Vance - Here's over latest effort at an idiot's guide - a cross between my old one + Marianne's new one. Note that instructions for leaving sorcerer's apprentice mode are missing - a gross oversight. Laura

Instructions for running BASIC on the CAL Time-Sharing System -- May, 1971

Find a free teletype. Communication with the CAL Time-Sharing System is carried out via teletype. There are twelve teletypes available for student use between the hours of 2 and 6 p.m., Monday through Friday. These teletypes are located, four in each room, in

~~125 T-7 (phone 2-9105)~~ all gone *

223 Campbell Hall

225 Campbell Hall (phone 2-5008)

Someone who can answer questions about CAL TSS should be in either T-7 or Campbell Hall every afternoon from 2-6. If you are in the room without the supervisor, use the telephone to get advice. We will try using these teletypes on a first come first served basis in the hope that the usage will be fairly evenly distributed over the four hours daily. If this is shown to be a poor system, a sign-up sheet for 15 minute intervals will be circulated.

Setting the switches. When you've found a free teletype you'll have to set a few switches properly. There are two kinds of teletypes around, 33's and 35's. A 33 is smaller and is yellow and brown, while a 35 is gray. The on-off switch on each teletypes is located near your right hand; make it point to LINE (LOCAL makes your teletype behave like a typewriter that doesn't transmit anything). The 35's usually have a button on your left hand which controls the paper tape gizmo. Make it point at K and forget about paper tape. If your teletype has a little toggle switch which points to either A or B, make it point to B - TSS always runs on the B machine.

Typing commands. You should think of your communication with TSS as a series of commens, typed by you, which cause things to be done and evoke various responses, typed on your teletype by TSS. Each command is typed as a bunch of non-blank characters followed by a carriage return (the button marked RETURN) on the right side of the keyboard. TSS does not really start to act on your command until you type the carriage return, so you can correct mistakes as you go along any time before you press the return button.

Vance - Thanks. Note further corrections marked with *

If you mistype a character you can correct it (immediately after it was typed) by typing CONTROL-Q (i.e. by holding down the button marked CTRL while typing Q). A left-arrow will be typed on your teletype; then you may type the character you intended in the first place. Typing two CONTROL-Q's will xxxxxx erase the last two characters, etc. If the line you're typing is so botched up that you want to start over, type CONTROL-Y. The teletype will print an up-arrow and perform a carriage return. There are many other fancy tricks one can play with the line editor, the program which watches over all the lines you type in. (If you want more information, ask for the Line Editor Document. Also see Figure 1 at the end of this handout.)

Establishing contact. The maneuver about to be described calls for dexterity (sinistro-dexterity, actually). With your left hand hold down the buttons marked CTRL and SHIFT while you strikye a P with your right. The teletype should spring to life and print

```
CAL TSS  VERSION 1.1
NAME YOUR PERMANENT DIRECTORY
```

If it prints, instead,

```
PANIC IN LOGONO
NAME YOUR PERMANENT DIRECTORY
```

or something similar that means that your teletype was kkx being used by another student before you appeared. If neither of the above messages appears, there are two likely possibilities:

1) TSS is down. (If there is someone beside you happily typing away at TSS you know this can't be the case.)
2) Your teletype is out of order. Go back and check to see that all the buttons are set correctly. Try the foregoing procedure on another teletype, if one is free, and if it works you know the first one is sick.

In either of the above cases, bring the problem to the attention of the T.A. (He probably won't be able to do anything, but you'll feel better having someone to talk to.)

If, however, TSS has written you a message indicating that it wants the name of your permanent directory, you should proceed to log on by holding the following conversation:

TSS: CAL TSS VERSION 1.1
NAME YOUR PERMANENT DIRECTORY
.

YOU: GUEST (on the same line following the period supplied by TSS)

TSS: GIVE PASS WORD
.

YOU: GUEST (again immediately following the period)

TSS: ENTER TENTATIVE NAME FOR TEMPORARY DIRECTORY
.

YOU: any 7 or fewer alphanumeric characters which you feel will uniquely identify you (again immediately following the period)

TSS: COMMAND PROCESSOR HERE
! (the ! indicates the presence of the command processor which allows you to call several different systems - here we will be concerned with BASIC only)

YOU: BASIC (on the same line directly following the !)

TSS: BASIC HERE
: (the : indicates that BASIC is waiting for a command from you)

YOU: I (directly following the colon, to indicate that you wish to insert some BASIC statements into a (currently empty) file)

Talking to BASIC . You can now proceed to enter statements of you BASIC program, such as

```
10      LET  X = 2
```

or

```
20      READ  A,B,C
```

ending each statement with a carriage return. (If you make typing errors in entering a statement, you can back up one character with a CONTROL-Q or remove the entire line with a CONTROL-Y as explained earlier.) BASIC is watching over each line as it is entered and will object to any line it can't understand or that has the same line number as a line already entered. If it writes you an error message, type the line in again with the error corrected.

When entering the END statement, terminate the line with 2 carriage returns instead of the usual one. This signals that you are through inserting statements into your program, at least for the moment. This dobble carriage return will cause a colon to appear at the left margin; this prompting character is BASIC's way of letting you know that it's waiting for an instruction from you.

Executing your BASIC program. If you now wish to execute your program, type RUN on the same line as the colon; results from the PRINT statements in your program will appear followed by the message

EXECUTION COMPLETE

if all has gone well, or some sort of error message like

ERROR IN LINE 35 EXPONENT OR ARGUMENT OF EXP TOO BIG

if it hasn't.

Editing commands. If your program stops executing because of an error or terminates successfully but gives the wrong answers, you will want to fix it and run it again. Even if it runs properly you may want to change the data or some of theprinting formats. Changes to the program may be made by using the editing commands which are built into BASIC. The editing commands allow you to do many things besides just inserting lines in your file as described earlier. They allow you to move through the file looking for things, and to changes lines or delete them entirely if you prefer. The line at which the editor is positioned is called the current line. The current line may be changed by three commands: T, M, and B. T (for top) causes the editor to position itself at the top of the file. Thus to insert something at the beginning of a file one types

T;I

(since successive commands to the editor may be separated by semicolons).

The Move command. The M (for Move) command has five different forms. M by itself or M1 means move one line forward (down) in the file. M7 means move seven lines forward. M.string where string is any sequence of characters, means move forward in the file until a line containing that string as a subpart is reached. M/string means move forward in the file until a line begining with that string is reached (ignoring leading blanks). If the last line in the file is reached before the particular stopping condition is met the editor continues at the first line of the file (i.e. it "wraps around"). If the condition is never met the message *NOT FOUND is printed and no movement occurs. Finally, M$ means move to the last line in the file.

These five command forms occur in several of the commands described below so let us use the abbreviation sc to stand for the stop condition and say that a move command takes the form

Msc

where sc may be nothing, a number, .string, /string, or $.

The Back command. Typing

B3

moves the editor back three lines in the file. B all by itself means B1. A number is the only stop condition allowed ~~xxxxxxxxxxx~~ with the Back command.

The Print command. A command of the form

Psc

prints lines until the stop condition sc is met or the end of the file is reached. Specifically, P or P1 prints one line, the current one, but does not change the current line. Thus

P;M;P

is equivalent to

P2

The last line printed is the current one. To print the whole file type

T;P$

If the end of the file is reached before the stop condition is satisfied, the message *BOTTOM is printed and the editor stays there (note that this is different from the Move command).

The Delete command. A command of the form

Dsc

deletes the current line together with all the lines after it up through the one satisfying the stop condition. Specifically,

D4

deletes four lines and

D/~~1000~~ LOOP 1000 thanks, but the change should be made in the other direction — this is BASIC you know 1000

deletes from the current line through a line beginning with ~~LOOP~~. The lines you have deleted are replaced with a funny kind of line which prints as *DELETED. This line disappears as soon as the next file movement occurs.

If you want to replace a line, type

D;I

then type the replacing line(s). Don't forget to leave insert mode by typing an extra carriage return after the last line to be inserted.

The change command. If you wish to change part of a line, rather than deleting it entirely and replacing it with another one, use the Change command. This command has the form

C/string1/string2/sc

where string1 is the sequence of characters to be changed, and string2 is its replacement. Only the first instance of string1 in a li ne is changed. If the stop condition is omitted, the changing is done to the current line only (this is the most common case). Otherwise the first instance of string1 in each lines is changed to string2 until the line satisfying the stop condition is encountered. For example, the command

C/1/2/4

asks that the first instance of 1 be changed to 2 in the next four lines, starting with the current one.

If all instances are to be replaced, rather than just the first in each line, then the Change Global command

CG/1/2/4

may be used. The strings represented by string1 and string2 may be of any length or may be null.

(Note that the editor can be used as a separate xxxx subsystem as indicated by Appendix A. Whether used independently or as part of BASIC it has the same characteristics.)

Terminating your editing. If you think your program is now patched up so it will run all right you can type RUN and it will start executing. If you're through with the program for the moment but would like to try it again later during the same day type F,fname where fname is the name (seven characters or less) you'd like to give your file. Later when you have BASIC's attention again you can type

R,fname

when prompted by a colon and the program named fname will start executing. If what you've been doing looks like a total disaster, type

Q

(for quit) and your file will all disappear. Both the F and Q commands leave you in the hands of the command processor after they are executed, so an exclamation mark will appear in the left margin.

Going home. If you're all done for the day type LOGOUT and all your work (except what's printed on the teletype paper) will disappear. Please tear off the paper to dispose of as you see fit, but leave enough showing to indicate what state the teletype is in (i.e. leave the LOGOUT message and the system's response GOOD DAY to be seen by the next user).

Sample encounter with TSS.

```
CAL TSS VERSION 1.1
NAME YOUR PERMANENT DIRECTORY
.GUEST
GIVE PASS WORD
.GUEST
ENTER TENTATIVE NAME FOR TEMPORARY DIRECTORY
.JUNK
COMMAND PROCESSOR HERE
!BASIC
BASIC HERE
:I
5       REM  ANSWER TO PROBLEM 2 OF THE MIDTERM
10      READ N
20      PRINT N
30      PRINT
40      PRINT
50      READ X
60      IF X < N THEN 50
70      IF X >= N * 2 THEN 50
80      PRINT X
90      GO TO 50
100     DATA 10,10,11,19,20
110     END
:RUN
10
10
11
```

Sample complete BASIC run on CAL TSS

```
CAL TSS VERSION 1.1
NAME YOUR PERMANENT DIRECTORY
.GGUEST
BAD SYNTAX
NAME YOUR PERMANENT DIRECTORY
.GUEST
GIVE PASS WORD
.GUEST
ENTER TENTATIVE NAME FOR TEMPORARY DIRECTORY
.JUNK1
COMMAND PROCESSOR HERE
!BAASIC
UNEXPECTED FRETURN DURING COMMAND PROCESSOR, B7 = 010201
!BASIC
BASIC HERE
:I
5     REM PROBLEM 2 FROM MIDTERM
6     REM PRINT ALL NUMBERS > = N BUT < 2 * N
10    READ N
20    PRINT N
30    PRINT
40    PRINT
50    READ X
60    IF X < N THR-IN 50        (change mistyped R to an E)
70    IF X >= N * 2 THEN 50
80    PRINT X
90    GO TO 50
100   DATA 10,10,11,50,100,99,19,20
:RUN
ERROR END MISSING
:M/100;P          (move to appropriate position in file and print the line)
100   DATA 10,10,11,50,100,99,19,20
:I
120   END
:RUN
10

10
11
19
ERROR IN LINE 50 OUT OF DATA
:F,PROB2
COMMAND PROCESSOR HERE
!
```

Figure 1. 33/35 Teletype Keyboard and Control Characters

TTY in unknown state:

APPENDIX A - How to return to the COMMAND PROCESSOR

In order to call subsystems, the user must be in the COMMAND PROCESSOR, which is the "ground state" of the process watching his teletype. If he forgets what he is doing, or inherits a teletype in some unknown state, the table below explains how to tell what subsystem is in control and how to get back to the COMMAND PROCESSOR. Procedure:

1. If there is a prompt character printed by the teletype, check which subsystem uses that character.
2. If not, enter a null line and observe the response:
   a. If there is a response, the user should be able to identify the subsystem from the table.
   b. If there is no response, he should not try to use that teletype without getting expert advice; it may be blown up or it may be involved in a remote function such as printing.
3. Having identified the active subsystem, the user may dismiss it or proceed.

SUBSYSTEM	PROMPT	RESPONSES TO INCOMPREHENSIBLE INPUT OR ERRONEOUS INPUT	HOW TO DISMISS IT (Commands are underlined below)
COMMAND PROCESSOR	!	BAD SYNTAX or UNEXPECTED F-RETURN DURING COMMAND... + possible other lines or UNEXPECTED ERROR IN COMMAND PROCESS... + possible other lines or ERROR OCCURRED ON CALL TO COMMDS + other lines	when finished, LOGOUT when not finished, you may call any available subsystem;
SERVICES	&	same as COMMAND PROCESSOR, except the message says SERVICES	FIN
READ GHOST (Debugger)	@	same as COMMAND PROCESSOR, except the message says READ GHOST	to return to COMMAND PROCESSOR, PURGE to return to subsystem which made error originally, RETURN or RETRY
EDITOR	:	????	F or Q (see EDITOR document)
BASIC	:	???? or miscellaneous diagnostics relevant to erroneous BASIC statements	same as EDITOR
SCOPE	>	?SCOPE	FIN