Test bench - The Atari 800

At last! For three-four years, the United States had been celebrating it. We have been waiting for it. At last, for 7,500 FRF (incl. VAT), it will be able to connect to your PAL standard. You say you have a SECAM? Come on! Just a bad moment to pass, since by September the PERITEL system should allow you to see[1] all its colours!

Atari 400 and Atari 800

We tested the top of the range, model 800, but there is a simplified version, model 400. The most apparent difference is the keyboard which is a flat type on the 400 (like the Sinclair ZX-81).

The maximum RAM capacity is 16K on the 400 model versus 48K on the 800.

And it has only one ROM connector, instead of two on the 800. (But we haven't seen any programs using two connectors yet. All the ones we've had fit into the left-hand slot).

Weight makes a final difference: 4.4 kg for the Atari 800 and half that for the 400. For the rest, the use and accessories are identical in both cases. One only risks being limited by the memory size of the 400 when using it with floppy disks.

[1] Pun intended. *Le système Péritel devrait pouvoir vous autoriser à en voir de toutes "ses" couleurs* could also be translated as *The PERITEL system will give you a run for your money*.

Boxes of all sizes, in impressive numbers, a quantity of documentation capable of filling a library shelf. The arrival of Atari at home caused a small panic, requiring a thorough tidying of the "computer room". Unpacking, plugging in and exhausting my stock of multiple sockets extension cords...

And immediately a bad surprise, a label affixed to the keyboard bears the mention PAL. The colour television set I brought back from the magazine's office is a SECAM, and also has a SCART socket. No way of testing in these conditions but luckily the Atari 800 has a video monitor output similar to the one on my TRS monitor. According to the manufacturer, the connection is also available. This allowed me to begin to familiarise myself with the operation of the computer. But I soon gave up: I wanted to see the results in colour, so I started looking for a PAL receiver. I found one, at the end of the TV cord of a TRS Color. And there, new worry, if the TRS Color computer works perfectly on its television, impossible to obtain a picture with the Atari. It took me quite a few tries to understand that the Atari modulated the image in VHF, band I, whereas TRS used UHF. All this shows the difficulties we have in testing a colour computer before its release in France. Perhaps one day our SCART socket system will be used more universally, which would solve the problem of the standard for using accessories on a television set.

In any case, Atari will be equipped with the SCART connection when it is marketed in France, in September.

In the meantime, I managed to get a picture on the screen. It announces in white characters on a blue background "ATARI COMPUTER-MEMO PAD". There is no reaction to entering commands: the letters I type on the keyboard are displayed on the screen as if I were using a word processor.

Simply because there is no ROM cartridge in place. Atari doesn't yet understand what the keyboard is telling it. Let's take the opportunity to study the characteristics of this keyboard.

It is a QWERTY keyboard with 57 fully professional keys. Pressing a key causes a small beep to be heard from a speaker inside the computer. If the key is held down, the character is repeated on the screen. Almost all keys have three functions, selected by SHIFT or CTRL. The alphabetic keys can write letters in two modes, depending on the "state" of the CAPS/LOWR switch under RETURN. In CAPS mode, the letters produced on the screen are upper case, whether SHIFT is pressed or not. If LOWR is toggled, the keyboard produces lower case letters and SHIFT brings up upper case letters.

The alphabetic keys pressed at the same time as CTRL give graphic characters.

It is a pity that these characters are not engraved on the keys and that you have to look up the table in the manual each time to write a graphic character. The keyboard is almost too professional for a home computer.

Cursor movement is achieved by four directional arrows which are controlled by CTRL, a layout I don't like very much, as it makes access to the editor more difficult.

The latter also uses the INSERT DELETE/BACK SPACE and CLEAR keys. It is screen-based, i.e. corrections are made directly on the screen content by moving the cursor to the position to be changed. SHIFT or CTRL CLEAR clears the screen.

SHIFT INSERT creates a space to insert a line, while CTRL INSERT moves what follows the cursor one character to the right. SHIFT DELETE deletes a line, CTRL DELETE a character.

A key at the bottom right represents the Atari logo. It allows you to write characters in reverse video (without inverting the whole screen, but only each line typed after pressing this key). Unfortunately, BASIC does not recognise instructions written in this way and this possibility can only be used for writing texts with PRINT or for remarks.

On the right-hand side of the keyboard, four yellow keys are located above a power control light. The first, SYSTEM RESET, is protected from accidental presses by two plastic sides. It resets the system, but does not affect the contents of the RAM, and therefore does not remove any programs from it.

The following three keys are used with the game cartridges: OPTION, SELECT and START are used to select game levels and launch programs.

Just above the keyboard, a push button releases the cover of a compartment with two slots, each terminated by a 26-contact female connector. This is where ROM cartridges offering a wide variety of computer programs or languages can be plugged in.

Software distribution by cartridges has many advantages. To switch from one program to another, simply change the cartridge and you're done. No long wait to load from a cassette or even a floppy disk.

Much less risk of accidental program destruction. No wasted RAM, which is not so important for game programs, but becomes important for programming languages.

On a system with a fixed ROM memory, you can only change the programming language by placing the new one in RAM. With Atari, this is not the case, and it is interesting to know that the language cartridges are designed to use all peripherals,

including floppy disk drives, which therefore only require an Operating System to be loaded into RAM, but make full use of the contents of the ROM cartridge.

For the time being, three language cartridges are available: PILOT, BASIC (in-house), ASSEMBLY.

The arrival of PASCAL is announced as imminent, as well as a cartridge containing a Microsoft BASIC.

As for the game cartridges, they benefit from the experience of the Video Computer System from the same company. The three or four that I was able to try were of high quality, both from the point of view of graphics and sound and the interest of the programmes. They use joysticks or paddles that plug into four connectors on the front of the computer, below the keyboard.

When the cartridge compartment cover is opened (which cuts off the power supply), there are two small locking levers that release the top of the computer. Four other larger (44-pin) connectors are then accessible. These are designed to hold one ROM cartridge and up to three RAM (extension) cartridges. The ROM is labelled "Operating System" and contains the system monitor and character generator.

The RAM cartridges are 8 or 16K and allow to increase the maximum capacity to 48K.

Officially that is, because I have been told that 32K memory cartridges from other manufacturers than Atari can be found on the US market.

All of these connectors give the system a versatility that will allow it to be easily adapted, at a reasonable cost, to all the user's desires. No tedious tinkering with the system or dangerous to the machine. No need to send the computer back to the after-sales service to add a few Kbytes of memory or to change the computer language. This is the first time that I have encountered such flexibility on a computer and I admit that I found it very interesting to be able to go from PILOT to BASIC in a flash by doing a stopover with "Star Raiders" or "Missile Command".

Continuing our tour of the various connections, we can spot a new and interesting area on the right-hand side. From the back to the front, we see: the power socket, the on/off switch, a two-position switch to change the TV modulator channel, the peripheral connector and a video output. Power is provided by an external 9-volt AC transformer. Every peripheral on the Atari is powered by a similar transformer, which explains the shortage of my stock of multiple sockets extension cords that I mentioned earlier.

Intermediate conclusions

- Neatly presented system
- Very professional looking keyboard
- RAM and ROM connector system makes the computer very easy to modify
- Unfortunately, a lot of cables for connections

A commitment to saving RAM

The original design of the RAM and ROM connectors makes the inside of the Atari 800 quite different from what one usually finds in a personal computer.

Unscrewing the plastic cover reveals a duralumin basket on which the various cards are screwed. This basket forms the chassis of the system and its openings allow the RAM and ROM circuits to pass through. On one side are the auxiliary power supply components: rectification, filtering and stabilisation. Then the television modulator and the yellow keyboard selector contacts.

The main board is fixed under the metal basket and is itself shielded by an aluminium plate. There is a rather impressive number of discrete components, mostly resistors. On the front are the four connectors for the joysticks and the keyboard. On this main board, there are only two large circuits: a keyboard management circuit, the radio circuit and the serial links, a 6520 parallel coupler, the memory decoder and all the expansion connectors. The last connector on the 56-pin board houses the microprocessor board.

It is equipped with a 6502 running at 1.79 MHz. Two circuits, named ANTIC and CTIA, manage the screen under the control of the ROM of the "Operating System" cartridge.

The ANTIC circuitry operates in direct memory access (DMA) and takes over screen management from the microprocessor. The CTIA manages the priorities for the display of overlays and controls the colour luminance. These two circuits are responsible for the remarkable graphics quality of the Atari, since they manage the screen autonomously, without taking time from the microprocessor.

The two specialised chips mentioned above allow objects on the screen to be managed as if they existed on different planes.

If they cross each other, for example, objects in the foreground will hide objects in the background, which will reappear intact once the crossing is complete. All this happens without the flickering that characterises animated graphics with machines that manage the screen by successively erasing and redrawing it. The result is a quality of image for games that is second to none to the best specialised arcade machines that can be seen (or used) in cafés.

The only quality limitation could come from the resolution, which remains low if several colours are used. Here we find the concern to save the RAM used by the screen. Of the six purely graphic display modes, the first allows 40 dots by 24 in four colours chosen from among sixteen, consuming 273 bytes. The next mode goes to 80 X 48 dots in two colours (537 bytes), then 80 X 48 with four colours (1017 bytes), 160 X 96 and two or

four colours (2025 or 3945 bytes), the highest resolution is obtained on 320 X 192 dots but only one colour can be used while consuming 7900 bytes of RAM. For text display, the screen gives 24 lines of 40 characters. Text and graphics can be combined by keeping four lines of text at the bottom of the screen.

The production of music is operated by a semi-specialised circuit (it also manages the keyboard and the serial links) called POKEY.

The generated sound is modulated with the video signal, and is output through the TV speaker connected to the Atari. It can also be retrieved from the monitor output on the side of the computer.

Unfortunately, it is not possible to separate stereo channels, despite the existence of four different channels which allow for the most beautiful tunings. The parameters that can be changed for each note are pitch, distortion and volume. Four octaves can be played. The sound generator can be programmed from PILOT, BASIC, or with a special cartridge called "MUSIC COMPOSER". This allows you to write a score which is displayed on the screen on two staves (G and F keys).

Intermediate conclusions

- Well-built computer. Excellent noise-reducing shielding.
- Plug-in CPU card.
- Autonomously managed graphics and sound of outstanding quality.

The revival of the PILOT language

As we have discussed above, the plug-in cartridge system gives the Atari a lot of flexibility. If you are new to programming, you may be interested in learning PILOT. This language was designed in the late 1960s to make it easier for teachers to write programs for CAE (Computer Aided Instruction).

The ATARI version includes the use of "TURTLE GRAPHICS": graphics drawn on the screen by an imaginary turtle that moves following commands such as move forward, turn to, raise/lower pen... (in English). This avoids working with Cartesian coordinates which are sometimes off-putting.

PILOT can be used to create quite complete programs thanks to a set of instructions whose syntax remains very simple. To write a text on the screen, all you have to do is program after a line number :T: followed by the text. Almost all instructions are of this type. There are texts, jumps, loops and even the use of the music generator. The commands are often the same as in BASIC (RUN, LIST...).

An excellent introductory language, which allows you to enter individual computing by a very pleasant path.

BASIC, which can be plugged in on Atari, is a little more questionable. It is very complete especially in the field of mathematical functions, gives excellent possibilities for the realization of graphics and music but has some regrettable gaps. For example, it does not allow the display of a text in an INPUT order, does not allow ELSE after IF... THEN..., does not display intended listings, to highlight loops.

The RUN command does not accept arguments (RUN line number).

On the other hand, this BASIC has an advantage that is missing on many others, it detects syntax errors immediately after pressing RETURN (PILOT does the same). It has some original instructions such as POP, which clears the last line of the subroutine return stack, and this allows for some rather daring program structures. TRAP sends to a predefined line in case of an error (the ON ERROR GOTO of Microsoft BASIC). In the mathematical field, CLOG gives the decimal logarithm of a number. The trigonometric functions SIN, COS... can work in degrees or radians. ADR gives the memory address of a string of characters. The latter must undergo a prior declaration of their length, which cannot exceed 113 characters. [LD: inaccurate]

Numeric variables have only one mode and can be identified by a name of up to 120 characters. They accept up to 10 digits, but in this case the last digit is always zero: if you write A=1234567899 and PRINT A, the result will be 1234567890. In scientific

notation, you can go from 9E-99 to 9E97. Arrays accept at most two dimensions, which is low.

Almost all BASIC instructions allow abbreviations like I. for INPUT or REA. for READ (I don't really see the advantage in the latter case, there are so many keys to press).

The PADDLE, PTRIG and STICK instructions allow you to write BASIC programs using the various game controllers. The Atari 800 also has Microsoft BASIC which runs on a 32K RAM system. Unfortunately, we were not able to test it.

Intermediate conclusions

- The interchangeability of the languages is very pleasant
- PILOT is an excellent initiation language
- BASIC is complete but has some unfortunate gaps.
  Microsoft BASIC will certainly be welcome.

Comprehensive peripherals and documentation

A peripheral connection socket was placed on the side of the computer. It allows a fairly wide variety of accessories to be connected, but only one at a time. [LD: inaccurate] If you want to use a cassette recorder and a printer at the same time, for example, you have to add a connection interface. This must, like all the peripherals used, receive its own 9-volt power supply, which multiplies the number of wires on (or under) the work table.

The cassette recorder must be the one sold by Atari, which is not explained by a very high read/write speed. It gives an interesting possibility of synchronising the audio channel, amplified by the television set, with the execution of a programme. There are also learning tapes which supplement the execution of programmes with spoken explanations. The printer available is a small TRENDCOM redesigned for ATARI, using 11 cm wide thermal paper on which it writes forty characters per line. Two models of floppy disk drives are available: single (Atari 810) or dual (815). They can be combined up to four units: three singles, one single and one double, or two doubles.

The floppy drives require at least 16K of memory in the computer (only!) and currently run on an operating system called DOS II. This one is simple to use, it allows the formatting of diskettes (although those sold by Atari are pre-formatted for simple density use), the duplication of diskettes, of files, their deletion, locking, etc., and, original thing, the operating system is compatible with the PILOT and BASIC language cartridges (and probably the others to come). This means that the cartridges continue to be usable with the floppy drive. There is no need to call a "BASIC, disk version" or a "PILOT, disk version" from the floppy disk, so only 16K are required to use the floppy disk drive, which is as easy to set up as a cassette recorder.

Floppy disk drives are single density (single drive) or double density (double drive). In single density, a floppy disk can hold 88375 bytes.

Again, the documentation that comes with the Atari is very complete. We were only able to explore the English version, but if the translation respects the quality of the originals, there is nothing to complain about. Each program, language or peripheral is accompanied by one or two manuals explaining how to use it. If there are two manuals, the first one is usually a "quick starting guide/introduction" for beginners and the second is for advanced users. I particularly appreciated the binder that came with the PILOT cartridge, which includes an introductory manual, a reference book with numerous programme examples and two demonstration tapes. Not forgetting the general system manual which describes in the menu on nearly 400 pages the operating principles of the ATARI and its operating system. The mode of action of the screen controller for example is very well explained. This will allow the experienced programmer to take full advantage of the graphics possibilities.

Intermediate conclusions

- Satisfactory and well-designed peripherals for "non-professional/home" use
- Outstanding documentation (in English), as accessible to the beginner as it is complete for the experienced programmer.

Final conclusion

Despite the availability (in the US markets) of programs such as Visicalc, statistical calculations, and other word processors, the model 800 is aimed at the personal rather than the professional market. The design of the computer (plug-in cartridges), its simplicity of use, and the type of peripherals available testify to this intention.

And it must be said that the adaptation of the product to personal/home use is perfect.

For education too, Atari should give good results, especially with PILOT and its "Turtle Graphic". But here, French requirements could be a hindrance, (AZERTY keyboard...).

The Atari is announced this month in France and if the French subsidiary has provided it with a complete software catalogue, there is no doubt that this device will be as successful in France as it is in the United States. If you can use it with your SECAM television set, of course!

Riccardo Ettore
Xavier de la Tullaye

Pros and cons

The nature of the Atari 800 being resolutely for personal/home use, professional applications have been excluded from these assessments

Personal/Home use > Pros

- Full-featured and "professional" keyboard
- Neat presentation
- Numerous peripherals available
- Interchangeability of languages.
- Ideal BASIC for the beginner (syntax analyser) and PILOT language for the initiation.
- Easy to use programs: available as plug-in cartridges.
- Remarkable documentation (in English).
- Many programs available... but in English.
- Quality graphics and sound.

Personal/Home use > Cons

- Connection to PAL standard for the time being.
- Gaps/Missing functionalities in the BASIC.
- So many cables!

Educational/School use > Pros

- Sturdy system
- Very complete documentation accessible to beginners (but in English).
- Initiation languages for beginners (BASIC, PILOT, "Turtle Graphic").
- Many peripherals
- Easy to use (plug-in cartridges)
- A vast catalogue of software (but in English).
- High quality graphics and sounds.

Educational/School use > Cons

- PAL standard connection.
- Too many external connections/cables, display not integrated.
- No AZERTY keyboard.

Atari 800 - The manufacturer's point of view

We have just taken note of the test bench that you carried out on our computer, the Atari 800. You have rightly remarked on its many qualities, and in particular on the fact that it is truly designed to be a personal and home computer. Allow us, however, to complete your test bench by adding some details.

By the time you print these lines, the PASCAL and Microsoft BASIC languages will be available - their instructions manuals being translated into French. Note that these languages are, at first, available on floppy disks. The PASCAL compiler, as well as the complexity of the programs written in Microsoft BASIC, require the use of a floppy disk drive, rather than a cassette recorder. The Microsoft BASIC is a 16K model allowing double precision calculations, PRINT-USING, IF... THEN... ELSE..., n-dimensional arrays, etc... But the strongest point, of which Microsoft is very proud (because it is the first BASIC language to allow this possibility) lies in the fact that it is possible to make a complete animated graphic game, in BASIC, without using assembly routines. Special instructions were developed for this purpose for the Atari machines. There is no noticeable slowing down of the movement dynamics. This opens up extraordinary possibilities for the hobbyist.

You state that 32 KB memory cartridges are available on the American market. This information is correct, but as the computer's power supply is not designed to provide this excess current, this means that in practice there is a risk of the machine being damaged in the long term. In this case, of course, the warranty does not apply. We can only advise against this operation.

The CTIA has now been replaced by a more efficient circuit: the GTIA. Its greatest advantage is that it generates sixteen shades of sixteen luminances each, i.e. 256 shades instead of 128 for the CTIA. The resolution is low, even in the best case, because we are limited by the performance of the TVs. Using 320 dots horizontally already goes further than the TV resolution, as we are half a pixel away. That is why the hue can obviously no longer be guaranteed. It was therefore unnecessary to consider sixteen colours in the highest resolution.

However, you are making a mistake when you talk about connecting peripherals: you can perfectly well connect a cassette recorder and a printer without an interface module. The system can indeed control:

- four diskette drives;
- one cassette recorder;
- an Atari printer.

This is done directly. The interface module is necessary when you want to use other devices, such as:

- a modem;
- a digitizer tablet;
- a Centronics type printer;
- etc...

But Atari printers connect directly.
The cassette recorder must then be an Atari model, for very specific reasons:

1. Very specific adaptation to the CPU bus, which avoids the use of an interface card.
2. If the transfer rate is not higher than usual, we have not yet seen a recording or playback error, even on very low-quality tapes. The coding of the information, the various controls and the special write-read circuits allow this performance. The Atari cassette recorder gives this physical medium exemplary reliability.
3. Finally, the most remarkable thing is the simultaneous use of a digital track and an audio track. We have, for example, just developed a set of BASIC starter tapes where you have at the same time:
    - a voice guiding you through the learning process;
    - explanatory drawings on the screen;
    - questions that require you to use the keyboard.

This is a remarkably interactive use of the cassette: this kind of programme cannot be produced on a floppy disk. Finally, all machines and software are accompanied by French documentation - the software is also translated on the screen, when necessary (this is not the case for some purely visual games). Each user therefore has:

- clear and precise explanations in French;
- extensive software support;
- telephone help;
- etc.

In addition, we are currently developing a whole series of French-designed programmes and are in the process of making important agreements on this point with no less important publishers, designers, etc.

Anyone can write to us with their ideas. If they are good, the author will be rewarded!

ATARI
9/11, rue Georges ENESCO
94008 CRETEIL CEDEX
FRANCE