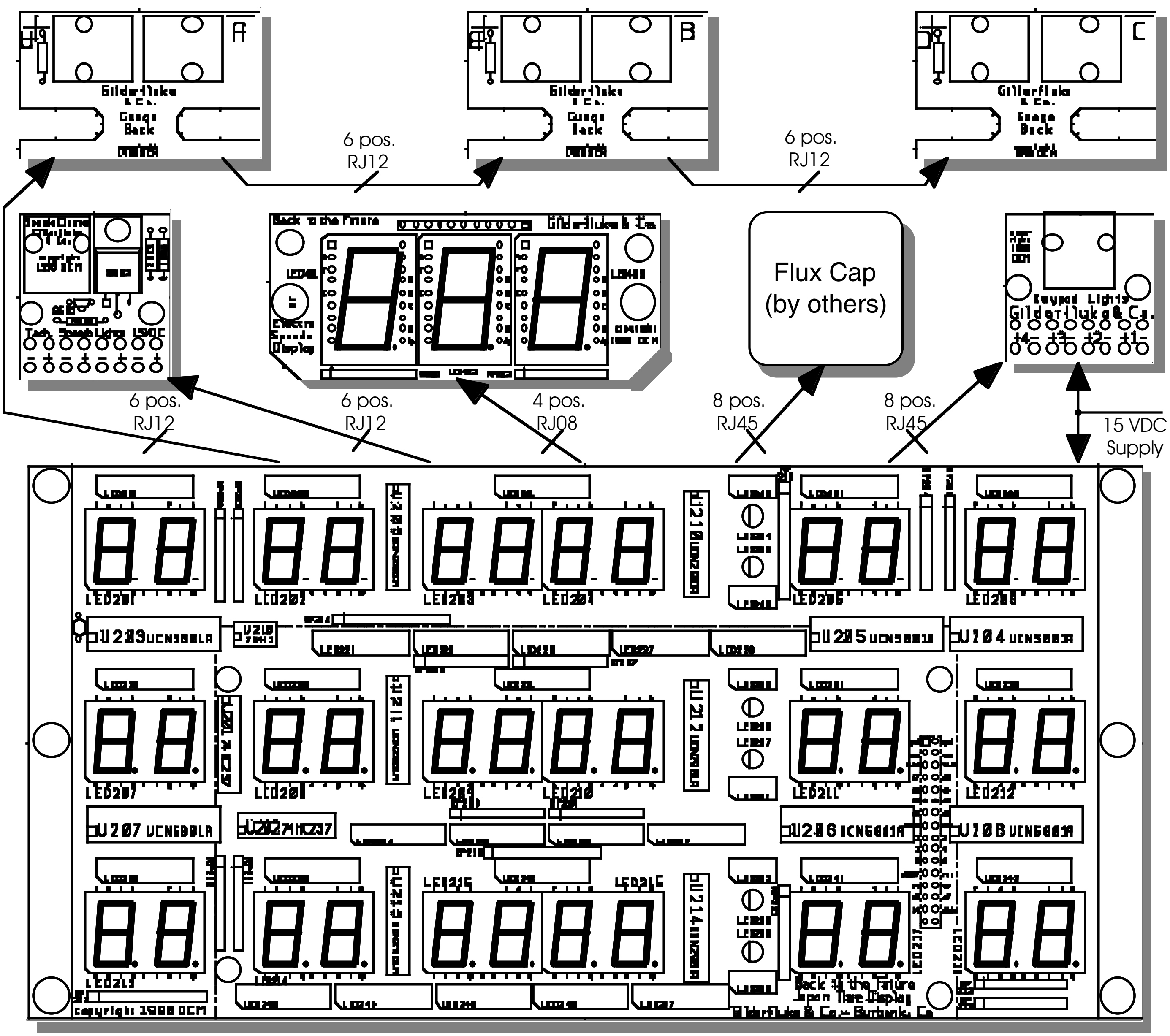
GILDERFLUKE & CO. · 205 SOUTH FLOWER STREET · BURBANK, CALIFORNIA 91502 · 818/840-9484 · 800/776-5972 · FAX 818/840-9485
EAST COAST/FLORIDA OFFICE · 7041 GRAND NATIONAL DRIVE · SUITE 128d · ORLANDO, FL 32819 · 407/354-5954 · FAX 407/354-5955

Gilderfluke & Co.
ROBOTICS & SOUND SYSTEMS

- BACK TO THE FUTURE JAPAN DASHBOARD -

The Back to the Future Japan dashboard printed circuit boards are based on the retrofit we did for the Back to the Future Dashboard computers at Universal Studios, Hollywood. In the case of the Hollywood installation, we only replaced the CPU and connected via two existing cables to the existing dashboard time display. In this case, we are providing the time display, Electronic Speedometer (E-Speedo) and miscellaneous connector boards as well as the CPU. All wiring uses standard RJ- IDS connectors.



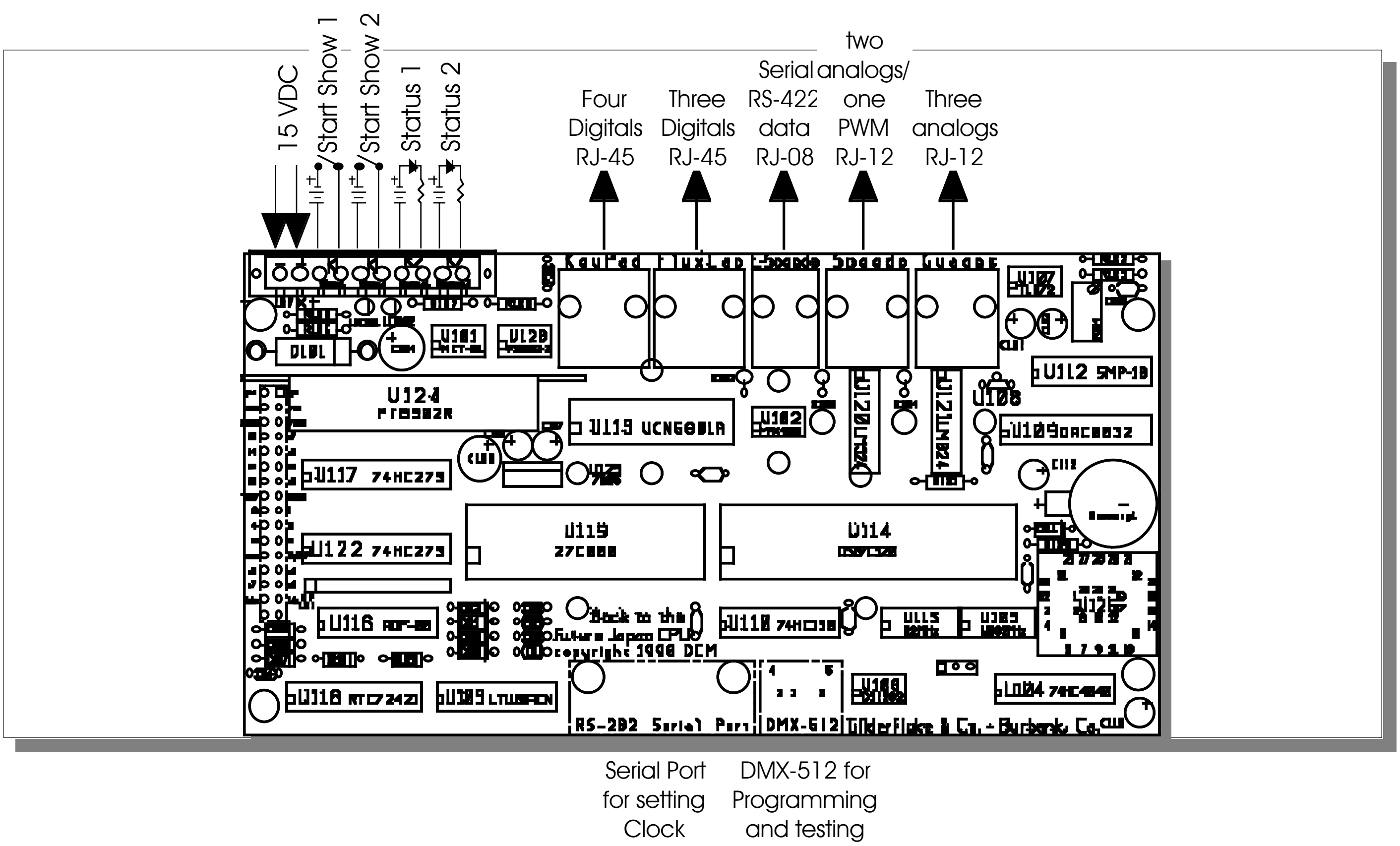
The mounting holes and printed circuit board outlines are identical to those used in both California and Florida attractions to allow for easy retrofits. The Back to the Future Japan dashboard consists of nine printed circuit boards:

1) Time display. Similar to the Hollywood and Florida installations, but also included on this printed circuit board are the drivers and decoding logic which had been on a second circuit board in the original attractions.

   The original Back to the Future attractions used cheap low output seven segment displays and LEDs which were scanned at a one of thirteen rate. This new version uses an optimum one of six multiplexing and LEDs and much higher quality (Hewlet-Packard) displays. These are rated for a light output of three to four times those that were used in the original attractions. The net result of this is an output level which will is potentially six to eight times brighter than was possible on the original attractions.

   The display printed circuit board is currently configured for operating the displays and a small number of LEDs from the regulated five volt supply. This will reduce heat dissipation to less than 1/8 watt per resistor. The LED bars which are used for backlighting the silkscreened overlay will be run from the unregulated fifteen volt supplied to the the Time Display. This is because with four LEDs in series in each LED assembly, a five volt supply simply won't allow for enough of a forward voltage drop (2 volts x 4 = 8 volts). The ground side of the back lights is switched through a 75451 to allow for dimming the back lights.

2) CPU: This is a 3.25" x 6.15" printed circuit board that attaches to the back of the time display. It contains the DS87C520 microcontroller that runs the whole dashboard.



The 32 MHz oscillator runs the microcontroller and baud clock for the DMX-512 input. The 1.8432 MHz oscillator provides the time base for the show playback (at 30 FPS), low speed serial port, and display multiplexing. All socketed ICs are held in place by pull ties.

Show memory is contained in a single thirty-two pin Eprom (27C040). The show data is based on the program we created for Universal Studios, Hollywood. Several channels have been added for the additional analog and digital channels used on the Back to the Future

Japan dashboards. These are organized to retain compatibility with the California dashboards.

A Real Time Clock chip which has been laser trimmed for an accuracy of +/-10 PPM provides the clock data for the display. A battery retains RTC data when the car is powered down. The firmware we have written will automatically adjust the clock to daylight savings time if desired and the turn of the millennium after 1999. In the last three years, the California installation has only rarely needed to adjust the clocks in their retrofitted attraction.

The two eight position RJ-45 connectors provide the digital outputs needed to run the lights on the keypad (four digital outputs) and LEDs in the Flux Capacitor (three digital outputs). The output capacity of these eight outputs is 150 ma continuous, 500 ma peak. These outputs are powered by the fifteen VDC that runs the dashboard.

The two six position RJ-12 connectors provide the 0-10 volt analog outputs needed to run the meters on the speedometer (one PWM backlighting brightness and two analog outputs) and Roentgen Gauges (three analog outputs). Five analog outputs are needed in total. A 2.5 volt, thermally stable reference is generated in the LM336-2.5. This is buffered and sent through the DAC. The outputs of the DAC is amplified to 0-10 volt levels and sampled (and held) in the SMP-18. The final outputs is then buffered by the two LM324s before sending the voltages out to the gauges.

Four eight bit channels of animation data (three seven segment displays and one brightness command) are transmitted serially through the four position RJ-08 connector for use by the E-Speedo display. This data is transmitted at 9600 baud using RS-422 signal levels.

A RS-232 port is provided for configuring the BttF2. Connection is via a standard DE-09 connector that extends from the bottom of the time display assembly.

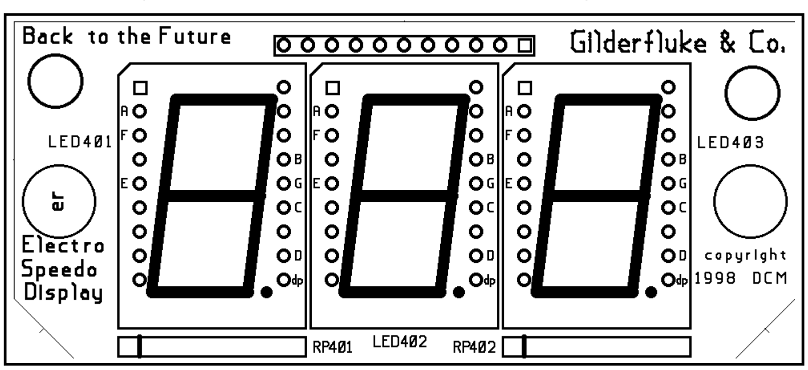
The DMX-512 port is used to receive data from PC·MACs animation control systems for programming the Back to the Future Japan CPU. It can also be used to receive animation data from a Togglodyte test tool for field servicing the display and attached components. Connection is via a standard miniature five position Mini-DIN connector that extends from the bottom of the time display assembly.

Two optically isolated inputs are provided. A dipswitch can select between Japan and California/Florida style starts. These inputs have resistors in series with them to be used with the 24 VDC inputs from the PLC.

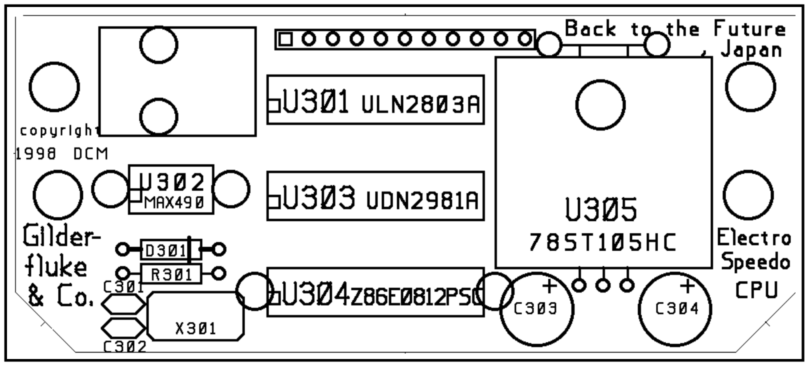
Two optically isolated outputs are provided. These output animation data from the shows that can be used as hearts or running status indicators. Currently, one is programmed to flash at 2 Hz during the main show, and the other flashes at 2 Hz during the load/unload show.

The BttF2 design uses a 3 amp rated integrated switching regulator for powering both the LED displays and the CPU printed circuit boards.

3) E-Speedo Display: This printed circuit board has three .8" tall yellow seven segment displays on it. As with the time display printed circuit board, much higher quality displays are being used for a potentially much brighter display than in either of the original attractions.

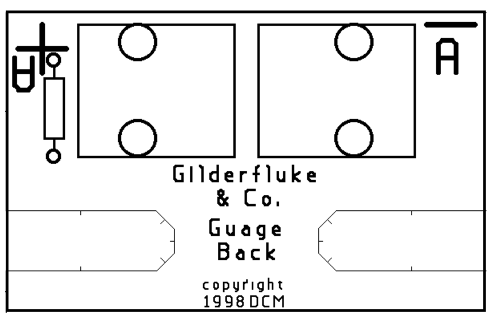


4) E-Speedo CPU: This is a small printed circuit board that mounts directly behind the E-Speedo display printed circuit board.

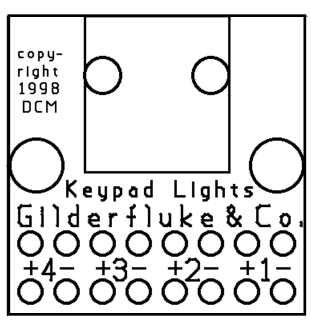


This printed circuit board receives the data for displaying via the RS-422 9600 baud serial link from the main dashboard CPU printed circuit board. A Z8 microcontroller on this printed circuit board decodes this data and multiplexes it (one of three) to the the displays. A five volt integrated switching regulator on this printed circuit board provides both logic and display power. All socketed ICs are held in place by pull ties.

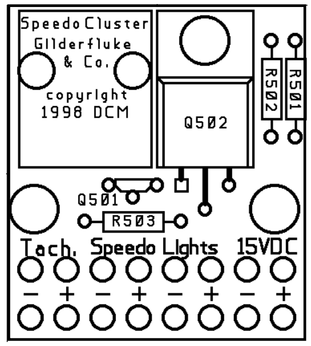
5, 6, & 7) Roentgen Gauge Breakouts: Three small circuit printed circuit boards that attach directly to the back of the 0-10 volt Roentgen Gauge meter movements to ease attaching them to the BttF2. Two of the gauges are Simpson 08890 2.5" gauges. The last gauge is a Simpson 07660 4.5" gauge. Unlike the original installations, each gauge gets one of three separate analog signals in the six position RJ-12 cable that daisy chains from the BttF2 through all three of these cards. Each card is labeled 'A', 'B', or 'C' to indicate which of the analog signals will be used on that gauge. The polarity and identity of these cards is clearly marked on each. Card 'A' is shown below.



8) Keypad Breakout: This small printed circuit board breaks out the eight position RJ-45 to discrete wire connections for each of the lights on the keypad assembly. There are no connections to the keypad itself, as it is purely decorative. On the original attractions, the four lights were controlled on just two circuits (three of the four lights were hardwired together). The BttF2 provides individual programmed controls to each light. The polarity of each connection is clearly marked on this card.



9) Speedometer Cluster Breakout: This small printed circuit board breaks out the six position RJ-12 to discrete wires for connection to the speedometer and tachometer motors.



The speedometer and tachometer motors are 0-10 volt input Beede 9303430991. They rotate approximately 270 degrees, based on the voltage input with no additional support circuitry.

The last signal to this breakout is used for dimming the speedometer cluster backlighting. A 2N3906 bipolar transistor inverts this signal and feeds it to the input of a IRFZ44N 'N' channel FET power transistor for controlling the incandescent light bulbs used for the speedometer cluster backlighting. With heat sinking, this FET is rated at over 40 amps continuous capacity. Fifteen VDC power for the back lights must be run from the power supply to this card. The polarity of each connection is clearly marked on this card.

- BTTF2 SERIAL PORT HOOKUP-

You can use just about any computer or terminal which has a serial port on it communicate with the BttF2 through its RS-232 serial port.

If you are using a computer as a terminal you will need to run a modem or terminal emulation program. These will send everything you type on the keyboard out the serial port on your computer while printing on the screen anything that comes in from the BttF2 through the serial port. A modem program will usually have the advantage over a terminal emulation program in that it will allow you to save data to your computer's disk drives and restore it later. The BttF2 uses no screen control codes or ESCape sequences, so it should work on any machine with a 80 column by 24 line display. Machines with other display formats will work, but may not look so neat on the screen.

Typical modem programs you can use are Terminal.exe (which comes with Windows 3.1) and Hyper Terminal.exe (which comes with Windows '95 and '98). If you can, find a copy of Terminal.exe, as it is a better program than the later Hyper Terminal.

When configuring your modem program, you should set it for 9600 baud, 8 data bits, one stop bit, and no parity. You should set your program not to insert an extra LineFeed (LF) character after each Carriage Return (CR) it receives, or else the menus will print 'double spaced'.

If you have hooked up the BttF2 to your computer and it still doesn't seem to respond to the keyboard, the first thing to check is that you are attached to the right serial port. The easiest way to do this is to disconnect the BttF2 and short between the Tx data out and Rx data in pins on the serial port connector on the back of your computer. On all IBMs and compatibles this means sticking a paper clip or similar tool between pins 2 and 3 on the 'Com.' connector. While still running the modem program, anything you type should appear on the screen while this paper clip is in place, while nothing will appear when you remove it. If your computer passes this test, then you are using the right serial port and the problem is most likely the baud rate setting or in your wiring to the BttF2. If you get characters on the screen even with the paper clip removed from the serial port, it means you probably need to set the 'echo' mode to 'none' or 'full duplex'. Then you should repeat this test.

The serial data signals from the BttF2 are brought out on a standard nine position PC-AT serial port connection. A nine pin male to nine pin female serial cable with 'straight through' wiring should be used to connect the BttF2 to your PC. The only pins that the BttF2 actually uses are the Txd, Rxd and ground (pins #2, #3 and #5).

The BttF2 expects to see the serial data in the following format:

ONE START BIT

EIGHT DATA BITS

ONE BIT

- BTTF2 COMMANDS -

The screen that the BttF2 will send to your computer looks like this:

```
- Gilderfluke & Co. - Back to the Future Japan - ver 1.01 - copyright 1998 DCM -


        EPROM: _56 channels @ 30 FPS / first show is 07305 frames long

        a) set time....
        c) Start Inputs (Dipsw #1) - Japan
        d) Automatic Daylight Savings Time (Dipsw #2) - no
        e) numbering system (Dipsw #3) - Decimal
        f) VT-52 Compatible terminal (Dipsw #4) - yes

        g) play on every full hour (Dipsw #5) - no
        h) play on every quarter hour (Dipsw #6) - yes
        i) play every five minutes (Dipsw #7) - no

        p) play main show now....






            (12) 12:19:00pm Tuesday January 26, 1999         command-
```

"a" Set Time:

This command will prompt you for the current date and time to be set on the Time/Date display. If you would like the BttF2 to adjust automatically to daylight savings time, turn on Dipswitch #2.

"c" Start Inputs (Dipsw #1):

When this dipswitch is OFF, the BttF2 will use the starts as specified in the Japanese Back to the Future attraction (one input starts the main show, the other input starts the load/unload show). When this switch is ON, the BttF2 will use the start signals as found in the California and Florida installations (bizarre).

"d" Automatic Daylight Savings Time (Dipsw #2):

When this dipswitch is ON, the BttF2 will use Daylight Savings time at the appropriate time of year.

"e" **Numbering System (Dipsw #3):**

When this dipswitch is OFF, the BttF2 will use decimal numbering for the show length display on this screen. When this dipswitch is ON, the BttF2 will use Hexadecimal numbering for the show length display on this screen.

"f" **VT-52 Display (Dipsw #4):**

When this dipswitch is ON, the BttF2 will use special screen codes to randomly position the cursor on the screen. There is very little reason to ever turn this switch ON.

"g" **Play on every Full Hour (Dipsw #5):**
"h" **Play on every Quarter Hour (Dipsw #6):**
"i" **Play on every Five Minutes (Dipsw #7):**

When any of these dipswitches are ON, the BttF2 will automatically play the main show every hour, fifteen minutes or five minutes. These can be used for cycle testing the BttF2 or to use the BttF2 as a lovely office clock.

"p" **Play Main Show Now:**

This command is used to start the main show playing from the serial port of the BttF2.

<space bar> or <ESC>ape key Redraw Screen:

Pressing either the <space bar> or <ESC>ape key will tell the BttF2 to redraw the screen. Changes in the dipswitches will not be reflected on the screen until it is redrawn.

- DECIMAL TO HEXADECIMAL TO ASCII TO PERCENTAGE -

The following chart shows decimal, HEXadecimal, ASCII and a few percentage equivalents to aid you when you need to convert between numbering bases. Also shown are the 'special' characters used by PC·MACs and Smart Brick Animation Control Systems. ASCII values that have their uppermost bit set (bit 7) are shown in parenthesis:

decimal	HEX	ASCII	%	decimal	HEX	ASCII	%	decimal	HEX	ASCII	%	decimal	HEX	ASCII	%
00	00h	null	0	64	40h	@	25%	128	80h	(null)	50% (don't care)	192	C0h	(@)	75%
1	01h	soh/^A		65	41h	A		129	81h	(soh)		193	C1h	(A)	
2	02h	stx/^B		66	42h	B		130	82h	(stx)		194	C2h	(B)	
3	03h	etx/^C		67	43h	C		131	83h	(etx/)		195	C3h	(C)	
4	04h	eot/^D		68	44h	D		132	84h	(eot)		196	C4h	(D)	
5	05h	eng/^E		69	45h	E		133	85h	(eng)		197	C5h	(E)	
6	06h	ack/^F		70	46h	F		134	86h	(ack)		198	C6h	(F)	
7	07h	bell/^G		71	47h	G		135	87h	(bell)		199	C7h	(G)	
8	08h	bs/^H		72	48h	H		136	88h	(bs)		200	C8h	(H)	
9	09h	ht/^I		73	49h	I		137	89h	(ht)		201	C9h	(I)	
10	0Ah	lf/^J		74	4Ah	J		138	8Ah	(lf)		202	CAh	(J)	
11	0Bh	vt/^K		75	4Bh	K		139	8Bh	(vt)		203	CBh	(K)	
12	0Ch	ff/^L		76	4Ch	L		140	8Ch	(ff)		204	CCh	(L)	
13	0Dh	cr/^M		77	4Dh	M		141	8Dh	(cr)		205	CDh	(M)	
14	0Eh	so/^N		78	4Eh	N		142	8Eh	(so)		206	CEh	(N)	
15	0Fh	si/^O		79	4Fh	O		143	8Fh	(si)		207	CFh	(O)	
16	10h	dle/^P		80	50h	P		144	90h	(dls)		208	B0h	(P)	
17	11h	dc1/^Q		81	51h	Q		145	91h	(dc1)		209	B1h	(Q)	
18	12h	dc2/^R		82	52h	R		146	92h	(dc2)		210	B2h	(R)	
19	13h	dc3/^S		83	53h	S		147	93h	(dc3)		211	B3h	(S)	
20	14h	dc4/^T		84	54h	T		148	94h	(dc4)		212	B4h	(T)	
21	15h	nak/^U		85	55h	U		149	95h	(nak)		213	B5h	(U)	
22	16h	syn/^V		86	56h	V		150	96h	(syn)		214	B6h	(V)	
23	17h	etb/^W		87	57h	W		151	97h	(etb)		215	B7h	(W)	
24	18h	can/^X		88	58h	X		152	98h	(can)		216	B8h	(X)	
25	19h	em/^Y		89	59h	Y		153	99h	(em)		217	B9h	(Y)	
26	1Ah	sub/^Z		90	5Ah	Z		154	9Ah	(sub)		218	BAh	(Z)	
27	1Bh	ESC		91	5Bh	[		155	9Bh	(ESC)		219	BBh	([)	
28	1Ch	FS		92	5Ch	\		156	9Ch	(FS)		220	BCh	(\)	
29	1Dh	GS		93	5Dh	]		157	9Dh	(GS)		221	BDh	(])	
30	1Eh	RS		94	5Eh	^		158	9Eh	(RS)		222	BEh	(^)	
31	1Fh	VS		95	5Fh			159	9Fh	(VS)		223	BFh	( )	
32	20h	SP	12.5%	96	60h	`	37.5%	160	A0h	(SP)	62.5%	224	E0h	(`)	87.5%
33	21h	!		97	61h	a		161	A1h	(!)		225	E1h	(a)	
34	22h	"		98	62h	b		162	A2h	(")		226	E2h	(b)	
35	23h	#		99	63h	c		163	A3h	(#)		227	E3h	(c)	
36	24h	$		100	64h	d		164	A4h	($)		228	E4h	(d)	
37	25h	%		101	65h	e		165	A5h	(%)		229	E5h	(e)	
38	26h	&		102	66h	f		166	A6h	(&)		230	E6h	(f)	
39	27h	'		103	67h	g		167	A7h	(')		231	E7h	(g)	
40	28h	(		104	68h	h		168	A8h	(()		232	E8h	(h)	
41	29h	)		105	69h	i		169	A9h	())		233	E9h	(i)	
42	2Ah	*		106	6Ah	j		170	AAh	(*)		234	EAh	(j)	
43	2Bh	+		107	6Bh	k		171	ABh	(+)		235	EBh	(k)	
44	2Ch	'		108	6Ch	l		172	ACh	(')		236	ECh	(l)	
45	2Dh	-		109	6Dh	m		173	ADh	(-)		237	EDh	(m)	
46	2Eh	·		110	6Eh	n		174	AEh	(·)		238	EEh	(n)	
47	2Fh	/		111	6Fh	o		175	AFh	(/)		239	EFh	(o)	
48	30h	0		112	70h	p		176	B0h	(0)		240	F0h	(p)	
49	31h	1		113	71h	q		177	B1h	(1)		241	F1h	(q)	
50	32h	2		114	72h	r		178	B2h	(2)		242	F2h	(r)	
51	33h	3		115	73h	s		179	B3h	(3)		243	F3h	(s)	
52	34h	4		116	74h	t		180	B4h	(4)		244	F4h	(t)	
53	35h	5		117	75h	u		181	B5h	(5)		245	F5h	(u)	
54	36h	6		118	76h	v		182	B6h	(6)		246	F6h	(v)	
55	37h	7		119	77h	w		183	B7h	(7)		247	F7h	(w)	
56	38h	8		120	78h	x		184	B8h	(8)		248	F8h	(x)	
57	39h	9		121	79h	y		185	B9h	(9)		249	F9h	(y)	
58	3Ah	:		122	7Ah	z		186	BAh	(:)		250	FAh	(z)	
59	3Bh	;		123	7Bh			187	BBh	(;)		251	FBh	( )	
60	3Ch	<		124	7Ch			188	BCh	(<)		252	FCh	( )	
61	3Dh	=		125	7Dh	|		189	BDh	(=)		253	FDh	(|)	
62	3Eh	>		126	7Eh	~		190	BEh	(>)		254	FEh	(~)	
63	3Fh	?		127	7Fh	del		191	BFh	(/)		255	FFh	(del)	100%