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Gilderfluke & Co.
ROBOTICS & SOUND SYSTEMS

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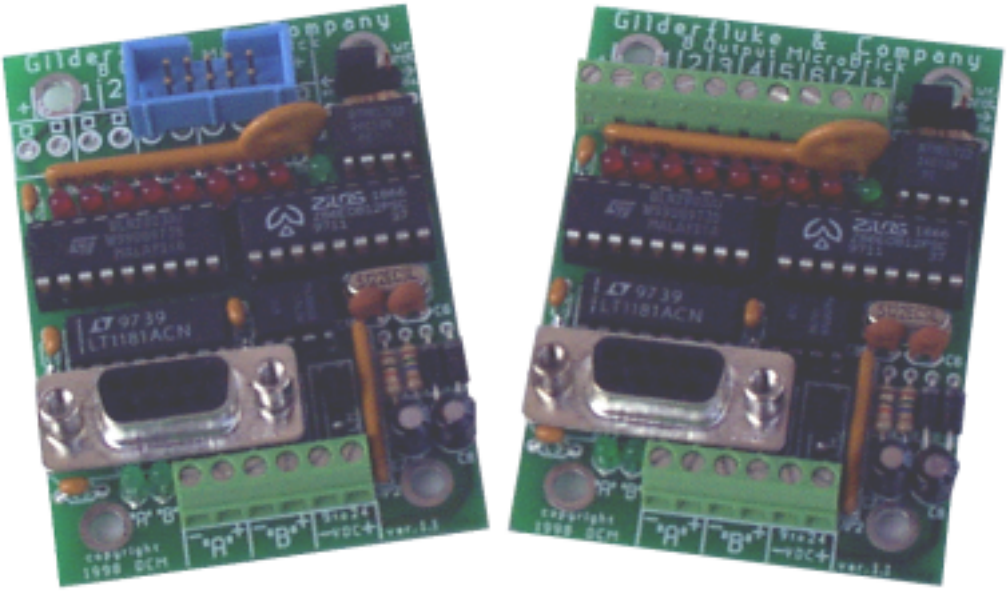
MiniBrick8
Eight Output Show Control System



The MiniBrick8 is a complete, stand-alone Show Control System. All you need to add is a 9-24 VDC power supply and whatever you want to control.

The MiniBrick8 is programmed using the PC·MACs Show Control software. Once a program is 'drawn' using the PC·MACs software, data is sent to the MiniBrick8 through the PC's standard RS-232 serial port. The MiniBrick8 can then be disconnected from the PC and it will run all by itself.

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A note about this manual:

This manual covers the specifics of the BR-MiniBrick8. To program the BR-MiniBrick8 you will also need the PC•MACs manual sections that cover the PC•MACs software.

The BR-MiniBrick8 is typically programmed in '**Software-only**' or '**Hardwareless Realtime**' mode. If you are using the PC•MACs MACs-SMP for programming your BR-MiniBrick8 through the DMX-512 inputs, please refer to the PC•MACs '**Unlimited**' mode.

The full PC•MACs manual can be downloaded from our web site at:

http:/ /www.gilderfluke.com

- MiniBrick8 Overview -

When used with the PC·MACs hardware (MACs-SMP Smpte Card), outputs can be updated in realtime. Once programmed, the MiniBrick8 can be disconnected from the PC and it will run all by itself.

The MiniBrick8 can be used to control animated shows and displays, fountains, fireworks, lighting, sound systems, simulators, slide and movie projectors, fiber optics, window displays, motors, pneumatic and hydraulic systems, special effects, signs, machines and machine tools in process control, or anything else that can be controlled by an electrical signal.

The MiniBrick8 is a complete stand-alone Show Control System. It can be used singly, or in combination with additional MiniBrick8s, Smart Bricks, Dumb Bricks or Digital Audio Repeaters. To program the MiniBrick8, you just draw the sequence you need on the screen of your computer using our easy-to-use PC·MACs software. When you have all of your shows completed (or just want to take a look at them), you can download them to a MiniBrick8 in about twenty seconds through the standard RS-232 serial port on your PC.

Features of the MiniBrick8 include:

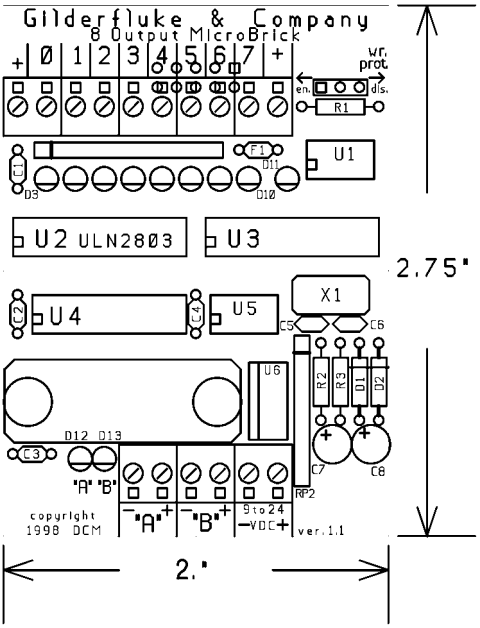
- Automatic 'program in place' download through the standard serial port on your PC. There are no Eproms to program or install! It takes about twenty seconds to download a fifteen minute show.
- Each MiniBrick8 comes with a minimum of thirty-two KBytes of nonvolatile memory. This gives a show capacity of over thirty-six minutes at fifteen Frames Per Second! Once downloaded, show data is retained for approximately forty years, with or without power applied. You can rewrite the memory about fifty thousand times. A 'Write Protect' jumper can protect the show data from accidental changes. Memory can be expanded to up to two hundred fifty-six KBytes if needed. This translates into almost five hours of show data at fifteen updates per second.
- Two optoisolated inputs to synchronize MiniBrick8s with pushbuttons or other real-time events. Multiple MiniBrick8s can be trig-

gered simultaneously or sequentially. Each MiniBrick8 input can be set to start, stop, pause, continue, or directly select a specific show. LEDs show all input activity.

- Two hundred fifty-five shows can be loaded onto a MiniBrick8 at one time. Shows can be accessed sequentially or directly using the two optoisolated inputs. Supports foreground/background shows. 'Next' show can be set for the end of any show, allowing you to loop a single show or build 'chains' of shows.
- The MiniBrick8 supports update rates from one frame per second to a maximum of one hundred frames per second. Different shows can each be programmed at different frame rates. This allows you to program a 'delay' show that ticks along at a low frame rate between your main shows.
- The eight outputs from a single MiniBrick8b can be fed to a Digital to Analog converter (like our DAC-08) wherever you need a programmable 0-10 volt analog control signal.
- Each of the eight outputs is rated for a continuous load of 150 ma., or 500 ma. peak. This is enough to drive small solenoid valves, relays, LEDs and similar loads. LEDs show all output activity. If more than eight outputs are needed, additional MiniBrick8s can be stacked to give you as many outputs as you need.
- Available with screw terminal outputs (MiniBrick8) or 1/4 J6 ribbon cable connector (MiniBrick8b).
- The MiniBrick8 runs on anything from 9-24 VDC . MiniBrick8s can even be run from batteries.
- MiniBrick8s mount in standard Augat 2.75" 'Snap Track', or on screw standoffs.

MiniBrick8 Connections & Jumper Configuration:

There are only a small number of connections and single configuration jumper on each MiniBrick8. Eight LEDs show the status of the outputs. Two green LEDs show the status of the two optically isolated inputs. One last LED is attached to the serial data transmission line on the MiniBrick8. This is used as a 'heartbeat' so that you can see that the MiniBrick8 is alive. If this LED doesn't flash at least once per second, you should power down the MiniBrick8 and check the power supply and connections to the MiniBrick8.

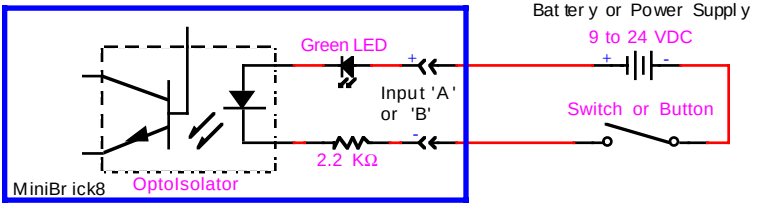


Write Protect Jumper: Each MiniBrick8 has just one jumper on it. It can be used to protect the EEprom from accidental alterations. When this jumper is in the 'Disabled' position, there is no possible way for a MiniBrick8 to alter its memory. With the jumper in the 'enabled' position, reads and writes can take place normally. ***This jumper must be in the 'enabled' position for shows to be downloaded to the MiniBrick8.*** With the memory write protected, it should retain whatever has been programmed into the MiniBrick8 for at least forty years.

RS-232 Serial Port: This is 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 MiniBrick8 to your PC. The only pins that the MiniBrick8 actually uses are the Txd, Rxd and ground (pins #2, #3 and #5). This connection is used to download data to the MiniBrick8. It can also be used with any standard modem program to talk to the MiniBrick8.

'A' & 'B' Inputs: These are two optically isolated digital inputs which can be used to start, stop, pause or select specific show sequences to play. LEDs show any activity on these two inputs:



Any event can be triggered on either the 'closing' or 'opening' edge of either input. A 'closing' is when you apply a voltage to an input. An 'opening' is when that voltage is removed. The inputs can be triggered on any voltage from 9 to 24 VDC. If you don't have an external source of power for these two inputs, you can 'steal' some juice from the MiniBrick8's power supply connections.

Power Supply: The MiniBrick8 can be run from any supply voltage from 9-24 VDC. The outputs are powered from this supply connection as well. If you are driving 24 VDC loads, then run the MiniBrick8 on 24 VDC. If your loads require 12 VDC, then run the MiniBrick8 on 12 VDC.

This input is protected from reverse polarity connections. An idle MiniBrick8 draws only about twenty-five milliamperes. It can run for up to a day on just a single nine volt battery even when it is running. The loads that the MiniBrick8 is controlling will usually draw far more current than the MiniBrick8 itself.

Outputs: Each MiniBrick8 has eight outputs (hence, the name). These are just like the standard outputs used on all Gilderfluke & Company Show Control Systems. The only difference is that these outputs are available with either a ten position screw terminal or Gilderfluke-standard 1/4 J6 insulation displacement header. The MiniBrick8s with screw terminals have two positions available with the common supply voltage and no ground position. You can pick up the ground at the power supply connection if needed.

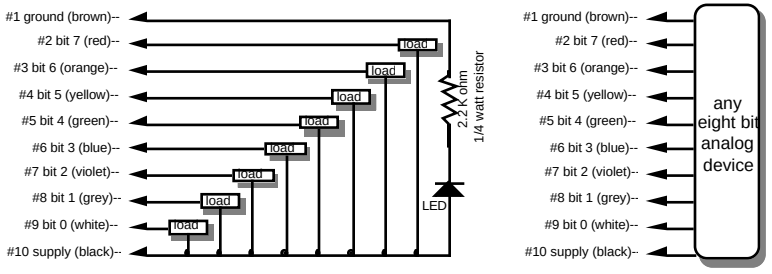
The Output connections for all Gilderfluke & Company Show

Control Systems is through 'J-6' output cables. These are forty wire ribbon cables which are made up of four identical eight bit wide 'channels'. A J-6 cable is often split up into four individual channels. Each '1/4 J-6' ribbon cable is made up of ten wires, and can be used to control eight individual 'digital' (off/on) devices, or one eight bit wide 'analog' device. This is what is found on a MiniBrick8 of you don't opt for the screw terminal connectors. Each group of ten wires also includes a common power supply and ground wire.

To simplify wiring to any Gilderfluke animation system, the connectors used on the 1/4 J-6 cables are what are called 'insulation displacement' (IDS) connectors. These simply snap on to an entire cable, automatically 'displacing' the wire insulation and making contact with the wires within. This means that an entire ten wire cable can be terminated in seconds. All connectors are polarized, to keep them from being plugged in backwards. Although there are tools made specifically for installing these connectors, the tool we find works best is a small bench vise.

Each 1/4 J-6 cable is arranged in the following order:

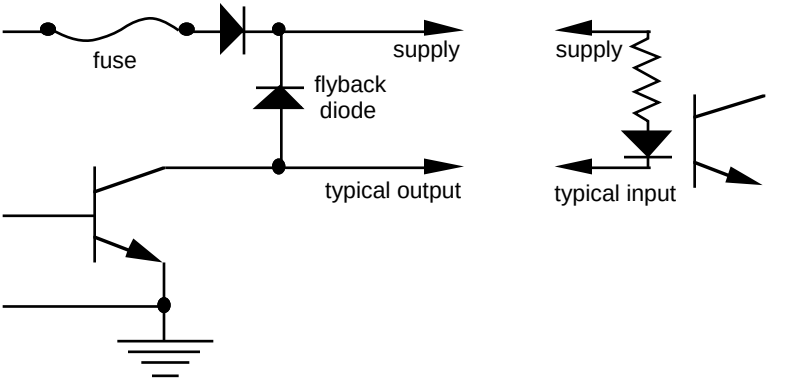
wire number	color	wire function
1	brown	circuit ground
2	red	data bit 7
3	orange	data bit 6
4	yellow	data bit 5
5	green	data bit 4
6	blue	data bit 3
7	violet	data bit 2
8	gray	data bit 1
9	white	data bit 0
10	black	unregulated power supply (PTC fused for 1 amp)



Any eight digital devices or one eight bit analog device can be connected to any 1/4 J-6 cable as shown. The LED between the ground (pin #1 brown) wire and supply (pin #10 black) wire

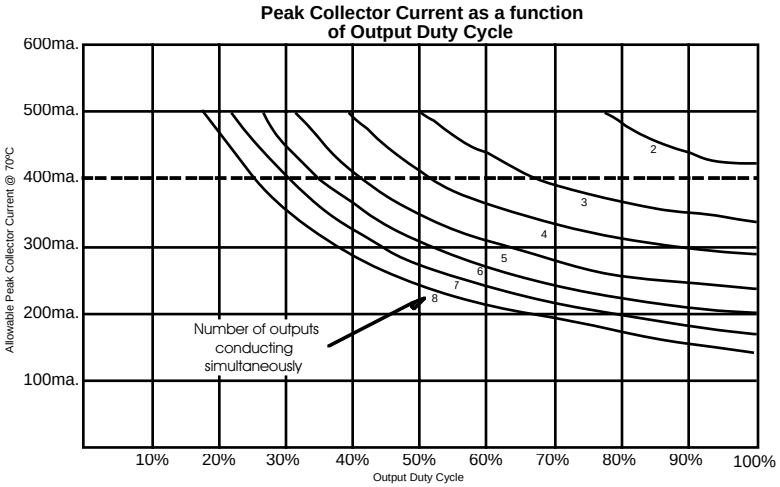
acts as an indicator which is lit if the fuse for that channel is OK.

All outputs are open collector switches to ground. Flyback diodes are included in the outputs for driving inductive loads. Power is supplied through a diode and a solid state circuit breaker to the common pin(s) on the connector. A safe level of current is 150 milliamperes simultaneously on each output. This is sufficient to drive most small relays, valves and other similar loads directly. If fewer than eight outputs are on at one time, then the outputs are rated as follows.



The supply line for each 1/4 J-6 is PTC fused for 1 amp. You should treat each 1/4 J-6 as an individual, and not cross the outputs or supply lines from one channel to the lines from any other channel. Doing this won't cause any damage, but can reduce the protection for the outputs that the fuses normally provide.

The current Output Capacity of each output is as shown in the following chart:



Since it is unusual to have more than 50% of the outputs on at any one time, you can usually assume the system has a 250 ma output current capacity. If you are going to be turning on lots of heavy loads at the same time, you should derate this to 150 ma.. This is sufficient to drive the majority of loads which will be directly connected to the outputs of the animation system. If additional current capacity is needed, or if you need to drive higher voltage loads, you can connect relays as needed to the outputs of the animation system. Coincidentally, boards for doing this are available from Gilderfluke & Company. These include:

DPDT relay board: A set of eight electromechanical relays with double pole/double throw contacts rated at 5 amps each.

Reed relay board: A set of eight small electromechanical relays with normally open contacts rated at 150 ma each.

I/O module: A set of eight small solid state relays with normally open contacts rated at 3.5 amps each (alternating current and direct current relays available).

Solid State Relay Fanning Strip: For connecting up to eight popular 'hockey puck' style relays to a 1/4 J-6 output cable. These are available with capacities of up to 75 amps each.

MiniBrick8 Serial Port Commands:

The MiniBrick8 can be accessed through the serial port from any computer running just about any modem program. The computer you are using doesn't even need to have any PC·MACs software installed on it. This is a feature that most users should never need to use.

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. You can not download files to a MiniBrick8 when using Hyper Terminal.

To use the MiniBrick8 with a terminal program, just connect it as you would normally with a straight nine position male to nine position female cable. Configure your terminal program for 9600 baud, no parity, eight data bits, one stop bit and 'xon/xoff' handshaking.

If the MiniBrick8 is not currently running a show, it will be printing the character '.' about once a second. This is the 'heartbeat' that you can see on the 'heart' LED on the MiniBrick8. When running a show, it will print a character 'f' on each frame. If it is looping, then an 'l' will be output each time the show loops. If you do not see any of these characters, then there is a problem with your physical connection or configuration.

Reset 'J5AA5'

This command will erase the EEprom on the MiniBrick8. The MiniBrick8 will also determine the type and quantity of memory chips installed and report this and the software revision number when it accepts this command.

Status 'i'

When it receives this command, the MiniBrick8 will respond with the following information on the MiniBrick8 (It will also print this information out when the MiniBrick8 is first powered up or after a successful AutoDownload):

a) Firmware revision number and copyright, 'Gilderfluke & Co. 1.2 MiniBrick8 copyright 1998 DCM'

b) Running status: Whether the MiniBrick8 is running, looping or stopped. What show it is (or was) playing and the frame number into that show the MiniBrick8 is on.

c) Input status: Whether each input is opened ('O') or closed ('C').

d) Thirty-two byte header and name of the AutoDownload file that has been downloaded to the MiniBrick8.

e) One sixteen byte show header for each show that is loaded in the MiniBrick8.

AutoDownload 'sA5A5' nn

This is the format of the file that the MiniBrick8 will receive and load into its EEprom memory.

An AutoDownload file is a binary file. Any AutoDownload file that has previously been saved can be sent to a MiniBrick8 by selecting the 'send binary file' on your modem program and selecting the AutoDownload for sending. You must be sure that the modem program has not been set to 'gobble' any special characters (carriage returns, line feeds, etc.).

The Hyper Terminal program that comes with Windows '95 and '98 will not work for sending AutoDownloads. For some strange reason it has been written to randomly change any binary value that is larger than one hundred twenty-seven.

RealTime Update '~'

This command sets the MiniBrick8 into a mode where it will update the outputs in realtime from the data received through the serial port. Sixteen bytes follow the command, and are in turn followed by an eight bit checksum. The MiniBrick8 uses this command to update the outputs in real time from the first data byte received when used with a computer that has as a MACs-SMP Smpte Card installed in it.

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HEXadecimal to Decimal to Percentage

This chart shows decimal, HEXadecimal, and a few percentage equivalents to aid you when you need to convert between numbering bases:

decimal	HEX	ASCII	%	decimal	HEX	ASCII	%	decimal	HEX	ASCII	%	decimal	HEX	ASCII	
00	00h	null	0%	64	40h	@	25%	128	80h	(null)	50%	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	D0h	(P)	
17	11h	dc1/^Q		81	51h	Q		145	91h	(dc1)		209	D1h	(Q)	
18	12h	dc2/^R		82	52h	R		146	92h	(dc2)		210	D2h	(R)	
19	13h	dc3/^S		83	53h	S		147	93h	(dc3)		211	D3h	(S)	
20	14h	dc4/^T		84	54h	T		148	94h	(dc4)		212	D4h	(T)	
21	15h	nak/^U		85	55h	U		149	95h	(nak)		213	D5h	(U)	
22	16h	syn/^V		86	56h	V		150	96h	(syn)		214	D6h	(V)	
23	17h	etb/^W		87	57h	W		151	97h	(etb)		215	D7h	(W)	
24	18h	can/^X		88	58h	X		152	98h	(can)		216	D8h	(X)	
25	19h	em/^Y		89	59h	Y		153	99h	(em)		217	D9h	(Y)	
26	1Ah	sub/^Z		90	5Ah	Z		154	9Ah	(sub)		218	DAh	(Z)	
27	1Bh	ESC		91	5Bh	[		155	9Bh	(ESC)		219	DBh	([)	
28	1Ch	FS		92	5Ch	\		156	9Ch	(FS)		220	DCh	(\)	
29	1Dh	GS		93	5Dh	]		157	9Dh	(GS)		221	DDh	(])	
30	1Eh	RS		94	5Eh	^		158	9Eh	(RS)		222	DEh	(^)	
31	1Fh	VS		95	5Fh			159	9Fh	(VS)		223	DFh	( )	
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%