Gilderfluke & Co.
ROBOTICS & SOUND SYSTEMS

BR-MultiShow Bricks

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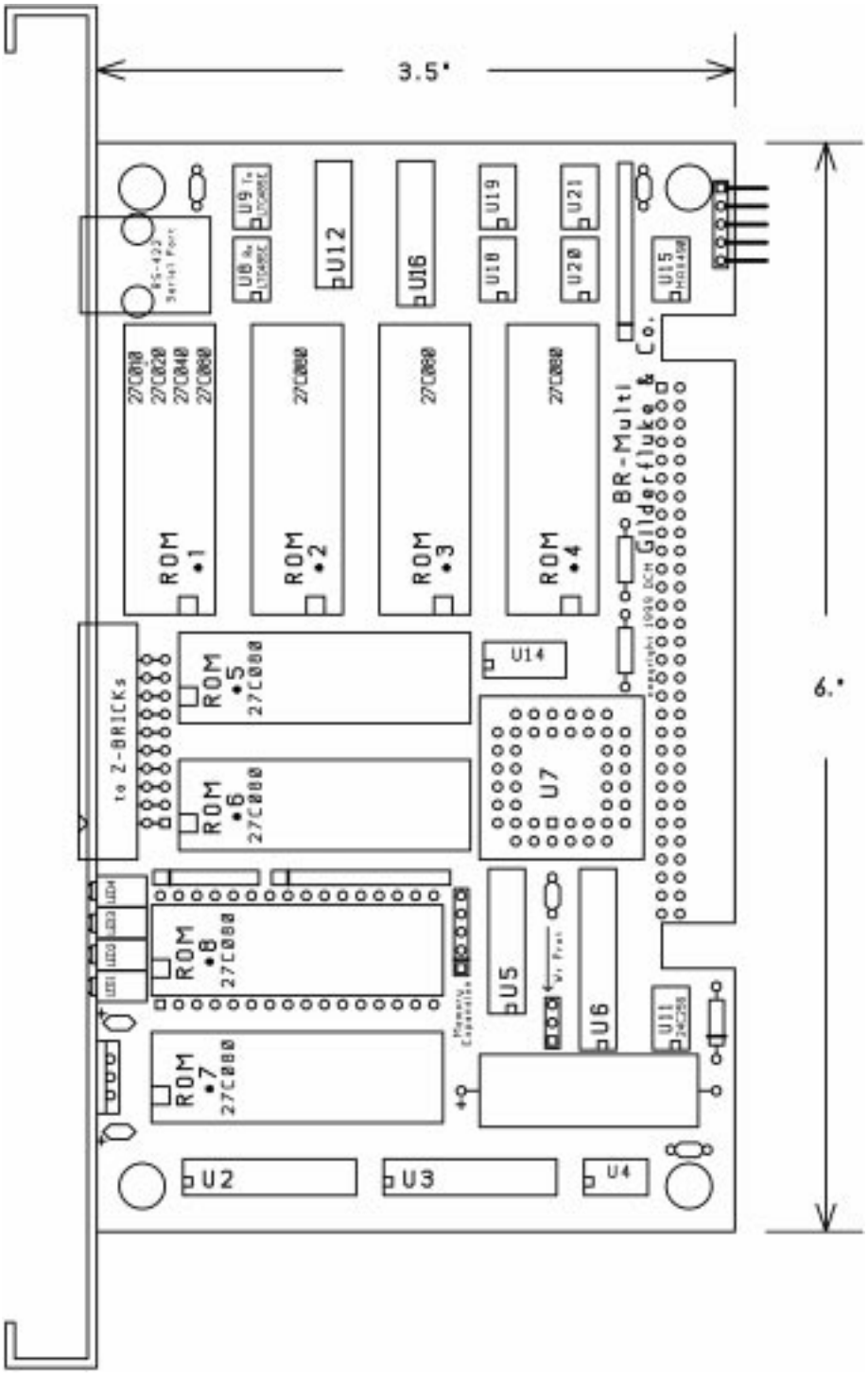

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Overview:

The BR-MultiShow Brick is a unique product in the Gilderfluke & Company lines. It is neither a Smart Brick nor a Dumb Brick. It is a stand-alone DMX-512 output show controller. The BR-MultiShow Brick can have up to 265 shows loaded on it. Up to eight of these shows can be played back at the same time, completely independently of the others.

One way you might want to think of this is as eight separate distributed Dumb Brick systems, which happen to share the same DMX-512 output cable. All eight shows can be running completely independently of the others. Each has its own inputs that tells it when to start or stop. Each can be told to loop one or more shows, or to stop and wait for the next trigger at the end of the show.

The data from these eight show sequencers are combined into a single DMX-512 output stream. Up to 256 channels worth of analog or digital output cards, dimmers and other DMX-512 compatible equipment can be attached to the DMX-512 output. Any individual DMX-512 channel can be controlled by any of the eight sequencers. Its neighbors can be controlled by the same, or any other sequencer. Even a single digital output bit within a channel can be controlled by a different sequencer than its neighbors.

Thirty times each second, all 256 channels of Eprom show data are transmitted through the Z-Brick and DMX-512 data outputs. The DMX-512 output can be used to control light dimmers, automated spotlights, color changers, fog and wind machines, or any other pieces of equipment which will accept standard DMX-512 inputs. The Z-Brick output can be used for additional digital outputs through one or more Z-Bricks.

The BR-MultiShow Bricks can be mounted in one 1" wide slot in any of our Brick Card cages. The BR-MultiShow Bricks can be used in conjunction with any selection of digital or analog output Smart Bricks, Electronic FeedBack (EFB) Smart Bricks and Z-Bricks. Since the output from the BR-MultiShow Bricks is DMX-512, additional card cages and other DMX-512 compatible equipment can be located at up to a mile from the cage that holds the BR-MultiShow Brick.

Card cages with one, two, three or sixteen slots are available from Gilderfluke & Company. The card cages provide all the connections for power supply, control signals and outputs that any Brick card will need. Several different styles of output connectors are available on the one and two slot card cages. The sixteen slot card cage mounts in seven inches of standard 19" rack space (4-1/2 "of space behind the panel).

Power requirements for each BR-MultiShow Brick is 9 to 24 VDC. The BR-MultiShow Brick itself draws approximately 200 ma..

The DMX-512 standard was developed by the United States Institute for Theatrical Technology (USITT) for a high speed (250 KBaud) asynchronous serial data link. Although it was originally designed for controlling light dimmers, it is now supported by hundreds of suppliers throughout the world for controlling all kinds of theatrical equipment.

Even though the DMX-512 standard calls for up to 512 channels of data, the DMX-512 transmission from PC·MACs is limited to 256 eight bit wide channels. You can address your DMX-512 compatible output devices to respond to any address between 00 and 255. Addresses above the 256th are used in PC·MACs for transmitting a checksum. The BR-

MultiShow Bricks can use this to verify that the data received from PC·MACs has no transmission errors in it. If you address a light dimmer or other DMX-512 device to addresses 256 or 257, you will see this verification data displayed as a flickering pattern.

On the Front of the BR-MultiShow Bricks:

A) RS-422 Serial Port: This is used to configure the BR-MultiShow Bricks. It is compatible with all the RS-422 Serial Ports used on Gilderfluke & Company products. This serial port connection is also connected to the backplane of the BR-MultiShow.

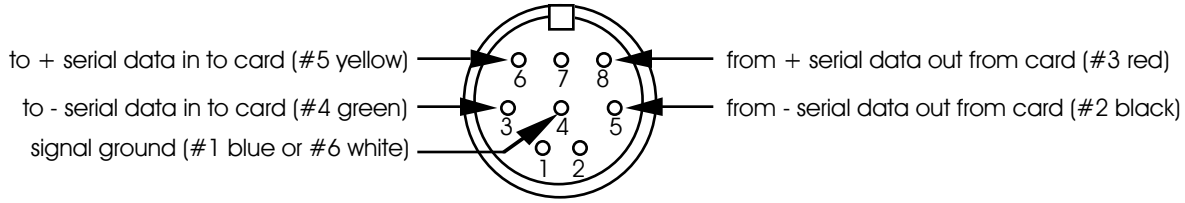
The serial data signals from the BR-MultiShow Bricks are brought out on a six position RJ-11 (modular telephone style connector). Facing the end of the cable with the release latch upwards, its pin out is as follows:

	COLOR	SIGNAL NAME:
LEFT	#1 white	Signal Ground
	#2 black	- Serial data out from card
	#3 red	+ Serial data out from card
	#4 green	- Serial data in to card
	#5 yellow	+ Serial data in to card
RIGHT	#6 blue	Signal Ground

PC and Compatible Connections: To cross wire the RS-422 / RS-485 signals from the BR-MultiShow Bricks to the RS-232 serial port of an IBM compatible, cross connect the signals as follows:

DB-25	DE-9	Signal	Signal from/to BR-MultiShow Bricks
2	3	DATA OUT	- Serial data into card (#4 green)
3	2	DATA IN	- Serial data out from card (#2 black)
7	5	GROUND	Signal Ground (#1 white or #6 blue)

Apple Macintosh Connections: Apple Macintosh computers have true RS-422 serial ports built in. To connect to the BR-MultiShow Bricks, the pin out is as follows (view is of male connector facing the end of the cable):



The BR-MultiShow Bricks expect to see the serial data in the following format:

ONE START BIT
EIGHT DATA BITS
ONE STOP BIT

The BR-MultiShow Bricks respond only to the commands to enter the configuration mode, download/upload configuration and status enquiries. It will ignore all other commands. This allows it to share the same RS-422 serial line with additional BS-ANAs, Digital Audio Repeaters, Smart Brick Brains and other serially controlled devices. The only requirement is that each unit be addressed to a different location.

B) Board Error LED: This LED will flash when:

1) BR-MultiShow Brick just booted
2) An error is found in the DMX-512 data checksum (if receiving DMX-512 data). If this and the DMX-512 LEDs don't turn off, then you are probably sending a DMX-512 stream to the card that doesn't have a checksum in it.

C) DMX-512 LED: This LED will be lit when the BR-MultiShow Bricks is receiving DMX-512 data.

D) Ease In/Brick Heart: This LED will flash at 15 Hz when one or more analogs are performing an Ease-In.

E) Heartbeat: This LED Flashes continuously while the CPU is running. If it ever stops for more than a fraction of a second, the 'Deadman' circuit in the BR-MultiShow Bricks will automatically reset

the CPU. While performing an Ease-In, the heart rate will double.

F) Z-Brick: This twenty pin IDS connector is used to connect to one or more Z-Bricks. When enabled, the BR-MultiShow Bricks puts out data from the DMX-512 input or onboard Eprom to this connector. The format of the data is as follows:

IDS pin #	SIGNAL
1	Data bit 0
2	Data bit 1
3	Data bit 2
4	Data bit 3
5	Data bit 4
6	Data bit 5
7	Data bit 6
8	Data bit 7
9	Address bit 0
10	Address bit 1
11	Address bit 2
12	Address bit 3
13	Address bit 4
14	Address bit 5
15	Address bit 6
16	Address bit 7
17	ground
18	ground
19	Strobe/
20	Reset/

When the address and data lines are valid, the rising edge of the Strobe line will latch the data into the addressed outputs.

BackPlane Connections:

The BackPlane connection is through a sixty position double sided edge connector (thirty connections on each side on .1" centers). This normally is plugged into a card cage, but can also be used with an IDS or other discrete edge connector. We recommend an Insulation Displacement (IDE) connector for the latter.

The first ten positions are used for the Smart Brick network and RS-422 Serial Port. They are normally bussed between all the cards in the card cage (although they can be separated by cutting the lines if desired). The BR-MultiShow does not use the Smart Brick Network.

The next forty positions are used to connect to the optically isolated inputs that are used to start and stop the BR-MultiShow. This pinout is identical to that used on the BS-BRN-CRD1 Smart Brick Brains. This allows the BR-MultiShow Bricks to be used with the KP-300 operator panel. These inputs are all optoisolated, and you must provide a (nominal) 24 volts DC to the appropriate lines for them to work.

The last ten positions are used to provide power to the BR-MultiShow. These wires are ganged to provide a higher current carrying capacity. The pinout of this connector is as follows:

output wire #	Edge pin #	color	wire function
Smart Brick net #2	1	black	Smart Brick Network Data (not used by BR-MultiShow Bricks)
Smart Brick net #1	2	white	Smart Brick Network Data (not used by BR-MultiShow Bricks)
Smart Brick net #3	3	red	Smart Brick Network Clock (not used by BR-MultiShow Bricks)
Serial Port #3	4	red	RS-422 Serial Port TxD + out
Smart Brick net #4	5	green	Smart Brick Network Clock (not used by BR-MultiShow Bricks)
Serial Port #2	6	black	RS-422 Serial Port TxD - out
Smart Brick net #5	7	yellow	Smart Brick Network Strobe (not used by BR-MultiShow Bricks)
Serial Port #5	8	yellow	RS-422 Serial Port Rx + in
Smart Brick net #6	9	blue	Smart Brick Network Strobe (not used by BR-MultiShow Bricks)
Serial Port #4	10	green	RS-422 Serial Port Rx - in
#1	11	brown	1/4 J6 in Ground
#2	12	red	1/4 J6 in bit 7
#3	13	orange	1/4 J6 in bit 6
#4	14	yellow	1/4 J6 in bit 5
#5	15	green	1/4 J6 in bit 4
#6	16	blue	1/4 J6 in bit 3
#7	17	violet	1/4 J6 in bit 2
#8	18	gray	1/4 J6 in bit 1
#9	19	white	1/4 J6 in bit 0
#10	20	black	1/4 J6 in + 24 VDC Supply
#11	21	brown	not used
#12	22	red	not used
#13	23	orange	not used
#14	24	yellow	not used
#15	25	green	not used
#16	26	blue	not used
#17	27	violet	Green Input negative
#18	28	gray	Green Input Positive
#19	29	white	Blue Input negative
#20	30	black	Blue Input Positive
#21	31	brown	not used
#22	32	red	not used
#23	33	orange	not used
#24	34	yellow	not used
#25	35	green	not used
#26	36	blue	not used
#27	37	violet	not used

#28	38	gray	not used
#29	39	white	not used
#30	40	black	not used
#31	41	brown	not used
#32	42	red	not used
#33	43	orange	not used
#34	44	yellow	not used
#35	45	green	not used
#36	46	blue	not used
#37	47	violet	not used
#38	48	gray	not used
#39	49	white	not used
#40	50	black	not used
n/a	51	black	power supply ground
n/a	52	black	power supply ground
n/a	53	black	power supply ground
n/a	54	black	power supply ground
n/a	55	black	power supply ground
n/a	56	red	+ power supply input
n/a	57	red	+ power supply input
n/a	58	red	+ power supply input
n/a	59	red	+ power supply input
n/a	60	red	+ power supply input

To simplify wiring to any MACs Animation Control System, the connectors used on the J6/A cables are what are called 'insulation displacement 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 forty wire cable can be terminated in seconds. All connectors are polarized, to keep them from being plugged in backwards.

Show Programming & Animation Data Eproms:

The only frame rate supported by the BR-MultiShow is 30 frames per second. All shows used with the BR-MultiShow must be programmed at this frame rate. Because the BR-MultiShow will carry up to 256 shows that run on up to eight separate sequencers, it has one very special rule for programming your shows:

No output (digital bit or analog channel) can be used in more than one sequencer at the same time!

This is very important. If the same output was used in two shows that were running simultaneously, the BR-MultiShow will 'overlay' them. This is to say, if a digital function is 'ON' in one of the shows, the second show could not turn this bit off. It will only go off when it is off in ALL shows that are running [1]. If analog channels are overlaid, the results will be unpredictable. The bits from both analog channels will be 'OR'ed together, resulting in an undesirable output level.

Although this sounds complicated, it is actually easy to do using PC·MACs:

1) Use the **SAME SITE FILE** for **all** the shows that are going to be loaded on a BR-MultiShow Brick.
2) All Analog channels should be defined with a default value of zero. This is so all shows will have zero values for all analogs except the ones you are programming.
3) All digital outputs should be defined with a default value of 'OFF'. This is so all shows will have all the digital functions 'OFF' except the ones you are programming.
4) There are eight show sequencers numbered 'a' through 'h'. Shows should be set up to run only on a single sequencer. Outputs used on any shows that are going to be run from one sequencer must not be used during shows that are run on any other sequencer.

   Hint: Name your outputs (or figures) starting with an 'a', 'b' or whatever sequencer they are going to be running from. If you have a figure named 'a Lincoln', you will know not to program it when you are programming shows that are going to be run from any but the 'a' sequencer.

5) The starting and ending frame's analog values should be set to the position you would like them to be held at when shows are not running. This is especially true for the shows you are going to select for the '**PowerOn/E-Stop**' shows.
6) If you are not sure that all the outputs are 'off'/zero during the shows where they need to be, you can do the following. As a last step before saving all your shows:
   a) Open each show individually.
   b) Move all analog and digital channels that **ARE NOT** used by the sequencer that this show will be using to the 'Editing' column of the 'Move to OffLine' dialog. Click OK.
   c) You should now see all the channels that **ARE NOT** going to be used by the same sequencer as this show. They should all be 'OFF' if they are digitals, or zero value flat lines at the bottom of the analog OffLine editing window pane if they are analogs. If you see any analogs that are off the zero value line or digitals that are 'ON', you may want to investigate before proceeding.
   d) 'Select All' under the Edit pulldown. This should select all the channels on display for the entire length of the show.
   e) 'Clear' command under the Edit pulldown. This will definitely force all the visible channels 'OFF' or to Zero.
   f) Save this show.
   g) Repeat 'a' through 'f' for each show to be loaded onto the BR-MultiShow Brick.

The Eproms used for BR-MultiShow Brick each contains up to 256 shows worth of data, and each show can contain up to 256 channel's worth of data. In addition, there is a header at the start of the AutoDownload file that tells the BR-MultiShow Brick how many shows and channels to expect in the file.

[1] This may be a feature you want to use on some occasions. As an example, if you had a set of eight show areas running from a single BR-MultiShow, with power to the compressor that provides compressed air to all eight scenes controlled by one digital output. You would want the compressor to run if any of the shows were running, so this bit would be programmed active on all of the shows. If any sequencer is running, then the compressor will be 'ON'.

An Eprom file set are generated on a PC·MACs system by: [2]

1) Selecting the '**Save as AutoDownload...**' command from the '**File**' pulldown.
2) Set the '**start**' and '**end**' boxes to set the number channels you want to go into this AutoDownload Eprom file. PC·MACs will default these values to include every channel that has been defined in your site file.
3) Use the '**Add**' button to select any additional shows you would like to be saved into this AutoDownload Eprom file set.
4) Use the '**Promote**' and '**Demote**' buttons to move selected show(s) into the order you would like to save them in the Eprom.
5) You can select each show individually and select:
   a) Whether or not this show can be stepped upon. If a new show is requested on the same sequencer that this one is running on, whether it will be ignored or not.
   b) What you would like to happen at the end of this show ('**play next show immediately**' or '**do nothing**'). Select '**play next show immediately**' if you want to loop a show or series of shows.
   c) Which show will follow this one. This should only be a show that has been programmed to use the same sequencer number as this one. Select '**play next show immediately**' and set select the same show to be '**next**' if you want to loop a single show.
6) Press the '**Build**' button to begin the saving process. A standard file save dialog will open. Name the file as desired. (it defaults to the name of the first show in the list). PC·MACs will warn you if a file already exists with this name. Hit OK to save the data to a file.

If you press the '**Report**' button, PC·MACs will display the information about the AutoDownload Eprom set you just saved. This information is also saved in a text file with the same name as the AutoDownload Eprom files, but with the extension of '.set'. You can open this file with any text editor like Notepad or Wordpad. The 'Eprom start' and 'Eprom end' are the actual locations of the shows in the Eprom set. The number shown for the 'Eprom End' for the last show in this file set is the last byte which will be saved into the Eprom. If your Eprom is smaller than this number, you will need to use more than a single Eprom.

The capacities of all of the large Eproms are as follows:

Eprom type	Total number of bytes
27C010	131,072
27C020	262,144
27C040	524,288
27C080	1,048,576

If additional capacity is needed, then a memory expansion board can increase the capacity of the BR-MultiShow to fifteen 27C080's (15,728,640 byte capacity).

The Eprom file that PC·MACs generates will have the extension of filename.Ann. The 'A' in the extension flags it as a 'AutoDownload' Eprom file. The 'nn' is the HEXadecimal address of the first channel in the Eprom set. Once saved, this file can be burnt into any Eprom from 1 Mbit (27C010) to 8 Mbits (27C080). The BR-MultiShow supports all four standard thirty-two pin Eproms. If only one Eprom is going to be used on the BR-MultiShow, you can use any Eprom size from 27C010 through 27C080. If more than a single Eprom is to be used, then they all must be 27C080s. Up to eight 27C080 Eproms can be loaded on the BR-MultiShow. With an expansion board, this increases capacity to fifteen 27C080 Eproms.

When burning AutoDownload Eprom sets that don't fit into a single Eprom, you must 'offset' your data in your Eprom programmer's software for the second and all subsequent Eproms. Most Eprom programmer software is pretty archaic (i.e.: DOS-like). Offset numbers are usually entered in HEXadecimal values. After each Eprom is programmed, load the same AutoDownload file again with the offsets shown below for each subsequent Eprom:

[2] More information on this process can be found in the PC·MACs manual.

Eprom Number	**File 'Offset' to use**
#1	000000h
#2	100000h
#3	200000h
#4	300000h
#5	400000h
#6	500000h
#7	600000h
#8	700000h
#9	800000h
#10	900000h
#11	A00000h
#12	B00000h
#13	C00000h
#14	D00000h
#15	E00000h
#16	F00000h

Serial Port Commands:

The following commands are used to communicate with BR-MultiShows and just about any other piece of equipment manufactured by Gilderfluke & Company. Just by attaching the serial port of your PC, PLC or terminal to the serial port of the Smart Brick, you can access these commands.

To enter the configuration mode: Type the following. The (address) is replaced by the HEX value set when the BR-MultiShow is configured.

m5AA5(address)

If any other card is in configuration mode (or even if it just thinks another card is in configuration), the BR-MultiShow won't be able to enter configuration mode. To exit any other card from configuration type 'XN'. You can then try entering configuration again.

To display the status of this card: Send the card an '**i(address)**'. The (address) is replaced by the HEX value set when the BR-MultiShow is configured. This will display a status report for the BR-MultiShow. The status for each of the eight sequencers are displayed, as well as the status of the ten optoisolated inputs.

To download the configuration of this card: Prepare your computer to receive and save a stream of ascii characters. Send the card a '**r(address)**'. The (address) is replaced by the HEX value set when the BR-MultiShow is configured. The card will respond with a stream of 1043 bytes of ascii data. Any number of additional cards (either more BR-MultiShows or any other card made by Gilderfluke & Company) can also have their configuration downloaded into the same file by giving them the same command with the appropriate addresses appended on. When you are done downloading configurations, you can tell your computer to stop saving received ascii to a file.

To reload saved configuration: All you need to do is send this file back to the cards through your computer's serial port. All cards that were addressed will hear their address in the data stream and load in the configuration data.

BR-MultiShow Configuration:

To communicate with the BR-MultiShow through the serial port, you can use just about any computer or terminal that has a serial port on it. Some newer computer designs, like the Apple Macintosh, come with serial ports which are directly compatible with the RS-422 / RS-485 signal levels the BR-MultiShow wants to see. These signal levels are close enough to be used with the RS-232 signal levels found on most older computers (like most IBMs and compatibles) with only a simple adapter cable, so long as the wire isn't too long. To gain the full advantage of the RS-422 / RS-485 signal levels you will need to use a signal level adapter like our 232conv-09.

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 BR-MultiShow through the serial port. Every copy of Windows comes with HyperTerm or Terminal.EXE, which are just such programs. Z-Term is available as shareware (free) from most Bulletin Board Systems and users' groups for Macintosh computers. A modem program will usually have the advantage over a terminal emulation program. It will allow you to save data to your computer's disk drives and then send it back to the BR-MultiShow at a later date. The BR-MultiShow uses no screen control codes or ESCape sequences (unless VT-52 compatible mode has been enabled), so it should work on any machine with an eighty column by twenty-four line display. Machines with other display formats will work, but may not look so neat on the screen.

When configuring your modem program, you should set it for 9600 baud, 8 data bits, one stop bit and no parity. You should set handshaking to 'Xon/Xoff'. Hardware handshaking must be turned off. If your terminal emulation program supports VT-52 terminal emulation (they all do!), you should enable it. This will allow faster screen redraws if 'VT-52 compatible' mode is enabled on the BR-MultiShow. You should set your program NOT to insert an extra LineFeed (LF) character after each Carriage Return (CR) it receives. You should also tell it NOT to scroll automatically after the eightieth column is filled. If either of these are on, the screen will be displayed 'double spaced'. This won't cause any problem, but will make it hard to see the whole screen at one time.

If you have hooked up the BR-MultiShow 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 BR-MultiShow 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 piece of wire, paper clip, or similar tool between pins 2 and 3 on the 'Com.' connector. While still running the modem program, anything you type should be shown 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 BR-MultiShow. 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' and try this test again.

To enter the configuration mode you need to type the following. The (address) is replaced by the HEX value set on the ADDRESS switches on the front of the BR-MultiShow:

m5AA5(address)

If any other card is in configuration mode (or even if it just thinks another card is in configuration), the BR-MultiShow won't be able to enter configuration mode. To exit any other card from configuration type 'XN'. You can then try entering configuration again.

To redraw the screen at any time, just press the <ESC>ape key or <SPACE> bar. The BR-MultiShow will display the following screen:

Configuration Screen:

The menu will appear as follows. Decimal values have been selected for the numbers. At the top of the screen the size of the Animation Data Eprom installed (if any) is shown. If the Animation Data Eprom isn't found, then 'not found' will appear in this space.

```
-Gilderfluke & Company - DMX-512 MultiShow Brick - ver1.02 - copyright 1999 DCM-
  All memory writes are disabled. You can not alter the current configuration.
   Eprom: 123 shows with 123 channels @ 123 Offset / Set FileName is FUDDNUTS

         a) serial address- __0        |  c) DMX Rx checksums- yes
         b) numbering system- decimal  |  d) VT-52 display- yes

0) input 0: close loops shows __1 on a_______ | open not used
1) input 1: close loops shows __2 on _b______ | open not used
2) input 2: close loops shows __3 on __c_____ | open not used
3) input 3: close loops shows __4 on ___d____ | open not used
4) input 4: close loops shows __5 on ____e___ | open not used
5) input 5: close loops shows __6 on _____f__ | open not used
6) input 6: close loops shows __7 on ______g_ | open not used
7) input 7: close loops shows __8 on _______h | open not used

8) green  : close E-stops shows   on abcdefgh | open clears E-stops  on abcdefgh
9) blue   : close pauses shows    on abcdefgh | open continues shows on abcdefgh
             sequencer numbers:  a     b     c     d     e     f     g     h
e) PowerOn/E-Stops go to show #|___1_|___2_|___3_|___4_|___5_|___6_|___7_|___8_|
f) Ease-In speed (in seconds): |_2.1_|_2.1_|_2.1_|_2.1_|_2.1_|_2.1_|_2.1_|_2.1_|
g) EaseIn Chans. | i) info | o) load defs. | p) play | r) save Config. | x) eXit

                                Enter Command-
```

All numeric values are entered in HEXadecimal (0-9, A through F) or Decimal numbers (0-9), as selected on the menu. Each number consist of one or more ASCII characters followed by a <RETURN> (<ENTER> on some keyboards). If more characters have been entered before the <RETURN> than are allowed, then the characters already entered will scroll to the left to make room for the new entries. Once a command has been invoked, characters can be erased one-by-one by using the <DELETE> key (<BACKSPACE> on some keyboards). An entire entry can be erased by hitting the <ESC>ape key. A command can be canceled altogether by hitting the <RETURN> key (<ENTER> on some keyboards) or <ESC>ape key after all of the characters have been erased or before any have been entered.

Once you have configured a BR-MultiShow, you should 'lock' the configuration by moving the 'Write Protect' jumper to the 'Write Protect' position from the 'Enabled' position. This should protect your configuration from anything shy of a lightning hit. As shown above, the second line of the menu will change to show that the Eprom has been protected and warn you that you can no longer make any changes. Configuration changes can be re-enabled at any time by moving the jumper back to the 'Enabled' position.

If you want to keep a hard copy printout of the current configuration of the BR-MultiShow: Press the <ESC>ape key to redraw the screen while saving the print in the modem program running on your computer. This file can then be printed out at any time.

a) Serial Port Address: This command is used to set the address that this card will be respond to on the RS-422 Serial port. Only one card at a time can use each address. This means that if you are configuring several cards, you may need to plug each one in one at a time and set each of them to unique addresses. After they are addressed, you can plug them all in at the same time and talk to them freely.

b) Numbering System: This toggle is used to select between HEXadecimal or Decimal numbering systems for display and entries. When percentage is selected, all entries are still made in Decimal numbers.

c) DMX Rx Checksum: This toggle is used to enable and disable the error checking in data re-

ceived through the DMX-512 data input. Without it, the BR-MultiShow won't be able to recognize errors in the incoming data, and may update the outputs with this bad data. It should be left ON whenever running from a PC·MACs or other DMX-512 source that supports this checksum.

d) VT-52 Compatible Display: When this toggle is enabled, the BR-MultiShow will use special escape sequences to clear the screen (<ESC>ape 'E'), clear the current line (<ESC>ape 'l'), or position the cursor (<ESC>ape 'Y' ROW COLUMN). When disabled, the BR-MultiShow has to redraw the entire screen to change any value, so it can save a good deal of screen redraw time if you have a compatible display.

Input Commands:

0) 1/4 J6 Input bit 0:
1) 1/4 J6 Input bit 1:
2) 1/4 J6 Input bit 2:
3) 1/4 J6 Input bit 3:
4) 1/4 J6 Input bit 4:
5) 1/4 J6 Input bit 5:
6) 1/4 J6 Input bit 6:
7) 1/4 J6 Input bit 7:
8) Green Input:
9) Blue Input:

These are used to set what action will happen on each edge of each input. You can set a different action on the opening and closing edge of each input. The options are:

a) Do Nothing: This input edge will not be used.

b) Start: One or more sequencers are started on this edge. You can specify which sequencer(s) are to be started, as well as which show. If you are starting more than a single sequencer, you should select 'whatever is next' instead of specifying a specific show. Otherwise, the same show will be started on more than one sequencer simultaneously.

The only difference between this command and the '**Loop**' command is that if you '**Start**' a show, then the BR-MultiShow will **NOT** check for another show to run at the end of the show you are starting.

If another show was already running on a sequencer and another is started (the show that is running was set to allow others to step on it), an Ease-In will smooth out any jumps that might otherwise be created on the analog channels.

c) Stop Immediately: One or more sequencers are stopped immediately on this edge. The data levels will be frozen at the current levels until another shoe is started. You can specify which sequencer(s) are to be stopped. Stopping a sequencer which is not running will have no effect.

d) Loop: This command is identical to the Start command above, except that at the end of the show which was started, the BR-MultiShow will check for a '**jump immediately to next show**' programmed into the show data. If there is one, the BR-MultiShow will start the next show.

e) Stop at End: At the end of the currently looping show(s), the BR-MultiShow will **NOT** check for another show to run. This command only effects sequencers that were started with the '**Loop**' command. You can specify which sequencer(s) are to be affected by this command.

f) Pause Sequencer: This command will temporarily stop any show that is running on a sequencer. Show data will freeze at the current levels until the show is 'continued' or another show is started. You can specify which sequencer(s) are to be affected by this command. Pausing a sequencer which is not running will have no effect.

g) Continue Sequencer: This command will restart any show that has been paused. Show data will continue from the frame upon which the show was paused, so no

Ease-In will be needed. You can specify which sequencer(s) are to be affected by this command. Continuing a sequencer which has not been paused will have no effect.

h) E-Stop Sequencer: This command will:

1) Immediately stop the affected sequencer(s).
2) Load the shows that have been selected for the '**PowerUp/E-Stop Shows**'. Show data will be output from the first frame of these shows.
3) An Ease-In will be performed to smooth out any possible jumps in the analog outputs.
4) Lock the effected sequencers to keep them from starting any other show until the E-Stop is cleared by a '**Clear E-Stop**' command.

You can specify which sequencer(s) are to be affected by this command.

i) Clear E-Stop: This command unlocks the selected sequencers so that they may once again accept commands to play other shows. Clearing an E-Stop on a sequencer which hasn't been E-Stopped will have no effect.

e) PowerOn/E-Stops go to show number: This command allows you to select which show each individual sequencer should go to when:

a) Power is first applied to the BR-MultiShow.
b) An E-Stop condition is triggered.

The shows that are selected for the PowerOn/E-Stop should have their first frames programmed with the default analog values for the individual sequencers.

f) Ease-In Speed: Ease-Ins perform a cross fade from the current values for all analog channels towards the new values that are being updated on that sequencer. If the target is moving, then the analog output will start at the previous values and start to follow the new commands more and more as the Ease-In times out.

This command is used to set how long an Ease-In will take for each of the eight sequencers. The speeds available are:

a) .5 seconds
b) 1.0_seconds
c) 2.1 seconds
d) 4.2 seconds
e) 8.5 seconds
f) 17 seconds

An ease-In will be triggered whenever:

a) Any show is started on a sequencer that already has a show running on it. Because the sequencer is in the midst of a show, the analog values probably aren't at the default positions for the sequencer.
b) A show is started on a sequencer which had the last show stopped before it reached its end. Since the sequencer was stopped before it reached the end of a show, the analog values probably aren't at the default positions for the sequencer.
c) An E-Stop is triggered for a sequencer. This causes the analog values to jump to the first frame of the **PowerOn/E-Stop show(s)**.
d) When DMX-512 is first received.
e) When DMX-512 reception is lost.

g) Ease-In Channels: Ease-Ins perform a cross fade from the current values for all analog channels towards the new values that are being updated on that sequencer. If the target is moving, then the analog output will start at the previous values and start to follow the new commands more and more as the Ease-In times out. An ease-In will be triggered whenever.

This command is used to set which channels are considered to be analogs for each of the eight sequencers. If you have analogs that use more than eight bits of resolution, only select the channel's most significant byte (MSB) as an analog. The LSBs will jump to the new values. Analog channels will be Eased-In whenever:

a) Any show is started on a sequencer that already has a show running on it. Because the sequencer is in the midst of a show, the analog values probably aren't at the default positions for the sequencer.
b) A show is started on a sequencer which had the last show stopped before it reached its end. Since the sequencer was stopped before it reached the end of a show, the analog values probably aren't at the default positions for the sequencer.
c) An E-Stop is triggered for a sequencer. This causes the analog values to jump to the first frame of the **PowerOn/E-Stop show(s)**.
d) When DMX-512 is first received.
e) When DMX-512 reception is lost.

This command first asks for the sequencer number you are setting the analog channels for. It then brings up a screen showing which channels are set as analogs. To change any analog channel on or off, just enter the number of the channel.

i) Information: This will display a status report for the BR-MultiShow. The status for each of the eight sequencers are displayed, as well as the status of the ten optoisolated inputs.

o) Reload Default Configuration: This command reloads the default configuration to the BR-MultiShow. Other than setting which channels are analogs and the speed of the Ease-Ins, the default configuration will need very little modification for most installations.

p) Play: This command allows you to pick and play any show on any of the eight sequencers. Although there is nothing to keep you from doing so, you should only play shows on the sequencer upon which they are normally played. If there is already one show playing an Ease-In will take place at the start of the new show. If the show which was playing 'can't' be stepped upon, then the BR-MultiShow will ask you if you would like to override the lockout or not. If the sequencer you are trying to start is in an E-Stop condition, then the BR-MultiShow will ask you if you would like to override the E-Stop or not.

r) Download configuration: This command is used to save the current configuration of the BR-MultiShow through the serial port to a file on your computer. This file can then be reloaded into this, or any other BR-MultiShow. To use this command, you first invoke it, then following the instructions, you set your computer to receive a string of ASCII characters.

```
-Gilderfluke & Company - DMX-512 MultiShow Brick - ver1.02 - copyright 1999 DCM-




 Set your computer to save a stream of text to a file. The file should be 1043
   bytes long. To reload this card, just send this file back to this screen.

                            Hit any key when ready.

          Stop saving text and hit any key when the data has finished.









                         hit <ESC>ape key to cancel-

                                 Enter Command-
```

You then press any key to tell the BR-MultiShow to send out its configuration. When it has finished, you then tell your computer to stop saving characters, and then hit any key to tell

the BR-MultiShow to redraw the screen.

x) eXit: This exits the configuration mode and returns the BR-MultiShow to the command mode. When exiting you must enter a 'y' or 'n', to preserve compatibility with some other Gilderfluke & Company cards.

s) Upload configuration: This command (which doesn't appear on the menu) is the compliment of the **Download Configuration** command. To invoke it, all you need to do is tell your modem program to send the file saved by the 'download' command back to the BR-MultiShow. This will automatically invoke the upload command and store the incoming data.

+) Data Dump: This command (which doesn't appear on the menu) dumps out the DMX-512 output buffer and the configuration memory onto the screen. This started as some developmental routines, and there was plenty of space available, so what the hell.

Using Z-Bricks with a BR-MultiShow:

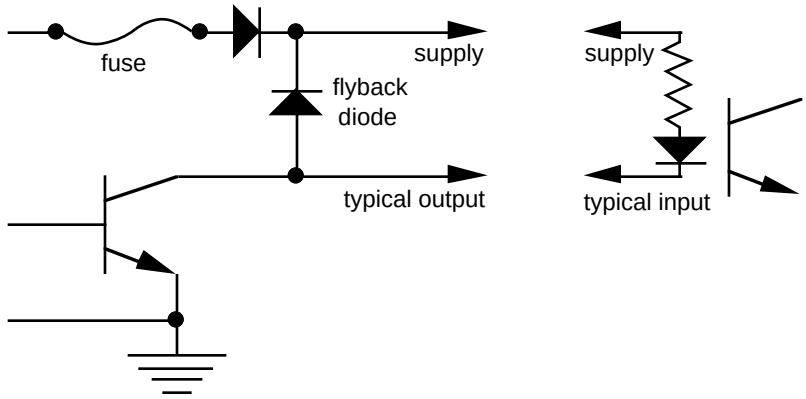
A Z-Brick is a card that can be used with any BR-MultiShow to add thirty-two digital outputs to it. The data for the Z-Brick comes either from the DMX-512 that is being received by the BR-MultiShow or from the Eprom on-board the BR-MultiShow. With proper buffering, any number of Z-Bricks can be added to a BR-MultiShow. Each adds another thirty-two digital outputs to the BR-MultiShow.

The Z-Brick's thirty-two outputs are addressed on four consecutive eight bit channels. This means that each Z-Brick needs four eight bit channels worth of data. The Z-Bricks can be addressed on any address that is a multiple of four. The two HEXadecimal switches on the front of the Z-Brick are used to set the address. The address is set using HEXadecimal numbers (a chart which shows both numbering systems is at the rear of this manual). The upper switch is used to set the upper nibble's address. The lower switch is used to set the lower nibble's address. Because the address has to be set on a four byte boundary, the lower switch has only four usable ranges. These are labeled on the silkscreen as '0-3', '4-7', '8-B', and 'C-F'. Setting this switch to any of the four positions in these ranges are acceptable. i.e.: there are four detents at 0, 1, 2 and 3 on this switch. Setting the switch to ANY of these positions counts as the position '0-3' on the Z-Brick.

The Z-Brick must be connected to the BR-MultiShow by a twenty position ribbon cable. When the Z-Brick is being scanned, the LED on its front will flash at 1/4 the frame rate.

In all animation systems made by Gilderfluke & Company all output cabling on the Z-Brick is through what we call 'J-6' standard output cables. These are 40 wire cables which are made up of four identical eight bit wide 'channels'. A J-6 cable is often split up into four individual channels. As each channel also includes a common power supply and ground wire, each '1/4 J-6' cable is made up of 10 wires, and can be used to control eight individual 'digital' (off/on) devices, or one eight bit wide 'analog' device.

In all animation systems made by Gilderfluke & Company, all digital outputs are open collector switches to ground, and all inputs are opto isolators. Flyback diodes are included in the outputs for driving inductive loads:

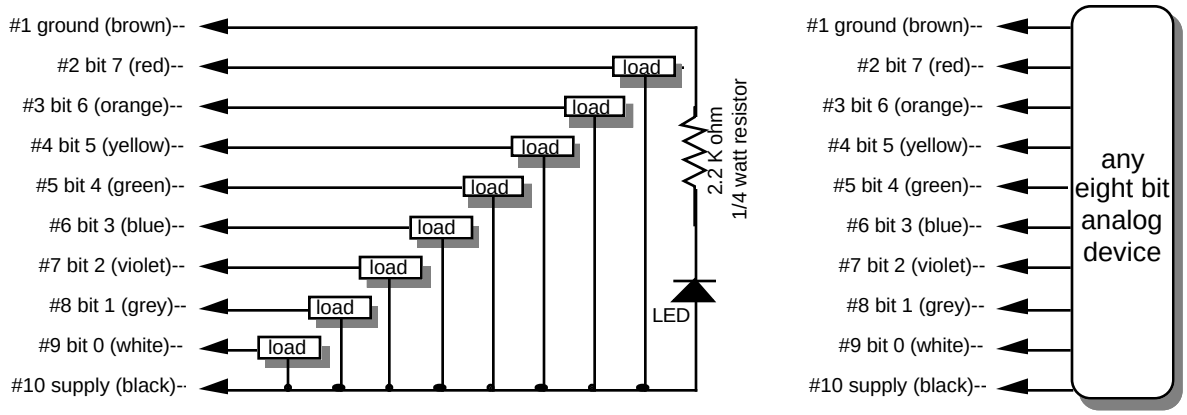


To simplify wiring to any Gilderfluke & Company Animation Control Systems, the connectors used on the J-6 cables are what are called 'insulation displacement connectors'. These simply snap on to an entire cable, automatically 'displacing' the wire insulation and making contact with the wires within. This means that an entire 40 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 J-6 cable is arranged in the following order:

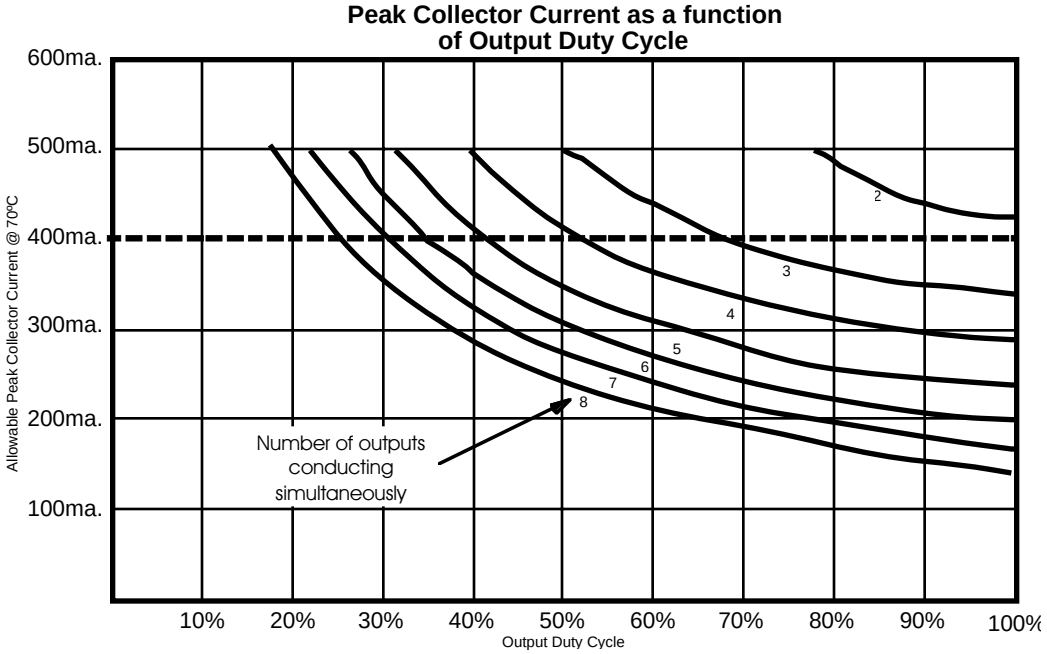
wire number	color	wire function
1	brown	circuit ground
2	red	channel 0 data bit 7
3	orange	channel 0 data bit 6
4	yellow	channel 0 data bit 5
5	green	channel 0 data bit 4
6	blue	channel 0 data bit 3
7	violet	channel 0 data bit 2
8	gray	channel 0 data bit 1
9	white	channel 0 data bit 0
10	black	+15 VDC unregulated power supply (fused for 1 amp)
11	brown	circuit ground
12	red	channel 1 data bit 7
13	orange	channel 1 data bit 6
14	yellow	channel 1 data bit 5
15	green	channel 1 data bit 4
16	blue	channel 1 data bit 3
17	violet	channel 1 data bit 2
18	gray	channel 1 data bit 1
19	white	channel 1 data bit 0
20	black	+15 VDC unregulated power supply (fused for 1 amp)
21	brown	circuit ground
22	red	channel 2 data bit 7
23	orange	channel 2 data bit 6
24	yellow	channel 2 data bit 5
25	green	channel 2 data bit 4
26	blue	channel 2 data bit 3
27	violet	channel 2 data bit 2
28	gray	channel 2 data bit 1
29	white	channel 2 data bit 0
30	black	+15 VDC unregulated power supply (fused for 1 amp)
31	brown	circuit ground
32	red	channel 3 data bit 7
33	orange	channel 3 data bit 6
34	yellow	channel 3 data bit 5
35	green	channel 3 data bit 4
36	blue	channel 3 data bit 3
37	violet	channel 3 data bit 2
38	gray	channel 3 data bit 1
39	white	channel 3 data bit 0
40	black	+15 VDC unregulated power supply (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:



The supply line for each 1/4 J-6 is 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 a 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 (AC and DC 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.

Edge Connector: All of the connections to and from Z-Brick Cards are available on the 60 position edge connector. You can use an Insulation Displacement Edge (IDE) connector if you aren't going to be using one of our card cages:

output wire #	Edge pin #	color	wire function
n/a	1	brown	not used
n/a	2	red	not used
n/a	3	orange	not used
n/a	4	yellow	not used
n/a	5	green	not used
n/a	6	blue	not used
n/a	7	violet	not used
n/a	8	gray	not used
n/a	9	white	not used
n/a	10	black	not used
#1	11	brown	J6 out channel 0 Ground
#2	12	red	J6 out channel 0 bit 7
#3	13	orange	J6 out channel 0 bit 6
#4	14	yellow	J6 out channel 0 bit 5
#5	15	green	J6 out channel 0 bit 4
#6	16	blue	J6 out channel 0 bit 3
#7	17	violet	J6 out channel 0 bit 2
#8	18	gray	J6 out channel 0 bit 1
#9	19	white	J6 out channel 0 bit 0
#10	20	black	J6 out channel 0 + Supply
#11	21	brown	J6 out channel 1 Ground
#12	22	red	J6 out channel 1 bit 7
#13	23	orange	J6 out channel 1 bit 6
#14	24	yellow	J6 out channel 1 bit 5
#15	25	green	J6 out channel 1 bit 4
#16	26	blue	J6 out channel 1 bit 3
#17	27	violet	J6 out channel 1 bit 2
#18	28	gray	J6 out channel 1 bit 1
#19	29	white	J6 out channel 1 bit 0
#20	30	black	J6 out channel 1 + Supply
#21	31	brown	J6 out channel 2 Ground
#22	32	red	J6 out channel 2 bit 7
#23	33	orange	J6 out channel 2 bit 6
#24	34	yellow	J6 out channel 2 bit 5
#25	35	green	J6 out channel 2 bit 4
#26	36	blue	J6 out channel 2 bit 3
#27	37	violet	J6 out channel 2 bit 2
#28	38	gray	J6 out channel 2 bit 1
#29	39	white	J6 out channel 2 bit 0
#30	40	black	J6 out channel 2 + Supply
#31	41	brown	J6 out channel 3 Ground
#32	42	red	J6 out channel 3 bit 7
#33	43	orange	J6 out channel 3 bit 6
#34	44	yellow	J6 out channel 3 bit 5
#35	45	green	J6 out channel 3 bit 4
#36	46	blue	J6 out channel 3 bit 3
#37	47	violet	J6 out channel 3 bit 2
#38	48	gray	J6 out channel 3 bit 1
#39	49	white	J6 out channel 3 bit 0
#40	50	black	J6 out channel 3 + Supply
black	51	brown	power supply ground
black	52	red	power supply ground
black	53	orange	power supply ground
black	54	yellow	power supply ground
black	55	green	power supply ground
red	56	blue	+ power supply input
red	57	violet	+ power supply input
red	58	gray	+ power supply input
red	59	white	+ power supply input
red	60	black	+ power supply input

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- 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 and RTU/FSK units. ASCII values that have their uppermost bit set (bit 7) are shown in parenthesis:

decimal	HEX	ASCII	%	decimal	HEX	ASCII	%	decimal	HEX	ASCII	%	decimal	HEXASCII	%
00	00h	null	0	64	40h	@	25%	128	80h	(null)	50%	192	C0h (@)	75%
1	01h	soh/^A	LaserSearch	65	41h	A		129	81h	(soh)		193	C1h (A)	
2	02h	stx/^B	PB Input wait	66	42h	B		130	82h	(stx)		194	C2h (B)	
3	03h	etx/^C	BLUE in wait	67	43h	C		131	83h	(etx/)		195	C3h (C)	
4	04h	eot/^D	GREEN in wait	68	44h	D		132	84h	(eot)		196	C4h (D)	
5	05h	eng/^E	STOP Relay	69	45h	E		133	85h	(eng)		197	C5h (E)	
6	06h	ack/^F	PLAY Relay	70	46h	F		134	86h	(ack)		198	C6h (F)	
7	07h	bell/^G	REWIND Relay	71	47h	G		135	87h	(bell)		199	C7h (G)	
8	08h	bs/^H	HDTV Mode	72	48h	H		136	88h	(bs)		200	C8h (H)	
9	09h	ht/^I	Hour = '01'	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%