high speed motion in the forward direction. End-of-tape is sensed by a photocell. Sensing EOT automatically generates the HALT command. If in Interrupt mode, completion of the automatic HALT command generates an output interrupt.

3320 CONTROL COMMANDS

Command	Function	Status Bits	Description
CIO A = 80 Z = Input Address	Start Read	Sets bit A0(output address) to 1 for not ready. Resets bit A0 to 0· after 30 milliseconds and simultaneously turns on the Read FF	Command normally given with a gap positioned under the Read/Write head. The command sets the motor and head controls to the Forward Read Mode and provides a start-up period before the Read circuitry is activated.
CIO A = 80 Z = Output Address	Start Write	Sets bit A0 (output address) to 1 for not ready. Resets bit A0 to 0 after 50 milliseconds and simultaneously sets the Write FF.	Command normally given with the Write head in a gap with the tape either moving or rot. Provides a start-up period before the Write circuitry is activated. During this period the erase circuitry will be on.
CIO A = 00 Z — Input or Output Address	Halt	Sets bit A0 (output address) to 1 for not ready. Resets bit A0 to 0 after 40 milliseconds	Command given whenever the program wishes to stop the tape. If in Interrupt mode, the 3320 generates an Output Interrupt upon command completion.

3320 CONTROL COMMANDS

Command	Function	Status Bits	Description

CIO A = AO
 	
    Z = Input
        or
        Output
        Address
	Write Gap	Sets bit AO (output address) to 1 for not ready.
		
		Resets bit AO to 0 after 40 milli-seconds.
			Command sets Write circuitry into Erase Mode and writes a gap for 40 milliseconds. At the end of this time the write circuit remains in Erase mode with the tape still in motion.
			
			If in Interrupt mode, an output interrupt is generated at the completion of the command.

CIO A = CO
 	
    Z = Input
        or
        Output
        Address
	Forward Space	Sets bit AO (output address) to 1 for not ready.
		
		EOB coming on resets AO to 0 to signal completion of the command.
			Command sets the tape in motion in the forward direction. When EOB comes on to signal that the next gap has been reached, the tape remains in motion.
			
			If in Interrupt mode, EOB generates an Input Interrupt.

CIO A = EO
 	
    Z = Input
        or
        Output
        Address
	Backspace	Same as Forward Space.	Same as Forward Space except tape remains in motion in the reverse direction at command completion.

INPUT REQUIREMENTS FOR TCEDIT

The format of the physical record block for object programs which can be read by the IOCS (Input Output Cassette System) package in TCEDIT is as follows:

1. The physical block is fixed at 256 bytes, defined by the statement

    BLOCK   DC   X'0100'   256 BYTES

2. Control information occurs at the front of each physical block.

    a. byte #1   Tape file data BOF/EOF as follows
        X'AA';X'AB' = beginning of record
        X'F0' X'F1'   beginning of file
        X'OE' X'OF'   end of file
        X'FE' X'FF'   self contained file (i.e., file contained within a single physical block)

    b. byte #2   Check sum byte

    c. byte #3,4   Record length (meaningful text)

    d. byte #5   00

    e. byte #6   File number

    f. byte #7,8   Record number (within file)

    g. byte #9,N   Record text characters

In reading a tape file, a check of byte #1 permits IOCS to process the data according to the following rules:

Byte #1 = [X'F0', X'F1']* Beginning of File record.

    a. File number must be 1 greater than prior record.
    b. Record number must be equal to 0001.
    c. Text contains text information of initial data in file.

Byte #1 = [X'AA', X'AB']* Beginning of Record.

    a. File number must be identical to prior record.
    b. Record number must be 1 greater than prior record.
    c. Text contains text information.

Byte #1 = [X'OE', X'OF']*   End of File record.

   a.   File number must be identical to prior record.
   b.   Record number must be 1 greater than prior
        record.
   c.   Text contains text information of last data in
        file.

Byte #1 = [X'FE', X'FF']*   Beginning/End of File record.

   a.   File number must be 1 greater than prior record.
   b.   Record number must be 0001.
   c.   Text data for file totally within current record.

* 1st byte in brackets is byte number one in the first
        record of the redundant record pair.

    2nd byte in brackets is byte number one in the second
        record of the redundant record pair.

3.   The IOCS package provides for redundant recording of
     each physical block on the cassette tape. To further
     insure the integrity of all data output to tape, the
     IOCS package performs the following functions:

   a.   Check sum control of all data contained within
        each physical block.
   b.   Verification of the start of record byte.
   c.   Verification of file number and record number
        according to the rules established for each
        start of record byte.

4.   The contents of the record text area (bytes 9 - N) are
     not of direct concern to the IOCS package except for
     the number of text bytes and check sum verification.

5.   Text material within each physical record contains one
     or more complete logical records. A logical record is
     a number of text bytes followed by a carriage return
     character.