# 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.

	LINE Hello Horld 🚽	<u>\$1                                    </u>	nt	-
	ov are you?			
	1 2 3			
	5 6 7 8			
	9 0 1 2 3			
ž		— approx. 3 mm line heigh	t	
	missing height			

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  $\mu$ F 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.

transtec TT4	01	G	eneral S	Getup		12 Jun	1992 Ve	r 1.05
Emulation Virtual Term: Wrap EOL Autoscroll Autopage Received CR New Line	inal		VT100 Off Off Off CRLF On	Setup La Recogniz Bell Ton Controls Margin B Refresh	e DEL e ell			nglish On 1 erpret Off 76Hz
UT52 <u>UT100</u>	VT220-7	VT220-8	VT320-7	VT320-8	VT420-7	UT420	)-8	
	Host Po	rt is on	Serial 1				enrl F7	ANSI2
† ↓ Select + → Select Tab Select Z Reset	t Value t Column	D De S Sa	fault ve	Next Scree Prev Scree F1-F10 C Clear	n Select	F3 Ke F4 Co	sp F8 sybd F9 omm F10 orts F11 ISI1	

Figure 8: "General Setup" screen.

torretor TT401	D:1	C-to-	12 1 1000 11 4 05
transtec TT401	Display	Setup	12 Jun 1992 Ver 1.05
Columns Auto Resize Screen Data Lines Line/Screen Display Cursor Cursor Style Background	80 On 3x48 36 On Blink Block Dark		Jump 5 Minutes
80 132			
Host Por	t is on <mark>Serial</mark>	1	F1 Genr1 F7 ANSI2
† ↓ Select Item + → Select Value Tab Select Column Z Reset Session	D Default S Save	F1-F10 Select	<ul> <li>Disp F8 Tabs</li> <li>F3 Keybd F9 Ansbk</li> <li>F4 Comm F10 FKeys</li> <li>F5 Ports F11 Exit</li> <li>F6 ANSI1</li> </ul>

Figure 9: "Display Setup" screen.

transtec TT401	Keyboard	l Setup	12 Jun 1992 Ver 1.05
<mark>Keyclick</mark> Key Repeat Keylock RETURN ENTER Inactive Bell Keyboard Mode	Off On Caps CR CR On Character	<x] backspace<br="">Key [, ,] Key [] Key [&lt; &gt;] Key [' ~] Keypad [,][.] Keyboard</x]>	DEL/BS Sends [, ,] Sends [] Sends [< >] Sends [` ~] Sends [,][.] US
Host Por	t is on Serial	1	F1 Genr1 F7 ANSI2
↑↓ Select Item ←→ Select Value	E Exit D Default S Save		F2 Disp F8 Tabs F2 Disp F8 Tabs F3 Keybd F9 Ansbk F4 Comm F10 FKeys F5 Ports F11 Exit F6 ANSI1

Figure 10: "Keyboard Setup" screen.

transtec TT401	Communications	s Setup	12 Jun 1992 Ver 1.05
Comm Mode Local Echo Host Xmt Limit FKey Xmt Limit Aux Receive Print Mode	On Line Off None None	Printer Selected Send ACK Serl Interface Modem Control Modem Speed	
On Line Local			
Host Port i	s on Serial 1		F1 Genrl F7 ANSI2 F2 Disp F8 Tabs
† ↓ Select Item E + → Select Value D Tab Select Column S Z Reset Session R	Default Pr Save F1	I-F10 Select	F2 Disp F8 Tabs F3 Keybd F9 Ansbk F4 Comm F10 FKeys F5 Ports F11 Exit F6 ANSI1

Figure 11: "Communication Setup" screen.

transtec TT401	Serial Ports	Setup	12 Jun	1992 Ve	r 1.05
Serl Baud Rate Serl Data∕Parity Serl Stop Bits Serl Rcv Hsk Serl Hsk Level Serl Xmt Hsk Serl Parity Check	XON-XOFF 192 None	Ser2 Baud Rate Ser2 Data⁄Parity Ser2 Stop Bits Ser2 Rcv Hsk Ser2 Hsk Level Ser2 Xmt Hsk Ser2 Parity Check			9600 B/None 1 N-XOFF 192 None Off
50 75 110 134.5 150 <mark>9600</mark> 19200 38400 5760		1200 1800 2400	3600	4800	7200
Host Port ↑ ↓ Select Item E + → Select Value D Tab Select Column S Z Reset Session R	)Default Pr SSave F1	ev Screen -F10 Select	F2 Di F3 Ke F4 Co	enrl F7 sp F8 eybd F9 umm F10 <mark>urts</mark> F11 ISI1	Tabs Ansbk FKeys

Figure 12: "Serial Ports Setup" screen.

transtec TT401	ANSI Se	tup 1	12 Jun 1992 Ver 1.05
Char Set National Mode Keys Keypad Cursor Keys Compose Key Alt Key	Multinational Off Typewriter Numeric Normal Local Ignore	Pound F1 Key F2 Key F3 Key F4 Key	US Hold Print Setup/Reset Session Break 250 msec
Multinational I	SO Latin-1		
Ho	st Port is on <mark>Serial</mark>	1	F1 Genr1 F7 ANSI2
Tab Select Co	lue DDefault	F1-F10 Select	F2 Disp F8 Tabs F3 Keybd F9 Ansbk F4 Comm F10 FKeys F5 Ports F11 Exit F5 ANST1

Figure 13: "ANSI Setup 1" screen.

transtec TT401	ANSI Se	etup 2	12 Jun 1992 Ver 1.05
Send Data Send Extent Send Term Print Print Extent Print Term Print NULL Char	All Screen None National Screen None Off	FKey Lock Feature Lock Xfer Term Disconnect ANSI ID Answerback Mode	Off Off Cursor 2 sec VT320 Off
All Erasable			
Host Por	t is on <mark>Serial</mark>	1	F1 Genrl M ANSI2
<pre>↑ ↓ Select Item • → Select Value Tab Select Column Z Reset Session</pre>	D Default S Save	F1-F10 Select	- F2 Disp F8 Tabs F3 Keybd F9 Ansbk F4 Comm F10 FKeys F5 Ports F11 Exit F6 ANSI1

Figure 14: "ANSI Setup 2" screen.

THE THE		10 1 1000 11 1
transtec TT401	Tabs Setup	12 Jun 1992 Ver 1.0
T T	T T T T	
······		
		T
	0.1 001	
	Column = 001	
Hast Dart	is on Serial 1	
		F1 Genrl F7 ANSI F2 Disp 🔀 Tabs
		F3 Keybd F9 Ansb
+ → Select Column SPACE SET/Clear Tab	BACKSPACE Default T HOME∕F14 Clear ALL	abs   F4 Comm F10 FKey Tabs   F5 Ports F11 Exit
		F6 ANSI1

Figure 15: "Tabs Setup" screen.

transtec TT401	Answerback Setup	12 Jun 1992 Ver 1.05
Answerback Definition:		
ANSWERBACK =		
Host Port is	s on Serial l	F1 Genr1 F7 ANSI2
HOME/F14 Erase Field BACKSPACE Erase Char	ENTER Conceal	F2 Disp F8 Tabs F3 Keybd F9 Ansbk F4 Comm F10 FKeys F5 Ports F11 Exit F6 ANSI1

Figure 16: "Answerback Setup" screen.

transtec TT401	Function Keys Setup	12 Jun 1992 Ver 1.05
sF6 =	Ι	Direction: Remote
F6 =		
Host Po	rt is on Serial 1	F1 Genr1 F7 ANSI2
CTRL+Key Select K ↑ ↓ Select F ← → Edit Fie BACKSPACE Erase Ch	ield END/F13 Default ld ENTER Change	t Keys   F4 Comm 🔢 FKeys

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	Out
	Ready	
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

		-1
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	select VT 100 personality, 7-bit transmission	
CSI 61 2 " p	8-bit transmission	
CSI 62 1 " p	select WY-85 or VT 400 personality, 7-bit transmission	
CSI 62 1 p CSI 62 2 " p	8-bit transmission	
CSI 62 2 p	select VT 300 or 400 personality, 7-bit transmission	
CSI 63 2 " p	8-bit transmission	
ESC SPACE F	select 7-bit transmission mode	
ESC SPACE G	select 8-bit transmission mode	
ESC 5FACE 0	save cursor position	
CSI s	save cursor position	
ESC 8	restore cursor position	
CSI u	restore cursor position	
CSI 67 % w	save current settings to NVRAM	
ESC,		
	delay terminal processing sound bell	BEL
CTRL G		
CTRL X	abort escape sequence	CAN
CTRL Z	abort escape sequence	SUB
ESC ] ESC ^	ignore subsequent data	
ESC_	tominal made react	
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

### Control and Escape Sequences for Native Personality

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	move cursor down	LF
CTRL K		VT
CTRL L		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	clear tab stop at current position	
CSI 2 W	1 1	
CSI 3 g	clear all tab stops	
CSI 5 W	1	
CSI 0 W	set tab stop at current cursor position	
ESC H	1 1	
CSI ? 5 W	set tab stop every 8 <sup>th</sup> 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	request tertiary device attributes	
CSI = c		
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	$=90_{\rm h}, 220_{\rm o}, 144_{\rm d}$ (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