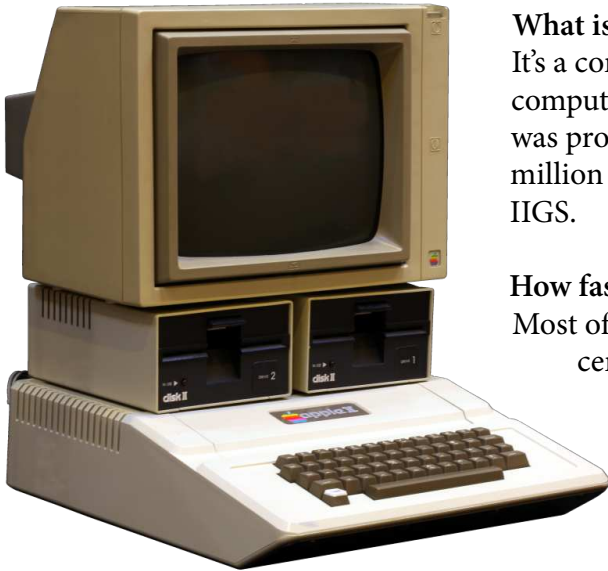


apple II computer



What is it?

It's a computer! The Apple II was the first commercially-successful computer made by Apple. It was designed by Steve "Woz" Wozniak and was produced from 1977 until late 1993 - almost 17 years! About 5–6 million Apple II's were sold, including the Apple II, II Plus, //e, //c, and IIGS.

How fast is it?

Most of the Apple II computers used an 8-bit "6502" or "65C02" central-processing chip which ran at 1 MHz (or 1 million instructions per second). This is about 1000 times slower than today's computers.

How much memory did it have?

Most of these computers came with 64 kilobytes (65536 bytes) of memory. That's about 100,000 times less memory than a modern computer!

Where's the mouse?

A mouse didn't become available for the Apple II until 1984.

What about hard drive storage?

Nope! These computers originally came with cassette tapes to store programs. Later, they came with disk drives that used 5.25" floppy disks. The disks could only store about 140,000 bytes of data. It would take about 7 million floppy disks to equal the storage of a hard drive in a modern laptop!



How much did these computers cost?

The original Apple II cost around \$2000 (equal to about \$6000 today).

Are they worth anything today?

Some of the early Apple II computers can be worth a lot, but usually, you can pick up an Apple //e or //c on eBay for around \$100. Sometimes you can get them for free on craigslist!

Are people still using the Apple II?

Yes! There are a lot of "retro computing" hobbyists who use their Apple II's to play games, hook up to modern computers, hook up to a Raspberry Pi, and lots of other cool projects. People are even writing new books about the Apple II!

How do I find out more?

Apple II History: <http://apple2history.org>

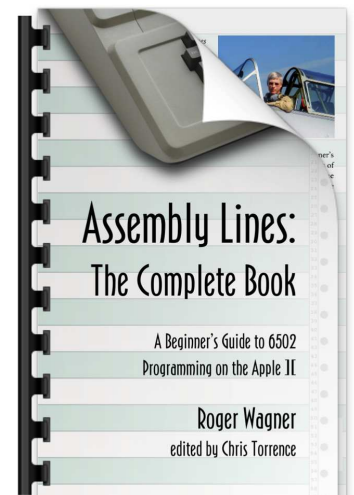
Open Apple Podcast: <http://www.open-apple.net>

Annual Apple II Convention: <http://www.kansasfest.org>

Emulator for Windows : <https://github.com/AppleWin/AppleWin>

Emulator for Mac: <http://www.virtualii.com>

Play games online: https://archive.org/details/apple_ii_library_4am



applesoft basic

From the Applesoft BASIC prompt, type in the following program:

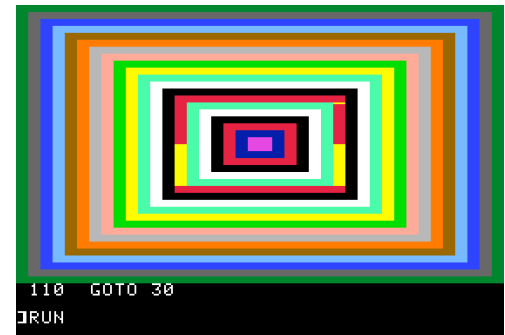
```
NEW <— Erase the previous BASIC program
10 PRINT "HELLO, APPLE!"
20 GOTO 10
RUN <— Press <CONTROL> C to stop the program
```

Now type in a new program:

```
10 INPUT "WHAT'S YOUR NAME? "; A$ <— The dollar sign makes this a "string"
20 PRINT "HELLO, " + A$
30 GOTO 20
LIST
RUN
```

Let's try some graphics. First we'll try low-resolution:

```
10 GR : C = 0
20 FOR A=0 TO 19
30 COLOR = C
40 HLINE A,39-A AT A
50 HLINE A,39-A AT 39-A
60 VLINE A,39-A AT A
70 VLINE A,39-A AT 39-A
80 C = C + 1
90 IF C > 15 THEN C = 0
100 NEXT A
110 GOTO 20
```



Type TEXT to get out of graphics mode and back to text mode.

Now let's try hires graphics:

```
10 HGR : C = 0 : A = 0 <— HGR turns on hi-resolution graphics
15 HCOLOR = C <— Colors range from 0 to 7
20 FOR I=A TO 279 STEP 19 <— The X coordinates go from 0 to 279
30 HPLOT I,0 TO 279-I,159 <— This draws a line from (X1,Y1) to (X2,Y2)
40 NEXT I
50 FOR I=A TO 159 STEP 19 <— The Y coordinates go from 0 to 159
60 HPLOT 0,159-I TO 279,I
70 NEXT I
80 C = C + 1 : A = A + 1
90 IF C > 7 THEN C = 0
100 IF A > 19 THEN A = 0
110 GOTO 15
```

Questions to Ponder:

1. What happens if you need to insert extra lines in between two lines?
2. How do you change the code on an existing line?
3. How is BASIC different (or the same) compared to modern computer languages?

For more info visit http://www.hoist-point.com/applesoft_basic_tutorial.htm

assembly language

Let's make the computer play a tune!

From BASIC, enter the assembly language "monitor":

```
␣CALL -151  
*
```

Look at some assembly-language code:

```
*FDF0L          <— This "Lists" the code starting at address $FDF0  
*L             <— This continues to list the code...
```

Enter the mini-assembler and type in a program:

```
*!  
!300: LDX #$FF          <— Load the X register with 255  
!302: LDY $06           <— Load the Y register with the value in location 6  
!304: LDA $C030         <— Click the Apple speaker once  
!307: DEY              <— Decrease the value in the Y register by 1  
!308: BNE $307         <— If Y is not equal to 0, loop back to location $307  
!30A: DEX              <— Decrease the value in the X register by 1  
!30B: BNE $302         <— If X is not equal to 0, loop back to location $302  
!30D: RTS              <— We're done, return from our program  
!                <— Press <Return> to exit the mini-assembler  
*300L                <— List our program (it should look like what we typed in)
```

Now load some data into the \$06 location and run your program:

```
*06:90          <— Load location 6 with the hex value $90  
*300G          <— Run our program at hex location $300  
*06:C0  
*300G  
*06:FF  
*300G  
*                <— Press <CONTROL> C <RETURN> to exit the monitor and return to Applesoft BASIC
```

Let's write a BASIC program to call our assembly language subroutine:

```
10 INPUT "ENTER PITCH 1-255: "; PITCH  
20 POKE 6, PITCH  
30 CALL 768  
40 GOTO 10  
RUN
```

Next, we'll try all of the tones from 1 to 255:

```
10 FOR PITCH=1 TO 255  
20 POKE 6, PITCH  
30 CALL 768  
40 NEXT PITCH
```

Now we'll play a tune:

```
10 FOR P=1 TO 8 : READ PITCH  
20 POKE 6, PITCH : CALL 768  
30 NEXT P  
40 DATA 160,160,144,128,160,128,144,240
```

CLASSIC APPLE GAMES

Lode Runner

Up, down, left, right: I, K, J, L
Dig left, dig right: U, O
Keyboard: Ctrl+K
Joystick: Ctrl+J
Skip to next level: Ctrl+6



Castle Wolfenstein

Q W E
A D Move in the 9 directions
Z X C S = Stop

I O P Point GUN in 9 directions
K ; L = Shoot gun
M , . T = throw grenade

Space Bar = Search dead bodies
Open Chests
Open door
Return = Inventory



Karateka

Q/A/Z punch high/middle/low
W/S/X kick high/middle/low
--> advance
<-- retreat
SPACE stand up
B bow
--> run forward
<-- stop
SPACE get into fighting stance



Firebug

S/X up/down
<-- --> left/right
P pick up gas can
SPACE drop gas can

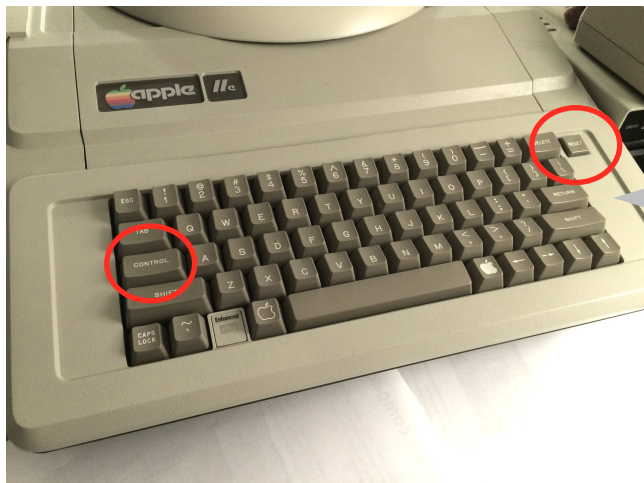


How to Turn on the Apple II



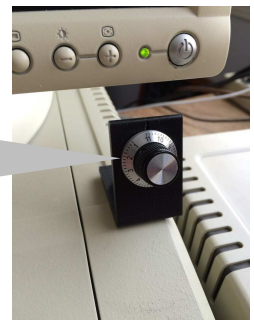
Hold the disk by the label and insert it into the disk drive. Close the door.

Turn on the switch on the left side of the computer. This should also turn on the monitor.



To start over, press **<CONTROL> <RESET>** or just turn the computer off and back on.

Adjust the sound using the volume knob.



Please turn off the computer when you are finished!