

The restoration of the Honeywell Questar M

written by Sergio Gervasini for ESOCOP - The European Society for Computer Preservation
<http://www.esocop.org>



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A copy of the license is available on Esocop's site and can be obtained here:

<http://www.esocop.org/gnu/gnu-1.3-license.txt>

References

Prologue Operating System v2.5b - Preservado !!!
<http://www.retrowiki.es/viewtopic.php?t=936>

Prologue , vous connaissez ?
[ref. Post of caracole – Pierre Giraud - at the end of thread]
<http://www.forum-auto.com/les-clubs/le-bistrot/sujet141259.htm>

Fédération des Equipes Bull
<http://www.feb-patrimoine.com/>

Inside ARCHIVES NATIONALES DU MONDE DU TRAVAIL -
<http://www.archivesnationales.culture.gouv.fr/camt/>
[ref. Document: 2012_007_INV.pdf]

Micral 8022G
<https://forum.system-cfg.com/viewtopic.php?f=1&t=4740&start=180>
<https://forum.system-cfg.com/viewtopic.php?f=1&t=4740&start=60>

Some documents about Micral:
<http://www.bitsavers.org/pdf/r2e/>

History

In 1973, the french mini-computer company R2E built the "first personal computer using a microprocessor" (three judges at The Computer Museum, Boston awarded this title) and called it "MICRAL".

The Micral N was the earliest commercial, non-kit personal computer based on a microprocessor, in this case the Intel 8008, earlier than the well-known Altair 8800.



In 1978 CII-Honeywell-Bull (now simply Bull), bought this company and after a while presented to the public the Questar M, which was nothing more than a Micral 80 series.



It's a PC based on Zilog Z80A, with 64k RAM, two 256Kb or 600 Kb 5"1/4 floppy disks, 14" monitor monochrome 80x24 text resolution.

The basic operating system of this machine was Prologue, a multitasking, multiuser OS. It was commonly combined with the BAL programming language, a mix of BASIC and COBOL with powerful files management commands, made by R2E. Both Prologue and Bal were more efficient and powerful than CP/M and later MS-DOS, but, sadly, they virtually never gone beyond the French borders.

My history

Flaashback: it was the 80s, I was used to write management software for the Hotels front-office, and one of my customers bought a Honeywell Questar M with *Prologue* operating system.

My software worked only in Cp/M and it was not possible for me to convert it for the Prologue, but i went to the Honeywell Bull Italy HQ, where I found the Cp/M disks for that machine and I had been able to transfer my software on it.

My customer used that machine for years, switched on 24h a day ...

Year 2017: from an online advert I realized that there was a Questar M for sale in Trieste (Italy), I made the necessary arrangements and at the first opportunity I went to collect it.

Then I looked for my floppies that I did use on that machine and, fortunately, I never threw them. They were still here.

Ok, we have the tools, we can start the restoration!



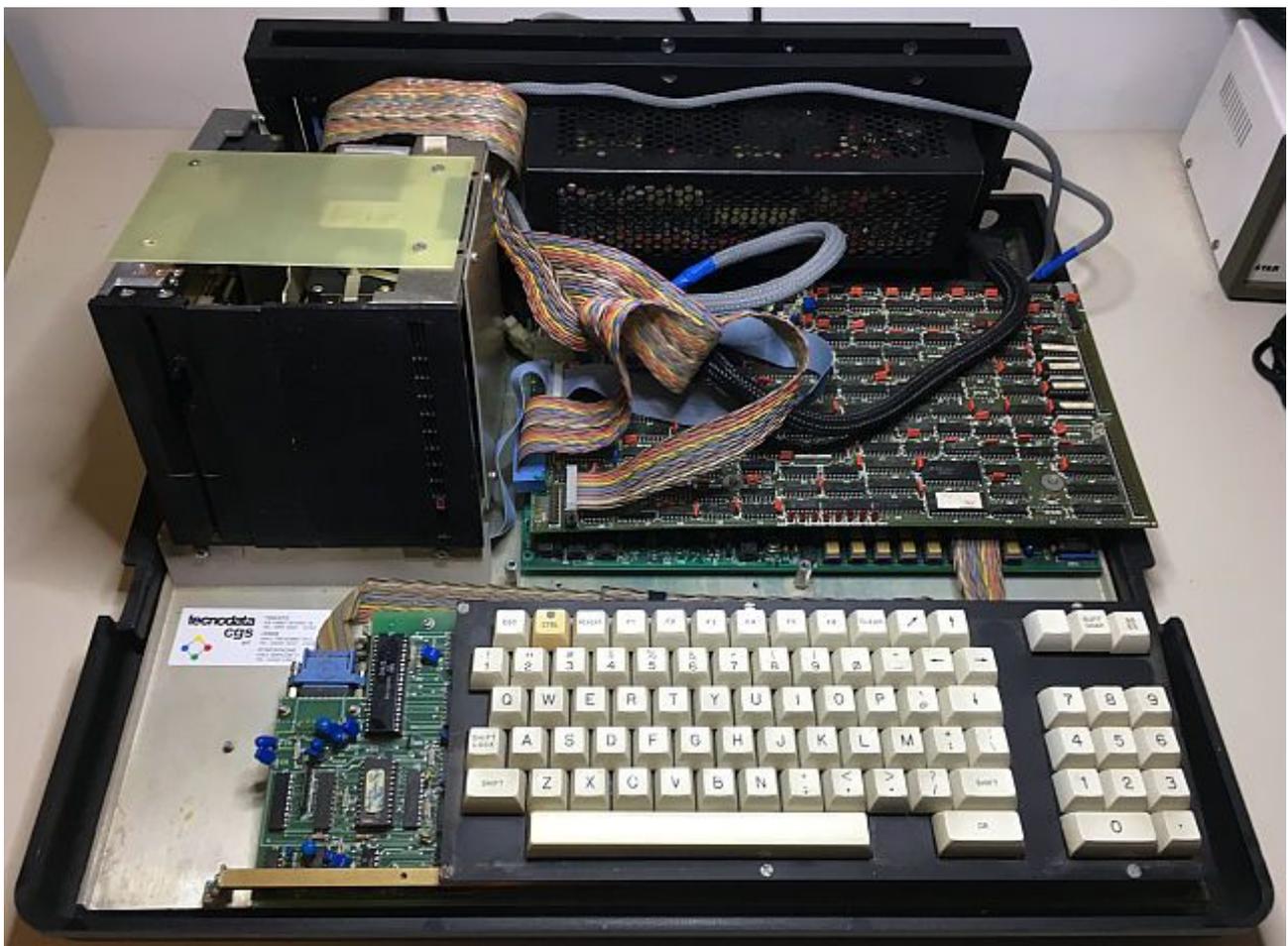
Visual Check

Apparently the machine looks good, just a few small signs, absolutely normal due to its age, and gives the impression of a good construction quality with only a few visible screws on the rear (and some hidden under the black front mask).

The monitor is mounted on a support with a cylindrical pin that allows it to rotate and to be easily removed, moreover it is connected to the computer with a single cable that sends both video signals and power.

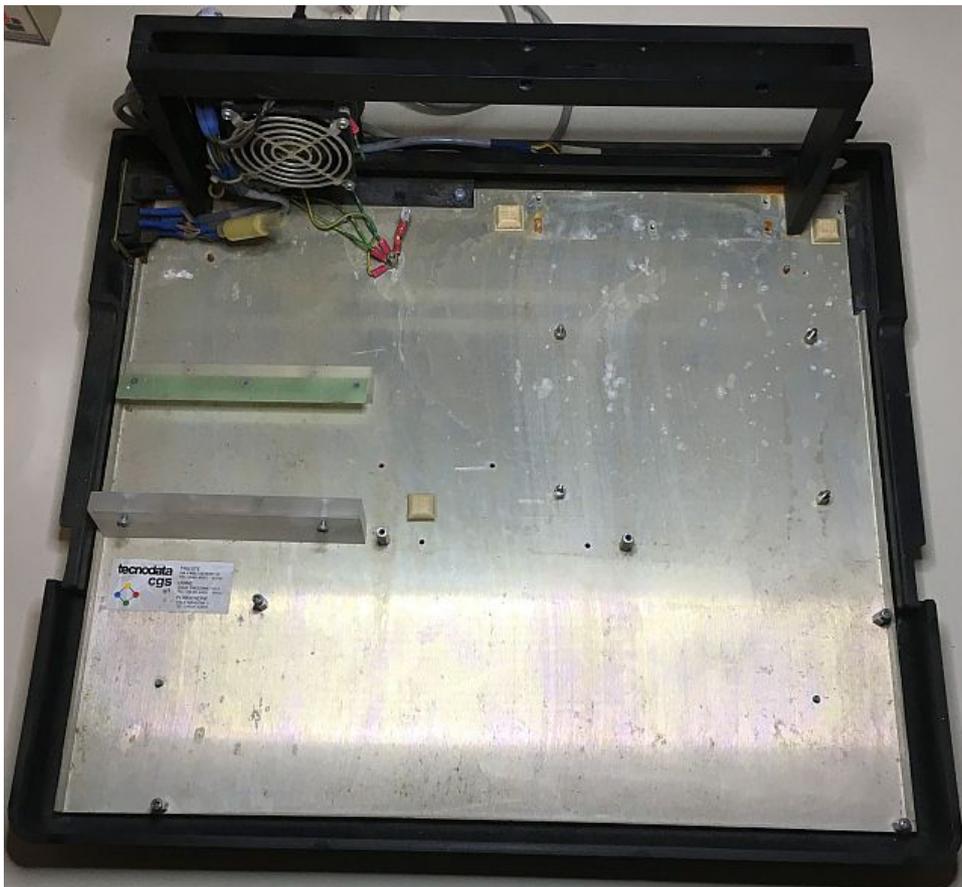


Inside the case, there are some less industrialized assembly solutions, as the floppy support, or the monitor support (which also includes space for the power supply), or the controller for the hard disk that looks like an unexpected addition. You'd also notice a bit of confusion in the cables wiring.



Disassembling the elements it's quite a difficult exercise, for example the mother board can not be removed if the power supply haven't already been removed, and the power supply itself must be removed paying close attention to the cables.

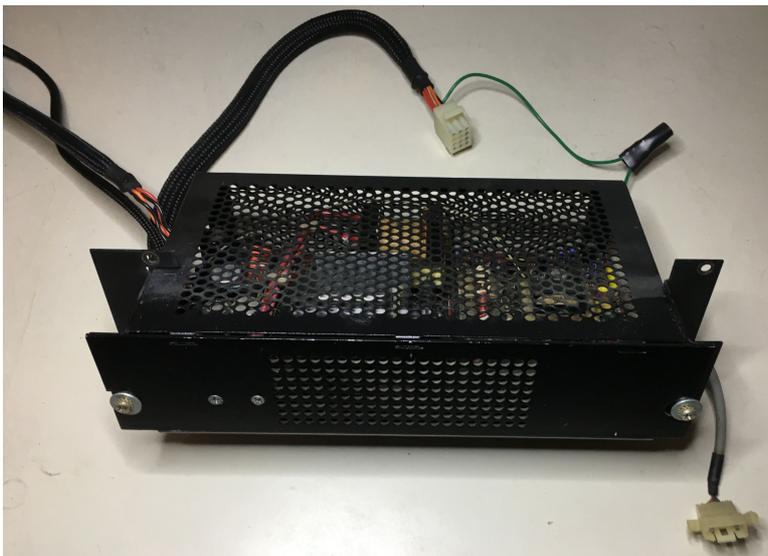
Some signs of corrosion are present on the bottom plate, anyway nothing to worry about; the dust is, of course, present everywhere, but with a good vacuum cleaner and a brush has been easily removed.



Power supply and motherboard

The first thing you'd check on an old machine is the power supply, which often includes many electrolytic capacitors that degrades over time.

I preferred to dismantle it and test it separately from the machine, simulating a resistive load, instead of leaving it inside.



Despite the time has gone, the power supply still works perfectly, the values are correct and even after a certain time there are no anomalous temperatures or voltages.

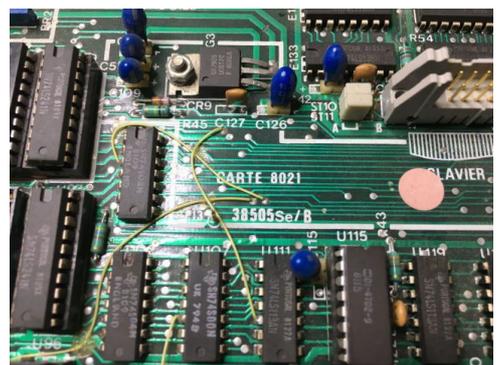
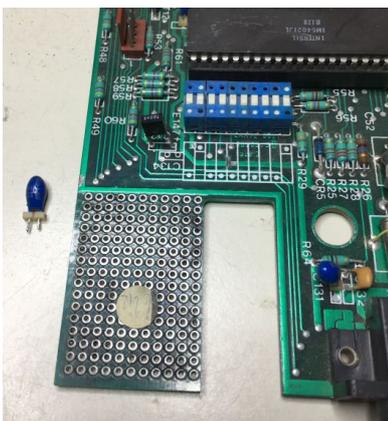
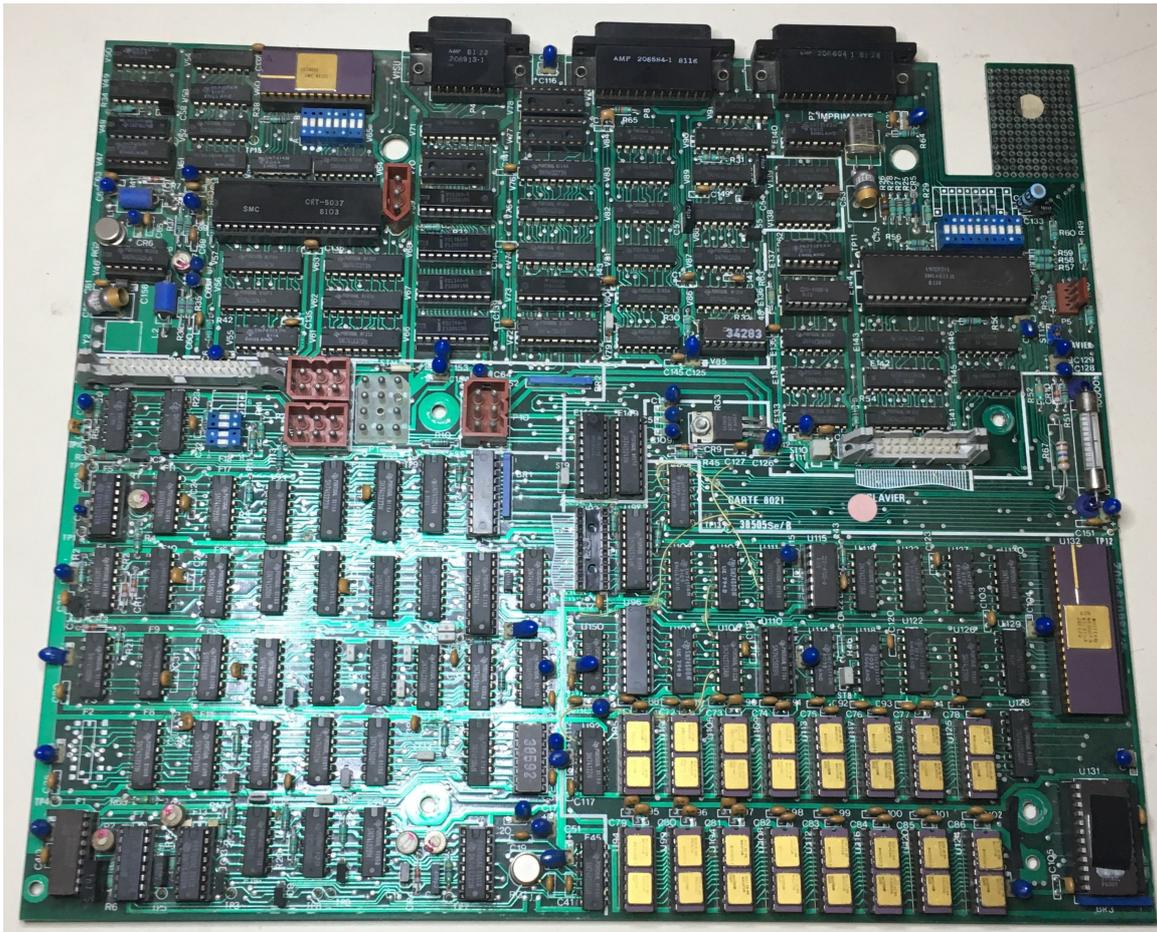
But after having reconnect the power supply (to the motherboard only), there were no voltages and it seemed that the power supply no longer works: obviously there were some short circuit on the board.

The mother board is equipped with tantalum capacitors that are sadly known for easily going into short circuit after a few years of inactivity.

Since the power supply is protected against short circuits, the dead capacitor has no visible signs of burning and therefore can only be found by measuring it.

With a tester I checked that the problem is on the +12V line, so I started looking for all the capacitors on that line and to remove them one by one, until I found the faulty.

After having replaced all the removed capacitors, I tried again to connect only the motherboard, which no longer gave anomalies on the voltages, so i could proceed with the other pieces of the machine.



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Monitor

The power supply went back into protection as I connected the monitor and restarted the machine, so I had to dismantle the monitor and look for another fault inside it.

Dismantling the monitor is a fairly simple operation, only 4 screws, and the components are easily accessible. There are 2 boards: one dedicated to the interface to the computer and the other is the real electronic driving the kinescope.



I found another series of tantalum capacitors, so I looked for the faulty ones again, and I found it quite easily.

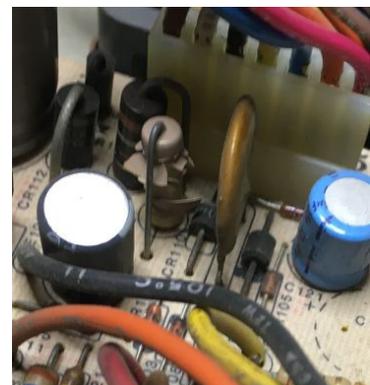
After replacing the capacitors, the power supply has resumed back to work correctly, but the monitor didn't give signs of life.

On the PC interface board there is a voltage regulator LM309K, which reduces the voltage of +12V to +5V for the logic present on the card ... but the +5V wasn't present, so probably the regulator was faulty.



During the operations I also saw that on the analog board there is a resistance flaked and therefore is probably broken, but the problem is that the schematics are not available anywhere and for that reason the value of the resistance was unknown to me.

Looking on the Internet for a picture of the same card, I found one with a fairly clear image of that resistance and I could then deduce the value: 4.7 Ohm (with a minimum of 2W).



After fixing these problems, finally the machine showed the QUESTAR/M prompt on the screen, so it was time to check what I can do from here.



Keyboard



The keyboard communicates with the mother board with a flat cable, probably with a parallel interface; but the peculiarity, which is shown only by removing the tape on the main chip, is that it is driven by another Z80, manufactured by NEC.



Boot from floppy disk

I didn't find any documentation on the commands running at the prompt, so I had to go by trial, and I found that the only commands that seemed to give some results were B (maybe for *Boot*) and G (maybe for *Go*, at some memory location).

As soon as I connected the floppy drive, I tried with my own Cp/M disk, and by issuing "B0" command I could finally boot the Bull !



An important note: the disks used are **hard sectored**, nearly impossible to find today, my few old floppies fortunately seem to work fine.



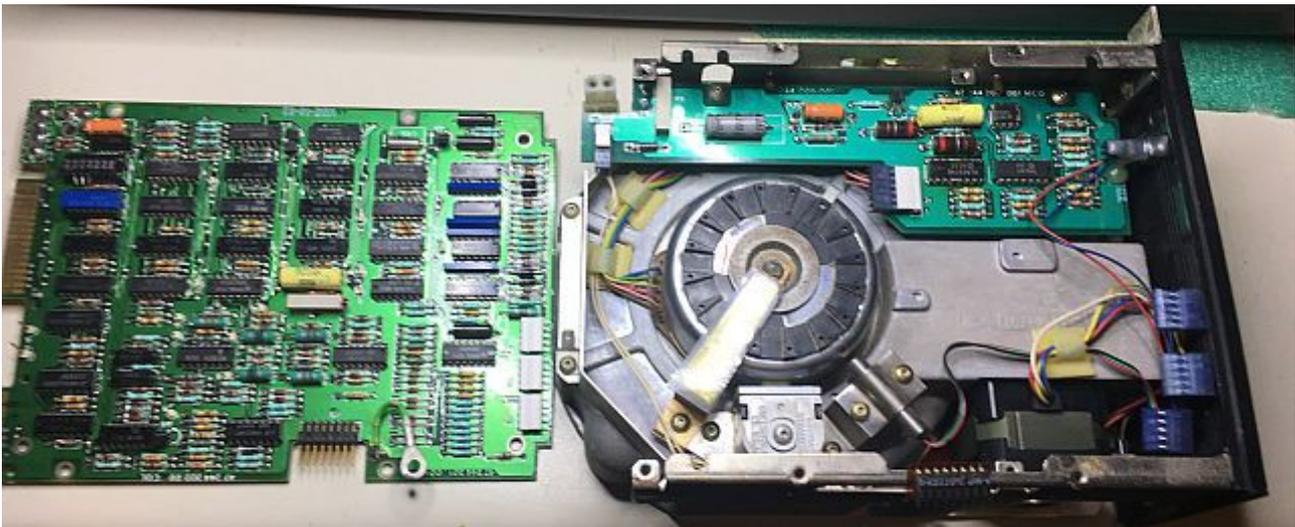
Hard disk

It's time now to connect the hard disk, just to find out if, after so long time, it still works. I have to admit that I was not very confident, there was some crustings and probably there would have been blocked moving parts. In fact, giving it power, I couldn't even hear the noise of the spinning disk ...

The label on the hard disk indicates only the new brand and the serial number of the disk, but almost certainly it is a Seagate disk rebranded.



Repairing an hard disk is usually a very risky job, at least if you want to save the content, but since I had no alternative I decided to remove the logic board to access the main engine.



While I was trying to rotate the main motor with my hands, I realized immediately that it was hard to move. I tried to power on the motor and I had the confirmation that was impossible to spin.

With a can of WD40 I tried to spray small amounts of lubricant in various places, until finally the disk started to spin freely! Eureka!

As soon as I reassembled everything, I tried to boot again, but with the Cp/M OS I couldn't find a way to access the hard disk, so I decided to use another disk in my possession with the label *Prologue*.

```
QUESTAR/M
QUESTAR/M

Honeywell Information Systems Italia
P R O L O G U E Vers. 1.8 del 16/11/81
Memoria disponibile :( 5F85 , FB80 )

-> MD0.ASG,CI,MD0.START
-> EX,SERX10
.ER.0 ‡
-> /          version : 2.9

-LISTA Vol: FIXMD5Mb File Nb: 895/332 Gr.Lg: 16 Used : 1216/29662
```

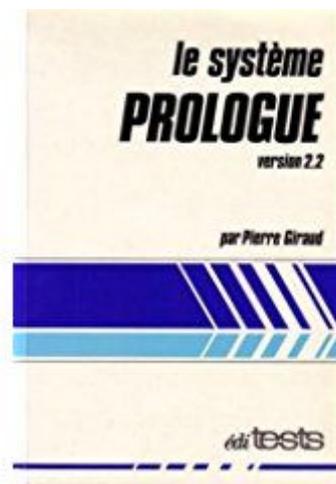
The floppy disk booted and shortly the system tried to access the hard disk, and the head moved, making movements as if it was working properly.

So it was time to study some *Prologue* commands.

The Prologue operating system

It is quite impossible to find any Prologue documentation on the web, the only reference I found is on a Spanish site (as written at the beginning of this document in the references section) which refers to version 2.5 (but I have 1.8) and which contains only some example commands.

It has been published a single book that talks about it, written by Pierre Giraud (see references at the beginning) that also wrote other books about micro-computer science in France.



I kindly ask if somebody should have any more documentation, to make it a copy and send it to the Esocop association via e-mail or snail mail.