The Brother TC-600

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1.1. General

The Brother TC-600 is a fully portable typewriter from the 1980s with terminal capabilities. Despite its lightweight plastic design, it features a well-designed keyboard. In the 1980s it was often used as a low-cost portable terminal respectively teletype.

It can be used in three operating modes:

- simple typewriter,
- word processor with storage capacity for several documents,
- computer terminal which can also send and receive text documents.

Table 1 Main characteristics of theTC-600.

Dimensions	340 x 276 x 58 mm
Display	single line 23 character LCD display
Interface	RS232 interface
Memory	14.3 kB memory, can be used to hold up to 9 named files
Mass Storage	optional 3-1/2 inch disk (100 kB) station FB-100 via RS 232 interface
Print Speed	12 cps
Print Method	thermal print head 24 x 18 dots (Brother Ribbon 6030)
Print Width	80 characters per line
Medium	a) thermal paper (210mm wide, without a ribbon), or b) paper with thermo-transfer ribbon (smooth paper preferred)
Power Supply	4 x LR20 batteries or external 6V power supply

Table 2 Similar Brother Terminal/Typewriters.

Type	EP-22	EP-44	TC-600
Keys	44	44	
Printing Speed	17 cps	16 cps	12 cps
Matrix	5x7	24x18	24x18
Characters per Line	75 characters	80 characters	80 characters
Display	16 characters	15 characters	23 characters
Calculator Function	= + - * /	= + - * / %	NO
Dimensions WxHxD	12.5 x 1.75 x 8.75 inch	13.2 x 2.2 x 10.5 inch	
Mass	5.3 lbs	5.5 lbs	
Baud Rates	75, 300	75, 110, 300, 600, 1200	75, 110, 150, 300, 600, 1200
Data Bits, Parity	8N	7N, 7Z, 7E, 7O, 8N	7N, 7Z, 7E, 7O, 8N
Stop Bits	1	1	1, 2
Handshaking	None, DTR monitored	None, Hardware, XON/XOFF	None, Hardware, XON/XOFF
Receive/Send	RXD	TXD, RXD	TXD, RXD
Memory	2015 Bytes	3726 Bytes	14.3 kB
Print Buffer	78 Bytes	78 Bytes	

Figure 1 **This advertisement for the Brother TC-600 appeared in 1985 on two opposing pages in the well-known, German magazine "Der Spiegel", reaching hundreds of thousands of readers. It showed the TC-600 as the "reinvented typewriter" as a peripheral for a computer as well as a standalone communication terminal.**

Figure 2 **A Brother TC-600 with German keyboard, serial cable and power supply connected. The paper holder for Fax paper rolls has been built by myself. A similar holder had been available as an accessory (order #6600). Furthermore, my machine is missing the keyboard and the serial port covers.**

1.2. The Power Supply

The machine can be powered by four internal LR20/AM-1/D/Mono batteries or by an external 6V DC power supply. The current during printout easily reaches 1A. **Please note that the 5.5 mm barrel connector has the positive voltage on the outside and the center pin carries ground.**

1.3. The Innards

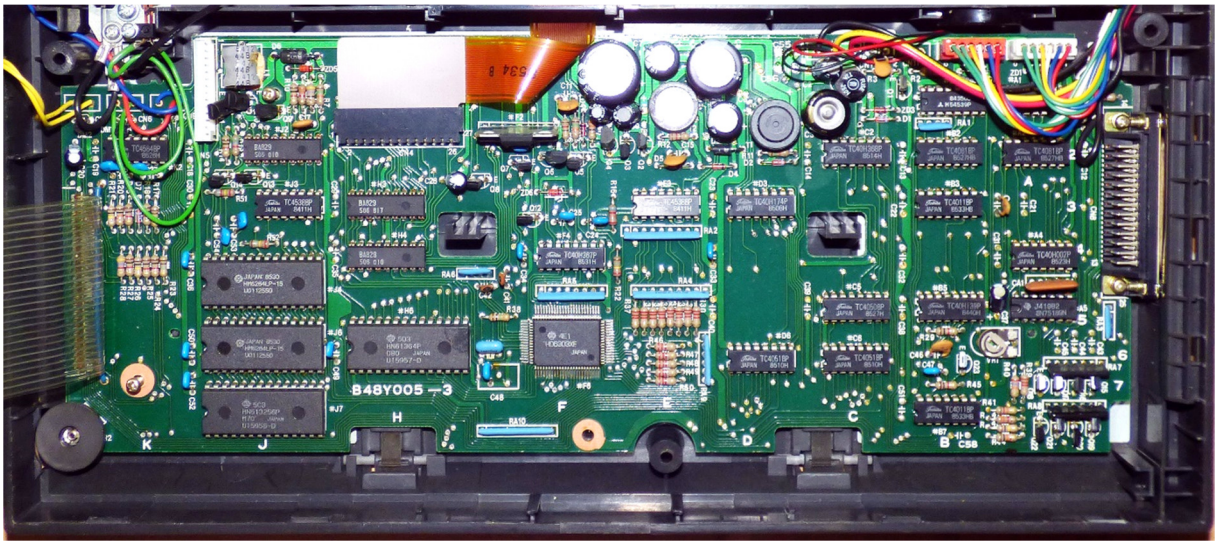


Figure 3 **The main printed circuit board with keyboard connector on the left and serial port on the right.**

Table 3 List of Components.

Count	Part-No.	Position	Description
2	M54539P	#A1, #B1	7 x Transistor array, stepper motor driver for paper advance and print head motion
1	TC4584BP	#K2	Hex Schmitt Trigger
2	TC4081BP	#A2, #B2	four AND gates with dual input
1	RC4011BP	#B3	four NAND gates with dual input
1	TC4011BP	#B7	four NAND gates with dual input
1	TC4050BP	#C5	six non-inverting buffers and TTL drivers
2	TC4051BP	#C6, #D6	8-channel analog multiplexer
2	TC4538BP	#E3, #J3	Dual Precision Retriggerable/Resettable Monostable Multivibrator
1	TC40H002P	#A4	quad 2-input NOR gate
1	TC40H367P	#F4	five 3-state non-inverting buffers
1	TC40H368P	#C2	five 3-state inverting buffers
1	TC40H174P	#D3	six D-memory buffers
1	TC40H139P	#B5	dual 2-to-4-line decoder
1	SN75189N	#A5	quadruple line receivers (RXD, DSR, CTS, ...?)
3	BA829	#J2, #H3, #H4	8-bit, serial IN, parallel OUT driver for print head
1	HD6303F	#F6	CMOS MPU
1	HN61364P	#H6	8192-word x 8-bit mask programmed Read Only Memory
1	HN613256P	#J7	32768-word x 8-bit CMOS Mask Programmable Read Only Memory
2	HM6264LP-15	#J4, #J6	8192-word x 8-bit High Speed CMOS Static Random Access Memory

1.4. The Serial Port

1.4.1. Using the Serial Port in Terminal Mode

The serial port has a standard 25 pin female socket. Because the TC-600 is configured as a printer a standard serial printer/plotter cable can be used to connect to a computer[1]. The settings of the serial port and the associated character translation mode are defined by a 6 character/digit string (e.g. “6en8x1”). The meaning of the six positions and their allowed values are described in Table 4 below.

If pos. 5 is ‘x’, the machine sends a byte 17_h (DC1) to indicate “XON” when it goes online. In case of ‘e’ the signal “External Ready” (“ER”, pin 20, equal to the standard DSR signal) is pulled low to indicate a “busy” condition.

If the translation modes ‘a’-‘c’ are used, the number of data bits is reduced to 7 (position 4 must be ‘7’), for modes ‘d’ and ‘e’ 8 data bits must be used.

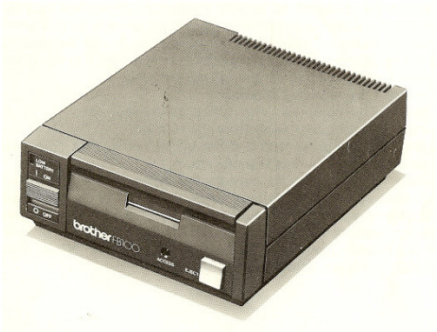
Table 4 Serial port configuration codes for terminal mode. Characters can be lower or upper case.

Position 1 Baud Rate		Position 2 Translation	Position 3 Parity		Position 4 Data Bits	Position 5 Handshake		Position 6 Stop Bits
1	75	a, b, c, d, e	n	none	1 … 8	n	none	1 or 2
2	110	*(a-c: 7-bit*	o	odd	*(typically 7 or 8)*	x	Xon/Xoff	
3	150	*d-e: 8-bit)*	e	even		e	ER line	
4	300		z	zero				
5	600							
6	1200							

[1] Brother offered its cables CA50-2 for the TI99/4A, CA50-5 for the VIC 20, CA50-8 for the Atari 400/800 and CA50-9 for the NEC PC-8201/PC-8801, SSHARP PC-1500 and SORD M223 MARK II.

1.4.2. Using the Serial Port in Word Processing Mode

In WP mode, the serial port can be used to connect a Brother FB-100 disk drive for storing text documents on 3-½ inch floppy disks. The TC-600 can store and retrieve text files, format a floppy and produce a directory listing. For this purpose, the following serial port settings are used. In contrast to Terminal mode, there seems to be no way to change the serial port settings in WP mode.



baud rate	9600
parity	none
stop bits	1
handshake	none

Figure 4 Floppy drive Brother FB-100 and serial port configuration.

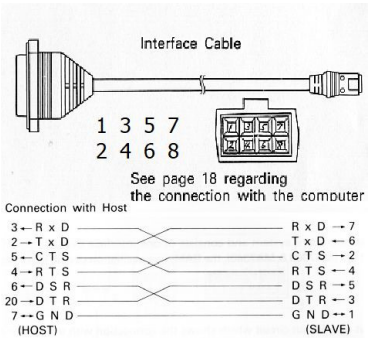
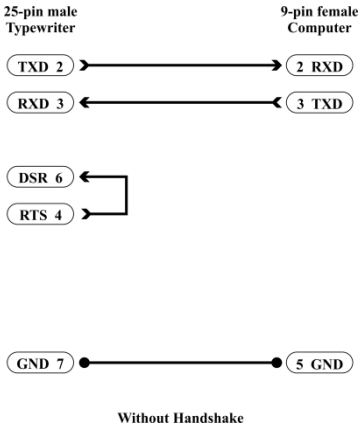


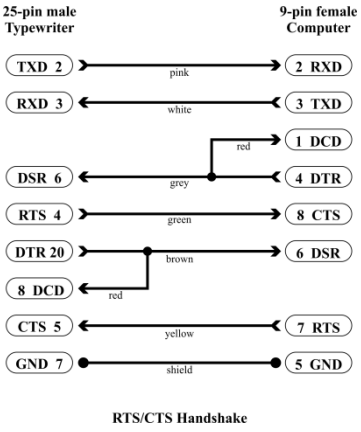
Figure 5 Original cable for connecting the FB-100 disk drive to a Tandy100 computer.

In order to simulate a floppy disk drive connected to the serial port of the TC-600 it is necessary to use the wiring shown in Figure 6 below.



Note: without the bridge between RTS and DSR, the TC-600 aborts any disk access with a message DISK NOT ATTACHED.

a) without handshaking.



b) with RTS/CTS handshaking and DSR/DTR.

Figure 6 Cables for connecting the TC-600 to a floppy drive simulator.

The WP mode offers the following floppy disk commands:

CODE + SAVE	asks for file number and name, creates a file on the disk and writes the TC-600 file to this file and closes it.
CODE + LOAD	asks for file number and name, opens the file on the disk and reads it into the TC-600 and closes it.
CODE + NAMES	lists all files found on the disk.
CODE + KILL	asks for file name and deletes it from the disk.
CODE + INITIAL	formats the disk.

The files in the numbered storage slots of the TC-600 must have unique names. It is not possible to have a file named “ABC” in one slot and then load a file “ABC” into another slot. For example, when a file from slot number 1, named “ABC”, is stored on disk by the SAVE command under a different name “XYZ”, the text is saved to a file “XYZ”, but the name of the file in slot 1 is also changed to “XYZ”.

By using different names, it is possible to duplicate the file in slot number 1 into slot 2

- by saving it to a new name:
  CODE + SAVE, “1”, “XYZ”, RETURN,
- renaming the local copy on the TC-600 back to the initial file name:
  “1”, “ABC”, EXIT and,
- reading the saved file back into another slot:
  CODE + LOAD, “2”, “XYZ”, RETURN.

The File Format

Files larger than 128 bytes are transferred in 128-byte chunks, the last chunk will be shorter or of zero length. There is no special end of file marker and the text is not padded to the block size of 128 bytes.

A typical short file looks like this:

```
1F 00 50 4A 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 1F
48 65 72 65 20 77 65 20 67 6F 2E 0D                                        Here we go.
4C 69 6E  6 52 02 33 2 2E 0D                                               Line #2.
54 68 69 73 20 69 73 20 4C 69 6E 65 20 23 33 20 77 69
   74 68 20 6D 6F 72 65 20 74 65 78 74 2E 0D                               This is Line #3 with more text.
4C 69 6E 65 20 23 34 20 73 74 61 72 74 73 20 68 65 72
   65 20 61 6E 64 20 77 65 20 67 6F 20 6F 6E 2E 2E 2E 0D                   Line #4 starts here and we go on...
41 42 43 44 45 30 31 32 33 34 35 36 37 38 39 2E 0D                         ABCDE0123456789.
41 6E 64 20 66 69 6E 61 6C 6C 79 20 73 6F 6D 65 20 5A
 65 72 6F 65 73 20 30 30 30 0D                                             And finally some Zeroes 000
```

Another example with line and character formatting:

```
1F 00 50 4A 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 1F header
D7 75 6E 64 65 72 D8 6E 6F 72 6D D9 32 0D                                  undernorm2
0D                                                                         empty line
D6 52 69 67 68 74 20 4D 61 72 67 69 6E 20 46 6C 75 73 68 0D                Right Margin Flush
D5 43 65 6E 74 65 72 65 64 0D                                              Centered
D5 48 DA 32 D9 4F 20 3D 20 77 61 74 65 72 0D                               H2O = water.
```

The header block, framed by $1F_h$, comprises 25 bytes. This block contains information about margins and tab stops. Details have been partially reverse engineered (Table 5).

Table 5 Details of the header block.

Offset	Contents	Example
0	block start	$1F_h$
1	left margin at column 0…	5
2	right margin at column …80	66
3	start of “hot zone”, extends to right margin, automatically set	60
4…13	position of tab stops. This is a bitmap of at least 10 bytes (80 columns). If a tab stop is set, the corresponding bit is set to 1.	
…		
24	block start	$1F_h$

The following text lines include control characters for certain operations. Each line ends with a single Carriage Return ($0D_h$) character.
The first line is displayed with a double underlined, capital 'M' as its first character.

Table 6 Formatting codes.

Codes for line formatting, stored in the first character of a line		
213_d	$D5_h$	line centered, appears as underlined small c
214_d	$D6_h$	line right margin flush, appears as double underlined capital R
Codes for character formatting, stored inside a line		
215_d	$D7_h$	begin underscore, appears as underlined right arrow →
216_d	$D8_h$	end underscore, appears as underlined left arrow ←
217_d	$D9_h$	superscript, appears as up arrow ↑, use subscript to return to base line
218_d	DA_h	subscript, appears as down arrow ↓, use superscript to return to base line

Some Interaction Sequences

A self-written simulator for the floppy drive allowed to capture the following command sequences.,

Save a new file:

GET DRIVE STATUS	REPLY_TYPE_NORMAL
CREATE DIRECTORY REFERENCE ”"name”	REPLY_TYPE_DIRREF with zeroed file name
OPEN FILE “name” for WRITE	REPLY_TYPE_NORMAL
OPEN FILE “name” for WRITE	REPLY_TYPE_NORMAL
OPEN FILE “name” for WRITE	REPLY_TYPE_NORMAL
WRITE FILE “name”	REPLY_TYPE_NORMAL
CLOSE FILE “name”	REPLY_TYPE_NORMAL

Note: it is unclear, why the OPEN FILE command is sent three times.

Re-Save an existing file:

GET DRIVE STATUS	REPLY_TYPE_NORMAL
CREATE DIRECTORY REFERENCE ”"name”	REPLY_TYPE_DIRREF with existing file name.
DELETE FILE	REPLY_TYPE_NORMAL, file is deleted
CREATE DIRECTORY REFERENCE	REPLY_TYPE_DIRREF with zeroed file name
OPEN FILE “name” for WRITE	REPLY_TYPE_NORMAL
OPEN FILE “name” for WRITE	REPLY_TYPE_NORMAL
WRITE FILE “name”	REPLY_TYPE_NORMAL
CLOSE FILE “name”	REPLY_TYPE_NORMAL

Load an existing File:

GET DRIVE STATUS	REPLY_TYPE_NORMAL

CREATE DIRECTORY REFERENCE 'name'	REPLY_TYPE_DIRREF with file name
OPEN FILE “name” for READ	REPLY_TYPE_NORMAL
READ FILE “name”	REPLY_TYPE_READFILE
CLOSE FILE “name”	REPLY_TYPE_NORMAL

Trying to load a non-existing File:

GET DRIVE STATUS	REPLY_TYPE_NORMAL
CREATE DIRECTORY REFERENCE “newfile”	REPLY_TYPE_DIRREF with zeroed file name

1.5. The Missing User’s Manual

So far, I have not yet found any manual for this machine. A manual for the similar EP-44 can be found on the internet. This is better than nothing but there are quite a few differences. Therefore, I produced this documentation for my own needs.

1.6. The Ribbon Cassette

Figure 7 The thermal transfer ribbon cassette for the TC-600 and other typewriters. It is only required, when printing on plain paper. Alternatively, thermally sensitive paper can be used.

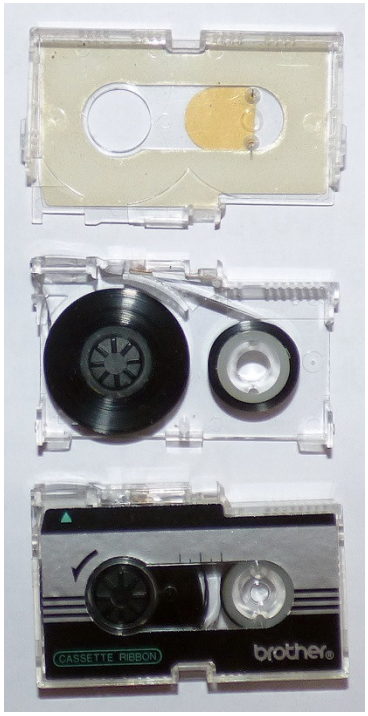


Figure 8 **Similar ribbon cassettes for the Brother EP-20 typewriter.**

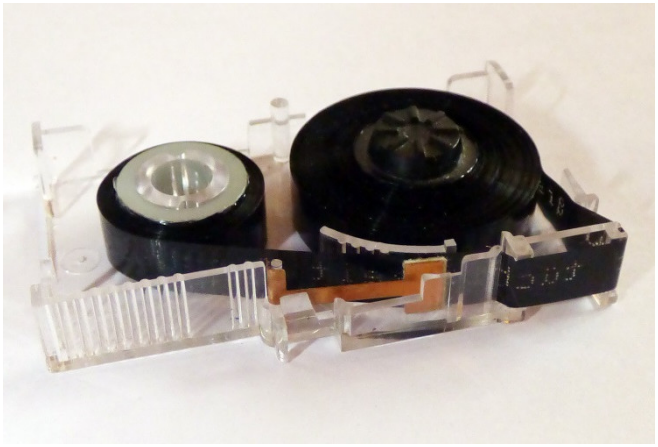


Figure 9 **This view shows the EP-20 cassette with the flat spring. It carries a wiper felt and keeps the ribbon tight.**

1.7. The Keyboard

Figure 10 **The keyboard layout (German).**

Table 7 **Character codes (for translation mode "e" and German keyboard). "-1" means that this is a Meta key which waits for the next character to form an accented letter.**

row 1	< | >	1	2	3	4	5	6	7	8	9	0	ß	´	<–
normal	27	49	50	51	52	53	54	55	56	57	48	225	-1	8
shift	27	33	34	152	43	37	38	47	40	41	61	63	133	8
2nd	-2	32	246	43	92	248	253	91	93	123	125	60	62	-2

row 2	TAB	Q	W	E	R	T	Z	U	I	O	P	Ü	ENTER
normal	9	113	119	101	114	116	122	117	105	111	112	129	13
shift	9	81	87	69	82	84	90	85	73	79	80	154	13
2nd	32	-1	-1	-1	-1	-1	230	36	155	156	32	157	-2

row 3		A	S	D	F	G	H	J	K	L	Ö	Ä
normal		97	115	100	102	103	104	106	107	108	148	132
shift		65	83	68	70	71	72	74	75	76	153	142
2nd		128	135	143	134	173	225	59	39	32	35	124

row 4		Y	X	C	V	B	N	M	,	.	–
normal		121	120	99	118	98	110	109	44	46	45
shift		89	88	67	86	66	78	77	59	58	95
2nd		146	145	237	32	168	38	33	64	152	42

Additional control codes can be sent by pressing CODE together with a key according to Table 8.

Table 8 Control codes obtained by pressing *Code* and *Key*. * **ESC and DEL do not require the Code key.**

Code	Name	Meaning	Key
0	NUL	Blank	
1	SOH	Start of Heading	A
2	STX	Start of Text	B
3	ETX	End of Text	C
4	EOT	End of Transmission	D
5	ENQ	Enquiry	E
6	ACK	Acknowledge	F
7	BEL	Bell	G
8	BS	Backspace	H
9	HT	Horizontal Tab	I
10	LF	Linefeed	J
11	VT	Vertical Tab	K
12	FF	Form Feed	L
13	CR	Carriage Return	M
14	SO	Shift Out	N
15	SI	Shift In	O

Code	Name	Meaning	Key
16	DLE	Data link Escape	P
17	DC1	Device Control 1	Q
18	DC2	Device Control 2	R
19	DC3	Device Control 3	S
20	DC4	Device Control 4	T
21	NAK	Negative Acknowledge	U
22	SYN	Synchronous Idle	V
23	ETB	End of Transmission Block	W
24	CAN	Cancel	X
25	EM	End of Medium	Y
26	SUB	Substitute Character	Z
27	ESC	Escape	↤↦*
28	FS	File Separator	▶
29	GS	Group Separator	◀
30	RS	Record Separator	▲
31	MS	Unit Separator	▼
127	DEL	Delete Rubout	DEL*

1.8. Special Character Output

Table 9 Often used character codes and codes sent out for each translation mode (a-e).

Key	Windows	HP	Translation Mode				
Character	(ANSI)	(Roman)	*a*	*b*	*c*	*d*	*e*
Ç	199	180	32	32	32	128	128
ü	252	207	32	125	125	129	129
é	233		32	32	32	130	130
â	226	192	32	32	32	131	131
ä	228	204	32	123	123	132	132
à	224	200	32	32	32	133	133
å	229	212	32	32	32	134	134
ç	231	181	32	32	32	135	135
ê	234		32	32	32	136	136
ë	235		32	32	32	137	137
è	233		32	32	32	138	138
ï	239	209	32	32	32	139	139
î	238	209	32	32	32	140	140
ì	236	217	32	32	32	141	141
Ä	196	216	32	91	91	142	142
Å	197	208	32	32	32	143	143
É	201		32	32	32	144	144
æ	230	215	32	32	32	145	145
Æ	198	211	32	32	32	146	146
ô	244	194	32	32	32	147	147
ö	246	206	32	124	124	148	148
ò	242	202	32	32	32	149	149

û	251	195	32	32	32	150	150
ù	249	203	32	32	32	151	151
§	167	189	32	64	64	152	152
Ö	214	218	32	92	92	153	153
Ü	220	219	32	93	93	154	154
ç	162	191	32	32	32	155	155
£	163	175	32	32	32	156	156
¥	165	188	32	32	32	157	157
Fr			32	32	32	158	32
ƒ	131		32	32	32	159	159
á	225	196	32	32	32	160	160
í	237	213	32	32	32	161	161
ó	243	198	32	32	32	162	162
ú	250	199	32	32	32	163	163
ñ	241	183	32	32	32	164	164
Ñ	209		32	32	32	165	165
¿	191	185	32	32	32	168	168
½	189		32	32	32	171	171
¼	188		32	32	32	172	172
¡	161	184	32	32	32	173	173
È	200		32	32	32	191	32
Ø	216	210	32	32	32	197	197
ø	248	214	32	32	32	196	196
¶	182		32	32	32	200	32
ß	223	222	32	126	126	202	225
²	178		32	60	32	203	253
°	176	179	32	94	32	204	248
µ	181		32	27+89	32	205	230
×	215		32	32	32	206	32
÷	247		32	32	32	207	246

Mode (a) replaces all special characters by the code 32. Modes (b) and (c) translate a few selected characters while modes (d) and (e) provide translations for almost all special characters. The translation tables do neither match the ANSI (Windows) nor the Roman 8 (HP) character sets. It seems to be a proprietary table.

1.9. Special Character Input

The machine prints a different character set when receiving bytes from a computer. For modes “a” to “c” only 7 bits are used so that the characters above code 127 are mapped to the characters 0 to 127.

For modes “d” and “e” the complete set of 256 characters is printed according to Figure 11.

Figure 11 Printout of a character table, raw bytes received in 8-bit modes “d” and “e”.

Translation Mode ‘d’ - Printout of received codes.

32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
	!	"	#	$	%	&	'	(	)	*	+	,	-	.	/
48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111
`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	
128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143
?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159
?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
á	í	ó	ú	ñ	Ñ	ª	º	¿	⌐	¬	½	¼	¡	«	»
176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191
Á	À	Â	Ã	ã	Ï	Í	Ì	Î	Ó	Ò	Ô	Õ	ð	Ë	È
192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207
Ê	Ú	Ù	Û	ø	Ø	¤	₧	¶	ij	ß	²	°	µ	×	÷
208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223
π	√	±													
224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239
240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255
											≣				

Translation Mode ‘e’ - Printout of received codes.

32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
	!	"	#	$	%	&	'	(	)	*	+	,	-	.	/
48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111
`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	
128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143
?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159
?	?	?	?	?	?	?	?	?	?	?	?	?	?	?	?
160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
á	í	ó	ú	ñ	Ñ	ª	º	¿	⌐	¬	½	¼	¡	«	»
176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191
192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207
208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223
224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239
	ß		π			µ							Ø		
240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255
	±					÷		°			√		²		

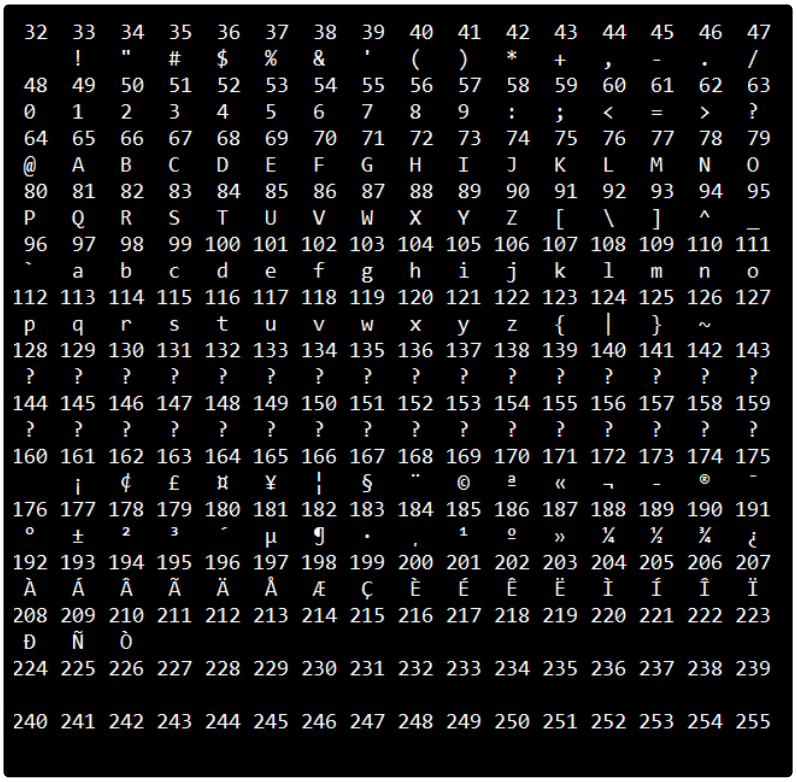


Figure 12 **The character table, received and stored as a text document in 8-bit mode "d" and sent out to a terminal program using the same mode. Obviously, a special translation to Unicode or a different Code table for legacy systems would be needed.**

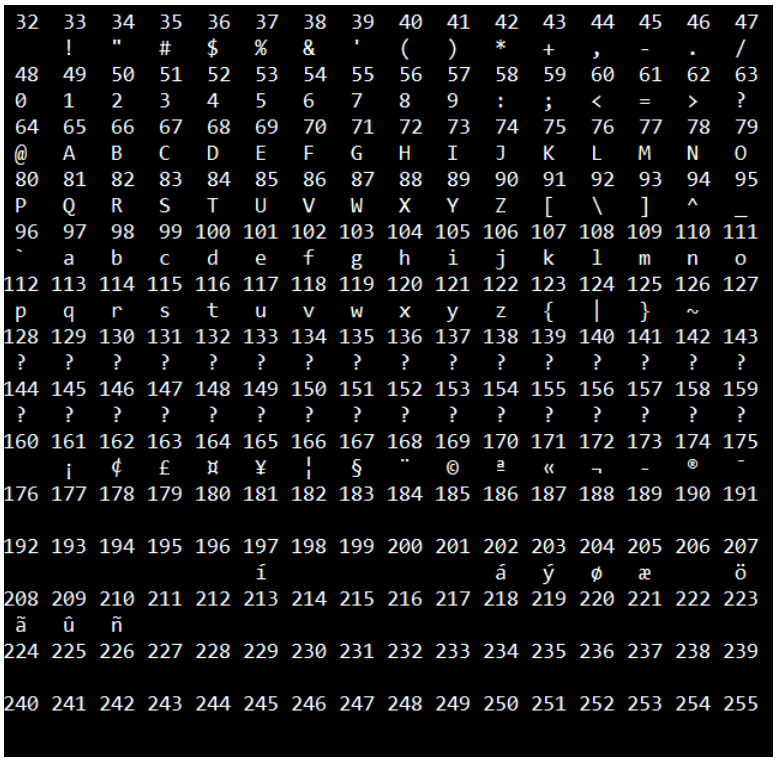


Figure 13 **The character table, received and stored as a text document in 8-bit mode "d" and sent out to a terminal program using mode "e".**

1.10. Terminal Mode

To use the machine as a terminal:

- Slide the 3-position switch to [TERMINAL].
- If the display does not show `OFF LINE` press the [ESC/ON] key.
- Press the [MODE] key and adjust the `SET-UP` string for the serial interface. When finished press the [ENTER] key on the keyboard.
- Answer the question `Left Margin 0/5?` with either a [0] or a [5]. Printouts will use this margin.
- Answer the question `Echo-Y/N?` with [Y] or [N] to enable or disable "local echo". This depends on whether the host has been set up to echo input characters or not.
- The display will show an underscore character.
- You can now start typing characters. These will not appear in the display. If you have selected "local echo" they will be printed as you type.

You can also send a text file (created in [WP] mode):

- Press the [PRINT] key
- Type the number of the file to print.
- The file will be sent to the host.

You can also receive a text file and store it as a document:

- Press the [INS] key
- Enter the file number. The file must be empty, you cannot overwrite an existing file. If the message `<Fn ALREADY EXIST>` is displayed, press the [ESC/ON] key to enter a different file number or press [EXIT] to abort the operation.
- Then send the file from the host. This means that you need someone on the host side to send the file.
- To close the file press the [ESC/ON] key after the file has been received.

When receiving documents, it may be necessary to slow down the host by adjusting inter-line or inter-character delays.

Debug Info Collector

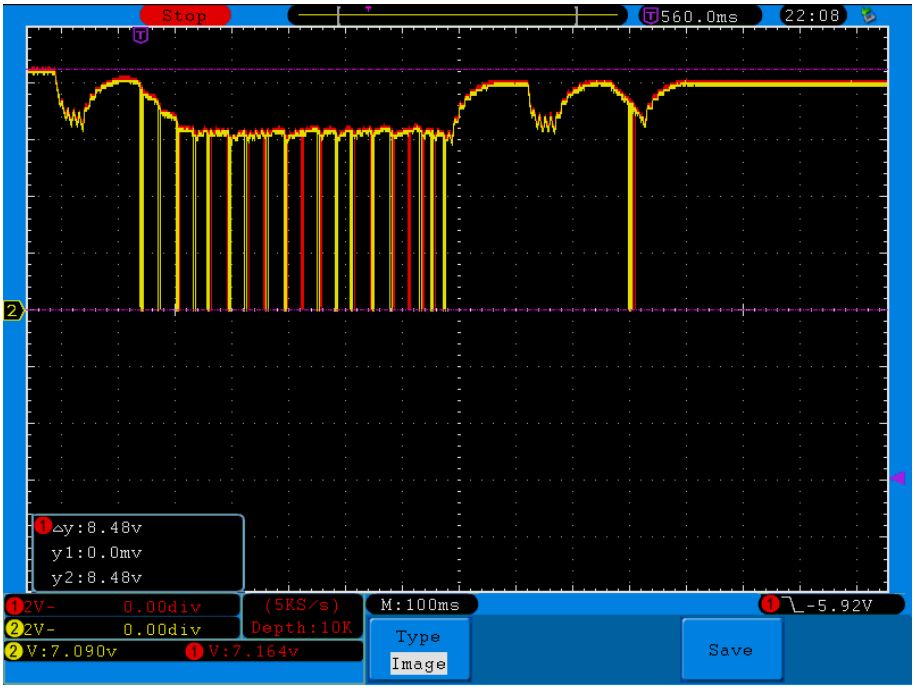


Figure 14: Output 2 and 4 of one of the three BA829 drivers during output of the text "undernorm^2". The output voltage is initially 8.48 V and is pulled down to zero for each active bit. The voltage recovers to about 6 V when bits follow immediately, to 6.8V during longer periods without duty.