

BR-MultiBrick32

Thirty-Two Output Show Control System

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The BR-MultiBrick32 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. It also can be used as a digital output card in any DMX-512, 'Dumb' or 'Smart' Brick environment.

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- BR-MultiBrick32 Overview 1**
- Features of the BR-MultiBrick32 1**
- BR-MultiBrick32 Indicators 4**
 - Heartbeat 4**
 - 'Smart' Brick Heart/Brick Running 4**
 - DMX-512 5**
 - Board Error 5**
 - Record 6**
 - Output LEDs 6**
 - Fuses 6**
- BR-MultiBrick32 Connections 7**
 - RS-422 Serial Port 7**
 - PC and Compatible Connections 7
 - Apple Macintosh Connections 7
 - DMX-512 Data In/Out 8**
 - 'Smart' Brick Network 10**
 - 'J8' Inputs 10**
 - Power Supply 11**
 - Digital Outputs 11**
 - Edge Connector 16**
- Preparing Animation Data for AutoDownloads 18**
- BR-MultiBrick32 Serial Port Commands 21**
 - Echo Commands 21**
 - Echo On 21
 - Echo Off 21
 - Card Status 22**
 - Card Reset 24**
 - Start Commands 24**
 - Start Track 24
 - Start Global 24
 - Stop Commands 25**
 - Stop Track 25
 - Stop Global 25
 - Loop Commands 25**
 - Loop Track 25
 - Loop Global 25
 - Stop at End Commands 26**
 - Stop at End Track 26
 - Stop at End Global 26

Select Show Commands	26
Select Show Track	26
Select Show Global	26
Show Pause Commands	26
Pause Show	26
Continue Show	26
AutoDownload	27
RealTime Update	27
BR-MultiBrick32 Hardware Configuration	28
Address	28
Record Enable	28
Dipswitch	28
DMX-512 Forever!	28
Disable When Stopped	29
Use DMX-512 Checksum	29
Record Forever!	29
Dipsw5	29
Dipsw6	29
Dipsw7	29
Write Protect Switch	29
'Smart' Brick/'Dumb' Brick Select	29
J8 Power	30
BR-MultiBrick32 Software Configuration	31
HEXadecimal to Decimal to Percentage	36

A note about this manual:

This manual covers the specifics of the BR-MultiBrick32. To program the BR-MultiBrick32 you will need to also need the PC•MACs manual sections that cover the PC•MACs software.

The BR-MultiBrick32 is typically programmed in '**Software-only**' or '**Hardwareless Realtime**' mode. If you are using the PC•MACs MACs-SMP for programming your BR-MultiBrick32 through the DMX-512 input, 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>

BR-MultiBrick32 Overview

The BR-MultiBrick32 is a complete stand-alone Show Control System. The BR-MultiBrick32 can be used singly, or in combination with additional BR-MultiBrick32s, BS-BRN-CRDs, BR-SmartMedia cards or any Gilderfluke & Co. Digital Audio Repeater. It 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, neon special effects, signs, machines and machine tools in process control, or anything else that can be controlled by an electrical signal.

The BR-MultiBrick32 is programmed using our PC·MACs Show Control software. While programming, data can be sent to the BR-MultiBrick32 through its DMX-512 input or RS-422 serial port. Once programmed, data is sent to the BR-MultiBrick32 through the PC's serial port for permanent storage. The BR-MultiBrick32 can then be disconnected from the PC and it will run all by itself.

When used with a 'Hardwareless RealTime' licensed copy of PC·MACs software, up to four BR-MultiBrick32s can have their outputs programmed and updated in real time with just a PC and a serial connection. When used with the PC·MACs hardware (MACs-SMP or MACs-USB Smpte Card), up to sixty-four BR-MultiBrick32s can be updated in realtime through the DMX-512 port.

Features of the BR-MultiBrick32 include:

- Automatic 'program in place' download through the serial port on your PC. There are no Eproms to program or install! The amount of time it takes to download shows the BR-MultiBrick32 depends on the length of the show(s). Short shows take only seconds. Shows that fill the entire BR-MultiBrick32s memory will take about ten minutes to download.
- Each BR-MultiBrick32 comes with a minimum of four MBytes of nonvolatile memory. This gives a show capacity of over seventy-two minutes at thirty 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' switch can protect the show data from accidental or unauthorized changes. Memory can be expanded to up to sixteen MBytes if needed. This translates into almost five hours of show data at thirty frames per second!

- When operated as a 'Dumb' Brick, four optoisolated inputs to synchronize BR-MultiBrick32s with pushbuttons or other real-time events. Multiple BR-MultiBrick32s can be triggered simultaneously or sequentially. Each BR-MultiBrick32 input can be set to start, stop, pause, continue, or directly select and play a specific show. Different actions can be requested on each inputs' opening or closing edges.
- When programming, or when installed as a permanent part of a larger control system, the BR-MultiBrick32 accepts data through its DMX-512 and RS-422 serial port. This data is used to update the outputs, and takes precedence over the on board Flash memory.
- When operated as a 'Smart' Brick, the BR-MultiBrick32 acts just like any other Playback-Only 'Smart' Brick, playing animation data from an on-board Flash Memory. As a 'Smart' Brick, it requires a 'Smart' Brick Brain to run. The 'Smart' Brick Brain tells all of the 'Smart' Bricks attached to it (including the BR-MultiBrick32) where in the show it is. The BR-MultiBrick32 then uses this information to access the appropriate data in the Flash Memory and update its outputs.
- Two hundred fifty-five shows can be loaded onto a BR-MultiBrick32 at one time. Shows can be accessed sequentially or directly using the four optoisolated inputs or serial commands sent through the RS-422 serial port. The 'Next' show can be set for the end of any show, allowing you to loop a single show or build 'chains' of shows.
- The BR-MultiBrick32 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, and uses little memory.
- The outputs from a BR-MultiBrick32 can be fed to Digital to Analog converters (like our single channel DAC-08 or four channel DAC-QUAD) wherever you need 0-10 volt analog control signals.
- Each of the thirty-two 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. Relays can be used to control higher current or voltage loads. If more than thirty-two outputs are needed, additional BR-MultiBrick32s can be added to give you as many outputs as you need.

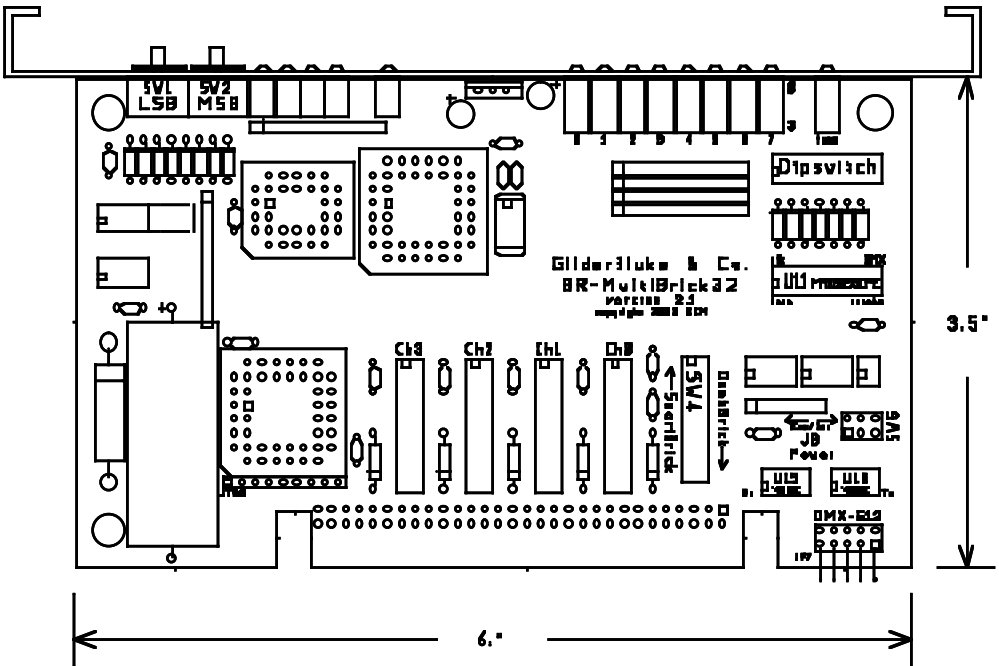
- The BR-MultiBrick32 runs on anything from 9-24 VDC. BR-MultiBrick32s can even be run from batteries.
- BR-MultiBrick32s mount in standard Brick card cages. These are available with one, two, or sixteen slots. Styles are available for mounting in 19" racks or independently. If space or budget considerations require, the BR-MultiBrick32 can be mounted on screw standoffs and connected using a sixty position IDS ribbon cable connector.

A 'Dumb' Brick is typically used in stand alone applications, where the show runs continuously or when triggered by an external event. Multiple 'Dumb' bricks can be triggered simultaneously, but will not be automatically synchronized as the Bricks in a 'Smart' Brick system are. Because each 'Brick' can be run completely independently, each can be running its own time line from its own trigger inputs.

A 'Smart' Brick system is used when you need to synchronize any number of 'Bricks' together on a 'Smart' Brick Network under the control of a single 'Smart' Brick Brain. The Brain itself allows shows to be triggered at specific times of the day using a real time clock and the Brains' 365 day schedule, and locked (synchronized) to Smpte time code, LaserDisks and DVDs, or the Brains' own internal or external clock. A single Brain and 'Smart' Brick network can run a single time line at one time.

BR-MultiBrick32 Indicators

There are only a small number of connections, indicators, and configuration dip-switches on each BR-MultiBrick32.



There are five Status LEDs on the BR-MultiBrick32:

- 1) Heartbeat:** The 'heartbeat' will always flash so that you can see that the BR-MultiBrick32 is alive. If this LED doesn't flash at least twice per second, you should power down the BR-MultiBrick32 and check the power supply and connections to the BR-MultiBrick32. If this output ever stops flashing, a special circuit on the BR-MultiBrick32 will reset and restart the microcontroller in less than a second.
- 2) 'Smart' Brick Heart/Brick Running:** Depending on the mode of operation the BR-MultiBrick32 is in, this LED has several different functions:

- a) **When operating as a 'Smart' Brick:** This LED will display the 'Smart' Brick Brain's heartbeat. This is transmitted from the 'Smart' Brick Brain through the 'Smart' Brick Network that interconnects all of the 'Smart' Bricks. If this LED is not flashing, then you need to check your 'Smart' Brick Network connections or your 'Smart' Brick Brain.
 - b) **When operating as a 'Dumb' Brick:** This LED will be ON whenever a show is running. It will be off when no shows are running. This output is also sent out the 'Yellow' status output on the 'J8' connection on the backplane.
 - c) **When receiving data download for permanent storage in Flash memory (Revision 1.nn Cards Only):** This LED will flash to show that data is being received.
- 3) **DMX-512:** This LED will light to show you that the BR-MultiBrick32 is receiving realtime updates through either the DMX-512 or RS-422 serial ports.
- 4) **Board Error:** This LED will flash to show you that the BR-MultiBrick32 has sensed one of the following errors:
- a) **Just booted:** Lights for a short period each time the BR-MultiBrick32's microcontroller starts up.
 - b) **'Smart' Brick Network Error:** Flashes if an error is received in a 'Smart' Brick Network packet from the 'Smart' Brick Brain.
 - c) **Realtime DMX-512 Update Error:** The optional checksum in the DMX-512 realtime update didn't agree with the data received.
 - d) **Realtime Serial Update Error:** The checksum in the RS-422 serial port realtime update didn't agree with the data received.
 - e) **Download Error:** There was an error in the data being downloaded to the BR-MultiBrick32.
 - f) **Download Timeout:** If the data being downloaded to the BR-MultiBrick32 stops mid-stream, this LED will flash as the BR-MultiBrick32 returns itself to normal operating mode.
 - g) **Data Verification Failure:** If you ask the BR-MultiBrick32 to verify the data in its flash memory, and it finds an error, it will flash this LED as well as displaying an error message on your computer screen.
 - h) **Memory locked:** If you try to clear the flash memory or

send a show to the BR-MultiBrick32 while the Write Protect switch is in the 'locked' position.

- 5) Record:** This LED is turned on whenever a revision 1.nn BR-MultiBrick32 has had its '**Record Enable**' button pushed. It indicates that the BR-MultiBrick32 has had its DMX-512 and 'Smart' Brick Network ports disabled and the RS-422 port enabled. This LED must be ON to talk to the BR-MultiBrick32 through the RS-422 serial port.

In revision 2.00 and later BR-MultiBrick32 hardware there is no '**Record Enable**' button. The RS-422 port, BrickNet, and DMX-512 ports are always available. This LED will light whenever the card is being configured and flash when it is receiving an AutoDownload file.

- 6) Output LEDs (Revision 2.00 and Later Cards Only):** These thirty-two LEDs show the current status of the thirty-two digital outputs. If a LED is lit, then that output is 'ON'. Because the outputs of a BR-MultiBrick32 are 'Open Collector, Switch To Ground', you can ground out any output pin, and the appropriate LED will light. This can be useful when diagnosing output wiring problems. If you are commanding 'on' an output and you don't see a LED, then the output is probably drawing too much current and the output is 'self protecting'. Disconnect the load and see if the LED now lights. If it does, then it definitely is an overload problem. If it does not, then try turning 'on' some of the other outputs. If they light OK, then the output driver might be damaged. If they do not, then verify your addressing and retest.

- 7) Fuses (Revision 2.00 and Later Cards Only):** The thirty-two outputs of the BR-MultiBrick32 are divided into four, eight-bit 'channels'. Each of these channels is fused for approximately one Amp of continuous current. These four LEDs light to show if the four fuses are OK. If any are out, then a short circuit (or too heavy of a load) is dragging the outputs down and causing the fuse to open. The fuses are actually 'PTC fuses', which act more like circuit breakers. Once the overload is removed, they reset.

BR-MultiBrick32 Connections

RS-422 Serial Port (Revision 1.nn Cards Only): This is used to configure the BR-MultiBrick32. It is compatible with all of the RS-422 Serial Ports used on Gilderfluke & Company products.

As a convenience, the four active lines on this connector are bussed to the backplane of the card cage. This allows you to communicate to a whole card cage full of BR-MultiBrick32, BS-ANAs, 'Smart' Brick Brains, Electronic FeedBack (EFB) 'Smart' Bricks and other cards through the connector on any single card. They just need to be set to different addresses. If desired, permanent connections can be made on the back of a card cage.

Revision 2.00 and later BR-MultiBrick32 cards have only the backplane serial port connections.

The serial data signals from the 1.nn revision BR-MultiBrick32s are brought out on a six position RJ-12 (six position, six conductor modular telephone style connector). Facing the end of the cable with the release latch upwards, its pin out is as follows:

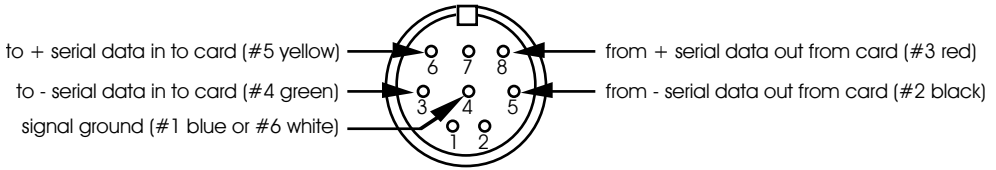
	COLOR	SIGNAL NAME:
LEFT	#1 white	Signal Ground
	#2 black	- Serial data out from card
	#3 red	+ Serial data out from card
	#4 green	- Serial data in to card
	#5 yellow	+ Serial data in to card
RIGHT	#6 blue	Signal Ground

PC and Compatible Connections: If you are only talking to a single BR-MultiBrick32 and your wire length is short, you may be able to simply cross wire the RS-232 serial port on your PC to talk to the BR-MultiBrick32. This does not work on all PCs, as some don't swing their RS-232 outputs as far as they should. If it does not work with your PC, you may need to get a RS-232 to RS-422 converter (like our 232conv-09) to talk to the BR-MultiBrick32. To cross wire the RS-422 / RS-485 signals from the BR-MultiBrick32 to the RS-232 serial port of an IBM compatible, cross connect the signals as follows:

<u>DB-25</u>	<u>DE-9</u>	<u>Signal</u>	<u>Signal from/to BR-MultiBrick32</u>
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-MultiBrick32, the pin out is as follows (view is of male connector facing the end of the cable):



The BR-MultiBrick32 expects to see the serial data in the following format:

ONE START BIT
EIGHT DATA BITS
ONE STOP BIT

Unlike many of the products manufactured by Gilderfluke & Company, the 1.nn revision BR-MultiBrick32s respond only to the commands to enter the configuration mode, download/upload configuration and status inquiries. It will ignore all other commands, which allows it to share the same RS-422 serial line with additional BR-MultiBrick32s, 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.

Starting with revision 2.00 BR-MultiBrick32s, the RS-422 serial port is available full-time. As a multidrop Serial network, it can be used to select and play shows, check the status of a card, or AutoDownload shows from any point on the network. Since it is 100% compatible with the RS-422 serial ports on all other Gilderfluke & Company equipment, a multidrop network can consist of up to 256 other Gilderfluke & Company devices.

Since this is probably the most widely used of industrial data networks, a myriad of other pieces of equipment are available which will also work with the RS-422 serial buss. A typical application is to use a touch screen operator interface to access and play shows. These generally use a user definable graphical interface. You pretty much draw a button, and then attach a string to it. When this on-screen button is pushed, this string is sent out to control the downstream equipment.

DMX-512 Data In/Out: Five pin MiniDIN connector (revision 1.nn cards only). Revision 2.0 and later BR-MultiBrick32 have only the

ten pin header for DMX-512 input and output through the backplane.

The BR-MultiBrick32 will stop listening to the 'Smart' Brick network whenever there is a DMX-512 signal present on this input. The DMX-512 data lines on this connector will be attached to the backplane DMX-512 header. This allows the DMX-512 signals to be bussed between cards within a card cage.

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.

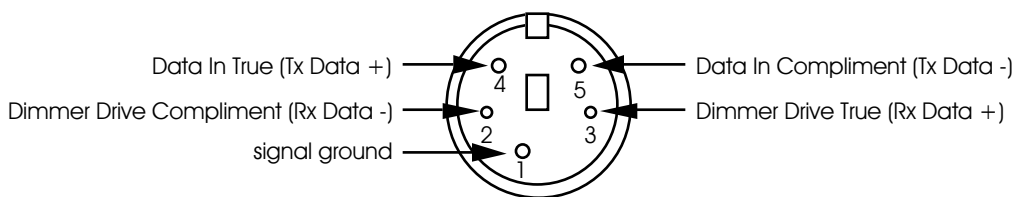
Even though the DMX-512 standard calls for 512 channels of data, the DMX transmission from PC•MACs is limited to 256 eight-bit wide channels. You can address your DMX-512 compatible output devices to respond to any address between 0 and 255. Addresses above the 256th are used in PC•MACs for transmitting a checksum. The BR-MultiBrick32 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. Note that at frame rates higher than forty FPS, not all 256 channels can be transmitted through the DMX-512 output.

The DMX-512 standard calls out a 5 pin XLR connector for all cabling. Unfortunately these connectors won't fit on a 1" wide card. For this reason we chose a 5 pin MiniDIN connector for this signal. the pinout is as follows:

<u>MiniDIN pin #</u>	<u>SIGNAL</u> ¹
1	Signal Common (shield)
2	Dimmer Drive compliment (Rx Data -)
3	Dimmer Drive True (Rx Data +)
4	Data In True (Tx Data +)
5	Data In compliment (Tx Data -)

Facing the end of the male end of a cable, the pins are located as shown:

¹ Don't blame us for these names. These are directly from the USITT.



Data from a PC-MACs should be fed into pins #2 (-RxD) and #3 (+RxD). The shield should be connected to pin #1.

'Smart' Brick Network: If Switch #4 is in the 'Smart' Brick position, the BR-MultiBrick32 will be operating as a 'Smart' Brick. The 'Smart' Brick Network normally found on a 'Smart' Brick is brought out on the edge connector. When plugged into any Gilderfluke & Co. Brick card cage, this will be brought out on a RJ-12 connector on the card cage. A card cage should not have both 'Smart' and 'Dumb' Bricks in the same card cage. They share the same pins on the edge connector and backplane. Damage may result if both are installed in the same card cage.

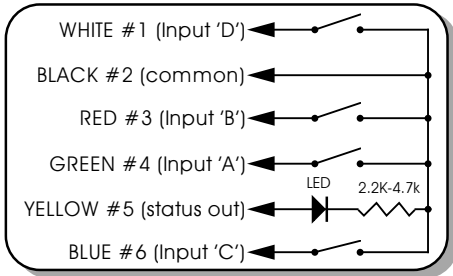
The 'Smart' Brick Network signals to the BR-MultiBrick32 are brought in through a six position RJ-12 (six position, six conductor modular telephone style connector) on the card cage. Facing the end of the cable with the release latch upwards, its pin out is as follows:

	<u>COLOR</u>	<u>SIGNAL NAME:</u>
LEFT	#1 white	Smart Brick Net Data +
	#2 black	Smart Brick Net Data -
	#3 red	Smart Brick Net Clock +
	#4 green	Smart Brick Net Clock -
	#5 yellow	Smart Brick Net Strobe +
RIGHT	#6 blue	Smart Brick Net Strobe -

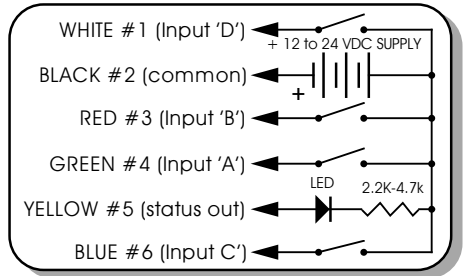
'J8' Inputs: If Switch #4 is in the 'Dumb' Brick position, the BR-MultiBrick32 will be operating as a 'Dumb' Brick. The trigger inputs and status output normally found on a 'Dumb' Brick are brought out on the edge connector. When plugged into any Gilderfluke & Co. Brick card cage, this will be brought out on a RJ-12 connector on the card cage. A card cage should not have both 'Smart' and 'Dumb' Bricks in the same card cage. They share the same pins on the edge connector and backplane. Damage may result if both are installed in the same card cage.

These are four optically isolated digital inputs which can be used to start, stop, pause or select specific show sequences to

play. Facing the end of the wire, with the latch upwards, the pinout of a standard 'J8' cable is as follows.



J8 with Sw8 set for INTERNAL power



J8 with Sw8 set for EXTERNAL power

Any event can be triggered on either the 'closing' or 'opening' edge of any 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 12 to 24 VDC. If you don't have an external source of power for these two inputs, you can 'steal' some juice from the BR-MultiBrick32's power supply connections by putting the '**J8 Power**' switch in the 'Internal' position.

Power Supply: The last ten contacts of the BR-MultiBrick32's edge connector are used for the power supply connections. The BR-MultiBrick32 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 BR-MultiBrick32 on 24 VDC. If your loads require 12 VDC, then run the BR-MultiBrick32 on 12 VDC.

This input is protected from reversed polarity. An idle BR-MultiBrick32 draws only about 200 milliamperes. The loads which the BR-MultiBrick32 is controlling will usually draw far more current than the BR-MultiBrick32 itself.

Digital Outputs: Each BR-MultiBrick32 has thirty-two outputs (hence, the name). These are just like the standard outputs used on all Gilderfluke & Company Show Control Systems. Card cages to hold the BR-MultiBrick32s are available with screw terminals or ribbon cable connections.

The Output connections for all Gilderfluke & Company Show Control Systems are 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. 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.

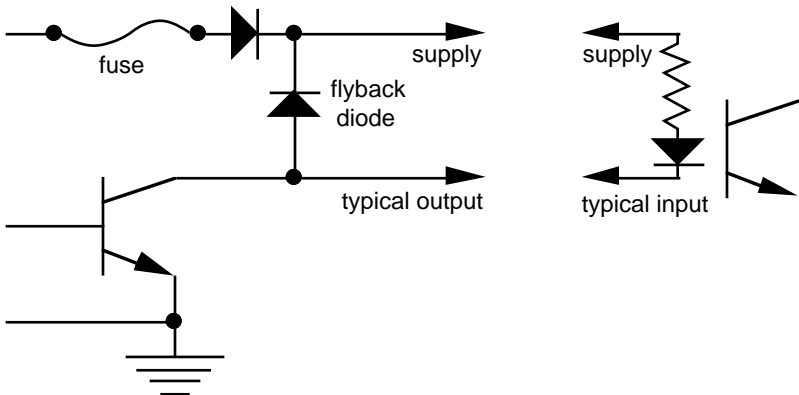
Each J-6 cable is arranged in the following order:

<u>wire number</u>	<u>color</u>	<u>wire function</u>
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	+ VDC unregulated power supply
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	+ VDC unregulated power supply
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	+ VDC unregulated power supply
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	+ VDC unregulated power supply

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 that is lit if the fuse for that channel is OK.

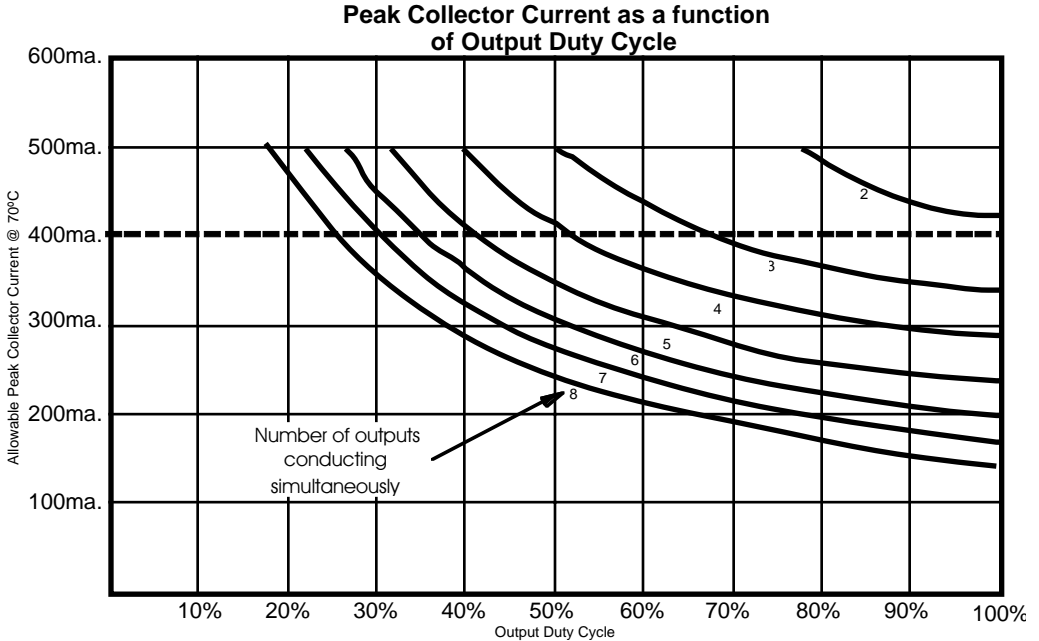
All outputs are open collector switches to ground. Flyback diodes are included in the outputs for driving inductive loads. Power is supplied through a diode and a solid state circuit breaker to the common pin(s) on the connector. A safe level of current is 150 milliamperes simultaneously on each output. 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.

Edge Connector: All of the connections to and from BR-MultiBrick32 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
J8 Black (common)	1	brown	J8 Common (black)/'Smart' Brick Net Data-
J8 White (Reset)	2	red	J8 'D' (white) input/'Smart' Brick Net Data +
J8 Red (Stop)	3	orange	J8 'B' (red) input/'Smart' Brick Net Clk +
Serial Port red #3	4	yellow	TxD + out from BR-MultiBrick32
J8 Green (Start)	5	green	J8 'A' (green) input/'Smart' Brick Net Clk -
Serial Port Black #2	6	blue	TxD - out from BR-MultiBrick32
J8 Yellow (Status Out)	7	violet	J8 Status (yellow) out/'Smart' Brick Strobe +
Serial Port Yellow #5	8	gray	Rx + in to BR-MultiBrick32
J8 Blue (Clock/Dbt. Show)	9	white	J8 'C' (blue) input/'Smart' Brick Net Strobe -
Serial Port green #4	10	black	Rx -in to BR-MultiBrick32
# 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

Preparing Animation Data for AutoDownloads

The Eprom Memories used for the original 'Brick' products manufactured by Gilderfluke & Company each contained one channel (eight-bits) worth of data. Later products used Eproms which contained several channels each. The Flash Memories used on the BR-MultiBrick32, BR-ANA, BR-EFB and BR-SmartMedia use a MultiChannel format with a complex header to allow them to be AutoDownloaded from PC·MACs. The following instructions apply to all of cards that use AutoDownload files.

After you have finished programming your show(s), files are AutoDownloaded from PC·MACs by:

- 1) Selecting the 'Save as AutoDownload...' command from the 'File' pulldown.
- 2) Use the 'Add' button to select any additional show(s) you would like to be saved into this AutoDownload file.
- 3) Use the 'Promote' and 'Demote' buttons to move selected show(s) into the order you would like to save them in the Flash Memory.
- 4) Select the 'first show' and what will happen to the BR-MultiBrick32 on power up. If you will be operating the BR-MultiBrick32 as a 'Smart' Brick, then set the power up action to 'wait'. If you have set the BR-MultiBrick32 to 'wait' at power up, then the first frame of the show you have selected will be output as soon as power is applied to the BR-MultiBrick32.
- 5) Set what will happen on each of the four 'J8' optoisolated inputs if you will be operating the BR-MultiBrick32 as a 'Dumb' Brick. You can ignore these settings if you will be running it as a 'Smart' Brick.
- 6) Select each show to be downloaded one at a time and set what will happen at the end of each show and whether it can be 'stepped on' if you will be operating the BR-MultiBrick32 as a 'Dumb' Brick. You can ignore these settings if you will be running it as a 'Smart' Brick. When operating as a 'Dumb' Brick, any show which can be stepped upon can be interrupted mid-show by a new show start coming in. Any show which can not be stepped upon will ignore all additional start commands while it is still playing.
- 7) Set the 'Brick Serial Address' to send the AutoDownload file to. This is the serial address of the card you want it to be received by. All other cards will ignore the data being sent to this one card. With BR-MultiBrick32s, the address is usually the same as the 'start' channel set in the next step.

- 8) Set the 'first channel' and 'last channel' boxes to set the number channels you want to go into this AutoDownload file. A BR-MultiBrick32 holds four channels worth of data. If this is the first (or only) BR-MultiBrick32 in the system, the addresses are typically set for '0' to '3'.
- 9) The '**Calculate Brick Start Frames**' checkbox must always be checked.
- 10) The '**Save Brick Starts**' checkbox should not be checked.
- 11) You can quickly test if the BR-MultiBrick32 is attached to the serial port properly by hitting the 'Reset MiniBrick' button. Of course, this will also erase any show data that was already in the BR-MultiBrick32's flash memory. PC·MACs will report if the Reset was successful or not.
- 12) Press the 'Build' or 'Download' button to begin the saving process. A 'Build' will just save the AutoDownload file to your disk, without sending it to the BR-MultiBrick32. A 'Download' will save the file to disk and send it to the BR-MultiBrick32. A standard file save dialog will open. Double check the Directory location and name the file as desired. (it defaults to the name of the first show in the list). You can tell Windows to save the file to a different directory, if needed. PC·MACs will warn you if a file already exists in this location with this same name. Hit OK (or change the name & hit OK if you want to preserve the older file) to save the data to a file.

After doing an AutoDownload, if you press the 'Report' button, PC·MACs will display the information about the AutoDownload file you just saved. This information is also saved in a text file with the same name as the Flash Memories, but with the extension of '.set'. You can open this file with any text editor (like Notepad or Wordpad). The numbers shown for 'Brick start' and 'Brick end' are what you need to enter into the 'Smart' Brick Brain to set the start and end of each show (If you will be running the BR-MultiBrick32 as a 'Smart' Brick). **The 'Eprom Memory start' and 'Eprom Memory end' are the actual locations of the shows in the Flash Memory set.** The number shown for the 'Eprom Memory End' for the last show in this file set is the last byte which will be saved into the Flash Memory. If your Flash Memory is smaller than this number, you will need to use external show data storage (such as a BR-SmartMedia) or have your BR-MultiBrick32 retrofitted with a larger Flash memory. Contact Gilderfluke & Co. if you need to have your flash memory expanded.

The AutoDownload file that PC·MACs automatically generates will have the extension of filename.Ann. The 'A' in the extension flags it as a

'AutoDownload' file. The 'nn' is the HEXadecimal address of the first channel in the AutoDownload set. If you are AutoDownloading to a number of different cards, you can use the same name for all of them without fear of overwriting the others since they will automatically have different 'extensions'. This file can be sent to any other BR-MultiBrick32 at any time using a computer and a terminal program like terminal.exe or our GilderTerm. HyperTerm.exe will not work for this, because it randomly alters values above 128 in the AutoDownload file.

The address of the data sent out from Flash memory may be different from what you saw when programming through the DMX-512 or serial input. This is a question of the address selected for the BR-MultiBrick32 and address range selected for the data when sending the AutoDownload file. The BR-MultiBrick32 always uses the address saved in the AutoDownload file for its outputs. This is normally what you want to do.

BR-MultiBrick32 Serial Port Commands:

The BR-MultiBrick32 can be accessed through the serial port from any computer running just about any modem or terminal program. The computer you are using doesn't even need to have any PC·MACs software installed on it.

Most Gilderfluke & Co products can be controlled through their RS-422 Serial ports. Up to 256 different cards and devices can be attached to the same serial lines, to form a complete RS-422 'multi Drop' network. Anywhere on this network you can attach operator panels to access and control it, or you can use a telephone or Internet modem so that it can be accessed from around the block or around the world. Commands can be addressed to a single card on the network, or all of the cards simultaneously.

One of the easiest and most flexible types of operator interfaces for accessing the serial network are the many touch screen operator panels. These are available from a number of different suppliers, and most of them will easily attach right to our serial network. Most of these allow you to 'draw' whatever buttons and user interface icons on their screens (using a provided Windows program), attach ASCII strings to these 'buttons', and then download the final configuration to the operator panel so the PC can be taken away.

Typical modem programs you can use are Terminal.exe (which came with Windows 3.1) and HyperTerm.exe (which comes later versions of Windows), or GilderTerm.

GilderTerm is available free from Gilderfluke & Co. for use with all of our products. It can be downloaded from our web page, and is included on all of our CD-ROMs. GilderTerm has been optimized for use with all Gilderfluke & Company equipment. All of the commands are built in, and it will even let you use your mouse to select commands.

To use the BR-MultiBrick32 with a terminal program, just configure it for 9600 baud, no parity, eight data bits, one stop bit and 'xon/xoff' handshaking. If you are using GilderTerm, all of the settings are fixed at the appropriate settings. All you will need to do is select the appropriate 'COM' port.

Echo Commands:

"a" [nn] (card address)

"b"

Echo On:

Echo Off:

The 'Echo ON' command will turn on a special mode that will cause all of the other serial port commands to echo on the selected card. This used when you are setting up serial commands

so you can verify all the commands you are issuing are being received correctly (the 'echo' responses are shown in *italics*):

If you send "a00", the echo mode will be turned ON:

card 00h/_0, echo mode on

If you send "*03" to request a specific show:

card 00h/_0, requested show 03h/_3 CHEEBURG

If you send "t00" to start the requested show playing on a specific card:

card 00h/_0, starting show 03h/_3 CHEEBURG

If you send "!00" to start a show looping on a specific card:

card 00h/_0, looping show 04h/_4 FRUTCAKE

If you send "u" to stop a show playing:

card 00h/_0, stopped show 05h/_5 IGETARND

If you send "u" to stop a card that is already stopped, it will give you an error message:

card 00h/_0, error: not playing or looping 05h/_5 IGETARND

Similar error messages will be returned whenever you ask the card to do something that it can not do at the current time.

The 'Echo OFF' command will turn off the echo mode on all the cards in the system.

"i" [nn] (card address) Card Status:

When the BR-MultiBrick32 receives this command, it will respond with the following information:

- a) Gilderfluke & Company, product name, Firmware revision number and copyright.
- b) Card serial address and if the Flash is write protected.
- c) Amount of Flash memory installed.
- d) Whether or not the Flash memory is enabled for writing.
- e) If it is operating as a 'Smart' Brick:
 - 1) The frame number currently being accessed by the 'Smart' Brick Network.
- f) If it is operating as a 'Dumb' Brick:

- 1) Whether the card is running, stopped, looping or paused.
 - 2) The current status of the four optically isolated inputs.
- g) Information on the currently loaded AutoDownload file:
- 1) AutoDownload file name (in DOS 8.3 format).
 - 2) Number of channels in the AutoDownload file.
 - 3) Number of shows in the AutoDownload file.
 - 4) AutoDownload file Header information.
 - 5) Individual show information with
 - a) Show number in the AutoDownload file.
 - b) The offset to the start of the show data.
 - c) How long the show is (in frames).
 - d) The show flag (which sets frame rate and step-ability).
 - e) Which show is defined as 'next'. If no specific show number as entered, a '00' means 'what-ever is next in list'.
 - f) The name of the show (in DOS 8.3 format).

The following shows a BR-MultiBrick32 information status response for a card which is operating as a 'Smart' Brick:

```
Gilderfluke & Co. MultiBrick32
firmware revision 2.10
copyright 2002 DCM

Card addressed at 01h/_1

4 Mbits (512KBytes) memory installed
Writing to Flash is Enabled

Smart Brick @ frame 00D86h/___3462

AutoDownload FileName: TEST.A00
Number of channels: 04h/_4
Number of shows: 06h/_6

00 B0 A1 01 04 06 01 01 08 00 01 00 04 00 01 00 08 01 01 00 20 04 40 00

01h/_1 st:00000h/____0 len:0122Ah/_4650 fl:EDh nxt:01h/_1 KOKIMO.SHO
02h/_2 st:0122Ah/_4650 len:01374h/_4980 fl:CDh nxt:00h/_0 MARGVILL.SHO
03h/_3 st:0259Eh/_9630 len:01248h/_4680 fl:CDh nxt:00h/_0 CHEEBURG.SHO
04h/_4 st:037E6h/_14310 len:0122Ah/_4650 fl:CDh nxt:00h/_0 FRUTCAKE.SHO
05h/_5 st:04A10h/_18960 len:00EA6h/_3750 fl:CDh nxt:00h/_0 IGETARND.SHO
06h/_6 st:058B6h/_22710 len:00F96h/_3990 fl:CDh nxt:00h/_0 409.SHO
```

(Sample data: Your show data will differ from what is shown.)

The status screen is a snapshot image of the current status of the BR-MultiBrick32. If you want to update the status information displayed, you must hit the 'Card Status' command a second time.

The following shows a BR-MultiBrick32 information status response for a card which is operating as a 'Dumb' Brick:

```
Gilderfluke & Co. MultiBrick32
firmware revision 2.10
copyright 2002 DCM

Card addressed at 00h/___0

4 Mbits (512KBytes) memory installed
Writing to Flash is Enabled

Input A/Green now Open
Input B/Red now Open
Input C/Blue now Open
Input D/White now Open

Dumb Brick show 01h/___1 KOKIMO looping @ frame 00F27h/___3879

AutoDownload FileName: TEST.A00
Number of channels: 04h/___4
Number of shows: 06h/___6

00 B0 A1 01 04 06 01 01 08 00 01 00 04 00 01 00 08 01 01 00 20 04 40 00

01h/___1 st:00000h/___0 len:0122Ah/___4650 fl:EDh nxt:01h/___1 KOKIMO.SH0
02h/___2 st:0122Ah/___4650 len:01374h/___4980 fl:CDh nxt:00h/___0 MARGVILL.SH0
03h/___3 st:0259Eh/___9630 len:01248h/___4680 fl:CDh nxt:00h/___0 CHEEBURG.SH0
04h/___4 st:037E6h/___14310 len:0122Ah/___4650 fl:CDh nxt:00h/___0 FRUTCAKE.SH0
05h/___5 st:04A10h/___18960 len:00EA6h/___3750 fl:CDh nxt:00h/___0 IGETARND.SH0
06h/___6 st:058B6h/___22710 len:00F96h/___3990 fl:CDh nxt:00h/___0 409.SH0
```

(Sample data: Your show data will differ from what is shown.)

“j5AA5” [nn] (card address) Card Reset:

This command will erase the 'Flash' memory on the BR-MultiBrick32. The BR-MultiBrick32 will also determine the type and quantity of memory chips installed and report this and the software revision number when it accepts this command.

Start Commands:

“f” [nn] (card address)

Start Track:

“u”

Start Global:

These commands are available ONLY on 2.0 or later revision cards which are being operated as 'Dumb' Bricks. If your system has a 'Smart' Brick Brain, then these commands should be addressed to the 'Brain'.

These commands start the animation playing on the BR-MultiBrick32(s) addressed by the command. The shows will always start from the beginning. If an addressed BR-MultiBrick32 is looping shows, it will have the **'LOOPING SHOWS'** flag reset.

If the BR-MultiBrick32 receives a start command after it has received a request for a specific show, it will play that show. Other-

wise it will play the show that has been set as the 'next' show for the show which is currently playing (or most recently played show if it is not currently playing). If this is the first show played after a BR-MultiBrick32 is reset, it will play the show which has been set as the 'first' show during the AutoDownload. Requests for specific shows can come only from the serial port.

When shows are downloaded to the BR-MultiBrick32, they can be set to ignore additional start commands while they are playing. This allows individual shows to be 'stepped' upon or not. If the BR-MultiBrick32 is already playing a show which has this option set, it will ignore this command.

Stop Commands:

"x" [nn] (card address)

"y"

Stop Track:

Stop Global:

These commands are available ONLY on 2.0 or later revision cards which are being operated as 'Dumb' Bricks. If your system has a Smart Brick Brain, then these commands should be addressed to the 'Brain'.

These commands stop the selected BR-MultiBrick32(s) unconditionally. The stop takes place at the current frame being played.

Loop Commands:

"! " [nn] (card address)

""

Loop Track:

Loop Global:

These commands are available ONLY on 2.0 or later revision cards which are being operated as 'Dumb' Bricks. If your system has a Smart Brick Brain, then these commands should be addressed to the 'Brain'.

This command acts much like the **START** commands, except that they also set the **'LOOPING SHOWS'** flag. With this flag set, it is possible to set a sequence of shows playing in any order. Since the 'next' show can be any show you ask for, one show can be played over and over again, or you can set up a sequence of shows which will be repeated until the BR-MultiBrick32 is told to stop.

Stop at End Commands:

"%" [nn] (card address)

"&"

Stop at End Track:

Stop at End Global:

These commands are available ONLY on 2.0 or later revision cards which are being operated as 'Dumb' Bricks. If your system has a Smart Brick Brain, then these commands should be addressed to the 'Brain'.

These commands reset the **'LOOPING SHOWS'** flag in the selected BR-MultiBrick32(s). What this does is to stop them playing when the end of the current show is reached. These commands are used when you want the shows to finish gracefully. The **STOP** commands are used when you want to stop a show immediately.

Select Show Commands:

"j" [nn] (Card Address) [nn] (show#) Select Show Track:
****" [nn] (show#) Select Show Global:**

These commands are available ONLY on 2.0 or later revision cards which are being operated as 'Dumb' Bricks. If your system has a Smart Brick Brain, then these commands should be addressed to the 'Brain'.

Up to two hundred fifty-five different animated shows can be stored on a single BR-MultiBrick32. These commands can be used to select an individual show on the selected BR-MultiBrick32(s). Individual shows can be requested with a range of 01 to FFH. Once a show is selected, it will be played on the next serial port **START** or **LOOP** command.

If a show selection has been made inadvertently, it can be cleared by sending a request for show number 00.

Show Pause Commands:

"<" [nn] (card address) Pause Show:
">" [nn] (card address) Continue Show:

These commands are available ONLY on 2.0 or later revision cards which are being operated as 'Dumb' Bricks. If your system has a Smart Brick Brain, then these commands should be addressed to the 'Brain'.

Any show can be paused at any point during its playback. The outputs are frozen at the levels they were at the instant the **PAUSE** command is received.

The **CONTINUE** command will resume any show playing which has previously been **PAUSED**.

“sA5A5” [nn] (card address) AutoDownload:

This is the format of the file that the BR-MultiBrick32 will receive and load into its 'Flash' memory.

An AutoDownload file is a binary file. Any AutoDownload file that has previously been saved can be sent to a BR-MultiBrick32 by selecting the 'send binary file' on your modem program and selecting the AutoDownload file 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 BR-MultiBrick32 into a mode where it will update the outputs in realtime from the data received through the serial port. The BR-MultiBrick32 uses this command to update the outputs in real time.

The maximum frame rate supported by this function is thirty frames per second. Any faster than this just won't fit through the PC's serial port.

BR-MultiBrick32 Hardware Configuration

BR-MultiBrick32 hardware configuration is done using a pair of address switches, an eight position DipSwitch, and two slide switches:

- a) **Address:** These two rotary switches on the front of the BR-MultiBrick32 are used to set the RS-422 serial port address where this card will be found. Normally, only one BR-MultiBrick32 card is set to use any one address. If more than one card is set to the same address, then only one card should have the '**Record Enable**' turned on at one time. BR-MultiBrick32 cards after revision 2.0 don't have a '**Record Enable**' switch, so shouldn't be set to the same addresses if they are on the same multidrop RS-422 serial port network.

The RS-422 serial address for the BR-MultiBrick32 is set using Hexadecimal numbers on these switches. The first digit of the Hexadecimal address is set on the upper of the two switches. The second digit of the hexadecimal address is set on the lower of the two switches. If you are not sure how these translate from decimal numbers, a chart at the end of every Gilderfluke & Company manual will show you the equivalent numbers.

- b) **Record Enable (Revision 1.nn Cards Only):** Pressing this switch on pre- 2.0 revision cards turns off the DMX-512 and 'Smart' Brick Network for this card and enables the RS-422 Serial Port. This must be done to talk to the BR-MultiBrick32 through the serial port, or to download shows to it from PC•MACs.

Pressing this button a second time or powering the BR-MultiBrick32 down and then back up again will reset the card to normal operation.

BR-MultiBrick32 cards after revision 2.00 don't have a '**Record Enable**' switch. The RS-422 serial port, DMX-512 port and BrickNet is active at all times for receiving AutoDownload files, RealTime updates, and commands.

- c) **Eight Position Dipswitch:** This is used as follows:

- 1) **DMX-512 Forever!:** When this switch is ON, the BR-MultiBrick32 will only use the RealTime data received through the DMX-512 port or RS-422 serial port for updating its outputs. It will never use data from the onboard Flash memory for output information. This is used if you will ONLY be using the BR-MultiBrick32 as a DMX-512 (or serially) controlled card.

2) Disable When Stopped: When this switch is ON, then all of the outputs will be returned to an 'off' state when a show is not being run. If this switch is OFF, then the last frame of data will be retained on the outputs until a new show is run or the BR-MultiBrick32 is reset.

3) Use DMX-512 Checksum: When this switch is ON, this switch tells the BR-MultiBrick32 to use the optional checksum transmitted from all Gilderfluke & Company equipment before updating the outputs. This will keep any outputs from being updated with data that has been corrupted in any way. You should always leave this switch ON if operating from Gilderfluke & Company equipment.

4) Record Forever! (Revision 1.03 to 1.99 Firmware Only): When ON, this switch forces the BR-MultiBrick32 permanently into 'Record' Mode. Use this switch in applications where you need the BR-MultiBrick32 to boot up listening to data coming into it on the RS-422 Port.

- | | | | | | | | | |
|-------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|------------------|------------------|
| 5) Dipsw5: | off | on | off | on | off | on | off | on |
| 6) Dipsw6: | off | off | on | on | off | off | on | on |
| 7) Dipsw7: | <u>off</u> | <u>off</u> | <u>off</u> | <u>off</u> | <u>on</u> | <u>on</u> | <u>on</u> | <u>on</u> |

9600	2400	4800	9600	19.2K	38.4K	57.6K	115K
Baud	Baud	Baud	Baud	Baud	Baud	Baud	Baud

2.00 and later revision BR-MultiBrick32s will allow you to change the baud rate used for the RS-422 serial port using Dipswitches 5 through 7. Only baud rates of 2400, 4800 and 9600 are valid at this time. If you want to use the BR-MultiBrick32 with PC•MACs or GilderTerm, **you must leave the baud rate set to the default 9600 baud.**

8) Write Protect Switch: When this switch is ON, the BR-MultiBrick32 will protect the onboard flash memory from accidental alterations. With the switch in the 'off' position, reads and writes can take place normally. ***This switch must be in the 'off' position for shows to be downloaded to the BR-MultiBrick32.*** With the memory write protected, the BR-MultiBrick32 should retain whatever has been programmed into it for at least forty years.

d) 'Smart' Brick/'Dumb' Brick Select: This switch tells the BR-MultiBrick32 whether the BR-MultiBrick32 is going to be acting like a 'Dumb' Brick or a "Smart' Brick'. When acting as a 'Dumb' Brick,

the BR-MultiBrick32 will be triggered to play shows by the four optically isolated 'J8' trigger inputs. When acting as a 'Smart' Brick, The BR-MultiBrick32 will lock to and follow time code information send to it through the 'Smart' Brick Network from the 'Smart' Brick Brain.

A 'Smart' Brick system is used when you need to synchronize any number of 'Bricks' together on a 'Smart' Brick Network under the control of a single 'Smart' Brick Brain. The Brain itself allows shows to be triggered at specific times of the day using a real time clock and the Brains' 365 day schedule, and locked (synchronized) to Smpte time code, LaserDisks and DVDs, or the Brains' internal or external clock. A single Brain and 'Smart' Brick network can run a single time line at one time.

A 'Dumb' Brick is typically used in stand alone applications, where the show runs continuously or when triggered by an external event. Multiple 'Dumb' bricks can be triggered simultaneously, but will not be automatically synchronized as the Bricks in a 'Smart' Brick system are.

This switch actually switches the six wires that connect to the backplane of the BR-MultiBrick32 between the optoisolators used for 'Dumb' Bricks and the RS-422 receivers used for 'Smart' Bricks. If you plug a BR-MultiBrick32 which has been configured to act as a 'Smart' Brick into a slot that has been configured for a 'Dumb' Brick, you risk damaging the RS-422 receivers.

The BR-MultiBrick32 doesn't actually believe that it has been set to act as a 'Smart' Brick until it receives a valid message through the 'Smart' Brick Network. In the unlikely event that you switch from 'Smart' Brick to 'Dumb' Brick mode while a BR-MultiBrick32 is running, there will be a delay of ten seconds or so before it starts acting as a 'Dumb' Brick. During any time that the Record Enable LED is on, the 'Smart' Brick Network will be disabled. Even so, if the BR-MultiBrick32 was in 'Smart' Brick Mode when the card had the Record Enabled button pressed, then it will remain a 'Smart' Brick until the Record Enabled button is pressed again.

- e) **J8 Power:** If the BR-MultiBrick32 is acting as a 'Dumb' Brick, then this switch is used to select whether the 'J8' power for the optoisolators is provided by the same power supply as the BR-MultiBrick32, or is provided by an external isolated source. When operating as a 'Smart' Brick, this switch has no effect.

BR-MultiBrick32 Software Configuration

The BR-MultiBrick32 can be accessed through the serial port from any computer running just about any modem or terminal program. The computer you are using doesn't even need to have any PC-MACs software installed on it.

Most Gilderfluke & Co products can be controlled through their RS-422 Serial ports. Up to 256 different cards and devices can be attached to the same serial lines, to form a complete RS-422 'multi Drop' network. Anywhere on this network you can attach operator panels to access and control it, or you can use an telephone or Internet modem so that it can be accessed from around the block or around the world. Commands can be addressed to a single card on the network, or all of the cards simultaneously.

Typical modem programs you can use are Terminal.exe (which came with Windows 3.1) and HyperTerm.exe (which comes with later versions of Windows), or GilderTerm.

GilderTerm is available free from Gilderfluke & Co. for use with all of our products. It can be downloaded from our web page, and is included on all of our CD-ROMs. GilderTerm has been optimized for use with all Gilderfluke & Company equipment. All of the commands are built in, and it will even let you use your mouse to select commands.

To use the BR-MultiBrick32 with a terminal program, just configure it for 9600 baud, no parity, eight data bits, one stop bit and 'xon/xoff' handshaking. If you are using GilderTerm, all of the settings are fixed at the appropriate settings. All you will need to do is select the appropriate 'COM' port.

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-MultiBrick32 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 your terminal emulation program supports VT-52 terminal emulation (they all do!), you should enable it on the BR-MultiBrick32. This will allow faster screen redraws. You should set your program NOI to insert an extra LineFeed (LF) character after each Carriage Return (CR) it receives. You should also tell it NOI 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-MultiBrick32 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-MultiBrick32 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-MultiBrick32. 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-MultiBrick32:

m5AA5(Card Address)

If any other card is in configuration mode (or even if it just thinks another card is in configuration), the BR-MultiBrick32 won't be able to enter configuration mode. To exit any other card from configuration type 'XN'. You can then try entering configuration again.

Most of the configuration of a BR-MultiBrick32 is done using the address and dipswitches. When you enter configuration, if the BR-MultiBrick32 is operating as a 'Smart' Brick, it will display the following screen:

```
Gilderfluke & Co. MultiBrick32
firmware revision 2.10
copyright 2002 DCM

Card addressed at 01h/_1

4 Mbits (512KBytes) memory installed
Writing to Flash is Enabled

Smart Brick @ frame 00D86h/___3462

AutoDownload FileName: TEST.A00
Number of channels: 04h/_4
Number of shows: 06h/_6

00 B0 A1 01 04 06 01 01 08 00 01 00 04 00 01 00 08 01 01 00 20 04 40 00

01h/_1 st:00000h/___0 len:0122Ah/___4650 fl:EDh nxt:01h/_1 KOKIMO.SHO
02h/_2 st:0122Ah/___4650 len:01374h/___4980 fl:CDh nxt:00h/_0 MARGVILL.SHO
03h/_3 st:0259Eh/___9630 len:01248h/___4680 fl:CDh nxt:00h/_0 CHEEBURG.SHO
04h/_4 st:037E6h/___14310 len:0122Ah/___4650 fl:CDh nxt:00h/_0 FRUTCAKE.SHO
05h/_5 st:04A10h/___18960 len:00EA6h/___3750 fl:CDh nxt:00h/_0 IGETARND.SHO
06h/_6 st:058B6h/___22710 len:00F96h/___3990 fl:CDh nxt:00h/_0 409.SHO

v) Verify flash
x) Exit configuration

Enter Command-
```

(Sample data: Your show data will differ from what is shown.)

As you can see, your only option is to test the show data which has been downloaded to the BR-MultiBrick32. This will take anywhere from a few seconds to several minutes, depending of the size of the AutoDownload file that must be tested.

To redraw the screen at any time, just press the <ESC>ape key or <SPACE> bar.

If the BR-MultiBrick32 is operating as a 'Dumb' Brick, the options to start, loop, or stop a show are also added to the menu.

```
Gilderfluke & Co. MultiBrick32  
firmware revision 2.10  
copyright 2002 DCM
```

```
Card addressed at 00h/___0
```

```
4 Mbits (512KBytes) memory installed  
Writing to Flash is Enabled
```

```
Input A/Green now Open  
Input B/Red now Open  
Input C/Blue now Open  
Input D/White now Open
```

```
Dumb Brick show 01h/___1 KOKIMO looping @ frame 00F27h/___3879
```

```
AutoDownload FileName: TEST.A00  
Number of channels: 04h/___4  
Number of shows: 06h/___6
```

```
00 B0 A1 01 04 06 01 01 08 00 01 00 04 00 01 00 08 01 01 00 20 04 40 00
```

```
01h/___1 st:00000h/___0 len:0122Ah/___4650 fl:EDh nxt:01h/___1 KOKIMO.SHO  
02h/___2 st:0122Ah/___4650 len:01374h/___4980 fl:CDh nxt:00h/___0 MARGVILL.SHO  
03h/___3 st:0259Eh/___9630 len:01248h/___4680 fl:CDh nxt:00h/___0 CHEEBURG.SHO  
04h/___4 st:037E6h/___14310 len:0122Ah/___4650 fl:CDh nxt:00h/___0 FRUTCAKE.SHO  
05h/___5 st:04A10h/___18960 len:00EA6h/___3750 fl:CDh nxt:00h/___0 IGETARND.SHO  
06h/___6 st:058B6h/___22710 len:00F96h/___3990 fl:CDh nxt:00h/___0 409.SHO
```

```
e) stop at End  
l) Loop a show  
p) Play a show  
s) Stop playing  
v) Verify flash  
x) Exit configuration
```

```
Enter Command-
```

(Sample data: Your show data will differ from what is shown.)

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	(dle)		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	DCCh	(\)	
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	(i)		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	A Eh	(.)		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%