The Transtec TT401 Terminal

Martin Hepperle, June 2018

The “Transtec TT401” is a simple serial terminal and was sold by the German company Transtec around 1989.
Transtec was founded in 1980 to market accessories for DEC and Sun at attractive prices. Later it expanded into several European countries. Transtec’s headquarters were located in Tübingen near Stuttgart. Its portfolio was extended to Sun-compatible Sparc workstations and finally High-Performance-Clusters. After many ups and downs the company finally folded in 2017 when it filed for bankruptcy.

The terminal carries a Transtec label but was produced by WYSE. It provides several DEC terminal emulation modes from VT-52 to VT-420. The screen is a white CRT with a diagonal of 12".

The terminal is very similar to the WY-185 and the LINK 420.
LINK was an OEM brand owned by WYSE. If you were to order a few thousand of these LINK terminals you could obtain them with your own company label. This is probably how the Transtec terminal came to life.

My Terminal

I found this terminal in 2018 on eBay and bought it for a reasonable 15€ including shipping. The terminal arrived well packaged and in good physical condition. However, when I tested it I obtained an image where I could at first only guess something like a blurred blinking cursor having a height of about 25 mm. After a while the image changed to a more acceptable display, but it had a strong nonlinearity in the vertical direction. Even with the linearity potentiometer adjusted to its limit, the uppermost line had a height of about 15 mm decreasing down to about 3 mm toward the bottom of the screen. This picture showed some variations each time the terminal was switched on.

Figure 1: Best display obtained after warming up.

Fixing the Terminal

Suspecting a thermal problem in the vertical circuit I used a heat gun to mildly warm the components in the front left corner of the PCB. I observed dramatic changes on the display.

Working on CRT systems requires some care to avoid shock hazard. Even if the tube stores only a low amount of energy this energy is stored at a high voltage which may hurt you if not discharged properly.

So I discharged the CRT tube, disconnected all wires and removed the PCB. A visual inspection showed that the 3300 µF capacitor C313 had leaked and luckily its electrolyte had produced only mild local corrosion on the PCB and the neighboring metallic parts. Another capacitor of the same make was also present so that I decided to replace both.

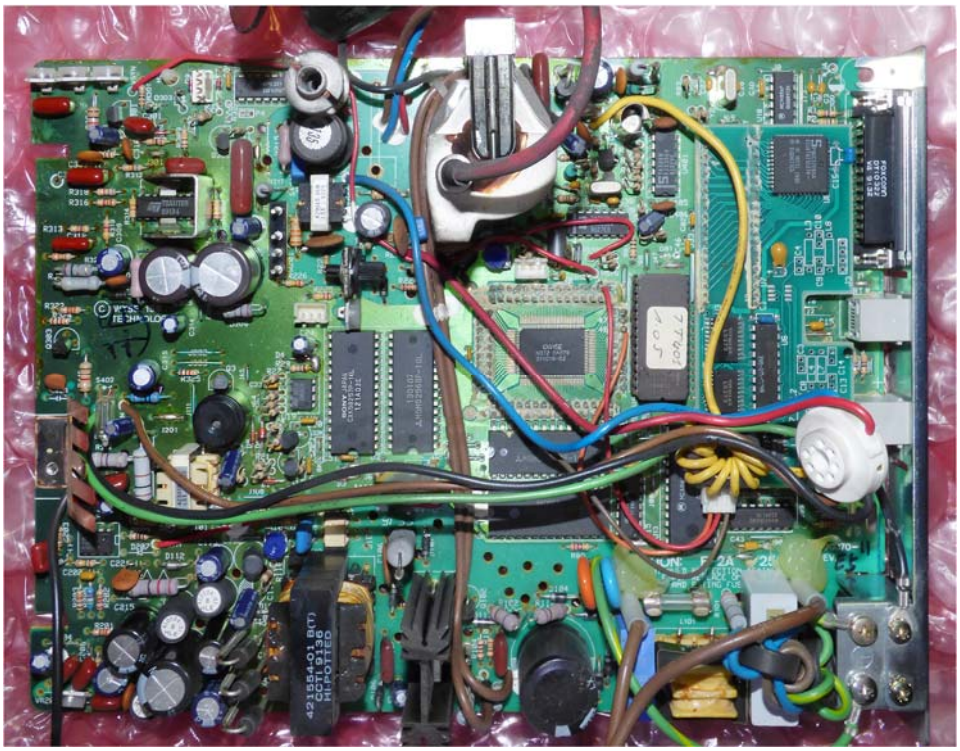

Figure 2: The main PCB carries an interesting piggyback PCB connected via three wires. This installation looks a bit makeshift. The vertical circuit, controlled by a TDA1107 with cooling wings is located in the upper left corner of the picture. The board has a small WYSE ASIC and another one is on the piggyback board.

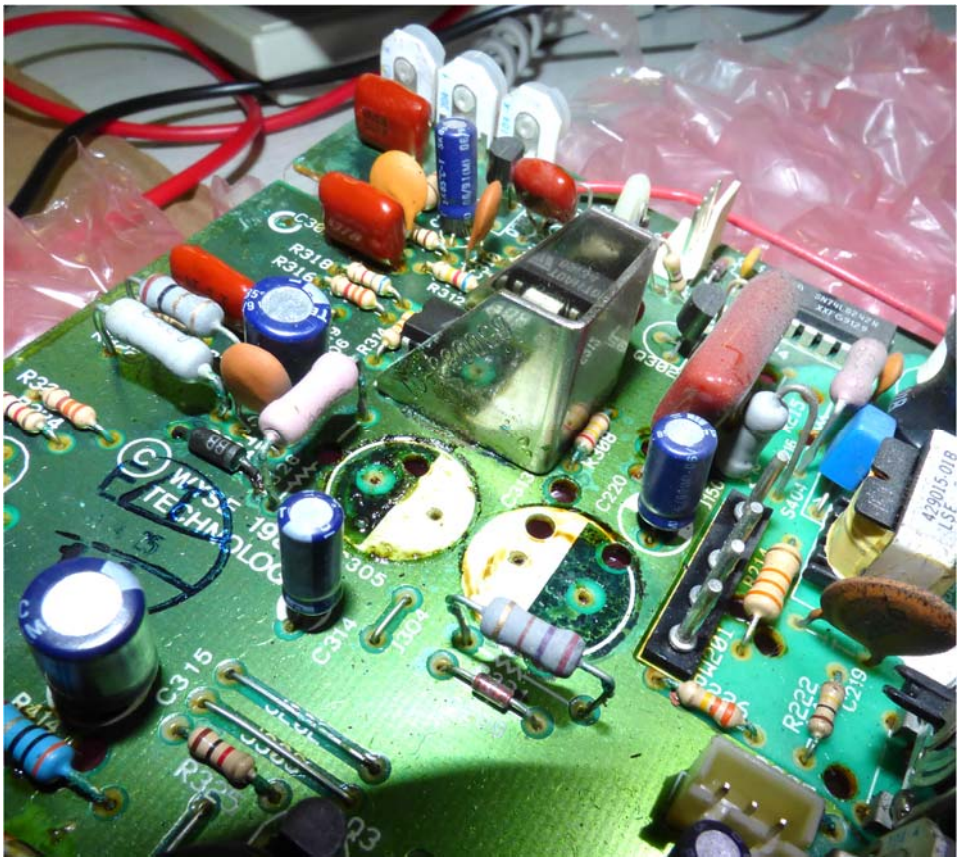

Figure 3: The remains of electrolyte around the leaking capacitor C313.

Figure 4: The two main culprits – leaking electrolytic capacitors. Note the low height.

I replaced the two electrolytic capacitors but was not able to find replacements with the same height. So I soldered the new ones into the PCB and tried to insert the PCB into the terminal. Thus I learned that they interfered with the CRT tube. Therefore I removed them again, added short wires and fixed them in a horizontal position using double sided foam tape.
Spotting three infamous WIMA X and Y filter capacitors, one already with slight cracks, I replaced these too. Interestingly two of them had been soldered "free flying" to the bottom of the PCB, maybe a last resort to fulfill the German FTZ regulations.

Some notes on WIMA and RIFA capacitors in power line filters
These capacitors were produced by casting a polyester resin around the capacitor foils. Polyester has good insulating characteristics, but it shows a relatively large shrinking factor when it cures. The shrinkage makes it easy to remove the capacitors from the mold during the manufacturing process. However the shrinkage does never stop – it continues over time so that polyester resin parts develop internal stresses until the resin may even crack. Depending on environmental factors this seems to happen after 10-20 years with these capacitors. The cracks may deform the metal foils and cause shorts, probably supported by humidity entering these cracks.

Note: Polyester resin (reinforced with glass fibers) was also used when composite materials were developed for application in aircraft. After a few years it was superseded by Epoxy resin. Epoxy has almost no shrinkage and better long term stability but is more expensive. Today, most aircraft parts are made from glass and carbon fibers, impregnated with Epoxy resin.
Polyester resin is cheaper and is therefore still used for objects where durability and maximum strength is not necessary – for example in low cost mass production of sailboats or car parts.

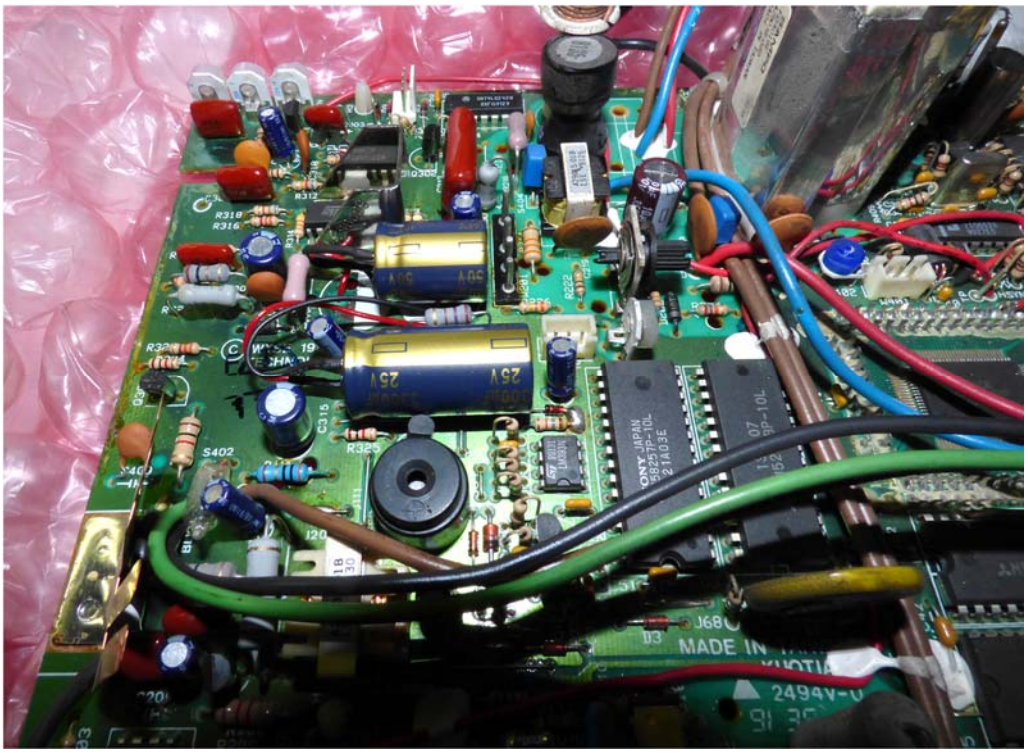

Figure 5: The flat installation of the new capacitors still maintains sufficient air flow around the resistor between them.

Figure 6: The keyboard's PCB is imprinted with the markings "(C) WYSE 1986 Technology, 99016 1-01 REV A4".

Figure 7: The rear view of the main unit (swiveling foot removed) shows the printer port and a second serial port as well as the DB-25 connector for the first serial port.

The back carries a label with the following details:

transtec Germany	Model No.: TT401 WHT
Made in Taiwan R.O.C.	Part No.: 00-102-079-004
	Serial No.: 0HX11A00184
	240 V 0.4 A 50 Hz

Terminal Setup

The F3 key opens a set of self explanatory setup screens as shown on the following pages.

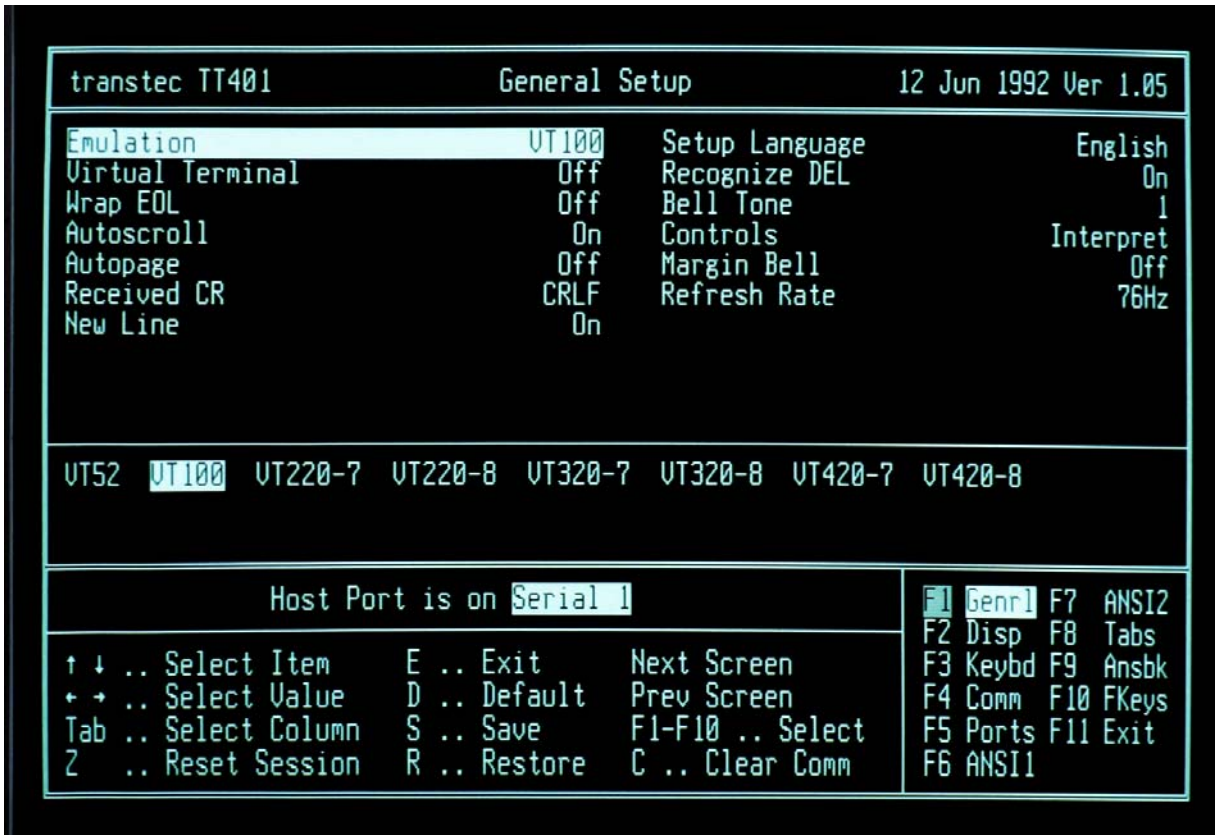

Figure 8: "General Setup" screen.

Figure 9: "Display Setup" screen.

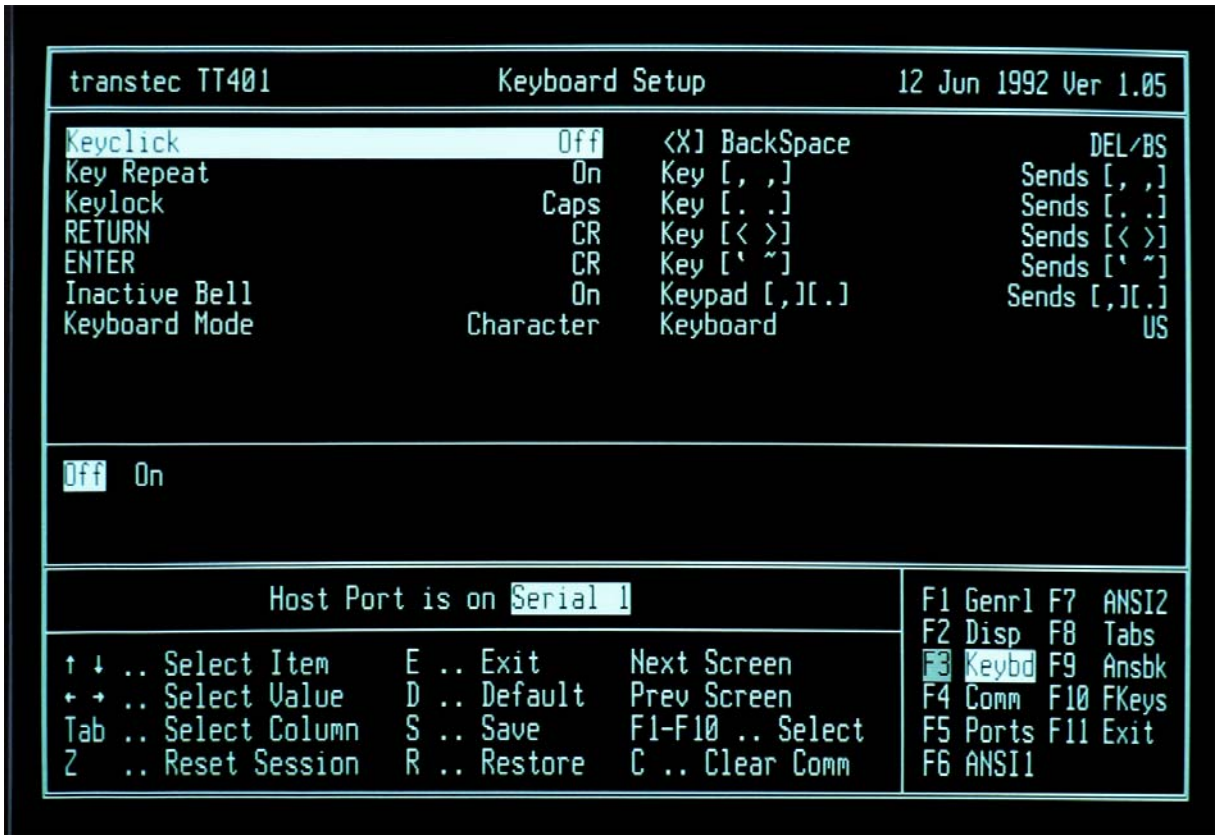

Figure 10: "Keyboard Setup" screen.

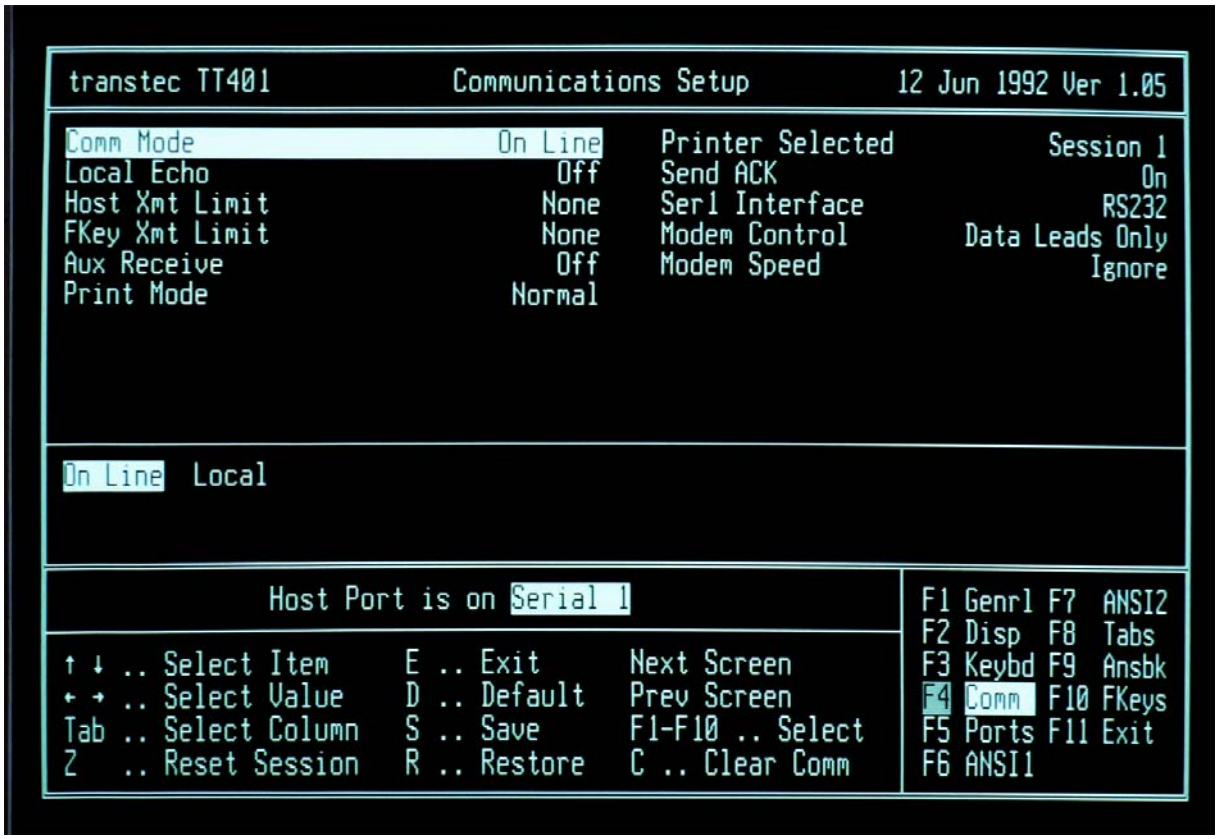

Figure 11: "Communication Setup" screen.

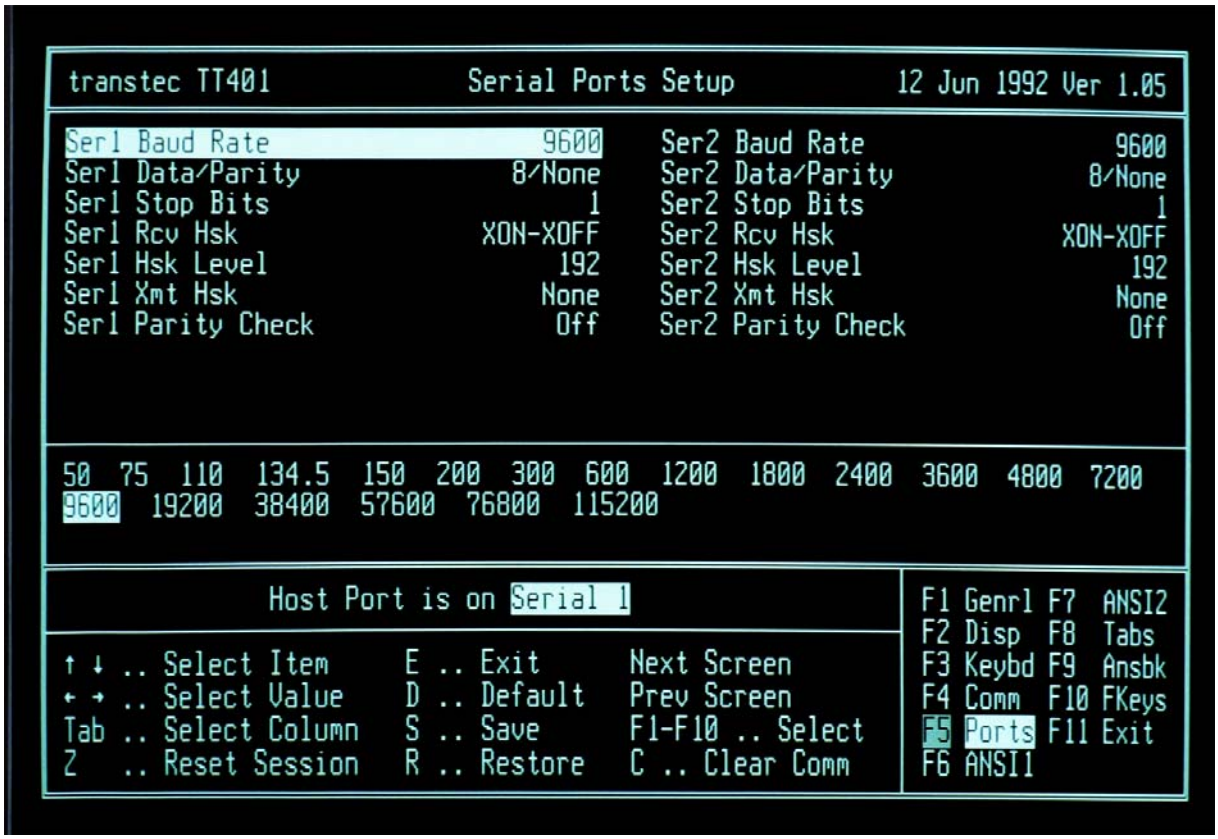

Figure 12: “Serial Ports Setup” screen.

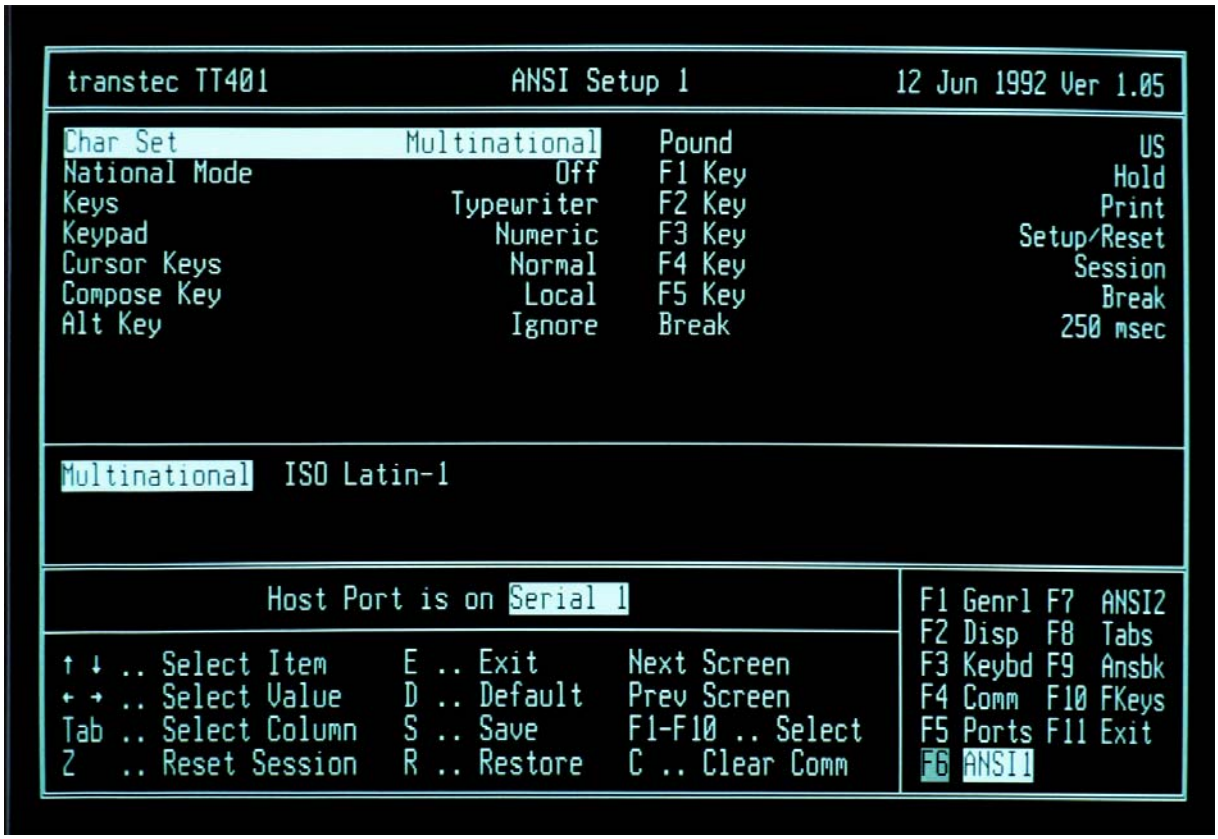

Figure 13: “ANSI Setup 1” screen.

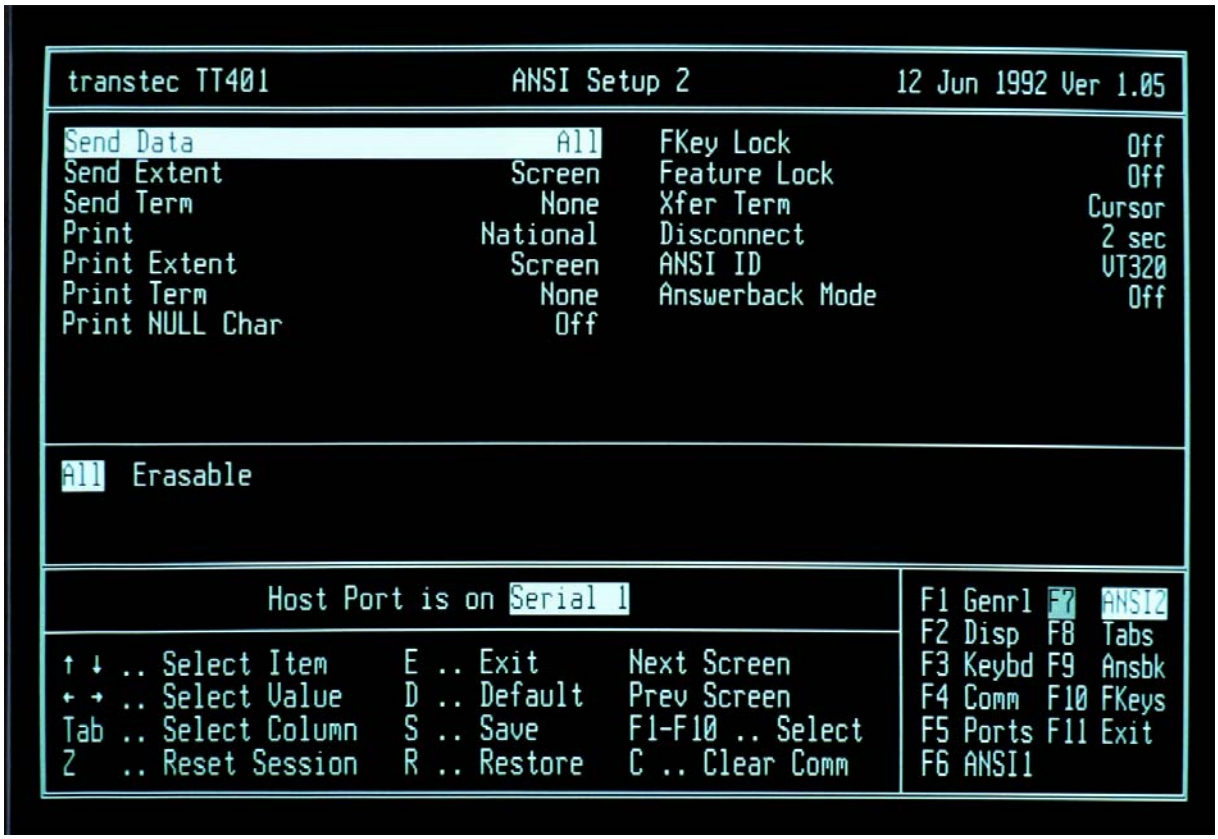

Figure 14: "ANSI Setup 2" screen.

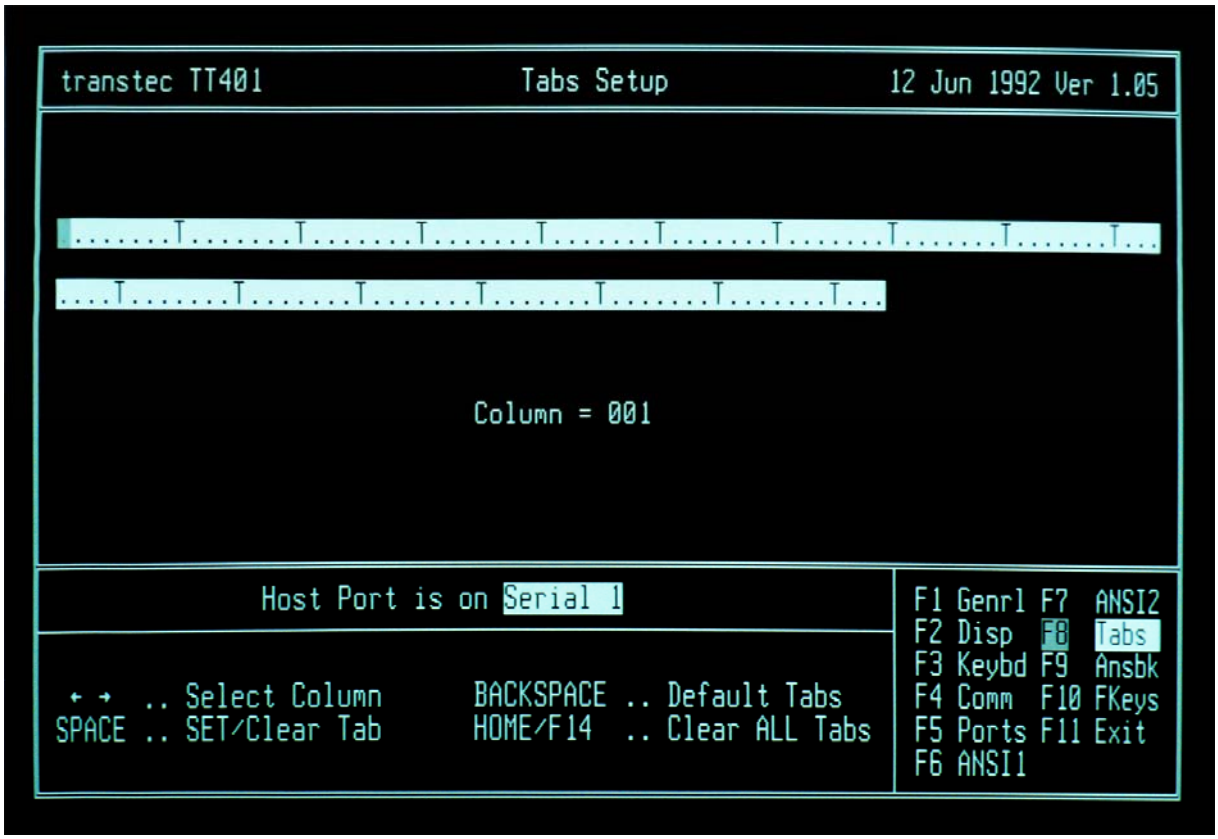

Figure 15: "Tabs Setup" screen.

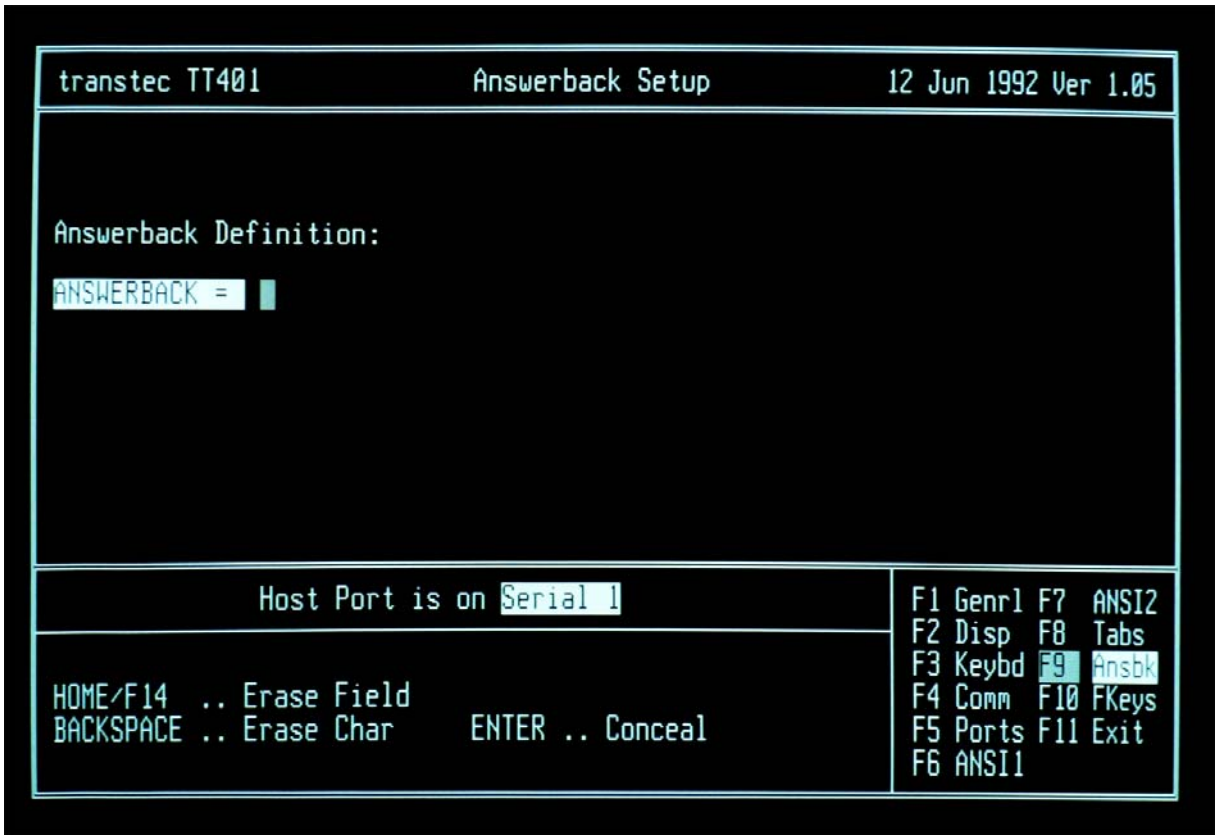

Figure 16: "Answerback Setup" screen.

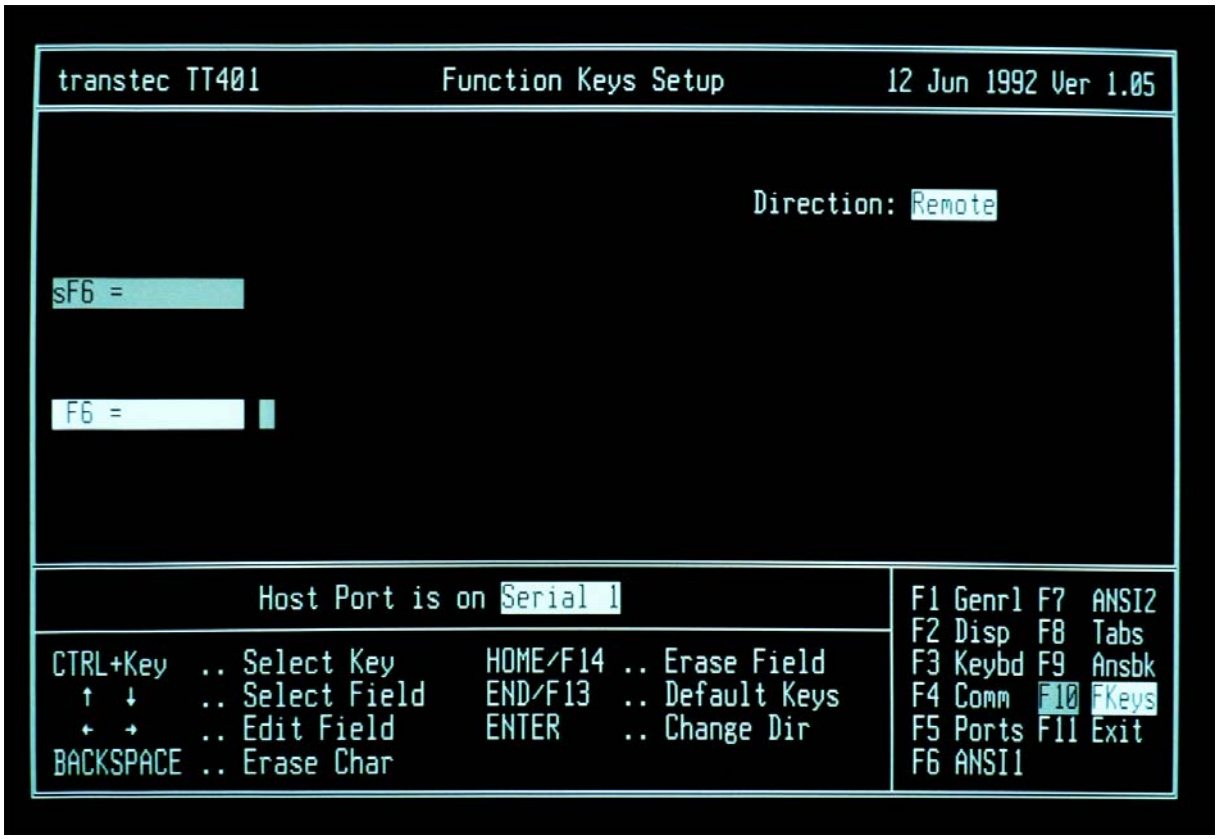

Figure 17: "Function Keys Setup" screen.

Port A – DB-25 connector (Port A, RS-232C)

Pin	Signal	Direction
1	Frame Ground	
2	Transmit Data	Out
3	Receive Data	In
4	Request to Send	Out
5	Clear to Send	In
6	Data Set Ready	In
7	Signal Ground	
8	Data Carrier Detect	In
12	Speed Indicator	In
20	Data Terminal Ready	Out
23	Speed Select	Out

Port B – RJ-12 6P6C Connector

Pin	Signal	Direction
1	Data Terminal Ready	Out
2	Transmit Data	Out
3	Transmit Signal Ground	
4	Receive Signal Ground	
5	Receive Data	In
6	Data Set Ready	In

Port PR – RJ-12 6P6C Connector

Pin	Signal	Direction
1	Data Terminal Ready	Out
2	Transmit Data	Out
3	Transmit Signal Ground	
4	Receive Signal Ground	
5	Receive Data	In
6	Data Set Ready	In

The two RJ-11 connectors looked liked asymmetric MMJ-423 connectors but they weren't.

Keyboard – RJ-10 4P4C Connectors

Keyboard End			Terminal End	
1	YELLOW	Data	4	BLACK
2	GREEN	+5V	3	RED
3	RED	Clock	2	GREEN
4	BLACK	Grd	1	YELLOW

CSI 2 h	keyboard lock ON	
CSI 3 h	control representation ON	
CSI 4 h	Insert ON	
CSI 12 h	local echo OFF	
CSI 13 h	control execution OFF	
CSI 16 h	transfer termination ON	
CSI 20 h	newline ON	
CSI 30 h	display OFF	
CSI 31 h	status line ON	
CSI 32 h	screen saver ON	
CSI 33 h	steady cursor ON	
CSI 34 h	underline cursor ON	
CSI 35 h	wide change clear OFF	
CSI 36 h	delete key redefinition ON	
CSI 37 h	nonerasable area transmit ON	
CSI 38 h	send full page ON	
CSI 40 h	extra data line ON	
CSI 42 h	select WY-60 personality	
CSI 49 h	recognize DEL ON	
CSI 54	key code mode ON	
CSI = 89 h	enable status reports ON	
CSI 61 1 " p CSI 61 2 " p	select VT 100 personality, 7-bit transmission 8-bit transmission	
CSI 62 1 " p CSI 62 2 " p	select WY-85 or VT 400 personality, 7-bit transmission 8-bit transmission	
CSI 63 1 " p CSI 63 2 " p	select VT 300 or 400 personality, 7-bit transmission 8-bit transmission	
ESC SPACE F	select 7-bit transmission mode	
ESC SPACE G	select 8-bit transmission mode	
ESC 7 CSI s	save cursor position	
ESC 8 CSI u	restore cursor position	
CSI 67 % w	save current settings to NVRAM	
ESC ,	delay terminal processing	
CTRL G	sound bell	BEL
CTRL X	abort escape sequence	CAN
CTRL Z	abort escape sequence	SUB
ESC] ESC ^ ESC _	ignore subsequent data	
ESC ! p	terminal mode reset	
CSI ! p	soft terminal reset	
ESC c	hard terminal reset	
ESC # 8	display screen alignment pattern	
ESC =	set numeric keypad to application mode	
ESC >	set numeric keypad to numeric mode	
DCS 0 ! u % 5 ST	select multinational character set	
DCS 1 ! u A ST	select ISO Latin-1 character set	
CTRL O	assign G0 character set to GL	SI
CTRL N	assign G1 character set to GL	SO

ESC ~	assign G1 character set to GR	
ESC n	assign G2 character set to GL	
ESC }	assign G2 character set to GR	
ESC o	assign G3 character set to GL	
ESC |	assign G3 character set to GR	
ESC N	assign G2 character set to GL for next character only	
ESC O	assign G3 character set to GL for next character only	
ESC D	move cursor down one line	
CTRL J CTRL K CTRL L	move cursor down	LF VT FF
ESC M	move cursor up one line	
ESC E	move cursor to first column of next line	
ESC 6	back index cursor	
ESC 9	forward index cursor	
CTRL H	backspace cursor	BS
CTRL M	move cursor to start of line	CR
CTRL I	tab forward to next tab stop	TAB
CSI 0 g	clear tab stop	
CSI 0 g CSI 2 W	clear tab stop at current position	
CSI 3 g CSI 5 W	clear all tab stops	
CSI 0 W ESC H	set tab stop at current cursor position	
CSI ? 5 W	set tab stop every 8th column	
CTRL S	suspend transmission	XOFF
CTRL Q	resume transmission	XON
CTRL E	set answerback mode	ENQ
ESC 5	send cursor character	
CSI 0 c	request primary device attributes	
ESC SPACE 0	request terminal product ID	
CSI > 0 c	request secondary device attributes	
CSI = 0 c CSI = c	request tertiary device attributes	
CSI 1 $ u	request terminal operating state	
CSI " v	request display extent report	
CSI & u	request user-preferred supplemental set	
ESC [0 i	page print	
ESC [? 5 i	print on terminal and printer ON	
ESC [? 4 i	print on terminal and printer OFF	
ESC [5 i	print on printer ON	
ESC [4 i	print on printer OFF	

CSI = Command Sequence Initiator = ESC [
DCS = character set character = 90_h, 220_o, 144_d (not sure whether this is correct)
ESC = Escape character = $1B_h$, 33_o, 27_d

References

[1] WYSE WY-185 Maintenance Manual, 870030-01 Rev. A, Wyse Technology, November 1989.
[2] WYSE WY-185ES Product Datasheet, Qume Division, 2006
[3] WYSE Support Knowledgebase, various articles, http://www.wyse.com:80/service/support/kbase, archived at https://web.archive.org