



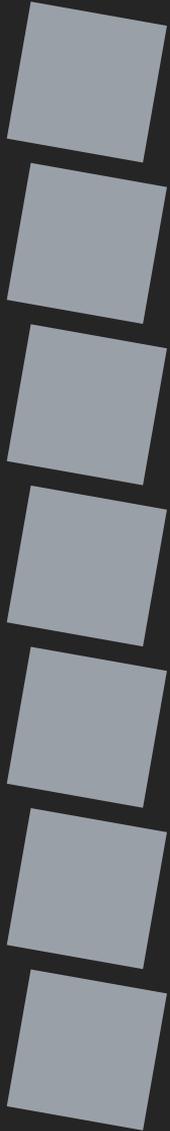
# REVIVING LE MINITEL



# SUMMARY

- How France conquered the world
- How it worked
- HTML5 and ES6 to the rescue
- Creating a VideoTex page [live demo]
- Surfing on Minitel [live demo]

# How France conquered the World



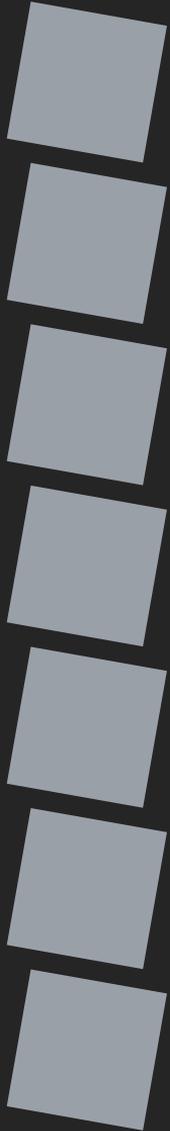
# France was REALLY late (late 1960s)

- Household equipment
  - USA = 90,5 %
  - France = 15,2 %
- Installation time
  - USA = 3 days
  - France = 3 years
- QoS
  - less than 60 % of calls succeeded

# So what?

- Manual switching until the late 1970s!
  - First automatic switch was tested in 1912
  - France is completely automated in 1978
- Up to 30000 operators
  - ~100 subscribers / operator
  - < 400 calls / hour / operator
- But France has a super plan!



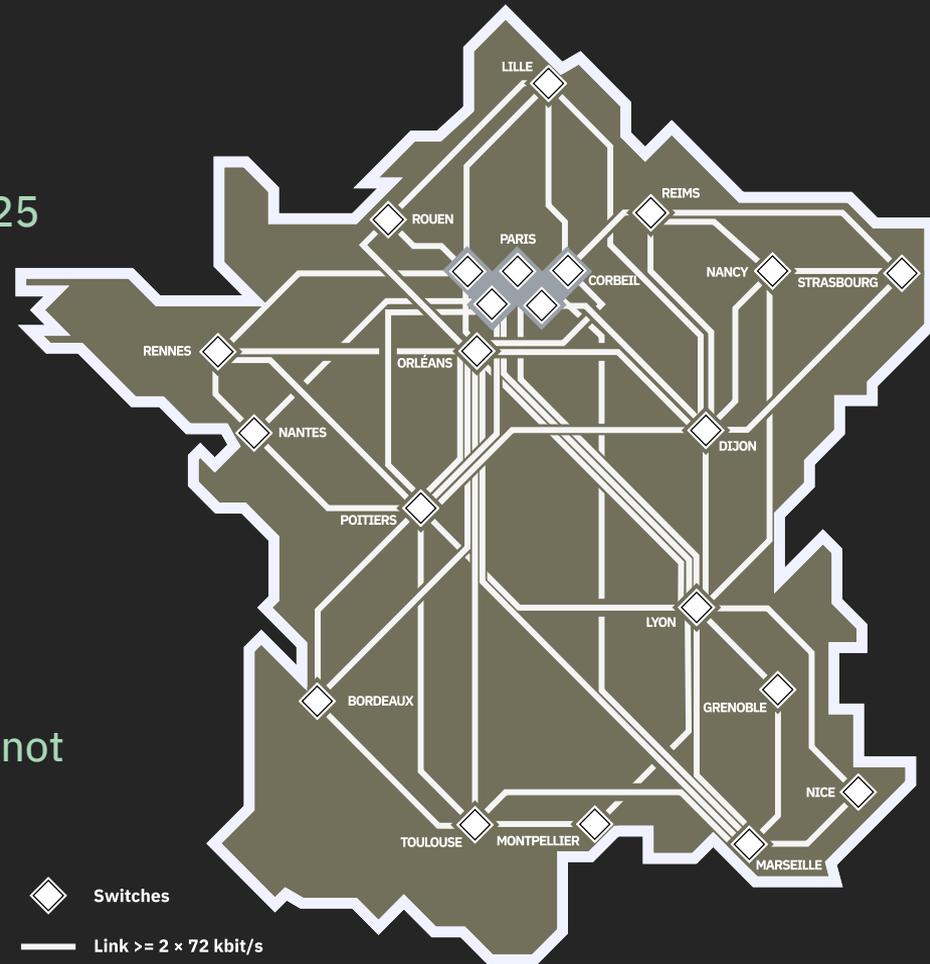


# Catch up and take the lead!

- Late 1960s, a decision is made
- **1972, DGT becomes the first investor in France**  
Direction Générale des Télécommunications / General Direction of Telecommunications
- **1978, PSTN is complete**  
Réseau Téléphonique Commuté RTC / Public Switched Telephone Network
- **1978, Transpac is born**  
French packet switched network based on X.25

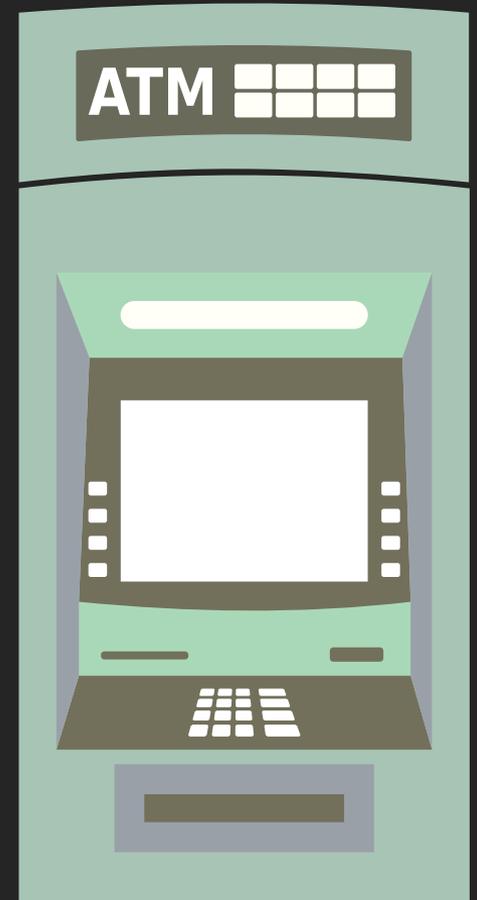
# Transpac

- **A public network: RCP**  
packed switched network, virtual circuit, X.25
- **Variable rate**  
50 bits/s to 64000 bits/s
- **Heterogeneous**  
direct access, modem, Telex...
- **New pricing**  
depends on rate and connection time, does not depend on distance



# What could you do with Transpac?

- B2B applications
  - Links between agencies (banks, insurance...)
  - ATM machine
  - Payment terminal
- B2C applications
  - Minitel



# Here comes the Minitel!

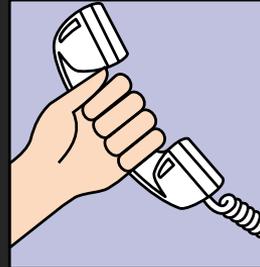
- Minitel = television + network + computing
  - 1974, BBC's Ceefax
  - 1979, CCETT's Antiope
- Getting it adopted by the French is not an easy task
  - Micro-computing is hard to grasp
  - Micro-computing is expensive
  - Nobody dreams of network



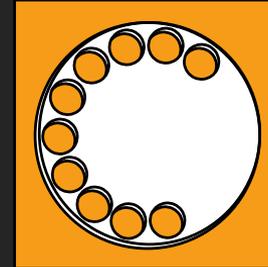
# Make it easy to use

- A simple terminal
  - zero maintenance, zero config
  - easy to install and use
- One killer app
  - electronic telephone directory
- Ad campaign
- A **FREE** terminal
  - free as in free beer!

Mettez en marche votre MINITEL.



1. Décrochez votre combiné.



2. Composez le n° d'appel.



3. Attendez le signal continu.



4. Appuyez sur la touche.



5. Attendez la page.

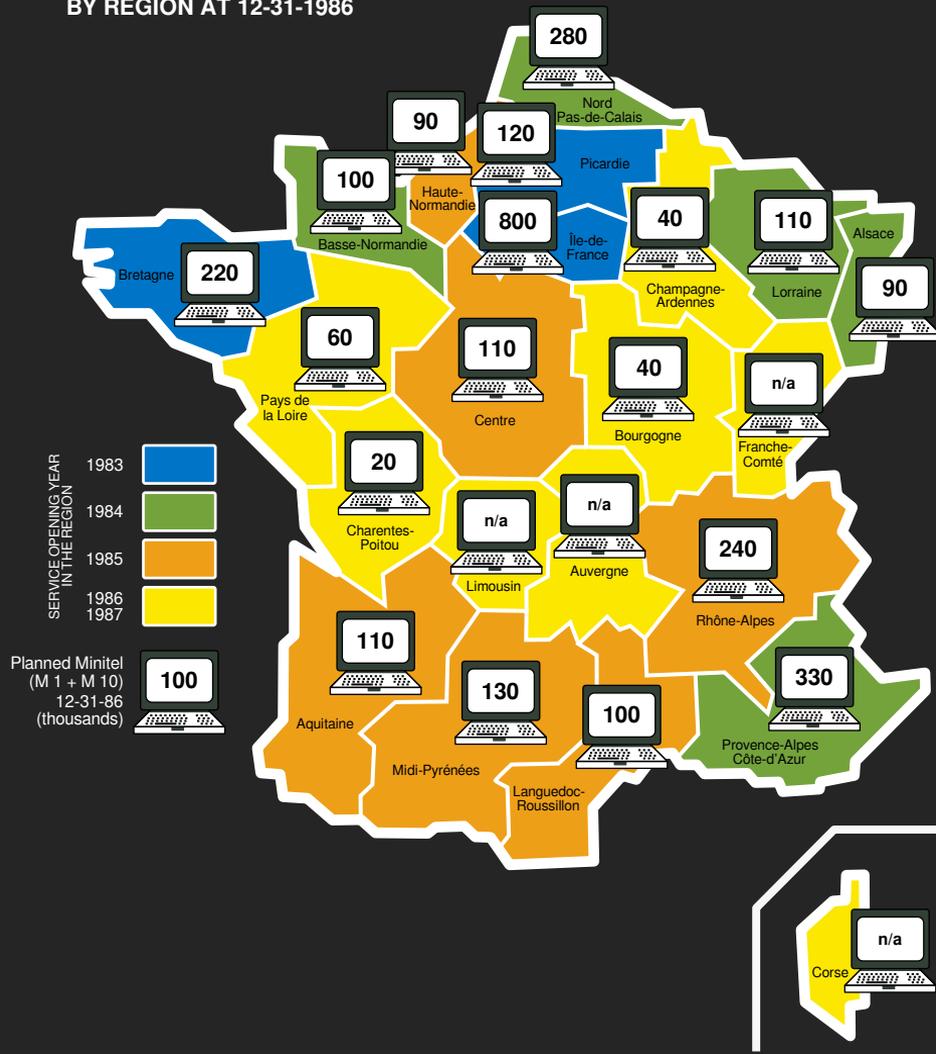


6. Raccrochez votre combiné.

# Minitel everywhere

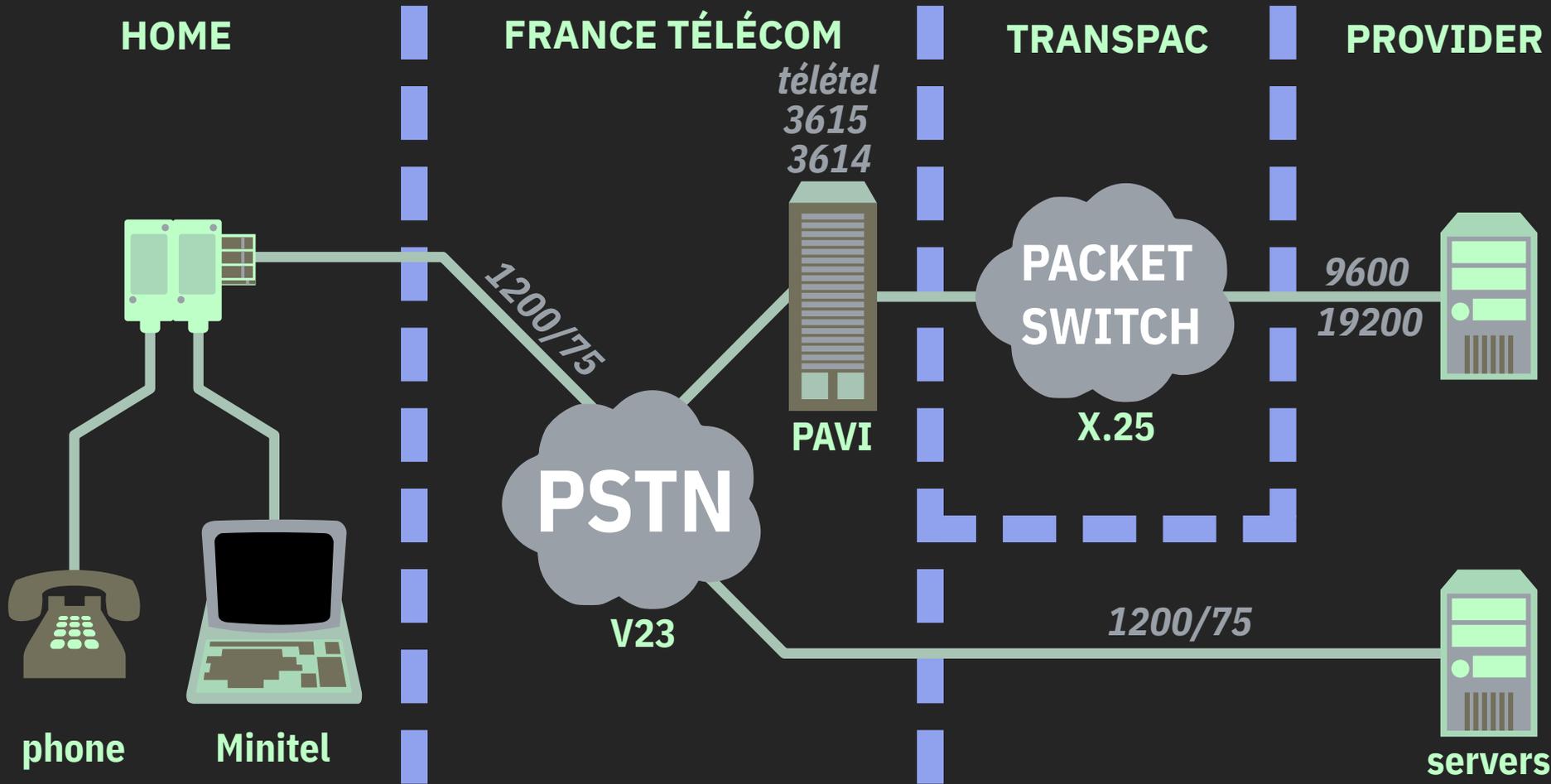
- 1 Minitel = 260 €
- 750 M€ on the map
- In 1993
  - 6.5 millions of Minitel
  - 500000 internal cards
- Paid by the French state
- Need to get the money back

ELECTRONIC TELEPHONE DIRECTORY  
BY REGION AT 12-31-1986



The image features a dark, almost black, background. In the center, the text "How it worked" is written in a bold, white, sans-serif font. On either side of the text, there is a light blue square. The square on the left is positioned to the left of the text, and the square on the right is positioned to the right of the text. Both squares are of equal size and are partially cut off by the edges of the frame.

**How it worked**



# The Minitel network

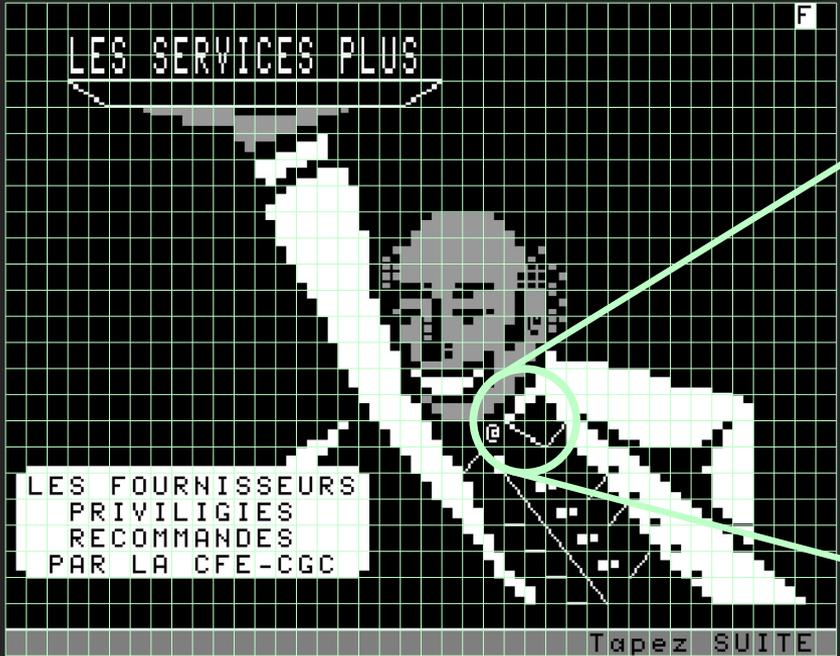
# Le Minitel

- A b&w passive terminal  
7 bits, uses Videotex
- 40 columns for 25 rows  
320 × 250 pixels, semi-graphic
- 8 colors  
though displayed as 8 shades of gray
- Rate  
↓ 1200 bits/s, ↑ 75 bits/s

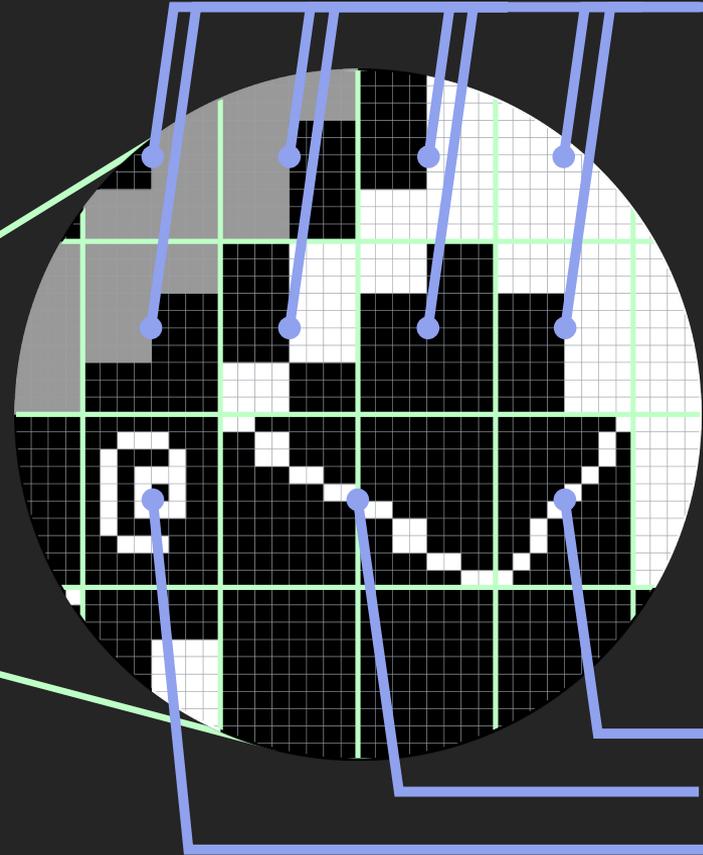
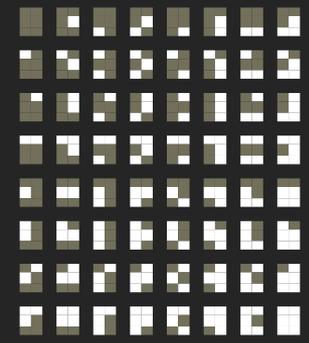


40 columns

25 rows



2x3 mosaic characters

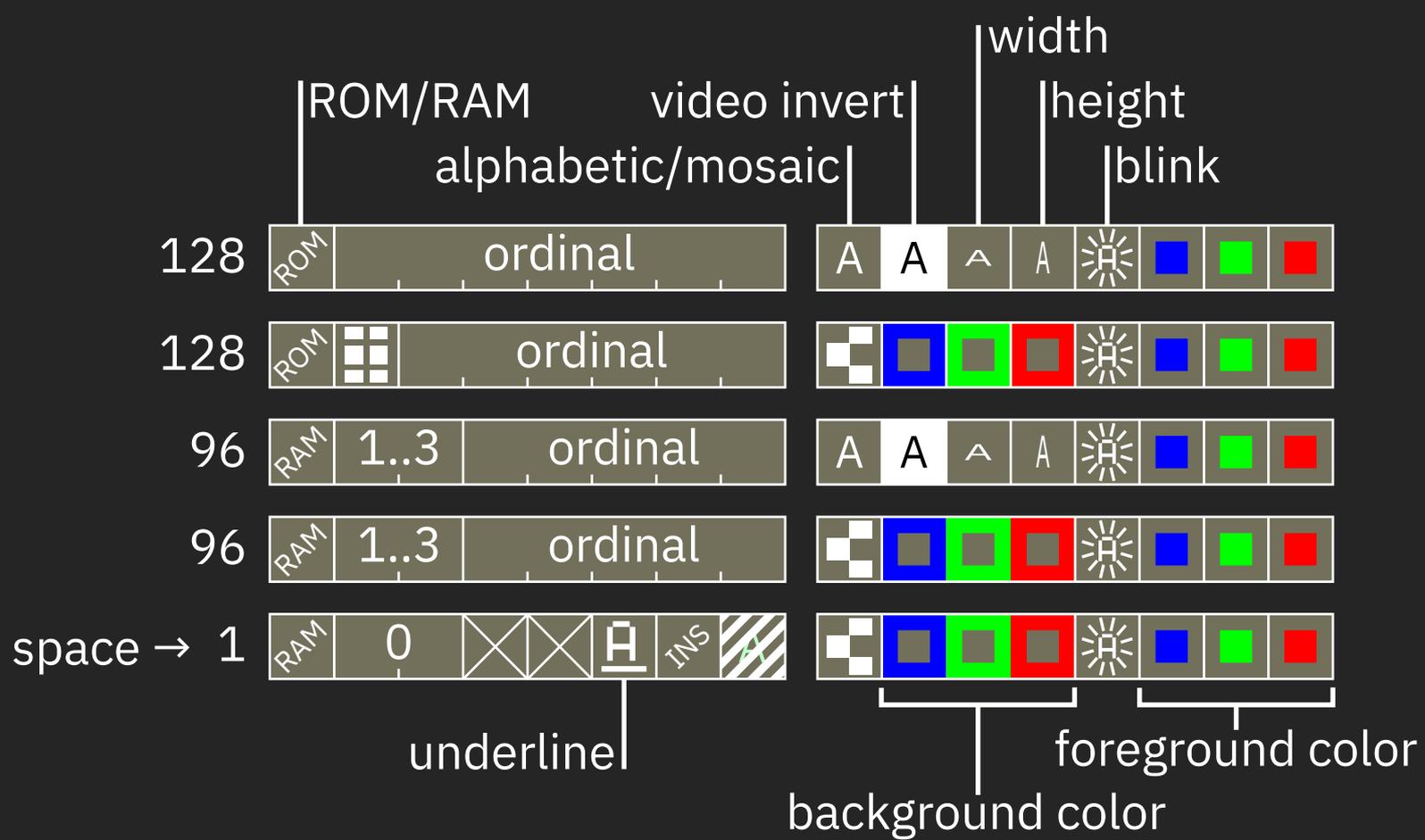


slash

double-width anti-slash

at sign used as a button

# Semi-graphic



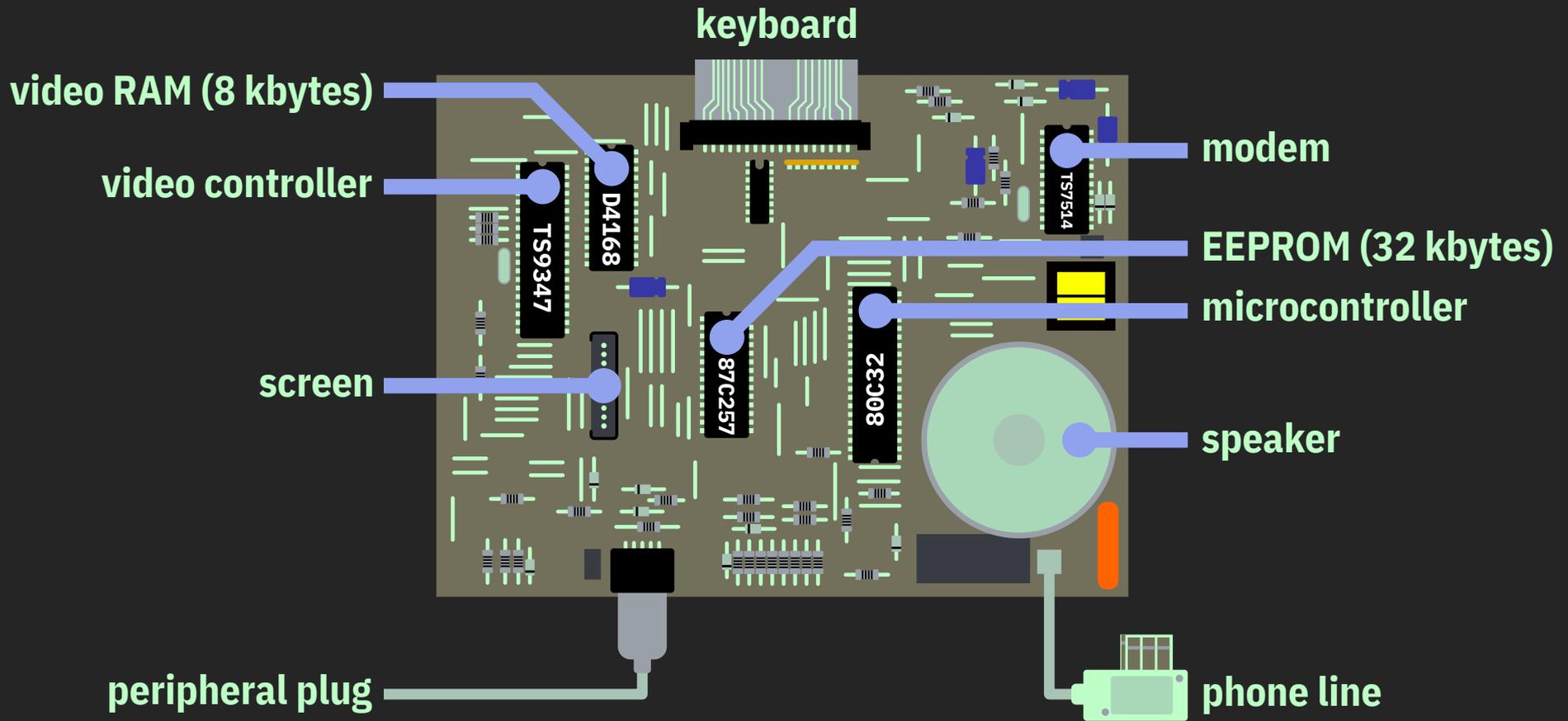
**A complex set of attributes**



FOSDEM'20

0C clear screen  
1F 4C 4C go to row 12, column 12  
1B 4F set double width + double height  
1B 43 set foreground color to yellow  
46 4F 53 44 45 4D 27 FOSDEM'  
1B 4E set double width + normal height  
1B 46 set foreground color to cyan  
0B move cursor to preceding row  
32 30 20

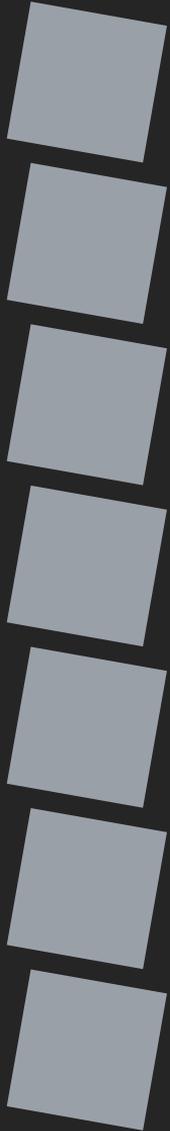
## What Videotex stream looks like



# Minitel 2 hardware

# The enemy brothers

Web (<HTML5)	Minitel
client initiates request	full duplex
no state	continuous
separation of content and presentation	graphics and text are the same
hyperlink	no hyperlink
hardware agnostic	tied to hardware
HTML, CSS, JS	Videotex



# What's needed to emulate a Minitel

- A widely available platform
- Specific capabilities
  - asynchronous communication
  - graphic primitives
- Identifying essential parts
  - Videotex interpreter
  - video controller
  - a Minitel service to connect to

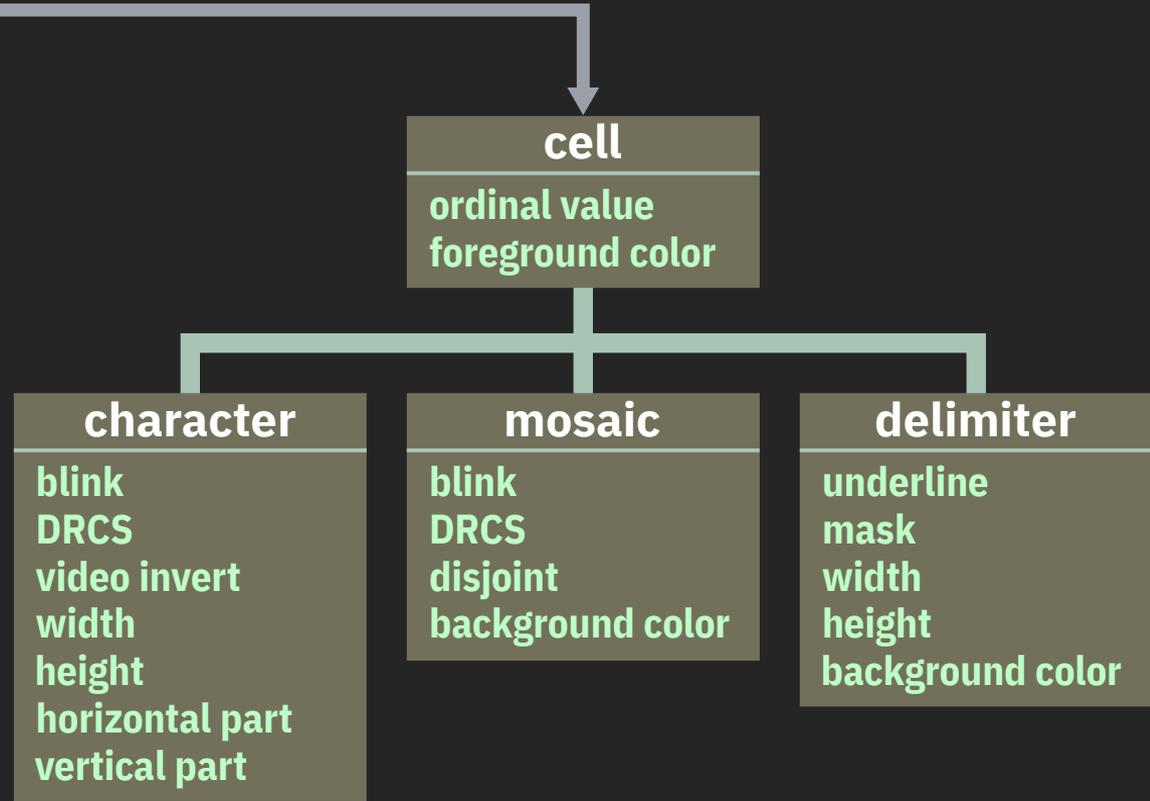
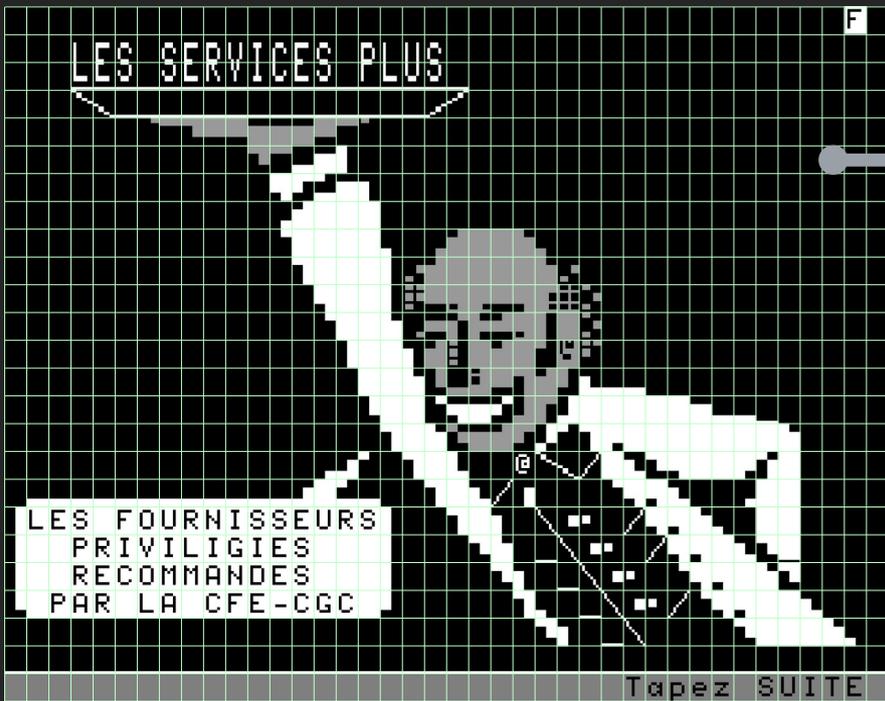


# **HTML5 and ES6 to the rescue**

# HTML5 and ES6

- HTML5 brings essential elements
  - Minitel screen → **canvas**
  - keyboard click → **audio**
  - phone line → **WebSocket**
- ES6 brings lots of programming facilities
  - promises
  - functional approach
  - etc.



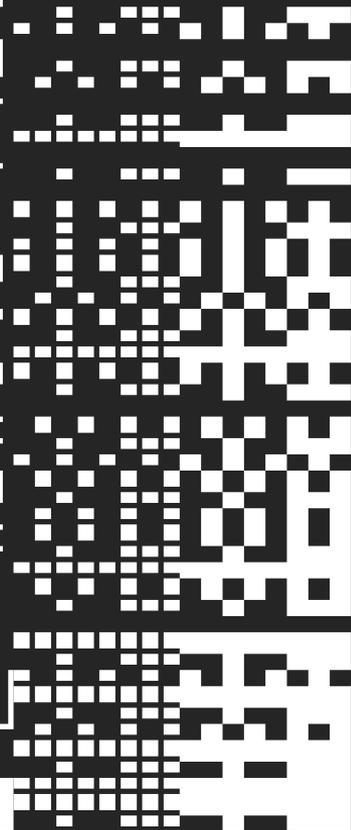


# The video memory

# Video Display Unit (VDU)

- Refreshes 50 times/second
  - draws modified rows
  - draws blinking characters
- Draws characters given their...
  - fore/back color + video inversion
  - underline
  - size
  - mask

```
? ° 0@P-p
À±!1AQa q
éè"2BRbr
ëë#3CScs
âï$4DTdt
Çç%5EUew
èù&6FVfv
Àà'7GWgw
û÷(8H%hx
èè)9IYiy
Ëë* :JZjz
èè+ ;K[k|
←1/4 , <L \ |
î1/2 - =M]m
→3/4 . >N↑n
↓ô / ? O _ o
```



# Creating a Minitel page (demo)

# Surfing on Minitel (demo)



# Resources

- **MiEdit and emulator**
  - sources → <https://github.com/Zigazou/miedit>
  - online → <https://zigazou.github.io/miedit/>
- **Minitel font**
  - sources → <https://github.com/Zigazou/Minitel-Canvas>
- **PyMinitel**
  - sources → <https://github.com/Zigazou/PyMinitel>

# THANKS FOR WATCHING!

- Many thanks to Christian Quest for his invaluable help
- Thanks also go to Julien Mailland
- Contact me
  - Twitter → @zigazou
  - Mail → zigazou@free.fr

# Minitel services... alive!

Name	Web	Phone
Electronic telephone directory	<a href="http://3611.re/">http://3611.re/</a>	+339 7227 3671
3615 code	<a href="http://3615co.de/">http://3615co.de/</a>	
3614 Hacker	<a href="http://www.3614hacker.fr/">http://www.3614hacker.fr/</a>	+339 7252 7252
3614 Teaser	<a href="http://www.3614teaser.fr:8080/">http://www.3614teaser.fr:8080/</a>	
3615 SM	<a href="http://sm.3615.live/">http://sm.3615.live/</a>	
Eureka	<a href="http://eureka.rxl1.com/emul/">http://eureka.rxl1.com/emul/</a>	
Jelora		+339 7262 9267
Computel (runs on a vintage Apple //e)		+331 8421 8116
JCA		+331 8421 8115
Cosmos 6502		+331 8421 8124