First make a backup of the JEM disk.
  If you are unsure how to make a copy read the section in your
DOS manual under the copy command.JEM must have a CGA or a EGA to
work a color monitor is not necessary a mono (one color) monitor
is ok with a CGA EGA.

 To use this tutorial print this file out to the printer or go
back to DOS and type in "copy tutor.prn prn" hit enter.You will
need a copy of this in front of you to use this tutorial.
 This tutorial assumes that you know some DOS commands , if you do
not you will need your DOS manual. This tutorial will teach you
how to use JEM step by step.So start on the first page and go
through it slowly if you have a problem go back a page.After you
get the hang of the commands JEM is very is easy to program in.

 First JEM is a LOGO like computer language or a Graphics
language. You can write computer programs in the JEM language that
will create geometric shapes by ordering the Turtle around the
screen. The following tutorial will teach the basic commands of
JEM. The commands must be enter exactly as in this tutorial if the
screen does not look like the tutorial says it should reenter the
commands.
 IMPORTANT TYPE IN THE COMMANDS EXACTLY IF A LETTER IS IN
 CAPITALS OR IF IT IS SMALLCAPS LOOK CLOSE AT THE COMMAND.

 Put the JEM disk in Drive A , type "jem" the screen should blank
and a small pyramid shape should appear in the center of the
screen. The small pyramid shape is called the Turtle. The display
should also be switched To the 40 character per line mode. The
bottom line of the screen will look like the line below.

        ?-   !

 This is the command line all JEM commands are entered here.
 Type in help the screen will now be in 80 character per line
mode. The screen will have two columns the column on the left is
the list of the commands "built into JEM" . The column to the
right is a brief description of the command on the left,the last
line reads "Press any Key for more Help".
 Press the space bar five (5)times. You have the Turtle in the
center of the screen and the bottom line should look like the line
below if the not press the space bar until the line appears.

        ?-   !

        This line is called the command line.

Moving the Turtle forward and back.

   To start to order the turtle around the screen type in forw [10]
then hit enter the turtle will move ahead ten (10) spaces. And
will leave a line behind it. Type in **back** [20] then hit enter the
turtle will back up twenty (20) spaces. Try moving the turtle
forward 15 spaces type in **forw** [15] hit enter
 The turtle should move ahead fifteen spaces. Try moving the turtle
back 12 spaces type in **back** [12] then hit enter.
 Try moving the turtle yourself when you feel confident in moving
the turtle go on to next section.

Clearing the Screen

   To clear the screen type in **cs** hit enter. The screen should be
clear now.

Turning the Turtle

   To turn the turtle type in **turn** [180] hit enter the turtle should
be facing the command line. Type in **turn** [360]   hit enter the
turtle should be facing the top of the screen. The turtle may
turned in any direction between 0 and 360 using this command.

                            0

                  270   T   90

                        180
  Think of the top of the screen being 0 degrees and the bottom of
the screen being 180 degrees. Or think of a compass ,the
turn [angle] command will turn the turtle around like the pointer
of a compass.

Hiding and Showing the Turtle

The Turtle may be hidden (made to disappear) type in **hide** hit enter. The turtle should be gone type in **show** hit enter the turtle should be back. Try this commands a few times.

Drawing Lines and Centering the Turtle

You can turn the line drawing by turtle on or off. Type in the command **upen** hit enter. Now type in the command **back [25]** hit enter. The turtle will have backed up 25 spaces and there will be no line drawn. Type in **dpen** hit enter , type in **forw [25]** hit enter. The turtle will have moved forward 25 spaces and drawn a line. Type in **upen forw [30]** hit enter the turtle should be 30 spaces forward and there should be no line drawn.
To put the turtle back in the center of the screen type **gh** hit enter. The turtle should be in the center of the screen.

Switching Line Colors

You can switch the color of the lines first clear the screen by using the clear screen command. Type in **cs** hit enter.
Type in **forw [5] Clr [3] forw [5]** hit enter. You should have one line in two different colors. Type in **Clr [2] forw [5]** hit enter. The number of pen colors are 4 per palette (between 0 and 3). Try using the Clr command.

Switching Palettes

To switch palettes type in **1** hit enter you now have the first palette of colors. Type in **2** hit enter you now have the second palette of colors.

Turning Command line on or off

You can turn the command line on or off to turn the line off type in **Off** hit enter. To turn the command line on type in **Line** hit enter.

Switching to 80 or 40 Characters per line mode

You can switch from 40 characters per line mode to the 80 character per line mode. Type in **Hi** hit enter you are now in the 80 character per line mode. Type in **med** hit enter you are now in the 40 character per line mode.

Exiting JEM
    Type in **end** hit enter the screen will clear and the dos prompt
    will appear.
    To go on with this Tutorial -
    At the DOS prompt Type in **jem** hit enter
    You will now be back in the the JEM program.
    If the user has created a command JEM will ask if you wish to
    save the file before returning to DOS.
    (Note see loading and saving files).
    **The next commands are more complex make sure you understand
    everything up to this point.**

Drawing a Box
    Using the commands shown so far you may now order the Turtle to
    do some complex commands. Like drawing a box first clear the
    screen use the **cs** command.
    Type in **cs** hit enter.
    Type in **forw [20] turn [90] forw [20]** hit enter.
    Type in **turn [180] forw [20]** hit enter.
    Type in **turn [270] forw [20]** hit enter.
    Now to hide the Turtle
    Type in **hide** hit enter.
    You will now have a box drawn on the screen.
    Now clear the screen and show the Turtle
    Type in **cs show** hit enter

Right and Left Turns
    You can turn the turtle right of its current position by using
    the right turn command.
     Type in **rtrn [10]** hit enter
    (The turtle should be ten degrees right of where it started)
     Type in **ltrn [10]** hit enter
    (The turtle should be 1ten degrees left of where it started)
    The **rtrn [angle]** and the **ltrn [angle]** will turn the turtle from
    the current position.

To draw a box using the **rtrn** command
    First Clear the screen
    Type in **cs** hit enter
    Type in **forw [20] rtrn [90]** hit enter.
    Type in **forw [20] rtrn [90]** hit enter.
    Type in **forw [20] rtrn [90]** hit enter.
    Type in **forw [20] rtrn [90]** hit enter.
    Type in **hide** hit enter.

Using the again Command
    You can use the again command to make the computer do the hard
    work. To use the again command first clear the screen using the
    cs command and show the turtle.
    Type in **cs show** hit enter.
    Type in **agn [4] forw [20] rtrn [90]** hit enter
    You now have a box on the screen.

Using the Faster command

If speed of the drawing seems slow there is a way to speed the
Turtle up using the F command. First clear the screen.
Type in cs hit enter
Type in F agn [4] forw [20] rtrn [90] hit enter.
This is the fast mode for the Turtle.

Using the Pause Command

If you wish to have the Turtle stop and wait you may use the the
pse command. The pse (pause) command will stop the turtle and wait
for a key to be pressed before going on the next command. To use
the pse command first clear the screen -
Type in cs hit enter
Type in forw [30] pse rtrn [90] forw [20] hit enter
The turtle will go forward 30 spaces and wait now hit any key on
the key board. The turtle will now turn and go forward 20 spaces
and stop.

Switching the Background color

To switch the background color use the B command.
Type in B [3] hit enter
Type in B [0] hit enter
There are 0 to 15 background colors that you can use with a CGA.
To reset to the default settings
Type in cs hit enter

The Repeat Command

The Repeat command will repeat all the commands following it. The
repeat command has to control keys they are the p key and the s
key. When the repeat command is running hitting the p key will
pause the turtle hitting any key but the s key will continue the
Repeat command. If you hit the s key the turtle will stop. to use
the repeat command-
 Type in Rept rtrn [93] forw [11] hit enter
 To pause the repeat command hit the the p key.
 (Note do not hit the enter key)
 To continue the repeat hit the spacebar.
 (Note do not hit the enter key)
 To stop the repeat -
 Hit the p key then hit the s key.
 (Note do not hit the enter key).
 Type in cs hit enter

To Enter Text on the screen

To enter text on the screen use the T command. To use the text
command-
 Type in T [2] Hello There , hit enter
 The number in the brackets is the line number to write the text.
The message you wish displayed on the screen must end with a
comma.

Creating your own programs or commands

     JEM allows you to create your own commands using the commands you
have be shown. To create your own commands
 Type in **expl** hit enter
 Type in **tell** hit enter
 Type in **Rightbox= F agn [4] forw [30] rtrn [90] ;** hit enter
 The screen will now be back with the turtle and the command line.
 Type in **Rightbox** hit enter.
 The turtle will have drawn the box.

Listing your own commands

     Jem allows you to list your commands that you have created by
using the the **show** command. To list your commands -
 Type in **expl** hit enter
 Type in **show** hit enter
 Type in **all** hit enter
 Jem will now list all the commands or words in memory.

Forgetting a command you have created

     Jem allows you to forget or get rid of commands that you do not
want or simple do not work as planned. To use the **forget** command-
 Type in **expl** hit enter
 Type in **forget** hit enter
 Type in **Rightbox** hit enter
 Hit enter
 Hit enter
 The command Rightbox is now gone.

Loading Files

    To load a file use the G command to use the the get file command-
    Type in G hit enter
    You will now be asked for the file name -
    Type in jem.dat hit enter
    (Note if JEM.DAT has been removed from your disk you will get a
     error comment)
    Type in expl hit enter
    Type in show hit enter
    Type in all hit enter
    Hit the enter key until you get the command line back.
    When the Turtle and the command line return -
    Type in window hit enter
    You now have a window on the screen.
    List the commands again and try some of the words listed in
    jem.dat

Saving Files

    If you use the expl command during a session when you enter the
    end command Jem will ask you if you wish to save the word file if
    you answer yes you will be asked for the name you wish to give the
    file. Or you may use the the Save command to use the the save
    command.
     Type in S hit enter
     You then be asked to give a file name
     Type in Myfile.dat hit enter

Chaining Files

     JEM allows you chain files and commands to use this command you
    must know the file name and the first command you wish to execute
    in that file.
     Type in Do "jem.dat window" hit enter
     Jem will load the file jem.dat and execute the command window.
     The Do command can be used to load files also to use as file
    loader only see page 9.

Auto Run JEM

    Jem allows you to create an auto run file or an auto load file to
    use the auto feature. You must use the file name jem.run rename or
    create a file with this name. To use the the auto run feature the
    word or command startup must be in the jem.run file. The command
    startup can be defined as what ever you wish.(See page 9)

Variables

Jem allows two variables they are **var1** and **var2**. To set the value in the variables -
Type in **s** [var1=1] hit enter
Type in **s** [var2=5] hit enter

To add to the current value of the variables

Type in **s** [var1+2] hit enter
(this will add 2 to the current value of **var1**)
Type in **s** [var2+3] hit enter
(this will add 3 to the current value of **var2**)

To subtract to the current value of the variables

Type in **s** [var1-2] hit enter
(this will subtract 2 from the current value of **var1**)
Type in **s** [var2-3] hit enter
(this will subtract 3 from the current value of **var2**)

To use a variable -

Type in **forw** [var1] **turn** [var2] hit enter

Screen wrap ON or OFF

The screen normally wraps around that is to say that the turtle if it goes off the top of the screen it will appear at the bottom of the screen. You can turn the the wrap off if you wish that means the turtle will not appear at the bottom of the screen if the turtle runs off the top of the screen. The command to turn the wrap off is **nwrp** to turn the wrap on the command is **wrap.**

To print out JEM's display turn the command line off,turn your printer on, hit the print screen key.

JEM is language similar to the computer language FORTH , user words or commands may defided using the pre-defined commands and/or user defined commands to create more commands. Load the file JEM.DAT to see examples of user created commands.

Chaining of files the user can chain any number of files to each other. The Auto run feature must have the JEM.RUN in the same directory as JEM.COM and the word **startup** must be used in the file JEM.RUN to start the auto run feature. To see how the auto feature works rename the file JEM2.DAT as JEM.RUN the load JEM. There is a small demonstration command in that file.

User defined commands can be repeated in the same data file **but** JEM will use the first definition only. The same word can be defined in a different file as a different command. User defined commands **must be longer than five (5)** characters in length for JEM to use them.

When using the **ag** (again) command care must used not to nest the the again command. Example of a nested command is **ag** [5] **forw** [10] **ag** [4] **forw** [10] **rtrn** [3].

To use the **Do** command to load files **only** simply do not give the command a word to execute. Example of a file load using the the **Do** commmand.

Type in **Do jem.dat** hit enter
Jem will load the file and return to the command line.
Also a user defined command can call itself if you do this JEM will go in to endless loop. You can try Ctrl c to stop JEM but you may need to shut the system off to end the loop.

Look at the JEM.DOC for addition information see next page for command abbreviations.

Jem basic commands can be shorten to one character to save time and space when the user creates their own commands here is a list of the shorten commands.

Function	Command	Short Command
Moving the turtle forward	forw [spaces]	f [spaces]
Moving the turtle backwards	back [spaces]	b [spaces]
Clear screen	cs	c
Turn to a compass point	turn [angle]	t [angle]
Hide the turtle from view	hide	h
Show the turtle	show	s
Turtle pen up	upen	u
Turtle pen down	dpen	d
Switch line colors	Clr [number]	C [number]
Switch to Palette 1	1	1
Switch to Palette 2	2	2
Command line on	Line	L
Command line off	Off	O
40 Chars per line(default)	med	m
80 Chars per line	Hi	H
Exiting JEM	end	end
Right turns	rtrn [angle]	r [angle]
Left turns	ltrn [angle]	l [angle]
Again x times	agn [times]	a [times]
Faster command	Fast	F
Pause wait foe keypress	pse	p
Seting Background Color	Back [number]	B [number]
Repeat Command	Rept	R
Put text on screen	T [line] here ,	T [line] here,
Get a data file	G	G
Get a data file	Do filename	D filename
Save a data file	Save	S
Get file Do a command	Do file command	D file command
Screen wrap on	wrap	w
Screen wrap off	nwrp	n
Variable # 1	var1	var1
Variable # 2	var2	var2
Explain to Turtle	explain	exp

The following page will let you try some user defined commands in the data file JEM.DAT to see how the commands work.

 You can get a print out of the file JEM.DAT to look at by going to DOS put the JEM disk in the disk drive. At the DOS prompt-

         Type in   copy jem.dat prn hit enter

          After the printer is done load the JEM program at the DOS prompt -

         Type in   jem hit enter

This page has a number of commands in the JEM.DAT file the user can try and look at. First load the data file jem.dat-

         Type in   D jem.dat   hit enter
         Type in   R shapes   hit enter

 Jem will draw a number of shapes on the screen

         Type in   cs R shapes2   hit enter

 Jem will draw some more shapes on the screen

   To see the difference in drawing speed using the Repeat command
 try this
         Type in   cs shapes2   hit enter

  When the turtle is finshed try the same word using the Faster command.
         Type in   cs F shapes2   hit enter

  There is a noticeable difference in drawing speed.
  You can use the turtle to draw letters also try

         Type in cs F startwrite   hit enter
 Now you can try some of the other words in the JEM.DAT file. Try creating some words try

         Type in   expl   hit enter
         Type in   tell   hit enter
         Type in   myword1= cs F startwrite ; hit enter

Get back to the command line and the turtle on the screen then -

         Type in   myword1 hit enter

Try creating your own words on your own now.

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