

PRELIMINARY
INTERFACE SUMMARY
MODEL 1100 MINI-DEK
(With NRZI Formatting Electronics)

1. INTRODUCTION

The Digi-Data MINI-DEK line of digital magnetic tape recorders can provide IBM compatible tape handling for all data processing systems.

The optional formatting electronics described here provide for the generation of IBM compatible inter-record gaps and check characters as well as buffering and error detection in read operations. The formatter handles all details of driving the tape transport, thereby simplifying the user's interfacing task. The tape generated is in IBM compatible NRZI 9 track format at 800 BPI. Data transfer rate is 10,000 chars/sec. (1 char. = 8 bits)

2. ELECTRICAL INTERFACE

All recorder interface lines are DTL/TTL compatible zero volt true signals. All outputs are open collector gates which must be terminated with resistors at the associated receivers. All inputs are designed to be driven from open collector gates and terminating resistors are included on the interface connector. If these resistors are removed each input presents a maximum of two DTL unit loads. Figure 1 illustrates the interface circuit recommended when the interface cable exceeds one foot.

Table 1 lists all interface signals and their pin numbers on the interface connector. Cabling to the recorder should be composed of #22 or #24 wire twisted pairs. All grounds leads should be terminated as close as possible to the associated line drivers or receiver.

3. LOGIC LEVELS

DTL/TTL Compatible Low True

TRUE: 0 to 1.0 volt

FALSE: 2.5 to 5.5 volt

4. INPUT SIGNAL DEFINITIONS

FORWARD

A transition to true commands forward motion of the tape.

When in the WRITE MODE a transition to false initiates generation of end-of-record check characters and delays necessary to produce an inter-record gap (IRG). The transition to false must occur after the trailing edge of the last desired write clock and prior to the leading edge of the first unused write clock.

In the read mode the transition to false serves to arm the stop circuitry. The FORWARD command is normally set false when the end of record output goes true. If FORWARD is set false during a record the tape will continue to the gap before stopping.

To read successive records without stopping, the FORWARD command is left true as long as desired.

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REVERSE

A transition to true causes tape to move in the reverse direction.

This command is blocked if the beginning of tape (BOT) marker is sensed. Transport halt is under the control of internal circuitry which causes the tape to stop in the first IRG detected after the REVERSE command goes false.

The REVERSE command should be utilized only for backspacing. Errors will probably occur if reading in reverse is attempted.

WRITE MODE

This line must be true at all times during write operations.

The transition to true may occur prior to or simultaneously with the FORWARD command.

The recorder will not write while off line, rewinding or if no write ring is installed.

REWIND	Any pulse on this input places the recorder in the rewind to load point mode. A REWIND command will be ignored if the tape is already at the load point.
OFF LINE	Any pulse on this line will disconnect the recorder from remote control and extinguish the ON LINE indicator on the recorder control panel. The machine will remain OFF LINE until the operator pushes the ON LINE button.
END OF FILE	A TRUE PULSE on this input causes an END OF FILE mark to be written on the tape.
WRITE DATA	A True Level spanning the write clock causes a "one" to be recorded on the tape. Data should be present prior to the write clock leading edge and remain stable until the trailing edge.
SKIP WRITE	A true level or pulse at the leading edge of a forward command causes the transport to erase 3-1/2 inches of tape prior to writing and is useful for skipping over defective areas of the tape.
WRITE CLOCK INHIBIT	A true level prevents the write circuitry from receiving write clocks. This input permits extensive erasing or may be employed to suppress the first clock in certain computer interfacing schemes.
READ DATA DISABLE	A true level sets all 8 "Read Data" lines and the "Read True Parity" line to a false condition. This allows data to be suppressed at any time during a read or read after write operation.
EXTERNAL WRITE CLOCK	This line is provided for computer interface schemes where it is desired to supply free running write clocks externally. Write oscillator frequency must be $10\text{KHZ} \pm 1\%$.

5. OUTPUT SIGNAL DEFINITIONS

READY	A true level means tape is loaded on machine and at rest. No motion command should be initiated unless READY is true.
ON LINE	A true level indicates that the operator has placed the recorder under remote control.
LOAD POINT	A true level indicates that the tape is positioned at the BEGINNING OF TAPE (BOT) marker.
END OF TAPE	This output will be true while the end of tape marker is being sensed. This signal may be noisy if the transport stops at the edge of the marker.
REWIND STATUS	A true level while the selected transport is in the rewind to load point mode.
READ CLOCK	<p>A true pulse nominal width of 2.0 usec. indicating that a character has been read and is available. The data is de-skewed and buffered and remains available until the leading edge of the next read clock.</p> <p>The read clocks corresponding to the end of record check characters are normally suppressed. This feature may be defeated by changing a jumper wire.</p> <p>One read clock will occur when reading an END OF FILE.</p>
READ DATA	(8 lines) Level representing the latest character read.
READ TRUE PARITY	Odd parity computed from the "Read Data" lines.

END OF RECORD	A true pulse (nominal width 500 usec.) which occurs after all end of record check characters have been sensed. The <u>transition</u> to true should be employed to drop the forward or reverse command when reading.
EOF DETECT	A true pulse (nominal width 500 usec.) prior to the end of record transition indicates that an END OF FILE mark has been read.
PARITY ERROR	A true level coincident with the bad character indicates that parity read was incorrect.
WRITE CLOCK	<p>True pulses appear when transport is up to speed and ready to write. An input data character (8 bits) should be present at the leading edge and remain stable until trailing edge of its corresponding clock pulse. The WRITE CLOCK pulses stop when the forward command goes false.</p> <p>The WRITE CLOCK frequency is 10KHz. with a nominal width of 2 microseconds.</p>
FILE PROTECTED	A true level indicates that no write ring has been installed on the reel. The transport will not write. (Optional feature)

6. TIMING DIAGRAMS

Figure 2 illustrates typical waveforms and timing for a write operation. All signals are shown as low true just as they appear on the interface connector. The sequence of events while writing a record begins with the application of a FORWARD command and WRITE MODE command to the recorder. The tape is brought up to speed in 30 msec. A further delay of 4 msec. for dual gap heads and 16 msec. for single gap heads is required for IBM compatibility. Following the appropriate delay the recorder generates write clocks and records the WRITE DATA inputs during each WRITE CLOCK pulse. The data must be present at the recorder inputs prior to and during each WRITE CLOCK pulse.

Timing Diagrams - continued

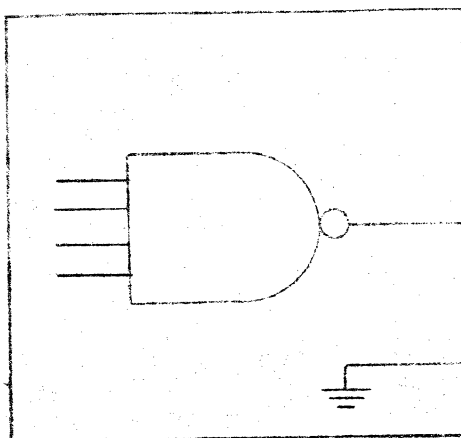
After the last data character has been recorded the FORWARD command should be set false. The tape continues in motion while the CRCC and LRCC error detection characters are recorded. Machines with the dual gap read after write feature continue in motion waiting for the read circuitry to detect the end of record. When this occurs (or after a single gap machine writes the LRCC) an additional 6 msec. of motion occurs to insure that old information on the tape is erased so it cannot be inadvertently treated as part of the new record.

The tape is then decelerated and the READY output goes true when the tape is at rest.

Figure 3 illustrates a typical read operation. The FORWARD command goes true with WRITE MODE false to initiate the sequence. When the recorder detects data the READ CLOCK output produces a 2 microseconds pulse for each character. At the end of the data the READ CLOCK stops appearing. The END OF RECORD output goes true after internal circuitry has read the CRCC and LRCC characters and moved the tape into the inter-record gap. The FORWARD command should be set false within 1.0 milliseconds after the END OF RECORD signal goes true to stop the tape in the gap. The READY output goes true when the tape has stopped.

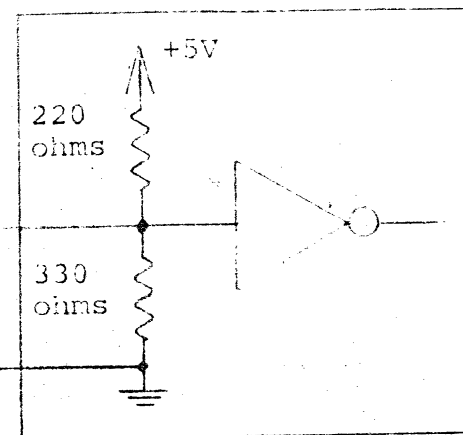
If the FORWARD command is set false prior to the end of the record the READ CLOCK and READ DATA outputs will go false and all data transfer will cease. The tape will continue on to the gap before stopping.

LINE TRANSMITTER



DTL 944 or equivalent
(open collector, 25 ma.
sink capability.)

LINE RECEIVER



DTL 936 or 946 or equivalent

Figure 1. Transport/Controller Interface Circuit.

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WRITE OPERATION TIMING DIAGRAM

WRITE MODE

FORWARD

GO FORWARD *

TAPE VELOCITY

WRITE CLOCK

WRITE DATA

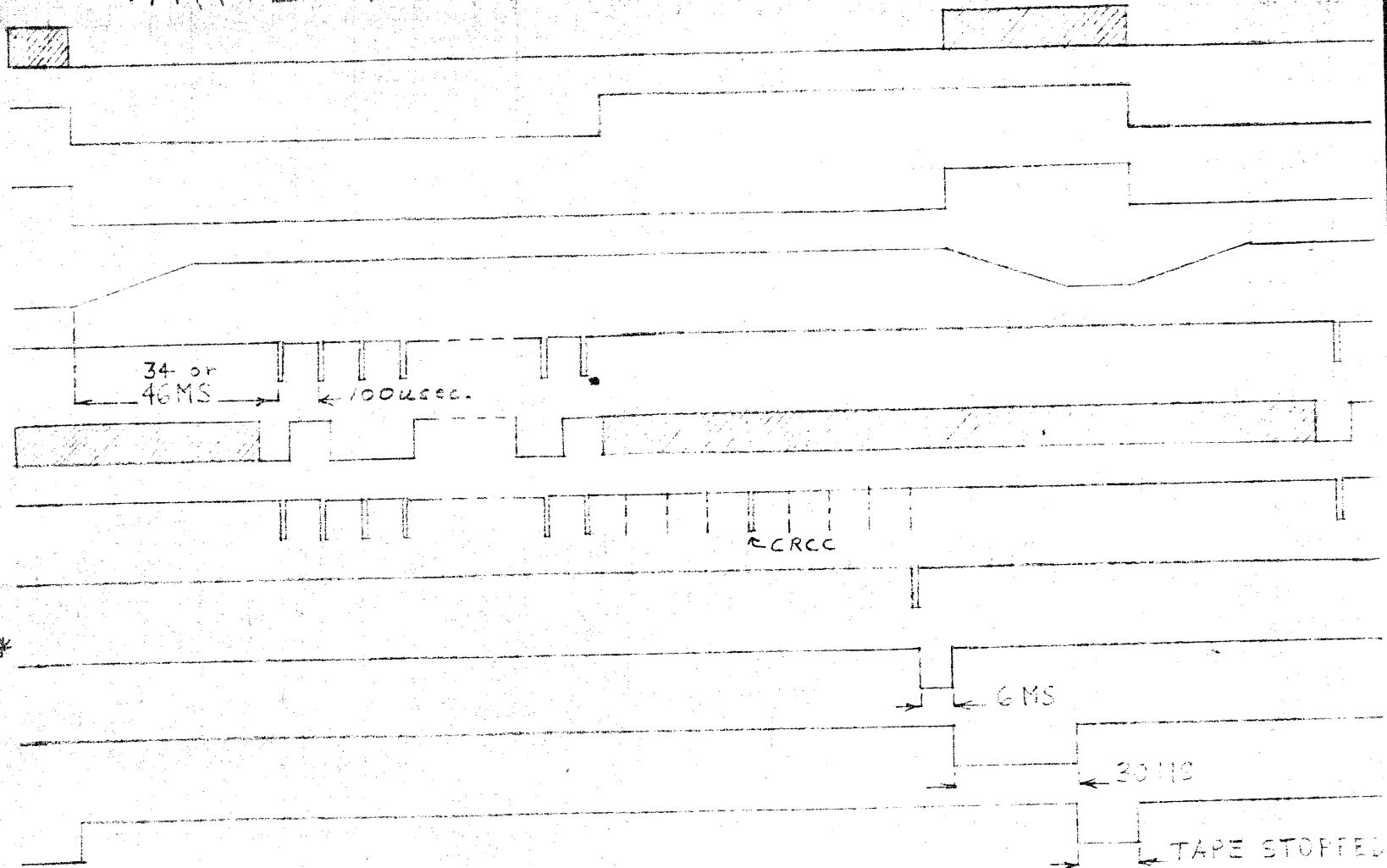
WRITE CLOCK *

WRITE LRCC *

CONTINUE MOVING*

RESET *

READY



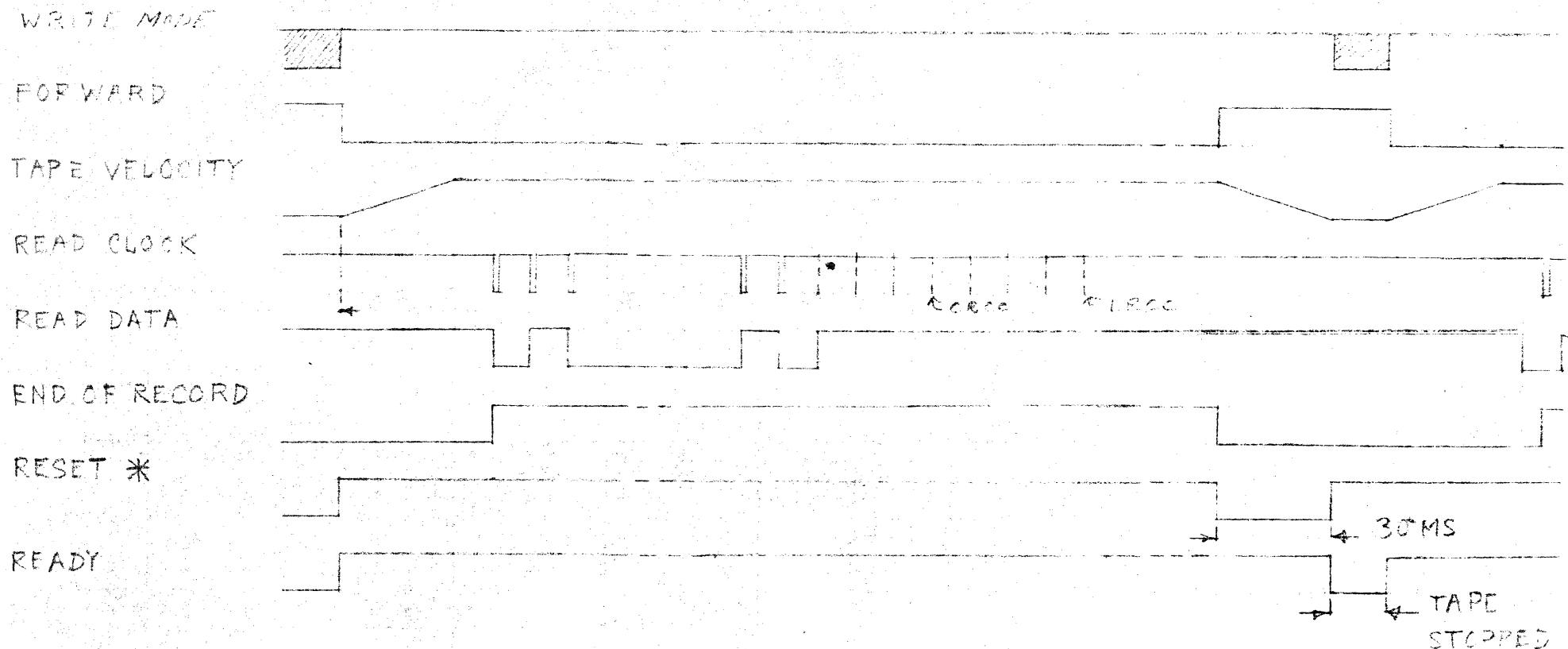
NOTES: SHADED AREAS REPRESENT 'DONT CARE' INTERVALS WHERE LINES MAY BE TRUE OR FALSE.

ASTERISKS (*) DENOTE INTERNALLY GENERATED TIMING SIGNALS, ALL OTHERS ARE INTERFACE INPUTS OR OUTPUTS.

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READ OPERATION TIMING DIAGRAM



NOTES: ASTERISKS (*) DENOTE INTERNALLY GENERATED TIMING SIGNALS WHICH DO NOT APPEAR AT INTERFACE INPUTS OR OUTPUTS

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