ECE 18-316
INTRO TO DATA STORAGE
FALL 98
INSTRUCTION SHEET: LAB # 2: Tape Platform Introduction

Due Friday, 9/11/98

In Class or To Jie Zou Before Start of Lab Section (1:30 PM)
Late submissions will not get credit

Purpose:

The purpose of this lab is to familiarize students with the tape recording platform that will be used in three of the classes six labs. Additionally, students will become qualitatively familiar with how variations in input signal reflect themselves in variations in output signal.

In Class:

1) Organize yourselves into groups of three (at most) students and find a lab bench for your group to work at. Please stick to the same bench and the same lab group all semester.

2) Wire up the tape recorder and the control device as shown in section 2.3 of the Operating Instruction Summary (OIS) sheet for the tape platform. Presently, the control device has no labels on it switches or buttons, but it will in the future. For now refer to the diagrams in 2.3 and the step by step hook-up instructions to determine how to wire up the control box.

3) Set the function generator to the following settings:

shape	square
freq:	200 Hz
amp:	500 mV (0-p)
offset:	0 V
output termination:	High Z

(note: you must recheck all settings after changing the output termination)

4) Following section 2.4 of the OIS sheet, record a simple signal for 30 counter clicks using the above settings. Work from the beginning of the tape.

5) Following section 2.5 of the OIS sheet, examine the readback signal on the scope. It should appear as a series of isolated alternating positive and negative peaks.

6) Capture the waveform from 5 into a file, for later processing by Matlab, as in lab 1.

7) Repeat the above steps for the following cases, but only using 10 counter clicks per recording conditions:
(note: termination setting should always stay at high Z; offset should always remain 0V)

Number	shape	freq	amp	counter at start	f.g. output termination	# periods shown
		Hz	V (0-p)	V	Ohms	-
1 (done)	square	200	0.5	0	High Z	4
2	square	100	0.5	30	High Z	2
3	square	400	0.5	40	High Z	8
4	square	2000	0.5	50	High Z	40
5	square	200	1.0	60	High Z	4
6	square	200	0.25	70	High Z	4
7	square	400	0.05	80	High Z	4

8) Follow the procedure for recording an input variant signal listed in section 2.6, using the example listed in 2.6.5 of the OIS sheet. Make up a worksheet like the one shown in the example, for all ten cases, which includes a column for readback amplitude. Follow the instructions for reading back an input variant signal in 2.7 to fill in the table, making sure to capture each file.

Write-up: (Each student should submit his or her own write-up)

1) Plot the data in 1-4 on a single page, each on its own axis, in order of increasing frequency, from top to bottom. Make sure that all of the graphs have the same vertical and horizontal scale. Label the axes, and make sure that words and letters do not overlap.

2) Find PW_{50} of the waveform from 1 in μs. PW_{50} is defined as the full width of the pulse at half of its amplitude. Label it by hand on one of the pulses in the graph.

3) Make a plot of readback amplitude versus linear density, in flux changes per mm (fcmm) by converting frequency into density using the tape speed (v = 2.5 cm/s). There is one flux change corresponding to each pulse meaning that there are two corresponding to each cycle of the write current. Answer the following questions about the graph.

a) How does the amplitude vary with increasing frequency for 1 thru 3: increasing or decreasing?

b) Does this trend persist for #4?

c) Describe any differences in shape you observe between the waveforms in 1-3 and the waveform in 4.

4) Plot the data in 1, 5, 6 and 7 on a single page, each on its own axis in order of increasing write voltage, from top to bottom. Make sure that all of the graphs are on the same vertical and horizontal scale. Label the axes, and make sure that words and letters do not overlap.

5) Make a plot of amplitude versus record current (0-p) in μA by converting write voltage into write current using a head resistance of 500 Ohms. Answer the following questions:

a) How does amplitude depend on increasing write current:
increasing or decreasing?

b) Would you say the relationship is linear?

6) Make a plot of all of the waveforms captured in 8, on one page. They should all be on one axis, each offset by a constant amount in the vertical direction such that none of the graphs overlap. Adding constants to waveforms can be accomplished by using the following concept, plus using the hold command.

```
[x,y] = hpread(…
yprime = y + constant
plot(x,yprime)
```

Label the axes, and each graph with an identifying piece of text, using the text command.

7) Attach a table containing the information you generated in 8.