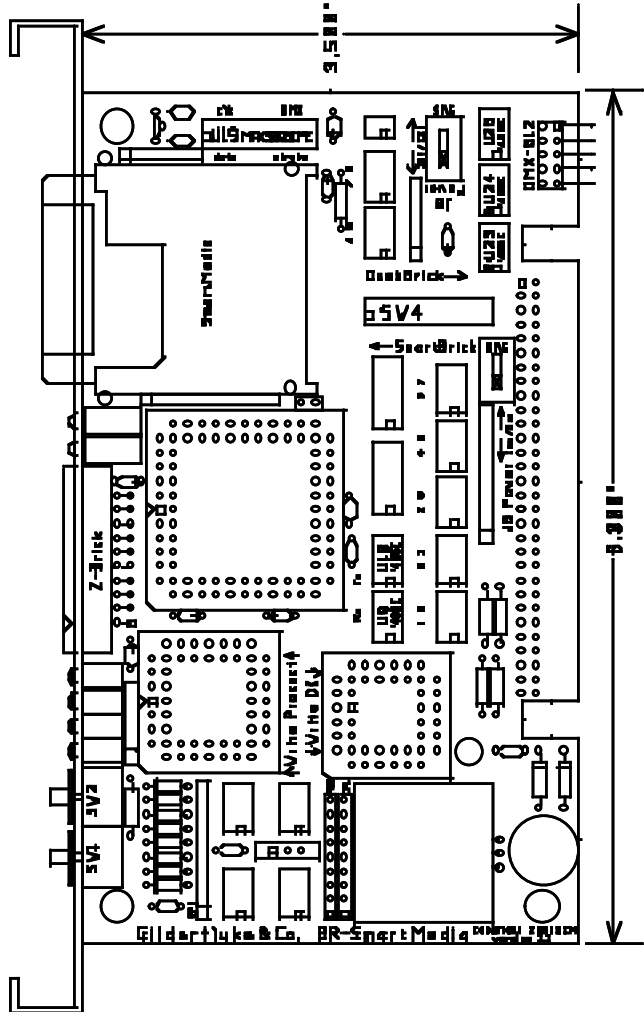
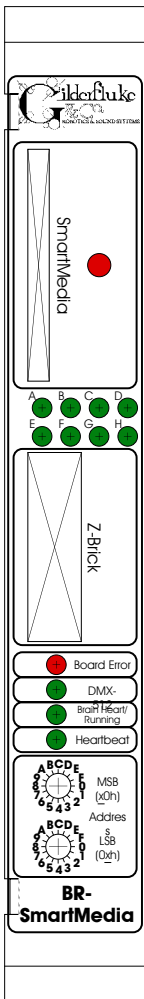


BR-SmartMedia

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A note about this manual:

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

The BR-SmartMedia is often programmed in '**Software-only**' or '**Hardwareless Realtime**' mode. If you are using the PC•MACs MACs-SMP or MACs-USB for programming your BR-SmartMedia 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-SmartMedia Overview

The BR-SmartMedia is a unique product in the Gilderfluke & Company lines. It is a combination of several previous products: BS-Serial, BS-DMX-Tx, and BR-MultiShow. In all modes, show data is output through DMX-512 or the Z-Buss. In the 'serial' mode, the card will also output data in a variety of serial formats through a secondary RS-422 serial port. Built-in serial modes are available that support MIDI, Moog motion bases, Intelix mixers, and Rexroth feedback cards. More modes can be added if needed, or you can write strings for controlling LaserDisks, DVDs, projectors, or whatever.

BR-SmartMedia in MultiShow mode: Strictly speaking, when in MultiShow mode, the BR-SmartMedia is neither a 'Smart' Brick nor a 'Dumb' Brick. It is a stand-alone DMX-512 output show controller. The BR-SmartMedia 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. MultiShow mode is used when:

- 1) You need 'off-board' or 'centralized' memory storage for a system that will be running multiple animation sequences simultaneously.

One way you might want to think of MultiShow mode is as eight separate distributed 'Dumb' Brick systems, which happen to share the same DMX-512 output cable. All eight sequencers can run 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 stop and wait for the next trigger at the end of the show.

Using the serial port, up to 256 BR-SmartMedia cards (or any other Gilderfluke & Co. cards) can share the

same 'multidrop' RS-422 serial network. This can easily interface with commercially made touch screen operator panels, PCs, or even Internet or telephone modems. The latter two allow you to control and monitor the system from around the block or from the other side of the world.

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.

Whether any of the sequencers are running or not, thirty times each second, all 256 channels of 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.

All shows programmed for use in MultiShow mode must be programmed at thirty frames per second.

BR-SmartMedia in Serial mode: When configured in Serial mode, the BR-SmartMedia can be used as either a 'Smart' or 'Dumb' brick. It can be used when:

- 1) You need to add a DMX-512 or serial output to a 'Smart' or 'Dumb' Brick system.
- 2) You have exceeded the onboard flash memory

capacity of another Brick card, and need to add almost unlimited 'off-board' memory storage.

- 3) You want to have 'centralized' memory storage, but only need to run a single sequencer at one time.

Animation and lighting data is stored on the SmartMedia Flash Card and transmitted out in a DMX-512 and/or secondary serial data port. The serial data can be transmitted in a number of different formats. It has dedicated modes for controlling MIDI devices, Moog Motion Bases, Intelix matrix mixers, Rexroth DCC Servo cards, and more. The second serial port can be set to operate at baud rates from 2400 baud to 115 KBaud.

- 1) BR-SmartMedia as a 'Dumb' Brick:** Switch #4 must be in the 'Dumb' Brick position to operate as a 'Dumb' Brick. There should never be both 'Smart' and 'Dumb' Bricks in the same card cage. Damage may result if there are.

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 BR-SmartMedia acts just like any other Playback-Only 'Dumb' Brick, playing animation data from the AutoDownload file found on the SmartMedia Flash Card. The BR-SmartMedia can be set to start and play a show at power up, or only play when triggered. The start trigger can come through the four optically isolated trigger inputs, or the RS-422 serial port. The BR-SmartMedia then

uses the show data stored in the AutoDownload file on the SmartMedia Flash Card to update its outputs at the appropriate frame rate.

The animation sequence which is to be used on the BR-SmartMedia is usually generated on a PC•MACs Animation Control System. During programming, the DMX-512 input or RealTime updates through RS-422 serial port can be used so that you can see the animation sequence as it is programmed. Once programming is completed and your show(s) saved to disk, the data is downloaded to the SmartMedia onboard the BR-SmartMedia through the serial port.

2) BR-SmartMedia as a 'Smart' Brick: Switch #4 must be in the 'Smart' Brick position to operate as a 'Smart' Brick. There should never be both 'Smart' and 'Dumb' Bricks in the same card cage. Damage may result if there are.

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.

This BR-SmartMedia acts just like any other Playback-Only 'Smart' Brick, playing animation data from a the AutoDownload file on the SmartMedia Flash Card. As a 'Smart' Brick, it requires a 'Smart' Brick Brain to run. The 'Smart' Brick

Brain tells all the 'Smart' Bricks attached to it (including the BR-SmartMedia) where in the show it is. The BR-SmartMedia then uses this information to access the appropriate data in the AutoDownload file on the SmartMedia Flash Card and update its outputs.

The animation sequence which is to be used on the BR-SmartMedia is usually generated on a PC•MACs Animation Control System. During programming, the DMX-512 input or RealTime updates through RS-422 serial port can be used so that you can see the animation sequence as it is programmed. Once programming is completed and your show(s) saved to disk, the data is downloaded to the SmartMedia onboard the BR-SmartMedia.

In all of the above modes, all 256 channels of DMX-512 of the AutoDownload file on the SmartMedia Flash Card are transmitted through the Z-Brick and/or DMX-512 data outputs. The Z-Brick output can be used for additional digital outputs through one or more Z-Bricks. 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.

Using the serial port, up to 256 BR-SmartMedia cards (or any other Gilderfluke & Co. cards) can share the same 'multidrop' RS-422 serial network. This can easily interface with commercially made touch screen operator panels, PCs, or even modems to control and monitor the system from around the block or from the other side of the world.

BR-SmartMedia as a Remote Terminal Unit (RTU): In this mode the card receives up to 256 channels of DMX-512 data transmitted by a PC·MACs Animation Control System, or any other source of DMX-512 data. In a hardwareless RealTime PC·MACs system¹, up to sixteen eight-bit wide channels of animation control data is received through the BR-SmartMedia's RS-422 serial port. It uses the DMX-512 or RealTime serial data to update its outputs. The BR-SmartMedia will retransmit DMX-512 data from channels 0 to 255 (0 to 15 for RealTime serial data). The DMX-512/RealTime serial inputs allow the BR-SmartMedia to be used as a permanent output device for a Control System, or the DMX-512/RealTime serial data can be used temporarily until the SmartMedia is programmed so the BR-SmartMedia can be used as a 'Smart' or 'Dumb' Brick.

BR-SmartMedia in DMX-512 Recorder mode: This is a mode which is used to 'capture' an incoming stream of DMX-512 data. This data can be saved into an AutoDownload file that can then be used to play back the sampled DMX-512 just as if it were generated using a PC·MACs Show Control System. Typically this is used to sample a lighting system's output so that the rather expensive lighting board that the lighting designer knows and loves can be returned to the rental house. The BR-SmartMedia then takes the place of the lighting board in the permanent installation.

A BR-SmartMedia is not normally left in Recorder

¹ The 'Hardwareless Realtime' Mode of operation of PC·MACs requires a license be purchased to upgrade PC·MACs from 'Software-Only' mode. It allows you to program and review your shows in Real-Time as they are being programmed. This requires a security key to be entered and validated in the PC·MACs software. If you would like to use this feature but do not have a security key, contact Gilderfluke & Company to have your software upgraded.

Mode after the data has been sampled. It is switched to whatever other mode best suits the application.

The second reason you may need the Recorder Mode menu is that this is where you will find the command to reformat a SmartMedia Flash Card. If the format of a SmartMedia Flash Card is damaged, or if the Flash Card is reformatted in a PC, it will need to be reformatted. If you reformat a SmartMedia Flash Card on a PC, it will work OK on a PC, but not in the BR-SmartMedia until it has been reformatted. We have found that this will even repair SmartMedia Flash Cards that have stopped working in MP3 players and other devices that expect the format to be in the SmartMedia Forum's standard arrangement. PCs do not format Flash Cards to this standard.

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-SmartMedia 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.

All 256 channels of data are also transmitted through the Z-Brick port. Depending on the mode and data stored, 256 or 512

channels of DMX-512 can be transmitted. The Z-Brick output can be used for additional digital outputs through one or more Z-Bricks. The DMX-512 output can be used to control light dimmers, automated spotlights, color changers, fog and wind machines, or any other equipment which will accept standard DMX-512 inputs. Channels where no data is stored in SmartMedia are cleared when operating as a 'Smart' or 'Dumb' Brick.

The BR-SmartMedia can be mounted in one 1" wide slot in any of our Brick Card cages. The BR-SmartMedia can be used in conjunction with any selection of 'Smart' Bricks, 'Smart' Brick Brains, Electronic FeedBack (EFB) 'Smart' Bricks and Z-Bricks in the same card cage. Card cages with one, two or sixteen slots are available. 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). In some applications you may need to mount a single BR-SmartMedia. This can be done by mounting the BR-SmartMedia on standoffs, and connecting to the BR-SmartMedia's edge connector with a mating connector. We usually recommend a card cage.

Power requirements for each BR-SmartMedia are 18 to 24 VDC. The BR-SmartMedia draws approximately 200 ma..

The BR-SmartMedia is a design upgrade from all earlier versions of the BR-MultiShow, BS-Serial, and BS-DMX-Tx. The chief differences are:

- 1) Combines the function of three different cards.
- 2) SmartMedia for show data storage instead of Eprom. This allows shows to be programmed and downloaded in seconds.
- 3) Operates as either a 'Smart' or 'Dumb' Brick

4) Runs cooler with a switching power supply.

On the Front of the BR-SmartMedia

A) Show Running LEDs: These eight LEDs are lit to show that a sequencer is running a show. In MultiShow mode, all eight of these LEDs are used. In any of the single sequencer modes of operation, only the 'Sequencer A' LED will light to show that it is running a show (or advancing frames if being operated from a Smart Brick Brain as a 'Smart' Brick).

During 'Ease-Ins', these LEDs will flash to show that the sequencers are in the process of doing an Ease-In.

Some operations that monopolize the CPU on the BR-SmartMedia will shut down all other normal operations. During these times, these eight LEDs will flash in a circular chase pattern to show the card is occupied. Some of the things that will cause this condition are:

- a) Doing initial mapping of the AutoDownload file on the SmartMedia Flash Card the first time it is plugged in. The BR-SmartMedia must read the entire AutoDownload file off the SmartMedia Flash Card to find where Windows has hidden all of its parts.
- b) During AutoDownloads.
- c) Configuration downloads.
- d) Configuration uploads.

B) SmartMedia Activity LED: This LED lights when any extended SmartMedia operation is going on. Just like the light on the front of a floppy disk drive, you should not remove the SmartMedia Flash Card or power down the BR-SmartMedia card while this LED is lit.

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

<u>IDS pin #</u>	<u>SIGNAL</u>
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/ Reset/
20	

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

- D) Board Error LED:** This LED will flash when:
- 1) BR-SmartMedia has just booted
 - 2) An error is found in the DMX-512 data checksum
 - 3) An error is found in the 'Smart' Brick Network checksum
- E) DMX-512 LED:** This LED will be lit when the BR-SmartMedia is receiving DMX-512 or RealTime updates via the RS-422 serial port.
- F) Brain Heart/Running LED:** 'Smart' Brick mode: The heartbeat from the 'Smart' Brick Brain is transmitted throughout the system over the 'Smart' Brick Network. The presence of a healthy heartbeat means that the data on the 'Smart' Brick Network is getting through cleanly. If it ever stutters or flashes erratically (or not at all), then there is a problem with the 'Smart' Brick Brain, the 'Smart' Brick Network, or the BR-SmartMedia. As the DMX-512 takes precedence over the 'Smart' Brick Network, this LED will go dark whenever a DMX-512 signal is present.
- G) Heartbeat LED:** 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-SmartMedia will automatically reset the CPU. While performing an Ease-In, the heart rate will double.
- H) Address Switches:** These two rotary switches on the front of the BR-SmartMedia are used to set the address of the RS-422 serial port where this card will be found. Normally, only one card is set to use any one address. If more than one card is set to the same

address, then the serial ports can not be attached to the same RS-422 multidrop network at the same time.

The RS-422 serial address for the BR-SmartMedia 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.

On the Back of the BR-SmartMedia

The BackPlane connections to the BR-SmartMedia is through a sixty position double sided edge connector (thirty connections on each side on .1" centers). This is normally plugged into a card cage, but can also be used with an IDS or other discrete edge connectors.

The first ten positions are used for the 'Smart' Brick Network and J8 connection ('Smart' Brick Network or optically isolated triggers, Depending on the position of Switch #4 the 'Smart/Dumb Brick Switch') and the primary RS-422 Serial Port (used for configuration and serial commands). They are normally bussed between all the cards in the card cage (although they can be separated by cutting the lines if desired).

The next forty positions are used to connect the majority of the BR-SmartMedia signals to the output cabling.

The last ten positions are used to provide power to the BR-SmartMedia. Five pins are used for the positive connection and five are used for ground. This provides a higher current capacity than single pins would.

The pinout of this connector is as follows:

<u>output wire #</u>	<u>Edge pin #</u>	<u>color</u>	<u>wire function</u>
J8/BrickNet Black	1	brown	J8 Common (black)/Smart BrickNet Data -
J8/BrickNet White	2	red	J8 'D' (white) input/'Smart' BrickNet Data +
J8/BrickNet Red	3	orange	J8 'B' (red) input/'Smart' BrickNet Clock +
Serial Port red #3	4	yellow	TxD + out from BR-SmartMedia
J8/BrickNet Green	5	green	J8 'A' (green) input/'Smart' BrickNet Clock -
Serial Port Black #2	6	blue	TxD - out from BR-SmartMedia
J8/BrickNet Yellow	7	violet	J8 Status (yellow) out/'Smart' Brick Strobe +
Serial Port Yellow #5	8	gray	Rx + in to BR-SmartMedia
J8/BrickNet Blue	9	white	J8 'C' (blue) input/'Smart' BrickNet Strobe -
Serial Port green #4	10	black	Rx -in to BR-SmartMedia
Ribbon cable #1	11	brown	1/4 J6 in Ground
Ribbon cable #2	12	red	1/4 J6 in bit 7
Ribbon cable #3	13	orange	1/4 J6 in bit 6
Ribbon cable #4	14	yellow	1/4 J6 in bit 5
Ribbon cable #5	15	green	1/4 J6 in bit 4
Ribbon cable #6	16	blue	1/4 J6 in bit 3
Ribbon cable #7	17	violet	1/4 J6 in bit 2
Ribbon cable #8	18	gray	1/4 J6 in bit 1
Ribbon cable #9	19	white	1/4 J6 in bit 0
Ribbon cable #10	20	black	1/4 J6 in + Supply

Ribbon cable #11	21	brown	secondary RS-422 ground
Ribbon cable #12	22	red	secondary RS-422 Serial Rx - data into card
Ribbon cable #13	23	orange	secondary RS-422 Serial Rx + data into card
Ribbon cable #14	24	yellow	secondary RS-422 Serial Tx - data out of card
Ribbon cable #15	25	green	secondary RS-422 Serial Tx + data out of card
Ribbon cable #16	26	blue	secondary RS-422 ground
Ribbon cable #17	27	violet	Green Input negative
Ribbon cable #18	28	gray	Green Input positive
Ribbon cable #19	29	white	Blue Input negative
Ribbon cable #20	30	black	Blue Input positive
Ribbon cable #21	31	brown	MIDI n/c (MIDI DIN pin #3)
Ribbon cable #22	32	red	MIDI Tx - (MIDI DIN pin #5)
Ribbon cable #23	33	orange	MIDI ground (MIDI DIN pin #2)
Ribbon cable #24	34	yellow	MIDI Tx + (MIDI DIN pin #4)
Ribbon cable #25	35	green	secondary RS-422 TxD - out from card (ver. 1.1+)
Ribbon cable #26	36	blue	ground
Ribbon cable #27	37	violet	secondary RS-422 TxD + out from card (ver. 1.1+)
Ribbon cable #28	38	gray	ground
Ribbon cable #29	39	white	secondary RS-422 Serial Rx - in to card (ver. 1.1+)
Ribbon cable #30	40	black	ground
Ribbon cable #31	41	brown	secondary RS-422 Serial Rx + in to card (ver. 1.1+)
Ribbon cable #32	42	red	ground
Ribbon cable #33	43	orange	
Ribbon cable #34	44	yellow	
Ribbon cable #35	45	green	
Ribbon cable #36	46	blue	
Ribbon cable #37	47	violet	
Ribbon cable #38	48	gray	
Ribbon cable #39	49	white	
Ribbon cable #40	50	black	
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

Note that on BR-SmartMedia cards revision 1.1 and later the secondary serial port is also brought out on the edge connector on pins #35 through #41. This matches the pinout for the secondary serial port on the BS-BRN-CRD Smart Brick Brain. This allows you to use the secondary serial port connector found on the first slot of our BR-CC10 and BR-CC11 three slot card cages for the secondary serial port.

To simplify wiring to any MACs Animation Control System, the connectors used on our card cages 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.

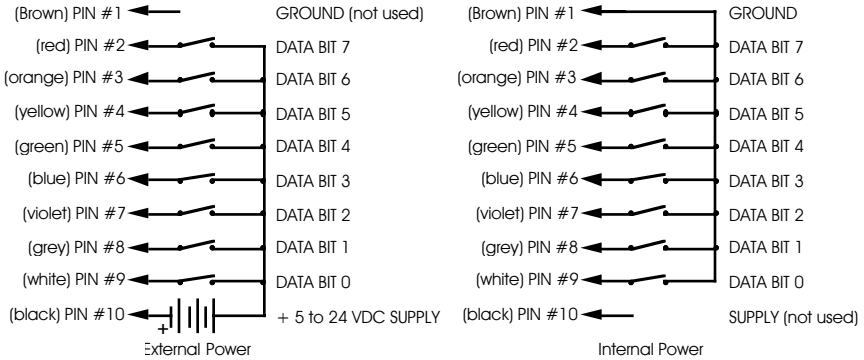
'Smart' Brick Network: If Switch #4 is in the 'Smart' Brick position, the BR-SmartMedia will be operating as a 'Smart' Brick. The 'Smart' Brick Network normally found on a 'Smart' Brick is brought out on the edge connector. When plugged into any Gilderfluke & Co. Brick card cage, this will be brought out on a RJ-12 connector on the card cage. There should never be 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-SmartMedia 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 -

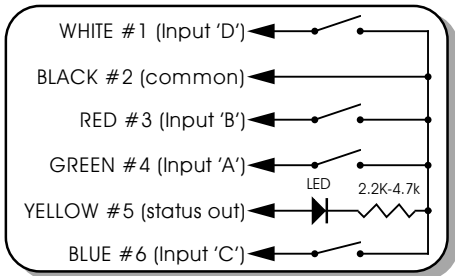
'J6' Inputs: If the BR-SmartMedia is acting as a 'Dumb' Brick, then Switch 5 is used to select whether the 'J6' power for the optoisolators is provided by the same power supply as the BR-SmartMedia, or is provided by an external isolated source. When operating as a 'Smart' Brick, this switch has no effect.

The 1/4 J6 Input is optically isolated. It can be set to run from an external power source (default configuration) or the same power as the Rack Smart Brick Brain. This is selected by moving Switch 5 as shown on the board.

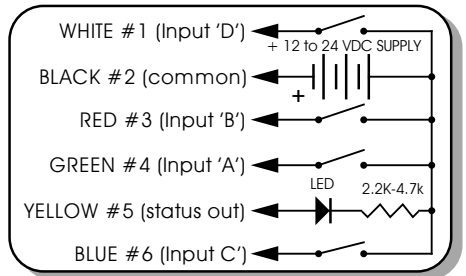


'J8' Inputs: If Switch #4 is in the 'Dumb' Brick position, the BR-SmartMedia will be operating as a 'Dumb' Brick. The trigger inputs and status output normally found on a 'Dumb' Brick are brought out on the edge connector. When plugged into any Gilderfluke & Co. Brick card cage, this will be brought out on a RJ-12 connector on the card cage. There should never be 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.

There 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-SmartMedia's power supply connections. Just put the **J8 Power** switch in the 'Internal' position.

Power Supply: The last ten contacts of the BR-SmartMedia's edge connector are used for the power supply connections. The BR-SmartMedia can be run from any supply voltage from 9 to 24 VDC.

The power supply input is protected from reversed polarity. An idle BR-SmartMedia draws only about 150 milliamperes. The LEDs on its face will usually draw far more current than the BR-SmartMedia itself.

Primary RS-422 Serial Port: This is used for configuration, uploading and downloading configurations, status inquiries, AutoDownloading show data to SmartMedia, and serial port RealTime updates. It is compatible with all the RS-422 Serial Ports and protocols used on Gilderfluke & Company products.

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-SmartMedia, 'Smart' Brick Brains, Electronic FeedBack (EFB) 'Smart' Bricks and other cards through the connector on the card cage. They just need to be set to different addresses.

The serial data signals from the BR-SmartMedia are brought out on 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:

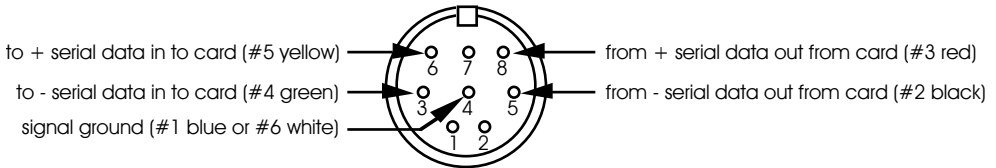
	<u>COLOR</u>	<u>SIGNAL NAME:</u>
LEFT	#1 white	Signal Ground
	#2 black	- Serial data out from card
	#3 red	+ Serial data out from card
	#4 green	- Serial data in to card
	#5 yellow	+ Serial data in to card
RIGHT	#6 blue	Signal Ground

PC and Compatible Connections: If you are only talking to a single BR-SmartMedia 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-SmartMedia. 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 to talk to the BR-SmartMedia. To cross wire the RS-422/RS-485 signals from the BR-SmartMedia 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-SmartMedia
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-SmartMedia, the pin out is as follows (view is of male connector facing the end of the cable):



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

ONE START BIT
EIGHT DATA BITS
ONE STOP BIT

BR-SmartMedia responds appropriately to all commands which are used by other Gilderfluke & Co. serially controlled devices. These are used for configuration, uploading and downloading configurations, status inquiries, AutoDownloading show data to SmartMedia, and serial port RealTime updates. It will ignore all commands which are not addressed to it, or not appropriate for it to respond to. This allows it to share the same RS-422 serial buss with additional BR-SmartMedia, Digital Audio Repeaters, 'Smart' Brick Brains and any other serially controlled devices. The only requirement is that each unit be addressed to a different location.

Secondary RS-422 Serial Port: This is used for sending serial data from the BR-SmartMedia while it is in any of the 'Serial' modes. It is compatible with all the RS-422 Serial Ports and protocols used on Gilderfluke & Company products.

The serial data signals from the BR-SmartMedia are brought out on the edge connector. In a three slot card cage, hardware

versions 1.1 and later will also bring out the secondary serial port on the 'aux.' serial port from card cage slot #1. This is 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:

	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

DMX-512 Data In/Out: Ten pin Male header connector. The BR-SmartMedia will stop listening to the 'Smart' Brick network whenever there is a DMX-512 signal present on this input.

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-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-SmartMedia 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 sixty FPS, not all 256 channels can be transmitted through the DMX-512 output.

The DMX-512 standard calls out a 5 pin XLR connector or screw terminals for all connections. All card cages will provide either screw terminals or other appropriate connection for attaching the DMX-512 input and output.

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-MiniBrick8, 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 our 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 AutoDownload file on the SmartMedia Flash Card.
- 4) Select the 'first show' and what will happen to the BR-SmartMedia on power up. If you will be operating the BR-SmartMedia as a 'Smart' Brick, then set the power up action to 'wait'. If you have set the BR-SmartMedia to 'wait' at power up, then the first frame of the show you have selected will be output on the DMX-512 and Z-Brick outputs. This setting is not needed if operating the BR-SmartMedia in MultiShow mode, as these settings are made for each sequencer in the MultiShow setup menus.
- 5) Set what will happen on each of the four 'J8' optoisolated inputs if you will be operating the BR-SmartMedia as a 'Dumb' Brick or in MultiShow mode. You can ignore these settings if you will be running it as a 'Smart' Brick. This setting is not needed if operating the BR-SmartMedia in MultiShow mode. In MultiShow mode, there are ten inputs that are set up in the MultiShow setup menus.
- 6) Select each show to be downloaded one at a time and set:
 - a) what will happen at the end of each show.
 - b) Whether it can be 'stepped on'.

if you will be operating the BR-SmartMedia as a 'Dumb' Brick or in MultiShow mode. You can ignore these settings if you will be running it as a 'Smart' Brick, because the Smart Brick Brain determines what happens at the end of each show. 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. This setting is not needed if operating the BR-SmartMedia in MultiShow mode.

- 7) Set the 'Brick Serial Address' to send the AutoDownload file to. This is the serial address of the BR-SmartMedia you want it to be received by. All other cards will ignore the data being sent to this one card. The address is often 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. Be sure to allow for enough extra channels for any Z-Bricks or DMX-512 lighting channels that might be attached to the BR-SmartMedia.
- 9) The '**Calculate Brick Start Frames**' checkbox must always be checked.
- 10) The '**Save Brick Start**' checkbox should not be checked.
- 11) You can quickly test if the BR-SmartMedia is attached to the serial port properly by hitting the 'Reset BR-MiniBrick8' button. Of course, this will also erase any show data that was already in the BR-SmartMedia's memory. PC·MACs will report if the Reset was successful or not. You don't need to worry about this if you are going to 'drag & drop' program the SmartMedia on your computer.
- 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-SmartMedia. This is used if you are going to then drag the AutoDownload file to a SmartMedia Flash Card that is inserted into your computer (or an external SmartMedia reader/writer).
 - b) 'Download' will save the file to disk and send it to the BR-SmartMedia Flash Card.

In either case, 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 to save the data to a file, or change the name & hit OK if you want to preserve the older 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-SmartMedia as a 'Smart' Brick). The **'Eprom Memory start' and 'Eprom Memory end' are the actual locations of the shows in the AutoDownload file on the SmartMedia Flash Card.** 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 AutoDownload file on the SmartMedia Flash Card. If your SmartMedia is smaller than this number, you will need to use a larger Flash Card.

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-SmartMedia 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.

If you are programming a BR-SmartMedia, you will probably be creating the AutoDownload file as described above. Instead of downloading it serially to the BR-SmartMedia card, which can take tens of minutes, you will just drag and drop program it on your PC. This is done just like copying any PC file from one disk to another.

The SmartMedia Flash Card is inserted into your computer for programming. If you have a PCMCIA slot on your laptop computer, you will probably be using a 'PCMCIA to SmartMedia' adapter. If you have a desktop machine, you will probably use a 'USB to SmartMedia' adapter.

In either case, once the SmartMedia Flash Card is inserted, it is mounted just like any other removable disk drive (Windows will spin for a bit and say it has 'found new hardware' the first time a new brand or size of Flash Card is inserted). You grab the AutoDownload file, and drop it onto the SmartMedia Flash Card. Even a multi megabyte file will only take a few seconds to copy. Make sure that you don't just move a 'shortcut' if you are on a Windows machine. The BR-SmartMedia needs the actual file and not just its name.

One **VERY IMPORTANT** precaution you must take with removable media

(like SmartMedia Flash Cards) on PCs is that **you CAN NOT just eject a SmartMedia Flash Card**. You must first tell the PC to 'turn off' or 'stop' the SmartMedia Flash Card. Once the PC says it is OK, then you can eject your SmartMedia Flash Card. If you do not, you will find that the end of your file was never written. If you are on a Macintosh, just eject the SmartMedia Flash Card as you would any other media.

One precaution you will have to take when programming SmartMedia Flash Cards on a PC is **DO NOT REFORMAT** them. The formatter on a PC will format the Flash Card with in a way which does not comply with the SmartMedia standards (it ignores the physical layout of the SmartMedia Flash Card sectors). If you have a Flash Card that has been formatted on a PC, the BR-SmartMedia WILL NOT be able to recognize it. To properly reformat a SmartMedia Flash Card, you will need to use the 'format' command available on the BR-SmartMedia's 'DMX-512 Recorder' menu. This will format a SmartMedia Flash Card back to the factory standards.

Serial Port Commands

The BR-SmartMedia 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 'MultiDrop' network. Operator panels can be attached anywhere on this network to access and control it, or you can use a telephone or Internet modem. The latter two allow a system to be accessed from around the block or around the world. Commands can be addressed to a single card on the network, or all 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 MultiDrop 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 with Gilderfluke & Co. equipment are Terminal.exe (which came with Windows 3.1) and HyperTerm.exe (which comes with later versions of Windows), or GilderTerm. The shareware Z-Term or earlier releases of AppleWorks (which included a terminal program) can be used on Macintosh computers.

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 the commands are built in, and it will even let you use your mouse to select commands.

To use the BR-SmartMedia 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 the settings are preset. All you will need to do is select the appropriate 'COM' port.

Echo Commands:

“a”(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. If the card is operating in MultiShow mode, the sequencer number ('A' through 'H') will be included in most of the echo responses. If you are in any other mode, the sequencer number will be omitted. In the following examples, the 'echo' responses are shown in ***bold 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 on all cards:

card 00h/_ 0, Sequencer A, requested show 03h/_ 3 ShoName3

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

card 00h/_ 0, Sequencer A, starting show 03h/_ 3 ShoName3

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

card 00h/_ 0, Sequencer A, looping show 04h/_ 4 ShoName4

If you send "u" to stop all shows playing on all cards:

card 00h/_ 0, Sequencer A, stopped show 05h/_ 5 ShoName5

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

card 00h/_ 0, Sequencer A, not playing or looping _ 8 ShoName8

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 turn off the echo mode on all the cards in the system.

“j5AA5” (card address)

Card Reset:

This command will erase the AutoDownload file on the SmartMedia Flash Card on the BR-SmartMedia. Needless to say, this command is only rarely used in a completed installation.

“j” (card address)

Card Status:

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

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

- a) Company: Gilderfluke & Co.
- b) Product name: BR-SmartMedia
- c) Current mode of operation
- d) Firmware revision number and copyright.
- e) 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.
- f) Card serial address.
- g) If it is a 'MultiShow' Brick:
 - 1) Whether each of the eight sequencers is running, stopped, looping, paused or E-Stopped.
 - 2) The current status of the ten optically isolated inputs.
- h) If it is a 'Smart' Brick:
 - 1) The frame number currently being accessed by the 'Smart' Brick Network.
- i) If it is a 'Dumb' Brick:
 - 1) Whether the BR-SmartMedia is running, stopped, looping or paused.
 - 2) The current status of the four optically isolated inputs.

The following shows a BR-SmartMedia information status response for a BR-SmartMedia card which is receiving DMX-512. The 'MultiShow' and 'Serial' modes are identical in operation when receiving DMX-512:

```
Gilderfluke & Company
BR-SmartMedia in Multi-Show Mode
version 1.22 - copyright 2003 DCM-
__9 shows with 232 channels @ __0 Offset / Set FileName is CROOM1__.A00
Card Address- __0
Receiving DMX-512
```

The following shows a BR-SmartMedia information status response for a card which is operating in 'MultiShow' mode:

```
Gilderfluke & Company
BR-SmartMedia in Multi-Show Mode
version 1.22 - copyright 2003 DCM-
__9 shows with 232 channels @ __0 Offset / Set FileName is CROOM1__.A00
Card Address- __0
Sequencer a show #__1 CRoom1_A looping @ frame 000421h / 1057
Sequencer b show #__2 CRoom1_B looping @ frame 0003C2h / 962
Sequencer c show #__3 CRoom1_C looping @ frame 0002F7h / 759
Sequencer d show #__4 CRoom1_D looping @ frame 00029Fh / 671
Sequencer e show #__5 CRoom1_E looping @ frame 00024Dh / 589
Sequencer f show #__6 CRoom1_F looping @ frame 00020Bh / 523
Sequencer g show #__7 CRoom1_G looping @ frame 0001CCh / 460
Sequencer h show #__8 CRoom1_H looping @ frame 000172h / 370
input 0: open
input 1: open
input 2: open
input 3: open
input 4: open
input 5: closed
input 6: open
input 7: open
Blue input: open
Green input: open
```

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

The following shows a BR-SmartMedia information status response for a card which is operating in one of the 'serial' modes as a 'Smart' Brick:

```
Gilderfluke & Company
BR-SmartMedia in BR-Serial Moog 2000 / length Mode
version 1.22 - copyright 2003 DCM-
__9 shows with 232 channels @ __0 Offset / Set FileName is CROOM1__.A00
Card Address- __0
BrickNet Active @ frame 000445h / 1093
```

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

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

```
Gilderfluke & Company
BR-SmartMedia in BR-Serial Moog 2000 / length Mode
version 1.22 - copyright 2003 DCM-
__9 shows with 232 channels @ __0 Offset / Set FileName is CROOM1__.A00
Card Address- __0
Sequencer a show #__1 CRoom1_A looping @ frame 000421h / 1057
Green input: open
Red input: open
Blue input: open
White input: open
```

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

Start Commands:

“t” (card address) (sequencer #)

Start Track:

“u” (sequencer #)

Start Global:

These commands are available ONLY on BR-SmartMedia cards which are being operated as 'Dumb' Bricks or in MultiShow mode. Appending the sequencer number ('A' through 'H') to the command is only needed for cards in MultiShow mode. 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-SmartMedia(s) addressed by the command. The shows will always start from the beginning. If an addressed BR-SmartMedia is looping shows, it will have the **'LOOPING SHOWS'** flag reset.

If the BR-SmartMedia receives a start command after it has received a request for a specific show, it will play that show. Otherwise 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-SmartMedia 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-SmartMedia, 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-SmartMedia is already playing a show which has this option set, it will ignore this command.

Stop Commands:

“x” (card address) (sequencer #)

Stop Track:

“y” (sequencer #)

Stop Global:

These commands are available ONLY on BR-SmartMedia cards which are being operated as 'Dumb' Bricks or in MultiShow mode. Appending the sequencer number ('A' through 'H') to the command is only needed for cards in MultiShow mode. If your system has a 'Smart' Brick Brain, then these commands should be addressed to the Brain.

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

Loop Commands:

“!” (card address) (sequencer #)

Loop Track:

“ “ ” (sequencer #)

Loop Global:

These commands are available ONLY on BR-SmartMedia cards which are being operated as 'Dumb' Bricks or in MultiShow mode. Appending the sequencer number ('A' through 'H') to the command is only needed for cards in MultiShow mode. If your system has a 'Smart' Brick Brain, then these commands should be addressed to the Brain.

These command acts much like the **START** commands, except that they also set the **'LOOPING SHOWS'** flag. With the 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-SmartMedia is told to stop.

Stop at End Commands:

“%” (card address) (sequencer #)

Stop at End Track:

“&”

Stop at End Global:

These commands are available ONLY on BR-SmartMedia cards which are being operated as 'Dumb' Bricks or in MultiShow mode. Appending the sequencer number ('A' through 'H') to the command is only needed for cards in MultiShow mode. 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-SmartMedia(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:

“)” (card address) (show#) (sequencer #)

Select Show Track:

“*” (show#) (sequencer #)

Select Show Global:

These commands are available ONLY on BR-SmartMedia cards which are being operated as 'Dumb' Bricks or in MultiShow mode. Appending the sequencer number ('A' through 'H') to the command is only needed for cards in MultiShow mode. 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-SmartMedia. These commands can be used to select an individual show on the selected BR-SmartMedia(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:

“<” (card address) (sequencer #)

Pause Show:

“>” (card address) (sequencer #)

Continue Show:

These commands are available ONLY on BR-SmartMedia cards which are being operated as 'Dumb' Bricks or in MultiShow mode. Appending the sequencer number ('A' through 'H') to the command is only needed for cards in MultiShow mode. 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” (card address)

AutoDownload:

This is the format of the file that the BR-SmartMedia will receive and load into its SmartMedia Flash Card.

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

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

“ ~ ”

RealTime Update:

This command sets the BR-SmartMedia into a mode where it will update the outputs in RealTime from the data received through the serial port. The BR-SmartMedia 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-SmartMedia Hardware Configuration

There are only a hand full of switches which can be used to configure the BR-SmartMedia. Once these are set, you will probably never need to adjust them again. Most of the configuration is done through the Software Configuration, which is described in the following section.

- 1) Address:** These two rotary switches on the front of the BR-SmartMedia are used to set the address for the RS-422 serial port. Normally, only one BR-SmartMedia card is set to use any one address. If more than one card is set to the same address, then the serial ports can not be attached to the same RS-422 multidrop network at the same time.

The RS-422 serial address for the BR-SmartMedia 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.

- 2) Write Protect Switch:** When this switch is 'Write Protect' position, the BR-SmartMedia will protect the onboard configuration EEprom from accidental alterations. With the switch in the 'Write OK' position, reads and writes can take place normally. With the memory write protected, the BR-SmartMedia should retain whatever has been configured into it for at least forty years.
- 3) 'Smart' Brick/'Dumb' Brick Select:** (Serial modes Only) This switch tells the BR-SmartMedia whether the BR-SmartMedia is going to be acting like a 'Dumb' Brick or a 'Smart' Brick'. When acting as a 'Dumb' Brick, the BR-SmartMedia will be triggered to play shows by the four optically isolated 'J8' trigger inputs. When acting as a 'Smart' Brick, The BR-SmartMedia will lock to and follow time code information send to it through the 'Smart' Brick Network from the 'Smart' Brick Brian.

A single card cage should not have both 'Smart' and 'Dumb' Bricks installed in it. Damage may result if there are.

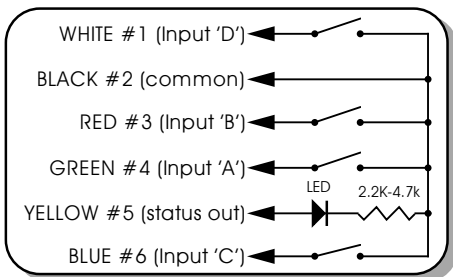
This switch actually switches the six wires that connect to the backplane of the BR-SmartMedia between the optoisolators used for 'Dumb' Bricks and the RS-422 receivers used for 'Smart' Bricks. If you plug in a BR-SmartMedia which has been configured to act as a 'Smart' Brick into a slot that has been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

The BR-SmartMedia 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-SmartMedia is running, there will be a delay of ten seconds or so before it starts acting as a 'Dumb' Brick.

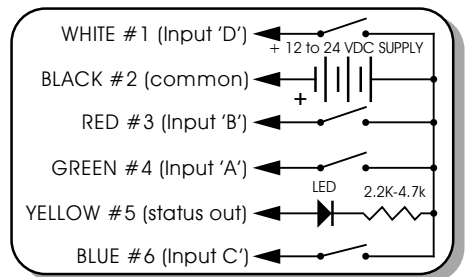
- 4) J8 Power:** If the BR-SmartMedia is acting as a 'Dumb' Brick, then this switch is used to select whether the 'J8' power for the optoisolators is provided by the same power supply as the BR-SmartMedia, or is provided by an external isolated source. When operating as a 'Smart' Brick, this switch has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

When plugged into any Gilderfluke & Co. Brick card cage, this will be brought out on a RJ-12 connector on the card cage. There should never be 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.

There 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



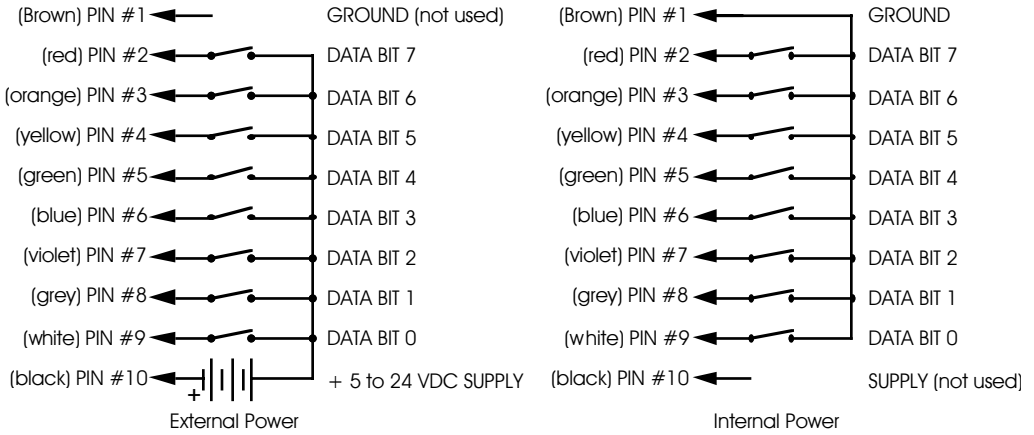
J8 with Sw8 set for EXTERNAL power

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-SmartMedia's power supply connections. Just put the 'J8 Power' switch in the 'Internal' position.

- 5) J6 Power:** If the BR-SmartMedia is acting as a 'Dumb' Brick, then this switch is used to select whether the 'J6' power for the optoisolators is provided by the same power supply as the BR-SmartMedia, or is provided by an external isolated source. When operating as a 'Smart' Brick, this switch has no effect.

lators is provided by the same power supply as the BR-SmartMedia, or is provided by an external isolated source. When operating as a 'Smart' Brick, this switch has no effect.

The 1/4 J6 Input is optically isolated. It can be set to run from an external power source (default configuration) or the same power as the Rack Smart Brick Brain. This is selected by moving Switch 5 as shown on the board.



BR-SmartMedia Software Configuration

The BR-SmartMedia 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 Gilderfluke & Co. 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 'MultiDrop' network. You can attach operator panels anywhere on the network 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 the cards simultaneously.

If you are using a PC, typical modem programs 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-SmartMedia 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 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-SmartMedia 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-SmartMedia. 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-SmartMedia 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-SmartMedia 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 computer's '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-SmartMedia. 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.

While in configuration, 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 the characters have been erased or before any have been entered.

Once you have configured a BR-SmartMedia, you can 'lock' the configuration by moving the 'Write Protect' switch to the 'Write Protected' position from the 'Write Enabled' position. This should protect your configuration from anything short of a lightning hit. The menu will change to show that the configuration EEprom 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 switch back to the 'Enabled' position.

If you want to keep a hard copy printout of the current configuration of the BR-SmartMedia, you should use 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.

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-SmartMedia:

m5AA5(address)

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

MultiShow Mode:

The menu will appear as follows when in MultiShow mode. In this case, decimal values have been selected for the numbers. At the top of the screen the size of the AutoDownload file found on the SmartMedia Flash Card (if any) is shown. If the AutoDownload file isn't found, then 'not found' will appear in this space.

```
-Gilderfluke & Company - BR-SmartMedia in Multi-Show Mode - v1.22 - [c]2003 DCM-
__9 shows with 232 channels @ __0 Offset / Set FileName is CROOML__A00
    All EEPROM writes are disabled. Card Address- __0

a) numbers- decimal | b) Boot check- no | c) DMX- Tx & Rx w/CS | d) VI52- no

0) input 0: close loops __1 CRoomL_A a_____ | open not used...
1) input 1: close loops __2 CRoomL_B b_____ | open not used...
2) input 2: close loops __3 CRoomL_C c_____ | open not used...
3) input 3: close loops __4 CRoomL_D d_____ | open not used...
4) input 4: close loops __5 CRoomL_E e_____ | open not used...
5) input 5: close loops __6 CRoomL_F f_____ | open not used...
6) input 6: close loops __7 CRoomL_G g_____ | open not used...
7) input 7: close loops __8 CRoomL_H h_____ | open not used...

8) blue : close E-stops shows seq. abcdefgh | open clears E-stops seq abcdefgh
9) green : close pauses show on seq abcdefgh | open continues shows on abcdefgh
    sequencer numbers: a b c d e f g h
e) Ease-In speed [in seconds]: |_0.5_|_1.0_|_2.1_|_4.2_|_8.5_|_17_|_8.5_|_4.2_|
f) PowerOn/EStops go to show # |__1_|__2_|__3_|__4_|__5_|__6_|__7_|__8_|
g) analogs to EaseIn | h) operating mode | i) Info | o) reload config.
p) Play a show | r) save config. | t) Test shows | x) exit

Enter Command-
```

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

- a) Numbering System:** This toggle is used to select between HEXadecimal and Decimal numbering systems for display and entries. When percentage is selected, all entries are still made in Decimal numbers.
- b) Boot Check:** This toggle is used to tell the BR-SmartMedia to check its inputs for changes when power is first applied to the card. In the single sequencer modes, the AutoDownload file tells the BR-SmartMedia what to do at startup. In the MultiShow mode, we must tell it in this way.

If this toggle is off ('no'), then the BR-MultiShow will simply sit and wait for a command to come in through the serial port or switch closure inputs before it will do anything.

If this toggle is on ('yes'), then the inputs will be read and inverted during the boot sequence. If you want the BR-SmartMedia to start playing show(s) on one or more sequencers, you simply set up one or more inputs to start or loop show(s) on the 'opening' edge of one or more inputs. On bootup, the BR-SmartMedia will see the input as an 'opening', even if there is nothing attached to it, and performs the appropriate action.

- c) DMX-512:** This toggle is used to enable and disable the DMX-512 in and out of the card, and the DMX-512 error checking.

You may need to disable the reception or transmission of DMX-512 in some applications. The most common reason for disabling reception is when a BR-SmartMedia card is installed in a sixteen slot card cage and its DMX-512 is used to feed the other cards in that cage. Because the DMX-512 lines are bussed across the whole card cage, the BR-SmartMedia would hear its own DMX-512 transmission. An external DMX-512 source takes precedence over the on-board animation on a BR-SmartMedia, so it would immediately stop reading data from the AutoDownload file on the SmartMedia Flash Card and use the incoming DMX-512 for its data source. Since it is its own data source, this doesn't work too well. Disabling the DMX-512 reception fixes this situation.

Note that version 1.0 of the BR-SmartMedia hardware does not physically disconnect the DMX-512 transmission lines from the DMX-512 terminals. It just stops transmission of data. Version 1.1 and beyond puts the transmitter into a high impedance state, effectively disconnecting it from the DMX-512 output pins when it is disabled.

The options for the DMX-512 input and output are:

- 1) 'Tx & Rx w/CS 'DMX-512 Transmission (Tx) and reception (Rx) WITH checksums (Default).**
- 2) **'Tx & Rx wo/CS':** DMX-512 transmission (Tx) and reception (Rx) without checksums.
- 3) **'Tx only w/CS':** DMX-512 transmission (Tx) only with checksums
- 4) **'Tx only wo/CS':** DMX-512 transmission (Tx) only without checksums
- 5) **'Rx only w/CS':** DMX-512 reception (Rx) only with checksums.
- 6) **'Rx only wo/CS':** DMX-512 reception (Rx) only without

checksums.

- 7) **'disabled'**: DMX-512 transmission (Tx) and reception (Rx) disabled.

The checksum is used to ensure veracity in data transmitted or received by the BR-SmartMedia. Without it, the BR-SmartMedia 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. Sending the checksum out does not affect any devices that don't support it, so it is always best to leave the Tx checksums ON for the benefit of the devices which do.

- d) **VT-52 Compatible Display**: When this toggle is enabled, the BR-SmartMedia 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-SmartMedia 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: If you '**Start**' a show, then the BR-SmartMedia 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-SmartMedia will check for a '**jump immediately to next show**' programmed into the show data. If there is one, the BR-SmartMedia will start the next show.
- e) **Stop at End:** At the end of the currently looping show(s), the BR-SmartMedia will **NOT** check for another show to run. This command only affects 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 effected 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) **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 second
- e) 8.5 second
- f) 17 seconds

An ease-In will be triggered whenever:

- 1) 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.
- 2) 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.
- 3) 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)**.

- 4) When DMX-512 is first received and it is transitioning from the data stored in the onboard SmartMedia Flash Card.
- 5) When DMX-512 reception is lost and the BR-SmartMedia is transitioning back to data stored on the onboard SmartMedia Flash Card.
- 6) (Smart Brick modes only) When Smart Brick net data is first acquired.
- 7) (Smart Brick modes only) When the frame being accessed by the Smart Brick net jumps backwards by one or more frames or forward by more than five frames.

While any sequencer is performing an Ease-In, the 'Show running' LED on the front of the BR-SmartMedia will flash.

f) 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-SmartMedia
- b) An E-Stop condition is triggered.

In the single sequencer modes, the AutoDownload file tells the BR-SmartMedia what to do at startup. In the MultiShow mode, we must tell it in this way.

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.

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.

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.

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:

the other sequencer if you answer 'yes'.

Analog channels will be Eased-In whenever:

- 1) 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.
- 2) 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.
- 3) 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)**.
- 4) When DMX-512 is first received and it is transitioning from the data stored in the onboard SmartMedia Flash Card.
- 5) When DMX-512 reception is lost and the BR-SmartMedia is transitioning back to data stored on the onboard SmartMedia Flash Card.
- 6) (Smart Brick modes only) When Smart Brick net data is first acquired.
- 7) (Smart Brick modes only) When the frame being accessed by the Smart Brick net jumps backwards by one or more frames or forward by more than five frames.

While any sequencer is performing an Ease-In, the 'Show running' LED on the front of the BR-SmartMedia will flash.

- h) Operating Mode:** This command is used to toggle through all the modes that are available to you on the BR-SmartMedia. The MultiShow mode is the only one that will allow more than one sequencer to be played at the same time. The other modes allow the secondary serial port and 'Dumb' or 'Smart' Brick modes to be used.

If you are just using the BR-SmartMedia for sending serial strings or DMX-512 data, just leave the card in Intelix mode and don't set up any of the Intelix-Specific commands. Most of the other serial modes could be used, but they force the secondary serial port to a fixed baud rate that may not be the one you need. Intelix mode allows the baud rate to be set anywhere between

2400 and 115 KBaud.

As of this writing, the modes available on the BR-SmartMedia are:

- 1) MultiShow mode: Allows up to eight independent sequencers to play at the same time.**
- 2) MIDI: Sends MIDI key on and key off commands
- 3) Intelix: Sends strings to control Intelix brand matrix mixers
- 4) Rexroth quick write: Supports serial control of Mannesmann Rexroth DCC Servo cards
- 5) Orpan (LSB first): One of two modes to support serial control of Orpan motion bases
- 6) Orpan (MSB first): One of two modes to support serial control of Orpan motion bases
- 7) Moog 2000 / DOF mode: One of four modes to support serial control of Moog electric motion bases
- 8) Moog 2000 / length mode: One of four modes to support serial control of Moog electric motion bases
- 9) Moog 5000 / DOF mode: One of four modes to support serial control of Moog electric motion bases
- 10) Moog 5000 / length mode: One of four modes to support serial control of Moog electric motion bases
- 11) DMX-512 Recorder mode: This is a mode which is used to sample incoming DMX-512 data, and record it to an AutoDownload file on the SmartMedia Flash Card. This AutoDownload file can then be used to play shows in any of the above modes. This is also where you will find the command to reformat your SmartMedia Flash Card, should this become necessary.

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

```
-Gilderfluke & Company - BR-SmartMedia in Multi-Show Mode - v1.17 - [c]2002 DCM-
__9 shows with 232 channels @ __0 Offset / Set FileName is CROOM1__.A00
Card Address- __0

Sequencer a show #__1 CRoom1_A looping @ frame 000421h / 1057
Sequencer b show #__2 CRoom1_B looping @ frame 0003C2h / 962
Sequencer c show #__3 CRoom1_C looping @ frame 0002F7h / 759
Sequencer d show #__4 CRoom1_D looping @ frame 00029Fh / 671
Sequencer e show #__5 CRoom1_E looping @ frame 00024Dh / 589
Sequencer f show #__6 CRoom1_F looping @ frame 00020Bh / 523
Sequencer g show #__7 CRoom1_G looping @ frame 0001CCh / 460
Sequencer h show #__8 CRoom1_H looping @ frame 000172h / 370

input 0: open
input 1: open
input 2: open
input 3: open
input 4: open
input 5: open
input 6: open
input 7: open
Blue input: open
Green input: open

i) to redraw, n) any other key to return to main menu -
```

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

This is a snapshot view of the status of the card. To get another snapshot, just hit the command again.

- o) Reload Configuration:** This command gives you the option of:
- 1) Reloading the default configuration into the BR-SmartMedia's configuration EEprom.
 - 2) Loading a previously saved configuration file to the BR-SmartMedia's configuration EEprom. (This option is only available if there is a SmartMedia Flash Card installed on the BR-SmartMedia)

If the second option is available, then the following screen will appear to allow you to choose between the two options.

```
-Gilderfluke & Company - BR-SmartMedia in Multi-Show Mode - v1.22 - [c]2003 DCM-  
__9 shows with 232 channels @ __0 Offset / Set FileName is CROOM1__.A00  
Card Address- __0  
  
Load Configuration  
  
a) Load from SmartMedia card.  
b) Load Defaults.  
  
a or b? [ESC to cancel] -
```

If you choose option 'a', the BR-SmartMedia will give you one more chance to bail out without clearing your configuration EEprom. If you enter 'Y' or 'y', the entire configuration EEprom will be cleared.

If you choose option 'b', then the following screen will appear:

```
-Gilderfluke & Company - BR-SmartMedia in Multi-Show Mode - v1.22 - [c]2003 DCM-
__9 shows with 232 channels @ __0 Offset / Set FileName is CROOML__.A00
Card Address- __0

This will restore the EEPROM configuration from the SmartMedia card.
The backup file is saved as: CONFIG.SM

Don't remove the SmartMedia card or power this unit down while the
card access LED is lit.

Hit any key when ready.

hit <ESC>ape key to cancel-
```

If you now hit any key OTHER than the 'Escape' key, the BR-SmartMedia will attempt to open a file named 'CONFIG.SM' on the SmartMedia Flash Card. If it is found, then its contents will be put into the configuration EEprom. Any configuration that had been in the EEprom will be overwritten.

The 'CONFIG.SM' file can come from either doing a 'configuration save' to the SmartMedia Flash Card, or a serial configuration save to a file named 'CONFIG.SM'.

- p) Play:** This command allows you to pick and loop 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 on, then the BR-SmartMedia 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-SmartMedia will ask you if you would like to override the E-Stop or not.
- r) Download configuration:** This command is used to save the cur-

rent configuration of the BR-SmartMedia through the serial port to a file on your computer, or to a file on the SmartMedia Flash Card. This file can then be reloaded into this, or any other BR-SmartMedia.

```
-Gilderfluke & Company - BR-SmartMedia in Multi-Show Mode - v1.22 - [c]2003 DCM-  
__9 shows with 232 channels @ __0 Offset / Set FileName is CROOM1__.A00  
Card Address- __0
```

Save Configuration

- a) Save to SmartMedia card.
- b) Save as serial download.

a or b? [ESC to cancel] -

If you choose option 'a', the following screen will appear:

```
-Gilderfluke & Company - BR-SmartMedia in Multi-Show Mode - v1.22 - [c]2003 DCM-  
  __9 shows with 232 channels @ __0 Offset / Set FileName is CROOVL__.A00  
      Card Address- __0  
  
This will dump the contents of the EEPROM through the serial port.  
Set your computer to save a stream of text to a file. The file should be 2055  
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-
```

Following the instructions, you set your computer to save a string of ASCII characters to a file **BEFORE** pressing ANY key.

When you press a key but 'Escape', the BR-SmartMedia will send out the entire contents of its configuration EEPROM through the serial port. When it has finished, you then tell your computer to stop saving characters, and then hit any key to tell the BR-SmartMedia to redraw the screen.

If you choose option 'b', the following screen will appear:

```
-Gilderfluke & Company - BR-SmartMedia in Multi-Show Mode - v1.22 - [c]2003 DM-
__9 shows with 232 channels @ __0 Offset / Set FileName is CROOM1__.A00
Card Address- __0

This will create a backup of the EEPROM on the SmartMedia card.

The backup file is saved as: CONFIG.SM

Don't remove the SmartMedia card or power this unit down while the
card access LED is lit.

Hit any key when ready.
hit <ESC>ape key to cancel-
```

Whether the backup file was saved through a serial download or written directly to the SmartMedia Flash Card, it can be restored using the 'Restore Configuration' command.

- f) Test:** This command checks the veracity of the AutoDownload file on the SmartMedia from stem to stern. It then reports if the file was good or corrupted.
- x) eXit:** This exits the configuration mode and returns the BR-SmartMedia 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 complement 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-SmartMedia. This will automatically invoke the upload command and store the incoming data.
- +j) 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 heck.

BR-SmartMedia in MIDI Mode

For a BR-SmartMedia in MIDI mode, the menu will appear as follows. At the top of the screen the size of the AutoDownload file found on the SmartMedia Flash Card (if any) is shown. If the AutoDownload file isn't found, then 'not found' will appear in this space

```
-Gilderfluke & Company - BR-SmartMedia in BR-Serial Mode - v1.22 - [c]2003 DCM-
  __9 shows with 232 channels @ __0 Offset / Set FileName is CROCM1__A00
      Card Address- __0

a) DMX- Tx & Rx w/CS
b) baud rate- forced to MIDI baud
c) numbering system- decimal
d) VT-52 display- no
e) EaseIn speed- 2.1 seconds
h) operating mode- MIDI

v) monitor channel- _10

u) MIDI keyboard channels- _11 thru _26
k) voice- 01, press vel- _64, release vel- _64
l) string trigger channel- none
m) edit strings....

g) analogs to EaseIn | h) operating mode | i) Info | o) reload config.
p) Play a show | r) save config. | t) Test shows | x) eXit

Enter Command-
```

- a) DMX-512:** Please refer to the MultiShow section of this manual.
- b) Baud Rate:** While using the BR-SmartMedia in MIDI mode, the secondary serial port is forced to the MIDI baud rate of 31,250 bits per second. Please refer to the MultiShow section of the manual for additional information on this command.
- c) Numbering System:** Please refer to the MultiShow section of this manual.
- d) VT-52 Compatible Display:** Please refer to the MultiShow section of this manual.
- e) Ease-In Speed:** Please refer to the MultiShow section of this manual.
- h) Operating Mode:** Please refer to the MultiShow section of this manual.

- v) Monitor Channel:** This command is used to select a channel that is used to build up a serial string byte-by-byte from the animation data, and then send it out at the appropriate time. It can be used to send any 'special' commands you might need to send to the equipment being controlled by the BR-SmartMedia. Any string of any length up to 256 bytes can be built up and sent using this feature. It is typically used to send commands to the serially controlled equipment that doesn't need to be sent regularly. Typical of these commands are initialization and de-initialization strings.

This command asks for the address of an eight bit value in the animation data. If you enter an address of 255/0FFh, this feature will be disabled. Once set (and configuration mode exited), the BR-SmartMedia will begin monitoring this location for any non-zero values. Once it finds one non-zero value, it starts buffering whatever values it finds in this location in each subsequent frame of animation data into a buffer. If it then finds two consecutive frames of animation data with a zero value in them, it will then immediately send out the entire string that has been built up.

The advantage of using this mode of sending strings is that any string can be built up and sent from the animation data. The disadvantage of this feature is that it takes as one frame of time for each entry in the string to be buffered in before it can be sent. A 200 character long string will take 202 frames of data to build up and send out. This translates to almost seven seconds at 30 FPS.

Data for these strings is typically hand entered using PC·MACs' OffLine editing tools. The target channel may be defined as either a single eight bit analog or as eight separate digital functions within the same byte. If it is defined as an analog, you can use the 'Set to a Value...' commands to enter each frame of the string (be sure to turn off the 'Cut/Paste' options under the 'Preferences' pulldown). If it is defined as eight digital channels, you can just draw in the binary data as needed.

- j) MIDI Keyboard Channels:** This is a MIDI Mode specific command. MIDI was designed for sending data from electronic keyboards and instruments to one another. This feature allows you to define sixteen consecutive bytes of animation data (128 digital bits) to emulate a MIDI keyboard. This command sets the address of the first byte used in this way. The other fifteen bytes follow immediately. If you set this value to 255/0FFh, this feature is disabled.

Once the address is set using this command and the configu-

ration mode exited, the BR-SmartMedia will start monitoring for any changes in these sixteen bytes. Any bit that goes high will trigger a MIDI 'key down' string to be sent. Any bit that was high and goes low will trigger a MIDI 'key up' string.

Normal keyboards only have 88 keys. The 128 digitals monitored by the BR-SmartMedia are mapped with a standard keyboard right in the middle. Middle 'C' is found on the 60th digital. This translates to bit four of the seventh byte that is being monitored.

Each of the MIDI key up/key down strings is three bytes long. At the relatively slow 31,250 baud rate MIDI uses (3125 bytes per second), it is possible to overrun the 256 byte long buffer used for sending data from the BR-SmartMedia. Be aware that the low speed of a MIDI serial stream means that it will take almost 1/10 of a second to send out 256 bytes of data. The following are the rules for MIDI:

- 1) Don't make more than 85 key changes on any one frame of animation data. The last bits won't be turned on or off until almost 1/10th of a second later (3 frames after the first bit changed, at thirty FPS).
- 2) You can not send more than 1041 MIDI key up/key down sequences per second.
- 3) At thirty FPS, the average number of changes on each frame should not exceed 34.
- 4) MIDI has no error detection or correction built in. There is no guarantee that any command will ever reach the device that the BR-SmartMedia is controlling through a MIDI output. If a MIDI 'key down' sequence is missed, the output will remain off until another MIDI 'key down' is received for the same output. If a MIDI 'key up' sequence is missed, the output will remain stuck on until another MIDI 'key up' is received for the same output. Do not use MIDI for any safety related equipment.
- 5) MIDI wiring standards allow for a MAXIMUM wire length of fifty feet. The longer the wire, the better are the chances that MIDI messages will be missed or garbled. A MIDI receiver can't tell a garbled MIDI message from a perfectly good one.

The above are all shortcomings in the design of any MIDI sys-

tem. They come directly from the MIDI standards. These are the reasons why MIDI is not used for any professional animation control systems.

Just for some contrast, at the typical thirty frames per second that a Gilderfluke Animation Control System operates at, there is no limitation to the number of digital functions that turn on or off at one time. With 2048 digital controls, there can be 2048 on and off events per frame, or 61,440 on and off events per second. If there is any error in the data stream, the outputs will not be updated with this bad data and the corrected data will be output on the next frame (typically 1/30th of a second later). Recommended wire length without any additional hardware is one mile.

- k) Voice, Press Velocity, and Release Velocity:** This is a MIDI Mode specific command. This command is used to set which of sixteen possible MIDI 'instruments' the key commands are sent to, and the 'speed' that is used for the MIDI 'key down' and 'key up' commands. The default MIDI 'speed' is 64. A value of one is the slowest possible key up or down speed. A value of 127 gives the fastest possible key speed. A 'speed' value of zero will turn off a note, even on a MIDI 'key down' message.
- l) String Trigger Channel:** This command is used to set the address of the eight bit channel that is used to trigger the strings which are entered using the next command. Setting this value to 255/OFFh will disable this feature.

Any eight bit channel of animation data can be used to trigger the sending of the strings which are entered using the next command. There are a total of sixteen strings available. Each bit triggers one string to be sent on the rising edge, and a second completely different string on the falling edge. This feature is typically used to send strings that need to be sent too regularly for using the 'Monitor Channel' feature.

- m) Edit Strings.....:** This command brings up the following menu. It is used to enter the strings that are sent when using the 'String Trigger' feature. There are sixteen possible strings. Each string can be up to eighteen characters long. One is sent on the rising, and a different one is sent on the falling edge of each of the eight bits in the String Trigger channel.

```

-Gilderfluke & Company - BR-SmartMedia in BR-Serial Mode - v1.22 - [c]2003 DCM-
  _9 shows with 232 channels @ __0 Offset / Set FileName is CROOML__A00
      Card Address- __0

input 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18
0) 0 ^ |_10|_13|_30|_82|105|115|105|110|103|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
1) 1 ^ |_10|_13|_31|_82|105|115|105|110|103|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
2) 2 ^ |_10|_13|_32|_82|105|115|105|110|103|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
3) 3 ^ |_10|_13|_33|_82|105|115|105|110|103|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
4) 4 ^ |_10|_13|_34|_82|105|115|105|110|103|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
5) 5 ^ |_10|_13|_35|_82|105|115|105|110|103|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
6) 6 ^ |_10|_13|_36|_82|105|115|105|110|103|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
7) 7 ^ |_10|_13|_37|_82|105|115|105|110|103|_|_|_|_|_|_|_|_|_|_|_|_|_|_|

8) 0 v |_10|_13|_30|_70|_97|108|108|105|110|103|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
9) 1 v |_10|_13|_31|_70|_97|108|108|105|110|103|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
A) 2 v |_10|_13|_32|_70|_97|108|108|105|110|103|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
B) 3 v |_10|_13|_33|_70|_97|108|108|105|110|103|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
C) 4 v |_10|_13|_34|_70|_97|108|108|105|110|103|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
D) 5 v |_10|_13|_35|_70|_97|108|108|105|110|103|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
E) 6 v |_10|_13|_36|_70|_97|108|108|105|110|103|_|_|_|_|_|_|_|_|_|_|_|_|_|_|
F) 7 v |_10|_13|_37|_70|_97|108|108|105|110|103|_|_|_|_|_|_|_|_|_|_|_|_|_|_|

enter number of string to edit, or <ESC>ape to return to main menu (0-F)-
    
```

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

In the example above, the strings have been set to display the bit number and the word 'Rising' or 'Falling'.

- g) Analogs to Ease-In:** Please refer to the MultiShow section of this manual.
- i) Info:** Please refer to the MultiShow section of this manual.
- o) Reload Configuration:** Please refer to the MultiShow section of this manual.
- p) Play a Show:** Please refer to the MultiShow section of this manual.
- r) Save Configuration:** Please refer to the MultiShow section of this manual.
- t) Test Shows:** Please refer to the MultiShow section of this manual.
- x) eXit:** Please refer to the MultiShow section of this manual.

BR-SmartMedia in Intelix Mode

For a BR-SmartMedia in Intelix mode, the menu will appear as follows. At the top of the screen the size of the AutoDownload file found on the SmartMedia Flash Card (if any) is shown. If the AutoDownload file isn't found, then 'not found' will appear in this space

```
-Gilderfluke & Company - BR-SmartMedia in BR-Serial Mode - v1.22 - [c]2003 DCM-
__9 shows with 232 channels @ __0 Offset / Set FileName is CROCML__A00
Card Address- __0

a) DMX- Tx & Rx w/CS
b) baud rate- 38.4 KBaud
c) numbering system- decimal
d) VT-52 display- no
e) EaseIn speed- 2.1 seconds
h) operating mode- Intelix

v) monitor channel- none

u) Intelix strings....

l) string trigger channel- none
m) edit strings....

g) analogs to EaseIn | h) operating mode | i) Info | o) reload config.
p) Play a show | r) save config. | t) Test shows | x) eXit

Enter Command-
```

- a) DMX-512:** Please refer to the MultiShow section of this manual.
- b) Baud Rate:** While using the BR-SmartMedia in Intelix mode, the secondary serial port can be set to any of the available baud rates. Please refer to the MultiShow section of the manual for additional information on this command.
- c) Numbering System:** Please refer to the MultiShow section of this manual.
- d) VT-52 Compatible Display:** Please refer to the MultiShow section of this manual.
- e) Ease-In Speed:** Please refer to the MultiShow section of this manual.
- h) Operating Mode:** Please refer to the MultiShow section of this manual.

- v) **Monitor Channel:** Please refer to the MIDI section of this manual.
- j) **Intelix Strings:** This is a Intelix Mode specific command. This command is used to set up the commands that the Intelix Matrix mixer will respond to. The format of all Intelix strings is pretty similar. The typical string to use with the BR-SmartMedia is the one that adjusts the level of a single matrix mixer cross point in real time.

```
-Gilderfluke & Company - BR-SmartMedia in BR-Serial Mode - v1.22 - [c]2003 DCM-
__9 shows with 232 channels @ __0 Offset / Set FileName is CROOM1__.A00
Card Address- __0

Channel 1 2 3 4 5 6 7 8 9
0) _20 |251|__0|_5|_2|_14|_4|_5|__0|__0|
1) xxx | | | | | | | | | |
2) xxx | | | | | | | | | |
3) xxx | | | | | | | | | |
4) xxx | | | | | | | | | |
5) xxx | | | | | | | | | |
6) xxx | | | | | | | | | |
7) xxx | | | | | | | | | |
8) xxx | | | | | | | | | |
9) xxx | | | | | | | | | |
A) xxx | | | | | | | | | |
B) xxx | | | | | | | | | |
C) xxx | | | | | | | | | |
D) xxx | | | | | | | | | |
E) xxx | | | | | | | | | |
F) xxx | | | | | | | | | |

enter number of string to edit, or <ESC>ape to return to main menu (0-F)-
```

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

In this example, the audio which is present on input number four is being sent to output number five. The level of the mix is set by animation channel twenty.

'251' (header for all commands), '0' (MSB of command length), '5' (LSB of command length), '2' (class), '14' (message I.D.), 4 (input number), 5 (output number)

Consult the Intelix programming manual for specifics on all other Intelix serial commands.

The Intelix mixer currently supports baud rates of 9600, 19.2 Kbaud and 38.4 Kbaud. There is no reason to use anything but the highest rate available. The maximum string length for the matrix mix commands is eleven bytes. The maximum number of ma-

trix points you should try to control is eleven when using 38.4 Kbaud and thirty FPS.

- l) String Trigger Channel:** Please refer to the MIDI section of this manual.
- m) Edit Strings.....:** Please refer to the MIDI section of this manual.
- g) Analogs to Ease-In:** Please refer to the MultiShow section of this manual.
- i) Info:** Please refer to the MultiShow section of this manual.
- o) Reload Configuration:** Please refer to the MultiShow section of this manual.
- p) Play a Show:** Please refer to the MultiShow section of this manual.
- r) Save Configuration:** Please refer to the MultiShow section of this manual.
- t) Test Shows:** Please refer to the MultiShow section of this manual.
- x) eXit:** Please refer to the MultiShow section of this manual.

BR-SmartMedia in Rexroth Quick Write Mode

For a BR-SmartMedia in Rexroth Quick Write mode, the menu will appear as follows. At the top of the screen the size of the AutoDownload file found on the SmartMedia Flash Card (if any) is shown. If the AutoDownload file isn't found, then 'not found' will appear in this space

```
-Gilderfluke & Company - BR-SmartMedia in BR-Serial Mode - v1.22 - [c]2003 DCM-
__9 shows with 232 channels @ __0 Offset / Set FileName is CROCM1__A00
Card Address- __0

a) DMX- Tx & Rx w/CS
b) baud rate- 38.4 KBaud
c) numbering system- decimal
d) VT-52 display- no
e) EaseIn speed- 2.1 seconds
h) operating mode- Rexroth quick write

v) monitor channel- none

u) Rexroth channels...
k) analog resolutions- 12 bits
l) string trigger channel- none
m) edit strings...

g) analogs to EaseIn | h) operating mode | i) Info | o) reload config.
p) Play a show | r) save config. | t) Test shows | x) eXit

Enter Command-
```

Before you can use a Rexroth DCC card with the BR-SmartMedia card, you must first configure it. You will probably want to wire any DCC card(s) to the BR-SmartMedia so that you can unplug their serial line from the BR-SmartMedia and plug it into your PC for doing configuration. Most of the configuration is the same as you would use for any DCC card application (consult the Rexroth DCC card documentation for this information). The only specifics that the DCC needs to operate with the BR-SmartMedia are:

- 1) Card address. Each DCC card must have a unique address assigned to it. Available addresses are 0 through 9, and A through Z. Cards must be powered up one by one and assigned if using the Rexroth configuration software for doing this. This is set on the 'Parameters' screen on Rexroth's setup program. The address can also be set using the front panel buttons and display.

- 2) The Quick Write 'Command Address' must be set to C038 on all DCC Cards. This is set on the 'Parameters' screen on Rexroth's setup program.
 - 3) All DCC cards must be set for Serial control. This is set on the 'Control Word' under the 'Edit' menu on Rexroth's setup program.
 - 4) Both the 'Run' and 'Enable' bits must be brought to 24 VDC before the DCC cards will run.
- a) **DMX-512:** Please refer to the MultiShow section of this manual.
 - b) **Baud Rate:** While using the BR-SmartMedia in Rexroth quick write mode, the secondary serial port can be set to any of the available baud rates. Please refer to the MultiShow section of the manual for additional information on this command.
 - c) **Numbering System:** Please refer to the MultiShow section of this manual.
 - d) **VT-52 Compatible Display:** Please refer to the MultiShow section of this manual.
 - e) **Ease-In Speed:** Please refer to the MultiShow section of this manual.
 - h) **Operating Mode:** Please refer to the MultiShow section of this manual.
 - v) **Monitor Channel:** Please refer to the MIDI section of this manual.
 - u) **Rexroth Channels....:** This is a Rexroth Mode specific command. This command is used to set up which animation channels are sent to which Rexroth DCC cards. These channels must be legal addresses for the resolution that has been set for the BR-SmartMedia card.
- 8) Eight bit resolution outputs can be set to any address.
 - 12) Twelve bit resolution outputs can not be set to any address that can evenly be divided by three (0, 3, 6, & 9 are examples of illegal 12 bit resolution addresses). If the first twelve bit resolution output is addressed at a value which when divided by three yields a remainder of one, then you must set the 'first channel' when saving the AutoDownload file from PC·MACs and setting the AutoDownload offset (command 'a' above) to the channel's address MINUS ONE. If the first twelve bit resolution output is addressed at a value which when divided by three yields a remainder of two, then you

must set the 'first channel' when saving the AutoDownload file from PC·MACs and setting the AutoDownload offset) to the channel's address MINUS TWO.

- 16) Sixteen bit resolution outputs can be set to any even number address. Examples of these are 0, 2, 4, 8 & 10.

The Rexroth DCC cards currently support baud rates of 9600, 19.2 KBaud and 38.4 KBaud. There is no reason to use anything but the highest rate available. The maximum string length for a Rexroth quick write command is eight bytes. The maximum number of DCC cards you should try to control is fifteen when using thirty FPS and 38.4 KBaud.

```
-Gilderfluke & Company - BR-SmartMedia in BR-Serial Mode - v1.22 - [c]2003 DCM-
__9 shows with 232 channels @ __0 Offset / Set FileName is CROOM1__.A00
Card Address- __0
Card Channel | Card Channel
0) ___      1) ___
2) ___      3) ___
4) ___      5) ___
6) ___      7) ___
8) ___      9) ___

a) _12      b) ___
c) _13      d) ___
e) _14      f) ___
g) _15      h) ___
i) _16      j) ___
k) _17      l) ___
m) _18      n) ___
o) _19      p) ___
q) ___      r) ___
s) ___      t) ___
u) ___      v) ___
w) ___      x) ___
y) ___      z) ___
enter number of string to edit, or <ESC>ape to return to main menu (0-9, a-z)-
```

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

- k) Analog Resolution:** This is a Rexroth Mode specific command. This command is used to toggle between eight, twelve and sixteen bit resolution analog values to be sent to the Rexroth DCCs. The resolution does not affect the time it takes to send messages to the DCCs. You will need to make sure that when you save the AutoDownload file from PC·MACs and set the AutoDownload offset that enough channels are saved.

- l) String Trigger Channel:** Please refer to the MIDI section of this manual.
- m) Edit Strings.....:** Please refer to the MIDI section of this manual.
- g) Analogs to Ease-In:** Please refer to the MultiShow section of this manual.
- i) Info:** Please refer to the MultiShow section of this manual.
- o) Reload Configuration:** Please refer to the MultiShow section of this manual.
- p) Play a Show:** Please refer to the MultiShow section of this manual.
- r) Save Configuration:** Please refer to the MultiShow section of this manual.
- t) Test Shows:** Please refer to the MultiShow section of this manual.
- x) eXit:** Please refer to the MultiShow section of this manual.

BR-SmartMedia in Orpan Modes

For a BR-SmartMedia in Orpan (LSB first) mode, the menu will appear as follows. At the top of the screen the size of the AutoDownload file found on the SmartMedia Flash Card (if any) is shown. If the AutoDownload file isn't found, then 'not found' will appear in this space.

```
-Gilderfluke & Company - BR-SmartMedia in BR-Serial Mode - v1.22 - [c]2003 DCM-
__9 shows with 232 channels @ __0 Offset / Set FileName is CROCML__.A00
      Card Address- __0

      a) DMX- Tx & Rx w/CS
      b) baud rate- 9600 baud
      c) numbering system- decimal
      d) VT-52 display- no
      e) EaseIn speed- 2.1 seconds
      h) operating mode- Orpan [LSB first]

      v) monitor channel- none

      l) string trigger channel- none
      m) edit strings....

g) analogs to EaseIn | h) operating mode | i) Info          | o) reload config.
p) Play a show       | r) save config.  | t) Test shows     | x) eXit

      Enter Command-
```

For a BR-SmartMedia in Orpan (MSB first) mode, the menu will appear as follows:

```
-Gilderfluke & Company - BR-SmartMedia in BR-Serial Mode - v1.22 - [c]2003 DM-
__9 shows with 232 channels @ __0 Offset / Set FileName is CROOML__.A00
Card Address- __0

a) DMX- Tx & Rx w/CS
b) baud rate- 9600 baud
c) numbering system- decimal
d) VT-52 display- no
e) EaseIn speed- 2.1 seconds
h) operating mode- Orpan [MSB first]

v) monitor channel- none

l) string trigger channel- none
m) edit strings....

g) analogs to EaseIn | h) operating mode | i) Info          | o) reload config.
p) Play a show       | r) save config.   | t) Test shows    | x) eXit

Enter Command-
```

In either of the Orpan modes, the first six axis of twelve bit analog data are sent out through the serial port. This transmission is continuous, so this mode is not suitable for general purpose serial communications applications.

The address of the first analog is always '01'. When you save the AutoDownload files for using Orpan mode, always start with channel '00' and use a '00' AutoDownload offset. The difference between the two modes is the order in which the bytes are sent.

- a) DMX-512:** Please refer to the MultiShow section of this manual.
- b) Baud Rate:** While using the BR-SmartMedia in Rexroth quick write mode, the secondary serial port can be set to any of the available baud rates. Please refer to the MultiShow section of the manual for additional information on this command.
- c) Numbering System:** Please refer to the MultiShow section of this manual.
- d) VT-52 Compatible Display:** Please refer to the MultiShow section of this manual.

- e) **Ease-In Speed:** Please refer to the MultiShow section of this manual.
- h) **Operating Mode:** Please refer to the MultiShow section of this manual.
- v) **Monitor Channel:** Please refer to the MIDI section of this manual.
- l) **String Trigger Channel:** Please refer to the MIDI section of this manual.
- m) **Edit Strings.....:** Please refer to the MIDI section of this manual.
- g) **Analog to Ease-In:** Please refer to the MultiShow section of this manual.
- i) **Info:** Please refer to the MultiShow section of this manual.
- o) **Reload Configuration:** Please refer to the MultiShow section of this manual.
- p) **Play a Show:** Please refer to the MultiShow section of this manual.
- r) **Save Configuration:** Please refer to the MultiShow section of this manual.
- t) **Test Shows:** Please refer to the MultiShow section of this manual.
- x) **eXit:** Please refer to the MultiShow section of this manual.

BR-SmartMedia in Moog Motion Base Modes

For a BR-SmartMedia that is in Moog 2000 DOF mode, the menu will appear as follows. At the top of the screen the size of the AutoDownload file found on the SmartMedia Flash Card (if any) is shown. If the AutoDownload file isn't found, then 'not found' will appear in this space

```
-Gilderfluke & Company - BR-SmartMedia in BR-Serial Mode - v1.22 - [c]2003 DCM-
  __9 shows with 232 channels @ __0 Offset / Set FileName is CROCML__A00
      Card Address- __0

      a) DMX- Tx & Rx w/CS
      b) baud rate- forced to 57.6Kbaud
      c) numbering system- decimal
      d) VT-52 display- no
      e) EaseIn speed- 2.1 seconds
      h) operating mode- Moog 2000 / DOF

      q) motion base ID- 1
      v) monitor channel- none

      u) min/max limits- 0/32767 | heave- 6550/29000
      k) analog resolutions- 12 bits
      l) string trigger channel- none
      m) edit strings....
      w) oversampling- 2x

g) analogs to EaseIn | h) operating mode | i) Info | o) reload config.
p) Play a show | r) save config. | t) Test shows | x) eXit

      Enter Command-
```

For a BR-SmartMedia in Moog 2000 Length mode, the menu will appear as follows:

```
-Gilderfluke & Company - BR-SmartMedia in BR-Serial Mode - v1.22 - [c]2003 DCM-
  __9 shows with 232 channels @ __0 Offset / Set FileName is CROOM1__.A00
      Card Address- __0

      a) DMX- Tx & Rx w/CS
      b) baud rate- forced to 57.6Kbaud
      c) numbering system- decimal
      d) VT-52 display- no
      e) EaseIn speed- 2.1 seconds
      h) operating mode- Moog 2000 / length

      q) motion base ID- 1
      v) monitor channel- none

      u) min/max limits- 1024/23142
      k) analog resolutions- 12 bits
      l) string trigger channel- none
      m) edit strings....
      w) oversampling- 2x

g) analogs to EaseIn | h) operating mode | i) Info           | o) reload config.
p) Play a show       | r) save config.   | t) Test shows      | x) eXit

      Enter Command-
```

For a BR-SmartMedia in Moog 5000 DOF mode, the menu will appear as follows:

```
-Gilderfluke & Company - BR-SmartMedia in BR-Serial Mode - v1.22 - [c]2003 DCM-
__9 shows with 232 channels @ __0 Offset / Set FileName is CROOM1__.A00
      Card Address- __0

      a) DMX- Tx & Rx w/CS
      b) baud rate- forced to 115.2Kbaud
      c) numbering system- decimal
      d) VT-52 display- no
      e) EaseIn speed- 2.1 seconds
      h) operating mode- Moog 5000 / DOF (NO Moog file!)

      v) monitor channel- none

      u) min/max limits- 0/65535
      k) analog resolutions- 12 bits
      l) string trigger channel- none
      m) edit strings....
      w) oversampling- 2x

g) analogs to EaseIn | h) operating mode | i) Info           | o) reload config.
p) Play a show       | r) save config.   | t) Test shows      | x) eXit

      Enter Command-
```

For a BR-SmartMedia in Moog 5000 Length mode, the menu will appear as follows:

```
-Gilderfluke & Company - BR-SmartMedia in BR-Serial Mode - v1.22 - [c]2003 DM-
__9 shows with 232 channels @ __0 Offset / Set FileName is CROOM1__.A00
      Card Address- __0

      a) DMX- Tx & Rx w/CS
      b) baud rate- forced to 115.2Kbaud
      c) numbering system- decimal
      d) VT-52 display- no
      e) EaseIn speed- 2.1 seconds
      h) operating mode- Moog 5000 / length (NO Moog file!)

      v) monitor channel- none

      u) min/max limits- 0/65535
      k) analog resolutions- 12 bits
      l) string trigger channel- none
      m) edit strings....
      w) oversampling- 2x

g) analogs to EaseIn | h) operating mode | i) Info           | o) reload config.
p) Play a show       | r) save config.   | t) Test shows      | x) eXit

      Enter Command-
```

Moog Motion bases accept a stream of serial data with a very specific format and then respond with a status message that the BR-SmartMedia card must pay a good bit of attention to determine what mode the Motion base is in. The Moog Motion bases must be updated at sixty times per second, no matter what (it puts the motion base into an error mode if a single update is missed).

The Moog Motion bases have two operating modes. In 'DOF' mode, the data is stored in 'Degrees of Freedom'. The PC that is located under the motion base translates these values to the actual leg lengths that are needed to get the motion base to the desired position. Channels are used as follows:

- Channel 0: Roll
- Channel 1: Pitch
- Channel 2: Heave (all axis up/down)
- Channel 3: Surge
- Channel 4: Yaw
- Channel 5: Sway

In 'Length' mode, the six axis of control are applied directly to the six

legs of the motion base. No translation is needed by the PC under the motion base.

If the Moog motion base is in the wrong mode (Length or DOF), the BR-SmartMedia will send the commands to put it into the appropriate mode.

In all cases the analog axis are addressed starting at '00'. Following the analog data is a digital byte which contains several commands that the Moog Motion Bases will respond to. For the three possible resolutions, the following addresses must be used:

Eight Bit Resolution: Analogs at 0, 1, 2, 3, 4, 5. Digital control word at 6

Twelve Bit Resolution: Analogs at 1, 2, 4, 5, 7, 8. Digital control word at 9

Sixteen Bit Resolution: Analogs at 0, 2, 4, 6, 8, 10. Digital control word at 12

In Sixteen bit mode, a 2000 series Moog Motion Base will only follow resolutions to fifteen bits. For this reason, the BR-SmartMedia code has been written to divide the sixteen bit values in half before they are sent to the motion base. In all resolutions, the AutoDownload file should be saved starting with address '00', and the 'First Address in Eprom' should be set to '00'.

You must use the connect through the edge connector to the card cage to connect to the serial port of a Moog motion base. The connections are used as follows:

RJ-12	BR-SM Card Cage	BR-SM Signal	Moog DE-9 Female	Moog Signal	Moog Signal from/to BR-SM
1 white	11 brown	ground	5	ground	ground
2 black	15 green	Tx +	2	Rx -	- Serial data out from BR-SM
3 red	14 yellow	Tx -	1	Rx +	+ Serial data out from BR-SM
4 green	12 red	Rx -	3	Tx -	- Serial data in to BR-SM
5 yellow	13 orange	Rx +	4	Tx +	+ Serial data in to BR-SM
6 blue	16 blue	Config.	n/c	n/a	ground

The bits within the Moog Control Word are used as follows:

Bit 0 = E-Stop: When this bit is active, it forces the Moog Motion Base into the E-Stop condition. As this is pretty drastic for a Moog Motion Base (it requires the PC under it to be rebooted), the use of this bit should be strictly limited. It is valid in all motion base states except 'disabled', when the motion base stops listening to the serial port altogether.

Bit 1 = Park: This command is valid only when the Moog Motion Base is in either Engaged or Standby modes. When this bit goes active, the motion base will return to the 'parked' position and enter 'Idle' mode. This command is usually programmed into the end of a

show to bring the motion base home for loading/unloading. Once a park command is issued, the motion profile data is ignored by the motion base as it heads to its home position.

Bit 2 = Engage: This command is valid only when the Moog Motion Base is in Idle mode and operating with sixteen bit resolutions. This command is used to move the motion base from the home position to the 'flying' position and enter the 'Engaged' mode. During the time after this command is issued until the motion base enters the 'Engaged' mode it is in what is called 'Standby' mode. During Standby mode you must hold all the position values at the following levels. If you do not, then the motion base will enter a fault mode and not Engage again until you have issued a 'Reset' command. Be aware that there is an anomaly in the Moog 2000 software that will cause it to fault out at least once the first time you try to Engage it. You will then need to issue a 'Reset' command and try again.

DOF mode: All axis but Heave = 32,767
Heave = 58,000

Length Mode: All axis = 2048

Bit 3 = Start: This command is valid only when the Moog Motion Base is in Idle mode. This command is just like the 'Engage' command above, except that it allows you to define the starting position for the ride vehicle. It can be used if you are using eight, twelve or sixteen bit resolution position commands. You set the starting position by sending any legal position commands to the motion base and issuing this command. During the time after this command is issued until the motion base enters the 'Engaged' mode it is in what is called 'Standby' mode. During Standby mode the positions must not change until the motion base has entered the 'Engaged' mode.

Bit 4 = Reset: This command is valid only when the Moog Motion Base is in either Fault or Inhibit modes. This command is used to reset low level error conditions in the Moog Motion Base. Examples of errors that this command will reset are those 'position errors' that are caused when you try to 'Engage' the Motion Base without sending it the appropriate position data.

Bit 5 = Inhibit: This command is valid only when the Moog Motion Base is in either Power Up or Idle modes. This is a temporary method of deactivating the motion base. When 'Inhibited', the motion base will ignore further commands until it receives a

'Reset' Command.

- a) **DMX-512:** Please refer to the MultiShow section of this manual.
- b) **Baud Rate:** While using the BR-SmartMedia in any Moog mode, the secondary serial port is forced to 57.6 Kbaud (Moog 2000 bases) or 115 Kbaud (Moog 5000 series bases). Please refer to the MultiShow section of the manual for additional information on this command.
- c) **Numbering System:** Please refer to the MultiShow section of this manual.
- d) **VT-52 Compatible Display:** Please refer to the MultiShow section of this manual.
- e) **Ease-In Speed:** Please refer to the MultiShow section of this manual.
- h) **Operating Mode:** Please refer to the MultiShow section of this manual.
- q) **Motion Base ID:** This is a Moog 2000 Mode specific command. Moog Motion bases can be assigned an identification number of between 0 and 32,768. This command is used to set the ID number that the BR-SmartMedia will send its data to. This number should be set to the same ID as the motion base you are working with. The default is '1'.
- v) **Monitor Channel:** Please refer to the MIDI section of this manual.
- u) **Min/Max Limits:** This is a Moog 2000/5000 Mode specific command. This command is used to set up the movement limits for commands sent to the Moog Motion Base. In DOF mode, the motion limits are from 0 to 32,767 for all axis but 'heave'. The heave axis is limited to 6550 to 29,000. In Length mode, all axis are limited between 1024 and 23,142. Any position command that exceeds these limit will be clipped by the BR-SmartMedia to them to keep a 'fault' from being generated by the motion base.
- k) **Analog Resolutions:** This is a Moog 2000/5000 Mode specific command. This command is used to toggle between eight, twelve and sixteen bit resolution analog values to be sent to the Moog Motion bases. The resolution does not affect the time it takes to send messages to the Moog Motion bases. You will need to make sure that when you save the AutoDownload file from PC-MACs the 'start address' is '00' and the AutoDownload offset (command 'a' above) has been set to '00'.

Eight Bit Resolution: Analogs at 0, 1, 2, 3, 4, 5. Digital control word at 6

Twelve Bit Resolution: Analogs at 1, 2, 4, 5, 7, 8. Digital control word at 9

Sixteen Bit Resolution: Analogs at 0, 2, 4, 6, 8, 10. Digital control word at 12

- l) String Trigger Channel:** Please refer to the MIDI section of this manual.
- m) Edit Strings.....:** Please refer to the MIDI section of this manual.
- w) Oversampling:** This is a Moog Mode specific command. The Moog Motion bases must be updated through their serial ports at sixty times per second. Animation systems typically are updated at thirty times per second. Normally the same data is sent to the Motion Base twice on each frame. When this toggle is ON, the BR-SmartMedia will interpolate the incoming data from thirty frames per second to sixty frames per second for the Moog Motion Base. This makes for a much smoother ride, and there is no reason to ever turn this off if you are running a Moog motion Base.
- g) Analogs to Ease-In:** Please refer to the MultiShow section of this manual.
- i) Info:** Please refer to the MultiShow section of this manual.
- o) Reload Configuration:** Please refer to the MultiShow section of this manual.
- p) Play a Show:** Please refer to the MultiShow section of this manual.
- r) Save Configuration:** Please refer to the MultiShow section of this manual.
- t) Test Shows:** Please refer to the MultiShow section of this manual.
- x) eXit:** Please refer to the MultiShow section of this manual.

BR-SmartMedia in Serial RealTime Update Mode

For a BR-SmartMedia that is in Serial RealTime Update mode, the menu will appear as follows. At the top of the screen the size of the AutoDownload file found on the SmartMedia Flash Card (if any) is shown. If the AutoDownload file isn't found, then 'not found' will appear in this space

```

-Gilderfluke & Company - BR-SmartMedia in BR-Serial Mode - v1.22 - [c]2003 DCM-
  __9 shows with 232 channels @ __0 Offset / Set FileName is CROCM1__A00
      Card Address- __0

      a) DMX- Tx & Rx w/CS
      b) baud rate- forced to 9600 baud
      c) numbering system- decimal
      d) VT-52 display- yes
      e) EaseIn speed- 2.1 seconds
      h) operating mode- Serial RealTime Updates

      u) 1st channel offset- __0

g) analogs to EaseIn | h) operating mode | i) Info          | o) reload config.
p) Play a show       | r) save config.   | t) Test shows    | x) eXit

      Enter Command-
```

Serial RealTime Update mode from a PC running our PC-MACs software sends out the first sixteen 8 bit wide channels of data through the PC's serial port. This mode allows a BR-SmartMedia to send out this same data. This can be sent to any equipment which supports Serial RealTime Updates.

You must use the connect to the serial port through the edge connector via the card cage for the serial port. The connections are as follows:

<u>RJ-12</u>	<u>Card Cage</u>	<u>Signal</u>	<u>Signal from/to BR-SM</u>
1 white	11 brown	ground	ground
2 black	15 green	Tx +	- Serial data out from BR-SM
3 red	14 yellow	Tx -	+ Serial data out from BR-SM
4 green	12 red	Rx -	- Serial data in to BR-SM
5 yellow	13 orange	Rx +	+ Serial data in to BR-SM
6 blue	16 blue	Config.	ground

- a) **DMX-512:** Please refer to the MultiShow section of this manual.
- b) **Baud Rate:** While using the BR-SmartMedia in Serial RealTime Update mode, the secondary serial port is forced to 9600 baud.
- c) **Numbering System:** Please refer to the MultiShow section of this manual.
- d) **VT-52 Compatible Display:** Please refer to the MultiShow section of this manual.
- e) **Ease-In Speed:** Please refer to the MultiShow section of this manual.
- u) **1st Channel Offset:** The serial data output from PC•MACs usually starts with the data addressed at zero. This allows you to offset to a higher address when needed.
- h) **Operating Mode:** Please refer to the MultiShow section of this manual.
- g) **Analogs to Ease-In:** Please refer to the MultiShow section of this manual.
- i) **Info:** Please refer to the MultiShow section of this manual.
- o) **Reload Configuration:** Please refer to the MultiShow section of this manual.
- p) **Play a Show:** Please refer to the MultiShow section of this manual.
- r) **Save Configuration:** Please refer to the MultiShow section of this manual.
- t) **Test Shows:** Please refer to the MultiShow section of this manual.
- x) **eXit:** Please refer to the MultiShow section of this manual.

BR-SmartMedia in DMX-512 Recorder Mode

For a BR-SmartMedia in Intelix mode, the menu will appear as follows. At the top of the screen the size of the AutoDownload file found on the SmartMedia Flash Card (if any) is shown. If the AutoDownload file isn't found, then 'not found' will appear in this space. If now AutoDownload file is found, then many of the following DMX-512 Recorder Mode commands will be unavailable:

```
-Gilderfluke & Company - BR-SmartMedia in BR-Serial Mode - v1.22 - [c]2003 DCM-
  _11 shows with _27 channels @ __0 Offset / Set FileName is TEST____.A00
      Card Address- __0

      a) DMX- Tx & Rx w/CS
      b) baud rate- forced to 9600 baud
      c) numbering system- decimal
      d) VT-52 display- yes
      e) EaseIn speed- 2.1 seconds
      h) operating mode- Serial RealTime Updates

      v) monitor channel- none

      u) 1st channel offset- __0

      l) string trigger channel- none
      m) edit strings....

g) analogs to EaseIn | h) operating mode | i) Info          | o) reload config.
p) Play a show       | r) save config.   | t) Test shows    | x) eXit

      Enter Command-
```

- a) DMX-512:** Please refer to the MultiShow section of this manual.
- b) Numbering System:** Please refer to the MultiShow section of this manual.
- c) VT-52 Compatible Display:** Please refer to the MultiShow section of this manual.
- e) Ease-In Speed:** Please refer to the MultiShow section of this manual.
- f) Current Show:** This is a DMX-512 Recorder Mode specific command. It is used to pick which show in the current AutoDownload file on the BR-SmartMedia will be recorded over or erased.
- r) Record Show:** This is a DMX-512 Recorder Mode specific command. This begins the process of sampling DMX-512 data into the show specified by the command above. If the BR-SmartMedia is

receiving BrickNet, then the recorder's clock will be locked to the Smart Brick Brain's frame rate. If the BR-SmartMedia is operating as a 'Dumb' brick, it will sample the incoming DMX-512 data at the frame rate set by the show which has been selected above. At the end of the recording session, the BR-SmartMedia will report if it has successfully recorded the show or not.

- w) Wipe Show:** This is a DMX-512 Recorder Mode specific command. It erases all the data in the show selected above.
- g) Analogs to Ease-In:** Please refer to the MultiShow section of this manual.
- i) Info:** Please refer to the MultiShow section of this manual.
- o) Reload Configuration:** Please refer to the MultiShow section of this manual.
- p) Play a Show:** Please refer to the MultiShow section of this manual.
- r) Save Configuration:** Please refer to the MultiShow section of this manual.
- t) Test Shows:** Please refer to the MultiShow section of this manual.
- x) eXit:** Please refer to the MultiShow section of this manual.

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	ASCI	%	decimal	HEX	ASCI	%	decimal	HEX	ASCI	%	decimal	HEX	ASCI	%
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	DCb	(\)	
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	ACb	(,)		236	ECb	(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%