Gilderfluke
& Co.
ROBOTICS & SOUND SYSTEMS

Br-Brain4 v4.nn

The Br-Brain4 are controllers with no analog or digital outputs. Instead, they use a Sd Flash card to store and transmit up to four universes of DMX-512 (2048 channels!) to other output cards, dimmers, and lighting.

Within these 2048 channels of DMX-512, the Br-Brain4 can be running up to eight asynchronous sequencers. This means that one channel of DMX-512 can be controlling a dimmer (or other output devices) for one show, while next DMX-512 channel can be controlling a dimmer (or other output devices) for a completely different show.

A typical applications would be for ride-through attraction or museum. A single Br-Brain4 would be used to run up to eight scenes. As the ride vehicle enters a scene, it triggers the animation, sound, video, lighting and effects for that scene. Meanwhile, in other parts of the attraction, up to seven other vehicles are entering seven other scenes, and triggering the sequencers on the same Br-Brain4 that controls these scenes. The DMX-512 that controls all eight scenes is all coming from the one Br-Brain4, controlling shared dimmer racks and other features.

If running as part of a larger show, the Br-Brain4 can lock its sequencers to Smpte timecode, Pioneer DVD timecode, or external switch closures. The Br-Brain4s can also send strings through their secondary serial port, or act as a time code reader and DMX-512 output device for our Pc•MACs Show Programming software. The Br-Brain4 can also lock to or generate BrickNet timecode to lock it together with other other Br-Brain4s and GilderGear.

Safety Disclaimer: Any electronic or mechanical system has a potential to fail. Certain applications using Gilderfluke & Company equipment may involve potential risks of death, personal injury, or severe property, or environmental damage ("Critical Application"). Gilderfluke & Company equipment is not designed, intended, authorized, or warranted to be suitable in life support applications, devices, or systems, or other critical applications. Inclusion of Gilderfluke & Company products in such applications is understood to be fully at the risk of the customer. In order to minimize risks associated with the customer's applications, adequate design and operating safeguards should be provided by the customer to minimize inherent or procedural hazards.

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A note about this manual:

This manual covers the specifics of the **Br-Brain4**. To program the **Br-Brain4** you will also want to refer to the **PC·MACs** manual sections that cover the **PC·MACs** software.

The **Br-Brain4** is typically programmed in 'Software-only' or 'Hardwareless RealTime' mode. If you are using the **USB-DMX** for programming your **Br-Brain4** through the DMX-512 inputs, please refer to the **PC·MACs** 'Unlimited' mode.

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

http://www.gilderfluke.com

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Br-Brain4 Overview

The functions of three separate Gilderfluke & Company products have been rolled into the Br-Brain4. This includes the functions of:

1) All earlier Smart Brick Brains, which functioned mainly as time code readers for 'Smart' Brick Show Control Systems

2) Br-SmartMedia for multiple sequencer support and DMX-512 show playback. The Br-SmartMedia had a capacity for 256 channels of DMX-512, played back on up to eight independent sequencers

3) MACs-USB for functioning as a time code reader and DMX-512 output device for a Pc•MACs Show Programming System

The Br-Brain4 is an output card which has one DMX-512 input and four universes (2048 channels) of DMX-512 output. These 2048 channels of DMX-512 output can be divided between eight different asynchronous sequencers.

The Br-Brain4 uses any standard Sd or SdHC flash card for storing shows. These cards should be formatted with FAT32 before use. If you are using a lot of channels or sequencers, the faster the card you use, the better.

The Br-Brain4 requires AutoDownload files generated by Pc•MACs version 2.02.212.xxx or later. These v1.1 AutoDownload files are completely backwards compatible with the earlier v1.0 AutoDownload files, but have an extended header that is used to configure the Br-Brain4. Among other things, the extended header holds all the FigureNames and OutputNames for all the channels in the show, the tables that tell the Br-Brain4 which outputs go with which sequencer, etc.. A v1.0 AutoDownload file will simply not work with a Br-Brain4. The Br-Brain4 relies on this 'meta data' to know what it should do.

Older Pc•MACs show and site files are compatible with Pc•MACs version 2.02.212.xxx or later. You can open these files and work on them freely. Before you can AutoDownload them, you will need to add at least one AutoDownload-capable piece of GilderGear to the Channels list. You can do this using the 'Add Device Without Channels' command to add a device, without adding any output channels to your existing show.

Although you can open and use a show that has been saved from Pc•MACs version 2.02.212.xxx or later with an earlier version of Pc•MACs, there are some provisos:

a) The older version of Pc•MACs will not support shows with more than 256 channels.

b) The older version of Pc•MACs will not support multiple sequencers or

Devices. Opening a show with the which has been used in the new version of Pc•MACs will erase these from your Channels List.

Like all GilderGear, the Br-Brain4 can hold up to 255 shows. For triggering those shows, there are:

a) ten optically isolated inputs

b) Rs-422 networkable serial port

c) Real time or GPS synchronized clock and 365 day schedule

In addition to serial and the external trigger inputs, the Br-Brain4 has a built-in real time clock. It has a battery backup so that it will retain the current time, even while it is powered down. Like any crystal controlled clock, it is about as accurate as a wristwatch. The clock chips we use are laser-trimmed to a maximum of +/- 25ppm. If this isn't accurate enough for you, one of the modes built-in to the secondary serial port allows it to talk to an optional GPS antenna. This gives the Br-Brain4 an accuracy of 1/1000 of a second. Br-Brain4s that are separated by a few feet, or the entire planet can then be synchronized with one-another. This has been used for parade floats to synchronize them, even though they have no connection to one another, or in fountains, where the times when shows are scheduled to play are accurate enough to set your wristwatch by them.

To trigger from the GPS or internal real time clock, the Br-Brain4 uses a 365 day schedule. This is configured using your computer, and saved to a 'Schedule.sch' file on the Br-Brain4's Sd card. You can schedule events using the days of the week, or by using specific dates. By using the days of the week for most scheduling, you will not need to alter the schedule once it is set. If you set a certain schedule for playing on all the Sundays in December, the same set of shows will play on Sundays on all the subsequent years. If you select to play a specific 'date' schedule on December 25th, this will override the Sunday 'Day of Week' schedule if the 25th happens to fall on a Sunday. This means that the special 'December 25th' schedule will be played on all subsequent December 25ths.

The BrickNet is a Gilderfluke & Co. method of distributing time code from a single 'Brain', to a number of 'Smart' Bricks. The 'Smart' Bricks would then use this BrickNet timecode to access their on-board memory and play back the appropriate show data. This was a very handy feature when the memory storage capacity was small (a few thousand frames, when we started!), but has now been largely superseded by storing the show data in a central location (like a Br-Brain4) and distributing it over a network (like DMX-512) to the output cards.

Where the BrickNet may still be advantageous is in very large installations. By using one Br-Brain4 as a BrickNet 'master', other Br-Brain4(s) can be slaved to it through the

BrickNet. The linked Br-Brain4s act like one really big Br-Brain4, with each contributing another four full DMX-512 universes to the project.

Any Br-Brain4 can be designated as a BrickNet 'master' through the configuration menus. You can select which of the eight possible sequencers are used as the source for the timecode. Other Br-Brain4(s) are then told to listen to the BrickNet for the timecode. The shows that are to be locked to BrickNet must also have the 'BrickNet' checkbox checked in the Show Information Dialog, so that the Br-Brain4(s) will know not to run the show(s) from the normal timecode, but to use the BrickNet instead. Although you could assign multiple sequencers to listening to the BrickNet as 'slaves', the other seven sequencers are available for all normal operations.

Frame rates for shows on the Br-Brain4 can be set to a variety of rates from one frame per second to 100 frames per second. It is unusual to run at frame rates above 30 FPS, or to use different frame rates for different shows. Frame rates above about 40 FPS can't support full sized DMX-512 universes of 512 channels each. The frame rate of the lowest numbered enabled sequencer determines the update rate for the DMX-512 outputs.

The Br-Brain4 has four different frame clock sources available for running shows:

a) Internal: This is the frame rate derived from the extremely accurate (+/- 25 PPM) crystal clock on the Br-Brain4

b) External: This clocking mode allows you to use one of the ten optically isolated trigger inputs as the clock source for a show

c) Smpte: Standard linear Smpte timecode is fed into the Br-Brain4's transformer isolated Smpte input. This is decoded by the Br-Brain4 and can be used to lock shows and other pieces of equipment that are also listening to the same Smpte time code. Smpte timecode is an 'absolute' time code. Each frame of Smpte timecode includes the Hour, Minute, Second and Frame number for that unique frame. Each show that is assigned to Smpte timecode in Pc•MACs will have an 'hour' number assigned to it. This gets passed to the Br-Brain4 in the AutoDownload file. If the Smpte received is before the hour for a show, it will display 'Smpte Early' on the LCD display, and start following when the Smpte timecode rolls into the assigned 'hour'. If a show is longer than one hour the Br-Brain4 will expect it to roll seamlessly into the next 'hour' after 59 minutes, 59 seconds and 29 frames. The Smpte used with Pc•MACs or the Br-Brain4 must NOT be 'drop frame'. If you view the Smpte timecode on the Br-Brain4's LCD display, drop frame will use ';' (semicolons) between the hours, seconds and minutes instead of the normal ':' (colon). Smpte clocked shows can be set to 'bridge' timecode dropouts, or

to freeze in place when it loses the timecode signal.

d) Laserdisc/DVD Serial Timecode: This is a query-and-response timecode used on Pioneer industrial LaserDisc, DVD and Solid State video players. When running a show with this timecode, the Br-Brain4 sends a '?f' to the player, and it responds with the current frame number. The Br-Brain4 then decodes this in much the same way as it decodes Smpte timecode. The Br-Brain4 has the ability to spin up and synchronize up to eight LaserDisc/DVD players using the Br-SDC8 serial multiplexer. LaserDisc/DVD clocked shows can be set to 'bridge' timecode dropouts, or to freeze in place when it loses the timecode signal.

Most shows on most sequencers are run from the Br-Brain4's 'internal' frame clock. If you are using BrickNet, External, Smpte or LaserDisc/DVD timecode, it is extremely unusual to use it on more than one sequencer within the same Br-Brain4.

The Br-Brain4 can sense any frame jumps on any sequencer, and generate an EaseIn on the DMX-512 that is output from that sequencer. A jump can be caused by:

a) Power up: This generates the longest (15 second) Ease-In as all the analog channels in the DMX-512 ramp from all-zeros to the level defined in the 'first' frame of the 'first' show.

b) Jumping Mid-Show: If the show jumps in the middle of one show to another show, this will generate an Ease-In on all the analogs for that sequencer. The length of the EaseIn is defined in Pc•MACs the EaseIn Setup Dialog. This can be accessed from the Preferences menu, Sequencer Setup Dialog, or from the AutoDownload dialog. EaseIns can be set from zero (disabled) to ten seconds.

c) Frame Jumps: If the show jumps forwards or backwards more than the number of frames you selected in Pc•MACs, an EaseIn is generated on the sequencer. This can never happen in Internally Clocked shows. It will happen regularly in LaserDisc/DVD clocked shows, Smpte Clocked shows and BrickNet Clocked shows. The length of the EaseIn and the threshold for the number of frames is defined in Pc•MACs on the EaseIn Setup Dialog. This can be accessed from the Preferences menu, Sequencer Setup Dialog, or from the AutoDownload dialog. EaseIns can be set from zero (disabled) to ten seconds. The Threshold can be set from 1 frame to 255 frames. A value of around five usually works well.

There are some analogs that shouldn't be Eased-In. These are usually 'control' channels in DMX-512 controlled lights. Easing-In these channels will cause the light to go through every trick it knows extremely rapidly. If you don't want an analog to EaseIn,

just open the Analog Setup Dialog for that channel from the Channels List, and uncheck the 'EaseIn' checkbox. It defaults to being enabled for most analog outputs.

The Br-Brain4s are designed to be used as stand-alone show controllers, as a 'master' sending data to other devices that act as 'slaves' on a DMX-512 network, or as 'slaves' themselves, receiving DMX-512 data from a 'master' elsewhere on the DMX-512 network. In the case of the Br-Brain4, about the only time it is used as a 'slave' is during programming, when a PC running Pc•MACs software is acting as the 'Master':

1) **Br-Brain4 running standalone or acting as a 'Master'**: This is the normal mode of operation for a Br-Brain4 once the shows have been programmed. In this mode of operation, data for the outputs is stored in the standard Sd or SdHC flash card. Shows can be started on the Br-Brain4 by:

    a) **PowerUp Options:** Shows can be started automatically when the Br-Brain4 is powered up. Even if a show isn't started playing, the data from the first frame of the show defined as the 'first show(s)' are sent to the DMX-512 outputs for each active sequencer. These are defined on the AutoDownload Dialog.

    b) **Trigger Inputs:** There are ten optically isolated trigger inputs on the Br-Brain4 that can be used to start, stop pause and in general control shows. New options include playing either randomly or sequentially from a list of shows, or E-Stopping a show (the Estop must be cleared before the Br-Brain4 will allow the sequencer to start playing again). These are all defined for an installation on the AutoDownload Dialog.

    c) **Serial Port:** Shows can be selected and started through the RS-422 serial port. A simple serial output touch screen or a PLC or other controller can be used to send these strings.

    d) **RealTime Clock or GPS Clock** using the 365 day scheduler.

    e) **BrickNet:** If a sequencer on a Br-Brain4 is set to listen to BrickNet timecode, triggers sent to the Br-Brain4 that is acting as the BrickNet 'Master' will start any BrickNet attached Br-Brain4s outputting show data.

2) **Br-Brain4 as a 'Slave'**: In this mode the Br-Brain4 receives data from and external source and uses this data to update its outputs. About the only time a Br-Brain4 is used as a 'slave' is during programming, when a PC running Pc•MACs software is acting as the 'Master'. Data can come from:

    a) RealTime serial updates from a Pc•MACs programming system through the RS-422 serial port. Up to sixteen eight-bit wide channels of Show

Control data can be received through the serial port at 9600 baud. The Br-Brain4 will immediately pass this incoming data through to the first DMX-512 output port. The Br-Brain4 will only update on good data packets received.

b) DMX-512 data from a Pc•MACs programming system (or any other source of DMX-512). Up to 512 eight-bit wide channels of animation control data can be received through the DMX-512 port. The Br-Brain4 will immediately pass this incoming data through to the first DMX-512 output port. If the incoming DMX-512 contains GilderChecksums, the Br-Brain4 will automatically update only on valid data packets.

c) High Speed RealTime serial updates from a Pc•MACs programming system through the RS-422 serial port. This is a new feature, which as of this writing, is unique to the Br-Brain4. It requires a USB-Rs232/422 serial adapter (which has been modified to support the higher baud rates) from Gilderfluke and Company, and a high quality, low capacitance balanced twisted pair cable between the USB-Rs232/422 and the Br-Brain4, which much be mounted in a Br-CC08. Pc•MACs will negotiate the best baud rate it can with the Br-Brain4, which can be as high as 1 Mbaud (you can see the baud rate displayed on the Br-Brain4's LCD screen). Up to 2048 channels of Show Control data can be received through the serial port at 1 Mbaud. The Br-Brain4 will immediately pass this incoming data through to the DMX-512 output ports. The number of universes this mode supports depends on the best baud rate that Pc•MACs is able to negotiate, which depends on the quality and length of the serial cables. The Br-Brain4 will only update on good data packets received.

The animation sequence which is to be used on the Br-Brain4 is generated on a PC•MACs Show Programming System. During programming, the DMX-512 input or RealTime updates through the 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) are saved to disk, the data is downloaded to the Sd flash card on the Br-Brain4. It is generally much faster and easier to save the completed shows' AutoDownload file to your computer's hard drive, then drag-n-drop the AutoDownload file onto the Sd/SdHC flash card that is then plugged into the Br-Brain4. You may choose to also include the .SET, .SHO, .STE and other files on the flash card as well, but the only files the Br-Brain4 actually reads are the AutoDownload (.A00) and schedule file (SCHEDULE.SCH) files.

All 2048 channels of data is transmitted through the four DMX-512 outputs on a Br-Brain4. If there are less than 2048 channels of data in your show(s), DMX-512 data past the last channel are sent as 'zeros'.

If you are transmitting DMX-512 data with GilderChecksums, you will want to avoid addressing dimmers and other devices to the same addresses that are used for the checksums (256 and 257 (if zero-based) or 257 and 258 (if one-based)).

The DMX-512 output can be used to control other GilderGear, light dimmers, automated spotlights, color changers, fog and wind machines, or any of the thousands of other pieces of equipment which will accept standard DMX-512 inputs.

The Br-Brain4 can be mounted in one 1" wide slot in any of our Brick Card cages. If you are going to be using the High Speed RealTime Updates, the Br-Brain4 will need to be mounted in a Br-CC08.

The Br-Brain4 can be used in conjunction with any selection of 'Smart' Bricks, Electronic FeedBack (EFB) 'Smart' Bricks and Z-Bricks. Card cages with one, two, three 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 (4-½" of space behind the panel).

Voltage requirements for Br-Brain4s is 9 to 24 VDC. The Br-Brain4 itself draws approximately 200 ma..

The revision 4.nn Br-Brain4 is an upgrade from all earlier version of the Smart Brick Brains. The chief differences are:

1) The functions of three separate Gilderfluke & Company products have been rolled into the Br-Brain4. This includes the functions of:

   1) All earlier Smart Brick Brains

   2) Br-SmartMedia for multiple sequencer support and DMX-512 show playback

   3) MACs-USB for functioning as a time code reader and DMX-512 output device for a Pc•MACs Show Programming System

2) Uses standard removable Sd or SdHC flash cards for show data storage

3) Supports four full 512 channel DMX-512 universes for up to 2048 Channels of output

4) Supports v1.1 AutoDownload files

5) Automatic recognition and support for GilderChecksums

6) Field upgradable firmware. Updates can be installed by just putting the firmware file onto the Sd card and inserting it into the Br-Brain4

Customized front panel artwork is available on all GilderGear, including the Br-Brain4. These can be custom branded, or labeled for specific installation names. Please contact the Gilderfluke & Company factory for details on generating custom Br-Brain4 labels.

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Multi-Sequencer Shows

The Br-Brain4 is the only piece of GilderGear that currently supports multiple Sequencers in a single AutoDownload file. You may have previously used Multiple Sequencer shows before without even knowing it. If you have programmed a number of shows that each run on independent pieces of GilderGear, you have programmed Multi Sequencer shows! Each of the show controllers can be triggered simultaneously to run as one big show, or triggered independently to run separate asynchronous shows. This is essentially what happens with the multiple sequencers within a Br-Brain4. It is like having eight separate show controllers that can be triggered simultaneously or independently, all within one Br-Brain4.

A Pc•MACs version 2.02.212.xxx or later are required to program shows to run on a Br-Brain4. Only they will generate the version 1.1 AutoDownload files that the Br-Brain4 requires. These versions also support multiple sequencers on the Br-Brain4.

Only users with a MACs-License are able to create and program multiple sequencers shows on Pc•MACs. Without a license, you will be limited to a single sequencer.

Because the analog and digital outputs are walled off between each sequencer, it is possible to have the same show running on all eight of the Br-Brain4's sequencers. The Br-Brain4 doesn't care if the shows are started simultaneously or minutes apart.

The following assumes that you are familiar enough with Pc•MACs to perform basic show programming and editing functions. If you are new to Pc•MACs, you may want to watch some of the online GilderYouTube videos and practice programming just a bit.

To create a multiple sequencer show on Pc•MACs:

1) Select 'new' from the top of the File Menu:
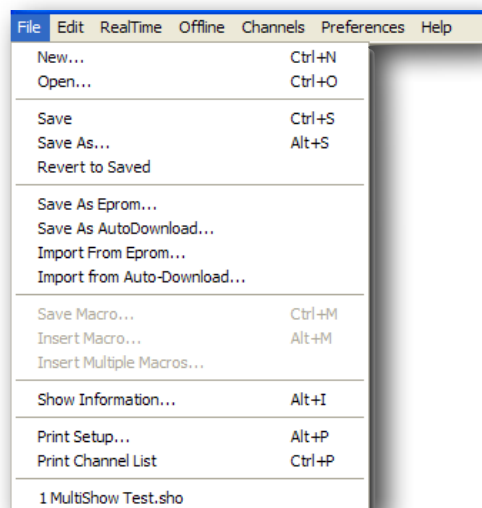
2) Pc•MACs will open the 'New Show' dialog:
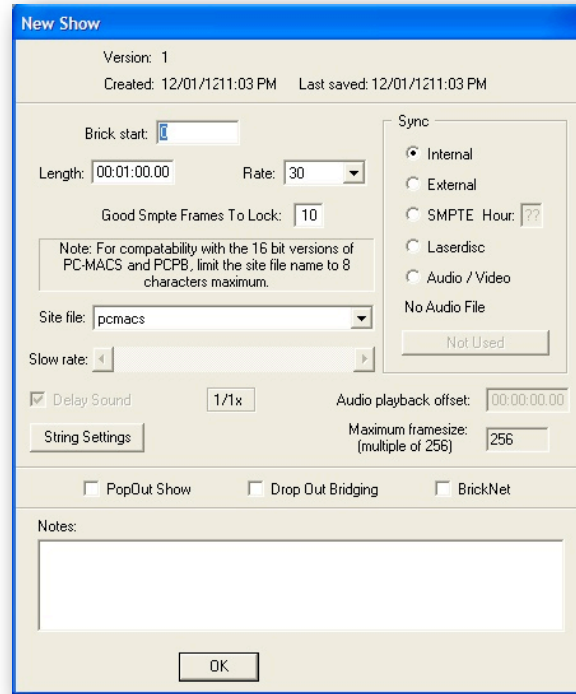
Except for the missing 'cancel' button, the 'New Show' dialog is identical to the 'Show Information' dialog found under the File Menu (Shortcut = Alt+'i').

3) Click on the Site File drop down. All of your previous site files will be listed. Select 'New' to begin making a new site file:
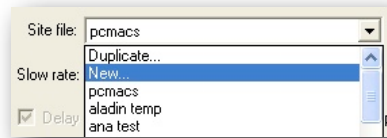
4) Name the new Site file whatever you like:
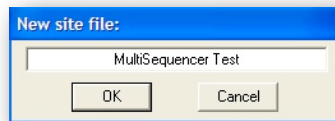
5) Set the length of the show, time code and frame rate, just as you would on any other show. The default shows are a one minute long show at 30 frames per second using 'internal' time code. You can use these default values if you would like.

6) Close the 'New Show' dialog
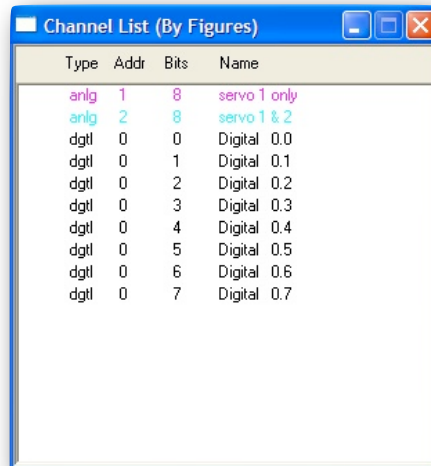
7) The empty channels list should open. This is where you tell Pc•MACs what GilderGear and other DMX-512 output devices you have in your installation. (If it doesn't automatically open, select 'Show List' from the Channels menu):
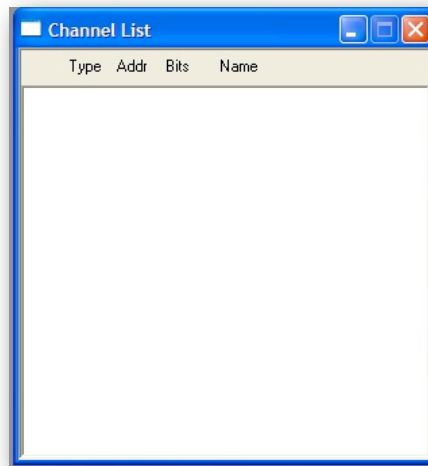
8) The easiest way to add output channels to the Channels List is to 'Add Devices with Channels', located under the Channels Menu. In this case, we are adding a Br-miniBrick8, and then including the two servo outputs. If you have another piece of GilderGear or a piece of third party DMX-512 gear that you want to use for this example, feel free to choose it instead.
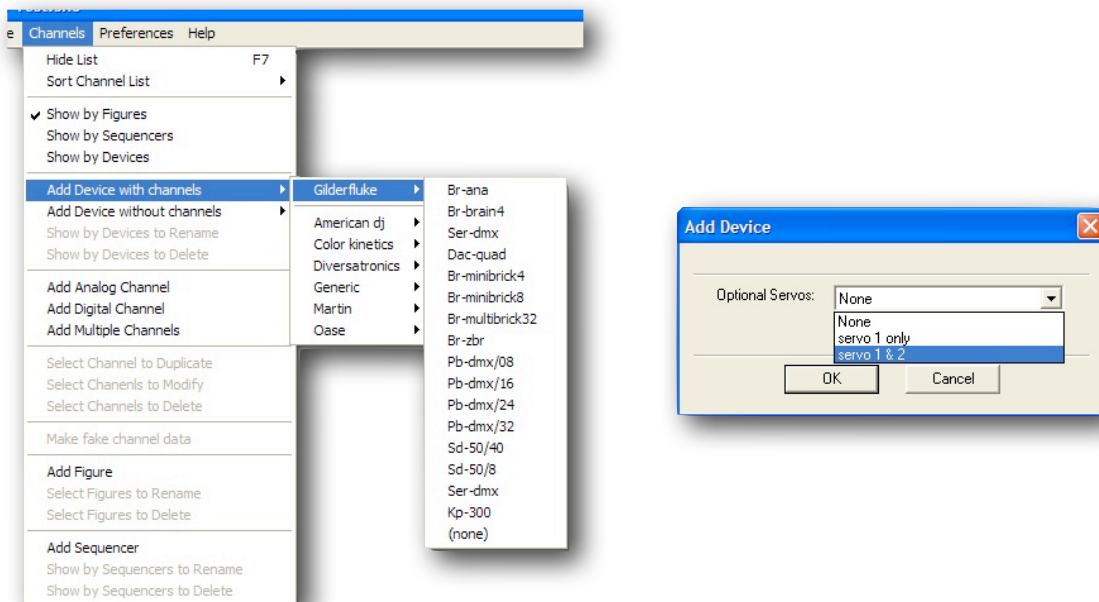
9) Adding a Br-miniBrick8 (with servos) results in eight digitals and two analogs being added to the Channels List:
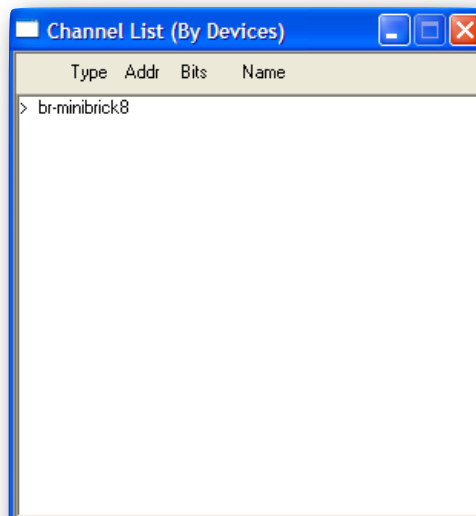
If you added a different device, you will see all the DMX-512 channels it needs, and the DMX-512 addresses you need to set them to. You can add more devices to the Channels List, if you would like.

You would now normally create 'Figures' and give them unique names. You do this using the Channels Menu's 'Add Figure' command. The outputs already in the Channels List can be dragged into the 'Figures'. 'Figures' are what we call the 'folders' you can use to help keep your Channels List organized. Just click on the '>' that precedes their names to view what is inside them. Clicking on the 'V' closes them back up.

You can modify the outputs simply by double clicking on them, or select the channel, and use the 'Modify' command under the Channels Menu.

10) Under the Channels Menu, select 'Show by Devices'. You will see all the output devices you have added the Channels List so far:

Double clicking on any DeviceName, or select the Device, and use the 'Modify' command under the Channels Menu. This will open a dialog where you can rename the Device, and modify any device-wide options.

11) Since this is the Br-Brain4 manual, we need to add a Br-Brain4 to the Channels List. Select to 'Add Devices with Channels', located under the Channels Menu, and choose the Br-Brain4:
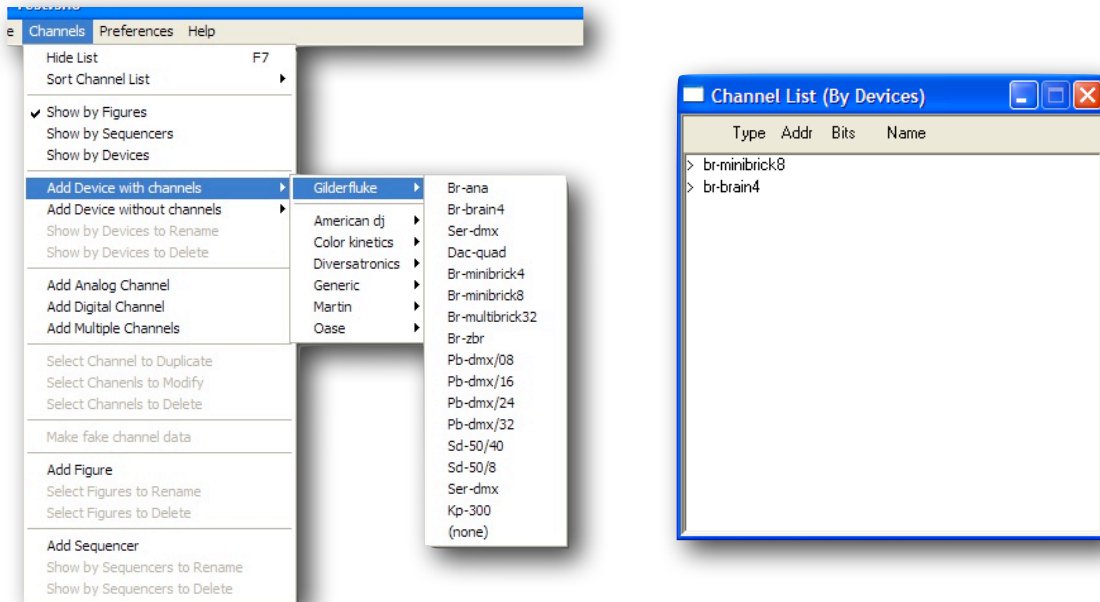
The Br-Brain4 does not currently add any output channels to the Channels List when it is added.

12) Under the Channels Menu, select 'Show by Sequencers'. You will see all the output sequencers you have added the Channels List so far (there should be only one):
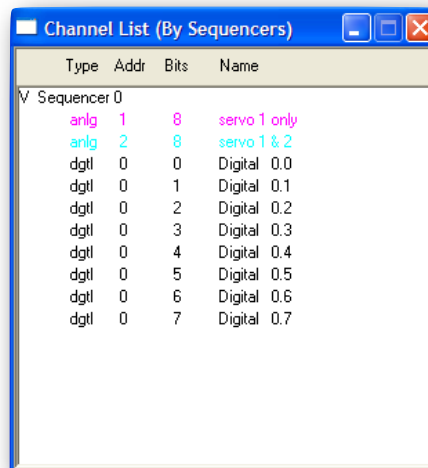
When outputs are added to Pc•MACs, they are automatically assigned to the first sequencer. Clicking on the '>' that precedes the Sequencer names

opens them to view what is inside them. Clicking on the 'V' closes them back up.

13) To add another sequencer, select 'Add Sequencer' from the Channels Menu:
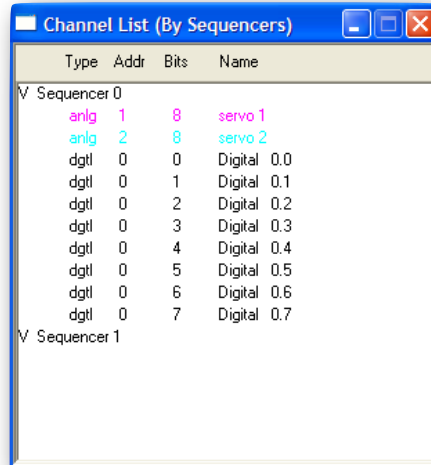
Clicking on the '>' that precedes the Sequencer names opens them to view what is inside them. Clicking on the 'V' closes them back up.

14) By default, all new channels are added to the first sequencer. Drag-n-drop some of the outputs from 'Sequencer 0' to 'Sequencer 1':
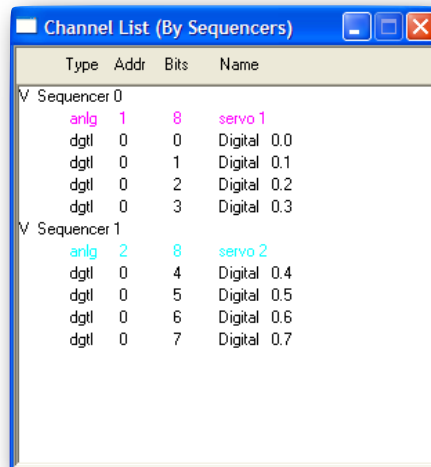
In this case, half of the Br-miniBrick8's outputs were moved to the new sequencer.

You can also move outputs between sequencers by double clicking on them, then selecting a new sequencer from the drop down. This just takes more time than dragging-n-dropping the channels to move them.

15) Double clicking on any Sequencer Name will open a dialog where you can rename the Sequencer, and modify any Sequencer-wide options.
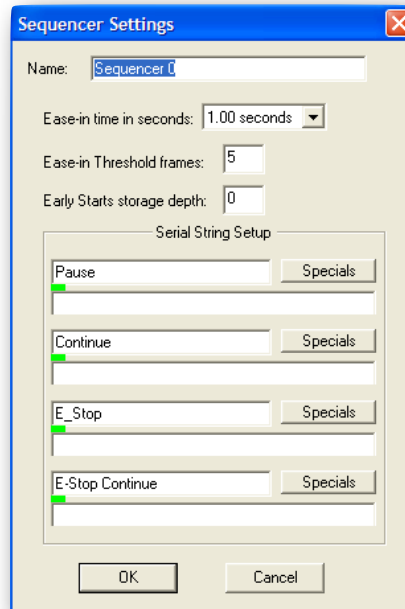
These settings will only be used once your shows are AutoDownloaded to the Br-Brain4. The important ones for this test are the EaseIn speed, and the number of frames which will trigger an EaseIn.

The 'Early Start Storage Depth' is used to bank requests for additional shows to play on this sequencer, while it is already playing a non-steppable show. The show request(s) will be stored until the current show ends, and then will start playing. On a Br-Brain4, you can store early show starts up to ten deep.

The Serial Strings that are entered on this dialog are sent when this sequencer is paused, Continued, E-Stopped, or E-Stop is cleared on the Br-Brain4.

16) Now it is time to program your shows. This is where it is assumed you are familiar enough with Pc•MACs to program your show using the soft console, drawing your show on the OffLine Editing window, or recording DMX-512 from another source. If you don't want to manually program this test show, you can select all the outputs on the Channels List and select the 'Make Fake Data' command under the Channels Menu.
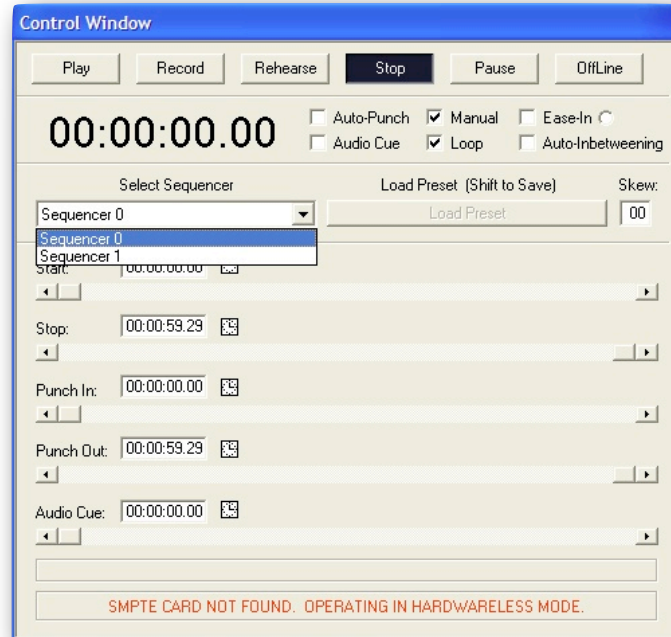
You can switch between the sequencers using the drop down on the Main Transport dialog. You will find that as you switch between the sequencers, all outputs except those that belong to the selected sequencer will be disabled for programming or editing. This prevents you from inadvertently programming channels that don't belong to the sequencer you have selected for programming.

There are two places where all channel remain accessible while programming multi-sequencer shows, no matter what sequencer is selected:

1) Channels List: You can access everything the Channels list, just like normal.

2) Disable Outputs dialog under the RealTIme Menu: This allows you to select an output and force it to a specific position, even if that output doesn't belong to the currently selected sequencer.

After your show is programmed, you can play it back from your computer directly through the serial or DMX-512 port to the Br-miniBrick8, or through the serial or DMX-512 port to the Br-Brain4, which in turn sends its DMX-512 to the Br-miniBrick8.

You will see that depending on the sequencer selected, only the outputs assigned to that sequencer will be played back. As you switch between sequencers, you have the choice of outputs assigned to the inactive sequencer freezing at the current positions, or ramping to the default positions. These are selected under the Preferences Menu:
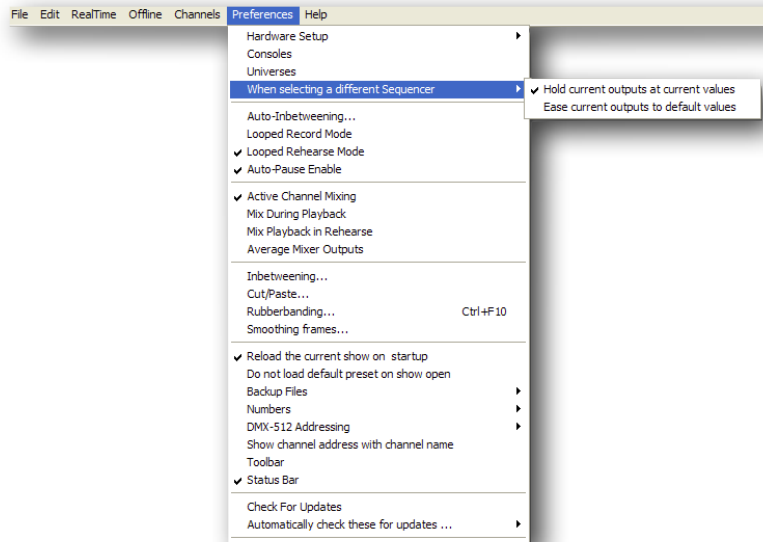
Pc•MACs will even let you switch between sequencers during the middle of a playback.

17) Once you are satisfied with your show, you can AutoDownload it to the Br-Brain4:
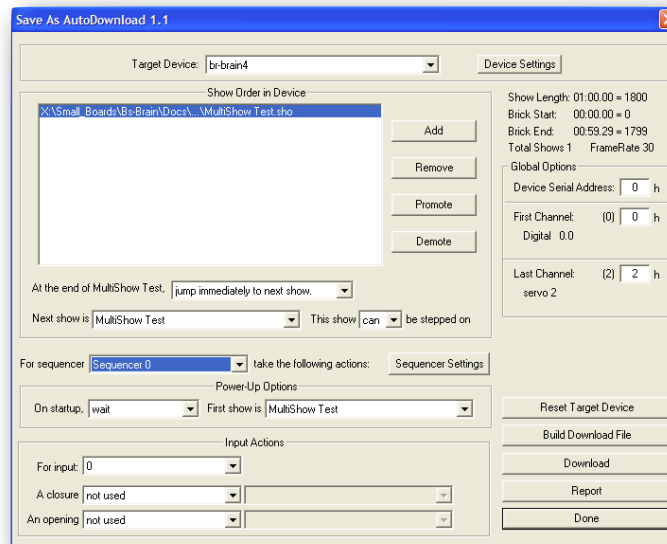
When you select the 'Save as AutoDownload…' from under the File Menu, the 'Target Device' at the top of the dialog will automatically select the

Br-Brain4 as the most capable AutoDownload device [1]. You can pop open the drop down and select a different AutoDownload target if you so desire. Pc•MACs uses the 'target device' to know what options are available for the trigger inputs, number of sequencers available, and even the size of the AutoDownload memory available.

18) Click on the 'Device Setup' button. The Device Setup dialog is where you tell Pc•MACs what sequencers it should AutoDownload onto the file for the Br-Brain4:
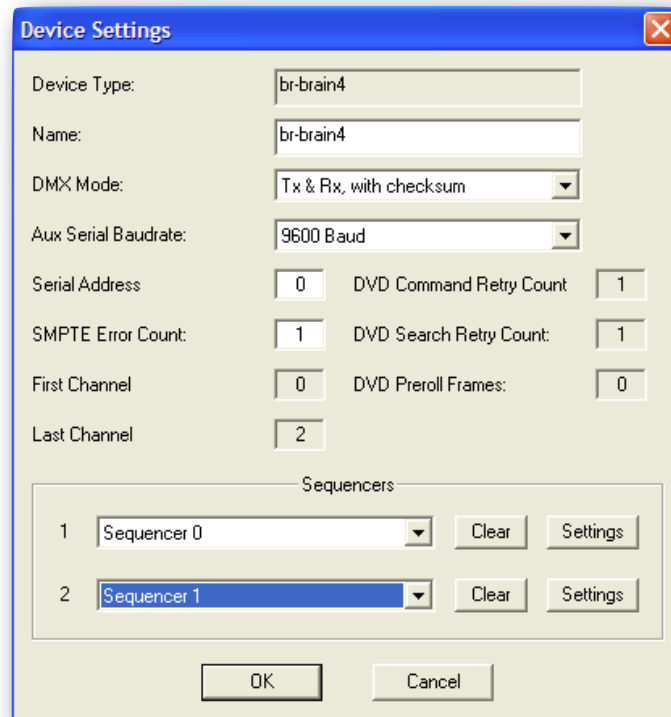
Select the sequencers to include in this AutoDownload. Because we created only two sequencers in this demo, only two slots to hold them are shown on the Br-Brain4's settings dialog. There can be up to eight slots on the Br-Brain4, if you have eight or more sequencers defined in your show. The order of the sequencers doesn't really matter to the Br-Brain4, but you will want to remember them when you are setting up the Trigger Input Actions and Startup Actions. Giving the sequencers more meaningful names will help you with this.

You will also want to make sure that the DMX-512 settings are as needed. For a Br-Brain4, it will always need its DMX-512 transmission enabled, since DMX-512 is its only output. If you are talking to other

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[1] The Br-Brain4 has more sequencers and more memory capacity than the only other AutoDownload-capable device in the list, the Br-miniBrick8.

GilderGear, you will probably want the GilderChecksums enabled.

The Device Settings dialog can also be accessed from the Channels List when it is in 'Show by Devices' mode by double clicking on the device, or selecting the device then the 'Edit Device' command from under the Channels Menu.

19) On the AutoDownload dialog, select each sequencer one-by-one and set:

1) Whether this sequencer should wait for a trigger input or start playing immediately at power-up

2) What show this sequencer should load at power-up. Even if it is not set to start playing at power-up, the first frame of this show will define the initial values for all the outputs assigned to this sequencer.

3) What each of the trigger inputs does on this sequencer. The inputs can each have completely different settings for the ten trigger inputs on a Br-Brain4. It will be unusual to use the same input on two different sequencers, unless it is for a pause or E-Stop command.

20) Press the 'Build AutoDownload File' button on the AutoDownload dialog. This will ask you for the name of your AutoDownload file, as well as the location where you would like Windows to put it. Pc•MACs will also generate a .set file, which is a text file duplicating what you see when you press the 'Report' button after an AutoDownload.

You could use the 'AutoDownload' button instead of the 'Build AutoDownload File' button. This generates the AutoDownload file and .set file just the same as the 'Build AutoDownload File' button, and then sends the AutoDownload file out through the serial port to the target device.

Since AutoDownload files tend to be large on Br-Brain4s, it is usually quicker to built the AutoDownload file, drag-n-drop it onto your Sd flash card, and then plug the card into the Br-Brain4. There should be only one AutoDownload file on the Sd flash card at one time. With more than one, the Br-Brain4 will simply load the first one it finds, which probably won't be the one you want it to load.

Once the Br-Brain4 loads the AutoDownload file (which usually only takes a moment), it will EaseIn all the analogs as it starts playing any shows that have been set to play at power-up. Any other shows can be started using the encoder and LCD display, the trigger inputs, RTC schedule or the serial port.

they only need your imagination to fill them in

PopOut Shows

PopOut shows are a variation on the multi-sequencer features of the Br-Brain4. They are used for two different playback scenarios from a Br-Brain4:

1) You have a room full of animated displays that spend most of their time running shows independently of one another. On occasion, you want all of these displays to run as one big coordinated show. In this case, the 'Main' show is normally stopped, and the PopOut shows are run as needed. To run the 'big' show, the PopOut shows on the PopOut sequencers are all stopped, and only the 'main' show is run on the first sequencer.

2) You have an animated show that spends most of its time running as one big show. In the midst of running this big show, individual characters can be triggered to 'break out' and run a PopOut show as an ad-lib or to respond to a heckler. At the end of the PopOut show, the PopOut Show on the PopOut Sequencer will stop, and the character(s) will then rejoin the main show in progress. As the PopOut show starts or ends, all analogs functions for that character automatically do an EaseIn so there is no jump in the animation as the main show is exited or rejoined.

In all multi-sequencer shows, the analog and digital outputs are confined to running on the sequencer to which they have been assigned. Outputs that are assigned to a sequencer will completely ignore anything that happens on any other sequencer.

When a PopOut show is running, it will run just like any other multi-sequencer show. Where PopOut shows are different is when they are NOT running. When a PopOut show is loaded on a sequencer, but not running, the outputs that are assigned to it will start following whatever show is playing on the first sequencer.

The 'Main'/'First' show is programmed not only with the outputs assigned to its sequencer. It also has the outputs assigned to the PopOut sequencers programmed into it.

A PopOut Show is defined by simply checking the 'PopOut Show' checkbox on the Show Information (found under the 'File' menu) or 'New' Show dialog.

You will also need to check the 'PopOut Show' checkbox on the 'main' show(s) that are to be run on the first sequencer. This allows you to see and program all the outputs in Pc•MACs when you select the first sequencer for programming. Without the 'PopOut Show' checkbox on the 'main' show(s) checked, you wouldn't be able to see or program the outputs assigned to the PopOut sequencers when you are programming the 'Main' show(s).
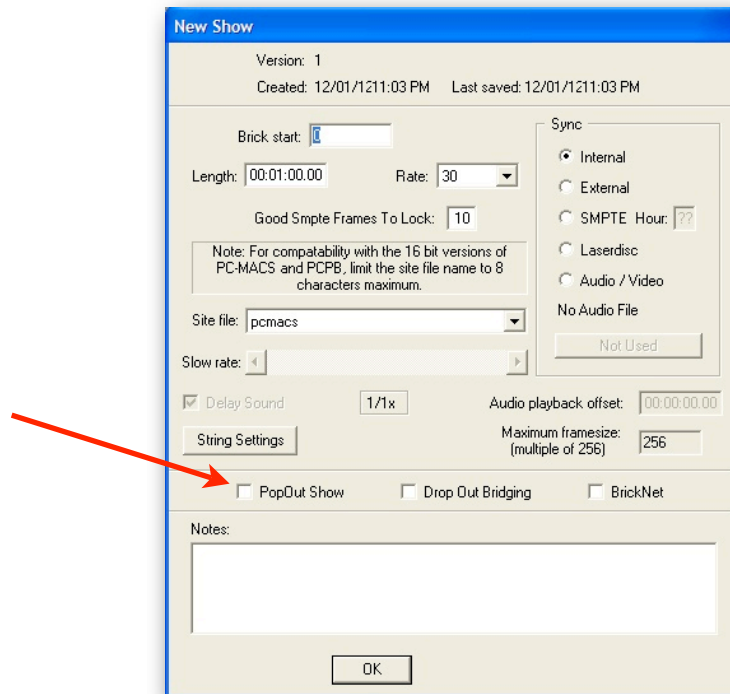
PopOut shows are set up exactly as any other multi-sequencer show. The 'Rules' for the PopOut Show(s) are:

1) Any shows that are used for PopOuts must have the 'PopOut Show' checkbox on the Show Information dialog (found under the 'File' menu) or 'New' Show dialog checked.

2) The first sequencer is reserved for the 'main' show. The Br-Brain4's other seven sequencers are all available for running PopOut shows. (up to seven at tone time!) To distinguish sequencers that are used for PopOut shows, we'll refer to them as 'PopOut Sequencers'. Any of the Br-Brain4's sequencers that are not being used as the 'Main' show or PopOut Sequencers can be used for regular multi-sequencer shows.

3) Only the analog and digital outputs you want to run as part of a PopOut should be moved to the PopOut Sequencer(s). If you have one figure (group of analog and digital outputs) you want to run as part of a PopOut show, just drag it to the PopOut Sequencer. If you have two or more figures you want to use for a PopOut, drag them all to the PopOut Sequencer.

4) Before programming a PopOut show, select the PopOut sequencer from the drop down on Pc•MACs' Main Window. Only the Analogs and digitals that have been assigned to this PopOut sequencer will be available from the mover dialogs and consoles for programming and editing. When you play this PopOut Show back, only the PopOut Sequencer's outputs will

play.

5) You should only run PopOut Shows on the PopOut Sequencers for which they are intended.

The 'Rules' for the 'Main' show(s) are:

1) The 'Main' show used with PopOuts must have the 'PopOut Show' checkbox on the Show Information dialog (found under the 'File' menu) or 'New' Show dialog checked.

2) The first sequencer in Pc•MACs must be used for the 'Main' show. 'Sequencer 0' is the default name for this first sequencer, but you can rename it anything that you like. This sequencer will be referred to as the 'Main Show' Sequencer or 'First' Sequencer.

3) The 'Main Show' Sequencer MUST also be assigned to the first sequencer slot on the Device Setup dialog for the Br-Brain4.

4) All the analog and digital outputs you aren't running as part of a PopOut Show or other multi-sequencer show(s) should be left in the 'Main Show' Sequencer.

5) Before programming a 'Main' show, select the 'Main Show' Sequencer from the drop down on Pc•MACs' Main Window. Because of the 'PopOut Show' checkbox on the Show Information dialog, ALL the Analogs and digitals that have been created will be available from the mover dialogs and consoles. When you play this 'Main' Show back, all the outputs outputs will play.

6) Once AutoDownloaded to the Br-Brain4, You should only run the 'Main' Show(s) on the 'Main Show' Sequencer.

Once AutoDownloaded onto a Br-Brain4, PopOut shows work as follows:

1) If a show with the 'PopOut Show' checkbox checked is loaded on any sequencer except the 'First'/'Main' sequencer, and is NOT running, it will check to see what show the 'First'/'Main' sequencer is running. It will use this show and frame number to play back animation data from the 'First'/'Main' Show.

2) If a show with the 'PopOut Show' checkbox checked is loaded on any sequencer but the 'First'/'Main' sequencer, and IS running, it will play back the show data from its show data.

make a drawing

Br-Brain4 Encoder & LCD Display

The Encoder and 2 x 16 LED backlit LCD display on the front of the Br-Brain4 are used for making minor service adjustments and diagnostics on the Br-Brain4. They can be used to enable and disable sequencers, monitor and jog individual DMX-512 outputs, and start shows.

The encoder has three modes of activation:

1)Rotate

2)Press

3)Press + Rotate

Press the encoder button while you turn the encoder knob to select one of the eight possible sequencers or the Br-Brain4's settings.

To select any of the settings within the eight sequencers or Br-Brain4's settings, turn the encoder knob without pressing the encoder button.

If left on its own, the LCD Display will initially show copyright and the firmware version number after the Br-Brain4 is powered on.

After that, the LCD will step through displaying a series of settings, first for the Br-Brain4 itself, and then for each sequencer that is being used. To halt this for sixty seconds, just tap the encoder button. If
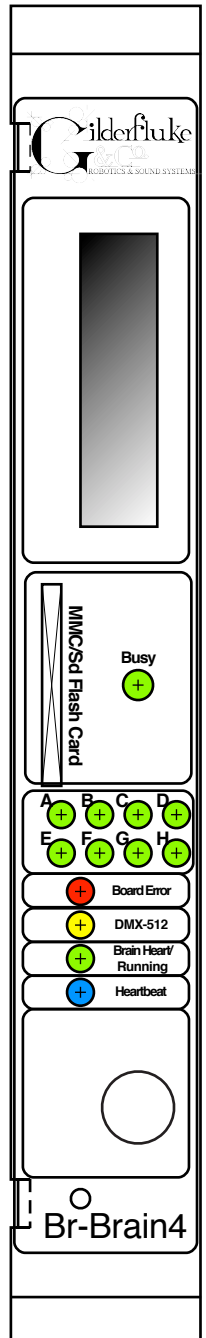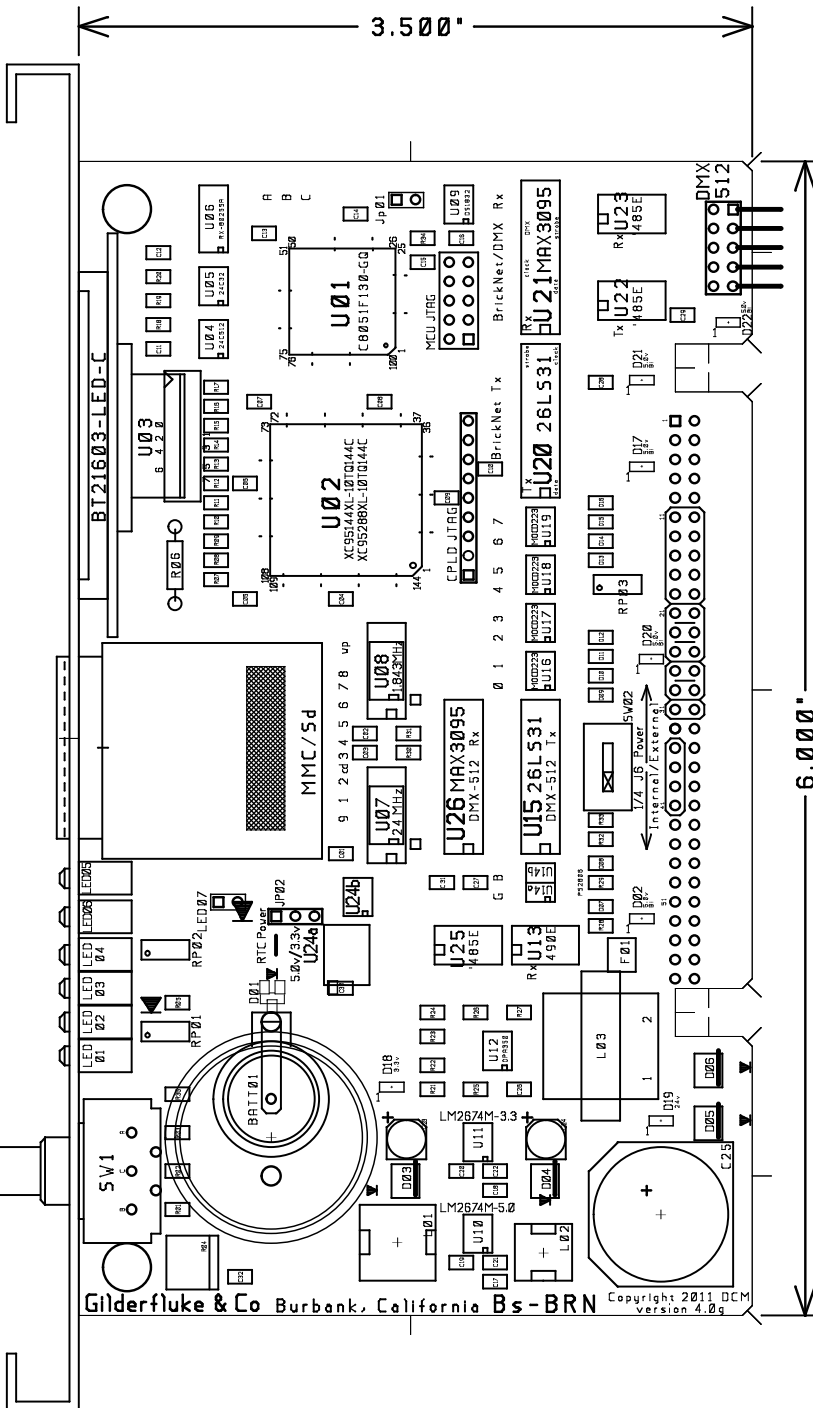
you use the encoder to select any particular setting for display or modification, the LCD display will 'hold' on that setting for 240 seconds before returning to scrolling.

The first ten settings are for the Br-Brain4 itself. Except for when it is displaying the 'Monitor and/or Jog an Output', The name of the Br-Brain4 is displayed on the upper line of the LCD display. This defaults to 'Br-Brain4', but can be changed in Pc•MACs on the 'Device Settings' dialog. The 'Device Settings' dialog is accessed either by:

1) Opening the Channels List, changing the 'Show by' to 'Show by Devices', and double clicking on the Br-Brain4 you will be downloading to.

2) Clicking on the 'Device Settings' button at the top of the AutoDownload dialog (next to where you select the target device).

The lower line of the LCD display rotates through the following settings when displaying the Br-Brain4's settings:

c) **Serial Address for the Br-Brain4:** This defaults to 'zero', but can be changed to anything between 0 and 255 using the encoder and LCD display. To change this setting:

1) Press and hold the encoder button for five seconds

2) Release the encoder button

3) Rotate the encoder to set the desired address

4) Press and hold the encoder button for five seconds to save the new setting, or just tap the encoder button to revert to saved value after a five second reconsideration period (press & hold the button if you change your mind and decide to save the changes).

d) **Current Input Status:** This displays the current state of all ten of the optically isolated trigger inputs to the Br-Brain4

e) **DMX-512 and Serial Reception Status:** This displays whether the Br-Brain4 is receiving any DMX-512 or serial port RealTime updates. It displays:

1) 'No Dmx/Serial Rx' if the Br-Brain4 is receiving neither DMX-512 or RealTime data packets

2) 'receiving DMX512' if the DMX-512 input is receiving valid DMX-512 input

3) 'receiving Serial' if the serial input is receiving valid RealTime packets

f) **ConfigPort Baud Rate:** This setting is used to display and modify the baud rate used for the primary configuration serial port. To change this setting:

1) Press and hold the encoder button for five seconds

2) Release the encoder button

3) Rotate the encoder to set the desired baud rate

4) Press and hold the encoder button for five seconds to save the new setting, or just tap the encoder button once to revert to saved value after a five second reconsideration period (press & hold the button if you change your mind and decide to save the changes).

g) **2ndaryPort Baud Rate:** This setting is used to display and modify the baud rate used for the secondary serial port. To change this setting:

1) Press and hold the encoder button for five seconds

2) Release the encoder button

3) Rotate the encoder to set the desired baud rate

4) Press and hold the encoder button for five seconds to save the new setting, or just tap the encoder button once to revert to saved value after a five second reconsideration period (press & hold the button if you change your mind and decide to save the changes).

h) **Key #:** This is used to enter keys to clear timers which have been set on the DeadBeat Menu. To clear a DeadBeat timer:

1) Press and hold the encoder button for five seconds

2) Release the encoder button

3) Rotate the encoder to enter the key

4) Press and hold the encoder button for five seconds to evaluate the key, or just tap the encoder button once to exit without checking the key after a five second reconsideration period (press & hold the button if you change your mind and decide to evaluate the key).

If the key fits any of the locks that have been setup on the DeadBeat menu, this will be reported on the LCD screen.

The keys are eight digit long Hexadecimal numbers. There are over four billion different keys. To make larger numbers easer to enter, between steps #2 and #3, you can press and turn the encoder to select the individual digits within the number that are to be altered. If you don't move the encoder for a few seconds, the selected digit will begin flashing so you can see which digit you have selected. If the entire number flashes, then the least significant digit is still selected. Repeat this process to set each digit individually, and then continue to step #4

i) **Smpt:** This simply displays whatever is being received on the Smpte input to the Br-Brain4. It normally displays in Hours:Minutes:Seconds.Frames. If semicolons are used to separate the Hours;Minutes;Seconds.Frames, this is an indication that the Br-Brain4 is receiving 'Drop Frame' Smpte, which should not be used with animated shows.

j) **DVD:** This simply displays Pioneer serial timecode being received on the Secondary Serial Port input to the Br-Brain4. It normally displays in Hours:Minutes:Seconds.Frames. To display the raw frame number, you can press the encoder button.

k) **Time:** The current Day of the Week and time is displayed on the LCD. If the second line starts with 'RTC', then the time is coming from the RealTime Clock chip on the Br-Brain4. If it starts with 'GPS', then the time is coming from a GPS receiver attached to the Secondary Serial Port.

l) **Monitor and/or Jog an Output:** The upper line of the LCD will alternate between showing the FigureName of the monitored channel (displayed very quickly), and the OutputName of the monitored channel (displayed for a bit longer). On the lower line of the display, the DMX-512 address and the current value of the monitored channel are displayed. To select a different output to monitor and/or Jog:

　1) Press and hold the encoder button for five seconds

　2) Release the encoder button

　3) Rotate the encoder to set the desired address

　4) Press and hold the encoder button for five seconds to Jog the selected output, or just tap the encoder button once to monitor the selected output after a five second reconsideration period (press & hold the button if you change your mind and decide to jog the output). If you have exited, the newly selected output will be displayed for monitoring, and you are done.

　5) If you entered 'Jogging', turn the encoder knob to change the output you have selected.

　6) To end jogging, tap the encoder button. After a five second reconsideration period, the output will return to normal operation (press & hold the button if you change your mind and decide to keep Jogging the output). When exiting Jogging, analog outputs will be EasedIn back to their programmed values without jumping violently.

　To make larger numbers easer to enter, between steps #2 and #3 (or

during step #5), you can press and turn the encoder to select the individual digits within the number that are to be altered. If you don't move the encoder for a few seconds, the selected digit will begin flashing so you can see which digit you have selected. If the entire number flashes, then the least significant digit is still selected.

Once the Br-Brain4 had finished displaying the ten 'Br-Brain4' settings, the settings for all the active sequencers are displayed. This will be somewhere between one and eight sequencers. The name of each sequencer is displayed on the upper line of the LCD as its settings are displayed on the lower line of the LCD display. The name of each sequencer is set on the 'Sequencer Settings' dialogs. These 'Sequencer Settings' dialogs are accessed either by:

1) Opening the Channels List, changing the 'Show by' to 'Show by Sequencers', and double clicking on the sequencer you want to change

2) Selecting the sequencer you would like to modify and clicking on the 'Sequencer Settings' button on the AutoDownload dialog (next to where you select the sequencer for the startup and input actions)

There are three settings for each sequencer: The lower line of the LCD display rotates through the following settings when displaying the Sequencer(s) settings:

a) **Sequencer Enabled:** Any sequencer can be turned on or off. If it is off, then there is no way to start a show on the disabled sequencer. This can be used to make sure that a sequencer is not accidentally started while maintenance personnel are working on the equipment it controls. To change this setting:

1) Press and hold the encoder button for five seconds

2) Release the encoder button

3) Rotate the encoder to turn the sequencer on or off

4) Press and hold the encoder button for five seconds to save the new setting, or just tap the encoder button once to revert to saved value after a five second reconsideration period (press & hold the button if you change your mind and decide to save the changes).

b) **Sequencer Show Name:** This displays the show number and name of the show that is currently loaded on this sequencer. The type of timecode used by this show is also displayed after the name:

1) 'DVD': Pioneer LaserDisc/DVD timecode through the Secondary Serial

2) 'SMP': Smpte timecode through the Br-Brain4's Smpte input

3) 'Int': Internally clocked (this is the most commonly used)

4) 'Ext': Externally clocked show

5) 'Pop': This show has been defined as a PopOut show

6) 'Bnt': This show will listen to the BrickNet, as set on the Main Menu

To start this or another show on this sequencer:

1) Press and hold the encoder button for five seconds

2) Release the encoder button

3) Rotate the encoder to select the desired show

4) Press and hold the encoder button for five seconds to start the selected show, or just tap the encoder button once to exit without starting any show after a five second reconsideration period (press & hold the button if you change your mind and decide to start the show after all).

c) **Sequencer Show Time:** This displays the status of the show that is loaded on this sequencer, along with the Hours:Minutes:Seconds.Frames into the show the sequencer is at. The Show's status is displayed as follows:

1) 'EStp': The show has been E-Stopped. No other shows can be started on this sequencer until the E-Stop is cleared.

2) 'ease': This show is doing an EaseIn on some analog outputs

3) 'paus': This show has been 'Paused'

4) 'loop': This show will play this show to the end, then play the 'Next' show

5) 'play': This show will play this show to the end, then wait for the next command to start the sequencer

6) 'STOP': This sequencer has been stopped mid-show

7) 'stop': This show reached its natural end, and then stopped

To start this or another show on this sequencer:

1) Press and hold the encoder button for five seconds

2) Release the encoder button

3) Rotate the encoder to select the desired show

4) Press and hold the encoder button for five seconds to start the selected show, or just tap the encoder button once to exit without starting any show after a five second reconsideration period (press & hold the button if you change your mind and decide to start the show

after all).

Br-Brain4 Panel Indicators

There are thirteen LED indicators on the front of the Br-Brain4.

They are used as follows:

A) Busy LED

(One Red LED)

This LED turns on when the Br-Brain4 is writing to the Sd card. The Sd card, or power to the Br-Brain4 should not be removed if this LED is lit.

During firmware updates, the Read LED and Busy LED flash back and forth. The first stage is comparing the BRAIN4.FRM file on the Sd card. It then flashes a little slower as it reads the BRAIN4.FRM file in from the Sd card. It then flashes back and forth much more quickly as it reprograms the microcontroller in the Br-Brain4. Under no circumstances remove power from the Br-Brain4 while firmware is being updated. A partial firmware update may 'brick' the Br-Brain4, and then it will need to be returned to the factory for reprogramming.

B) Sequencer LEDs

(Eight green LED)

These LEDs show the 'running' status of the eight sequencers in the Br-Brain4.

If the LED is lit, it means that the sequencer is advancing frames.

If the LED is flashing, it means that the sequencer is in the process of doing an EaseIn on the analog channels it controls.

C) Board Error LED

(One Red LED)

This LED will flash when:

a) Br-Brain4 just booted (it stays on for a few seconds after booting as a 'lamp test'.

b) An error is found in the DMX-512 data checksum

c) An error is found in the 'Smart' Brick Network checksum

d) An error is found in a serial RealTime packet

D) DMX-512 LED

(One Yellow LED)

This LED will be lit when the Br-Brain4 is receiving DMX-512 or RealTime updates via the RS-422 serial port.

During AutoDownloads of show data to the Br-Brain4, this LED will flash alternately with the Brain Heart/Running LED to show that a AutoDownload is in process.

E) Brain Heart/Running LED

(One Green LED)

This LED will be lit when the Br-Brain4 is running a show from its internal clock and Flash memory.

During AutoDownloads of show data to the Br-Brain4, this LED will flash alternately with the DMX-512 LED to show that a AutoDownload is in process.

F) Heartbeat LED

(One Blue LED)

a) 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-Brain4 will automatically reset the CPU.

Br-Brain4 Connectors

A) Sd/SdHC Flash Memory Card Slot

(One Sd/SdHC compatible socket)

This socket is compatible with both standard Sd flash cards and SdHC flash cards. You can also use Micro Sd and Micro SdHC cards with a suitable carrier that adapts the smaller cards to fit into standard Sd car slots.

The Br-Brain4 will support flash cards up to 32 GBytes in size. It will not currently support SdXC cards (64 GBytes and larger). Flash cards used on the Br-Brain4 should always be formatted 'FAT32'.

B) Backplane Connector

(60 Position Edge Connector)

The BackPlane connection is through a sixty position double sided edge connector (thirty connections on each side on .1" centers). This is normally plugged into a Gilderfluke Br-CCxx card cage which brings out all the backplane connections to screw terminals, ribbon cable connectors, and other connectors. If needed, an Insulation Displacement Edge (IDE) connector or other discrete edge connector can be used to plug in the Br-Brain4 instead of using one of our card cages.

The first ten positions of the sixty position backplane connector are used for the 'Smart' Brick Network and RS-422 Serial Port. They are normally bussed between all the cards in the card cage (although they can be separated by cutting the lines if desired). The card cages all bring the first ten positions of the 60 position backplane connector out to two Rj-12/Rj-45 connectors.

The majority of connections are on the center forty pins of the backplane connector. What these are used for depends on the type of card that is plugged into the card cage slot. A Z-Brick or Br-MultiBrick32 uses them for 'J6' digital outputs. A Br-ANA uses these pins for its 'J6/A' analog outputs. A Br-Brain4 uses them for a combination of inputs and outputs. The card cages bring out these forty connections to either a forty position screw terminal block, a forty position ribbon cable connector, or both.

The pinout of the sixty position backplane connector is as follows:

output wire #	Wire pin #	Edge pin #	color	wire function
J8/BrickNet Black		1	brown	J8 Common (black)/Smart Brick Net Data -
J8/BrickNet White		2	red	J8 'D' (white) input/'Smart' Brick Net Data +
J8/BrickNet Red		3	orange	J8 'B' (red) input/'Smart' Brick Net Clock +
Serial Port red #3		4	yellow	TxD + out from Br-Brain4
J8/BrickNet Green		5	green	J8 'A' (green) input/'Smart' Brick Net Clock -
Serial Port Black #2		6	blue	TxD - out from Br-Brain4
J8/BrickNet Yellow		7	violet	J8 Status (yellow) out/'Smart' Brick Strobe +
Serial Port Yellow #5		8	gray	Rx + in to Br-Brain4
J8/BrickNet Blue)		9	white	J8 'C' (blue) input/'Smart' Brick Net Strobe -
Serial Port green #4		10	black	Rx - in to Br-Brain4
Terminal/Wire #1	1	11	brown	circuit ground
Terminal/Wire #2	2	12	red	¼ J6 Trigger Input Bit 7
Terminal/Wire #3	3	13	orange	¼ J6 Trigger Input Bit 6
Terminal/Wire #4	4	14	yellow	¼ J6 Trigger Input Bit 5
Terminal/Wire #5	5	15	green	¼ J6 Trigger Input Bit 4
Terminal/Wire #6	6	16	blue	¼ J6 Trigger Input Bit 3
Terminal/Wire #7	7	17	violet	¼ J6 Trigger Input Bit 2
Terminal/Wire #8	8	18	gray	¼ J6 Trigger Input Bit 1
Terminal/Wire #9	9	19	white	¼ J6 Trigger Input Bit 0
Terminal/Wire #10	10	20	black	+ power isolated input/output
Terminal/Wire #11	11	21	brown	DMX-512 Universe b Tx -
Terminal/Wire #12	12	22	red	DMX-512 Universe b Tx +
Terminal/Wire #13	13	23	orange	DMX-512 Universe c Tx -
Terminal/Wire #14	14	24	yellow	DMX-512 Universe c Tx +
Terminal/Wire #15	15	25	green	DMX-512 Universe d Tx -
Terminal/Wire #16	16	26	blue	DMX-512 Universe d Tx +
Terminal/Wire #17	17	27	violet	Green Trigger Input
Terminal/Wire #18	18	28	gray	Green Trigger Input
Terminal/Wire #19	19	29	white	Blue Trigger Input
Terminal/Wire #20	20	30	black	Blue Trigger Input
Terminal/Wire #21	21	31	brown	Smpte Timecode Input
Terminal/Wire #22	22	32	red	Smpte Timecode Input
Terminal/Wire #23	23	33	orange	power supply ground
Terminal/Wire #24	24	34	yellow	power supply ground
Terminal/Wire #25	25	35	green	Secondary Serial Port Tx - (black)
Terminal/Wire #26	26	36	blue	power supply ground
Terminal/Wire #27	27	37	violet	Secondary Serial Port Tx + (red)
Terminal/Wire #28	28	38	gray	power supply ground
Terminal/Wire #29	29	39	white	Secondary Serial Port Rx - (green)
Terminal/Wire #30	30	40	black	power supply ground

output wire #	Wire pin #	Edge pin #	color	wire function
Terminal/Wire #31	31	41	brown	Secondary Serial Port Rx + (yellow)
Terminal/Wire #32	32	42	red	power supply ground
Terminal/Wire #33	33	43	orange	power supply ground
Terminal/Wire #34	34	44	yellow	power supply ground
Terminal/Wire #35	35	45	green	power supply ground
Terminal/Wire #36	36	46	blue	power supply ground
Terminal/Wire #37	37	47	violet	power supply ground
Terminal/Wire #38	38	48	gray	power supply ground
Terminal/Wire #39	39	49	white	power supply ground
Terminal/Wire #40	40	50	black	power supply ground
		51	black	power supply ground
		52	black	power supply ground
		53	black	power supply ground
		54	black	power supply ground
		55	black	power supply ground
		56	red	+ power supply input
		57	red	+ power supply input
		58	red	+ power supply input
		59	red	+ power supply input
		60	red	+ power supply input

The last ten positions are used to provide power to the Br-Brain4. These wires are ganged to provide a higher current carrying capacity, and brought out to screw terminals and/or 2.1mm power jacks on the card cages.

The card cages from Gilderfluke & Company are available in a variety of sizes to hold between one to sixteen cards. Some of these card cages are designed to be mounted in standard 19" electronics racks. Others are designed to be mounted standalone, on DIN rail or in Augat SnapTrak. The smaller card cages bring out the center forty connections of the sixty position backplane connector to either a forty position screw terminal block, a forty position ribbon cable connector, or both. The Br-CC16 (sixteen slot) and Br-CC09 (two slot) rack mounted card cages have only ribbon cable connectors on them, but we have cc-BR16BO spring blocks that can mount directly to the back of these card cages for attaching discrete wires. More commonly the ribbon cables are run to a rail at the back of the rack or a nearby 'break out box', and c-40trans ribbon cable-to-screw terminal connectors are mounted there allow discrete wires to be attached.

To simplify wiring to any MACs Animation Control System, the connectors used on the ribbon cables are what are called 'insulation displacement

connectors'. These simply snap on to an entire cable, automatically 'displacing' the 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.

C) 'Smart' Brick Network (on Card Cage)

(RJ-12 or RJ-45 Connector)

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 (or RJ-45[2]) 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.

Any Br-Brain4 can either transmit or receive BrickNet. Any 'Smart' Bricks that are listening to the BrickNet will be 'locked' to the timecode that they receive from a Br-Brain4 through the BrickNet. This allows you to make a single control system of any size by linking multiple 'Smart Bricks' together.

Through the serial configuration menu, the 'f) BrickNet:' command can be used to set whether a Br-Brain4 is transmitting or receiving. Additionally, you can tell a transmitting Br-Brain4 which of the eight possible sequencers to use for transmitting out of the BrickNet port. Any shows you wish to have locked to BrickNet must also have the 'BrickNet' checkbox checked on the File menu/Show Information dialog in Pc•MACs before they are AutoDownloaded.

The 'Smart' Brick Network signals to the Br-Brain4 are brought in through a six position RJ-12 (six position, six conductor modular telephone style connector) on the card cage. Facing either end of the cable with the release latch upwards, its pin out is as follows:

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[2] If the card cage has a RJ-45 connector, just ignore the outer two wires. The center six wires are wired as shown for the RJ-12 connector.

POSITION	WIRE #	COLOR	SIGNAL NAME:
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 -

D) Power Supply (on Card Cage)

(Two Position Screw Terminals and/or 2.1mm Power Connector)

The last ten contacts of the Br-Brain4's backplane connector are used for the power supply connections. The Br-Brain4 can be run from any supply voltage from 9-24 VDC. Other cards (specifically analog output cards) need a higher 'minimum' voltage to run.

This input is protected from reversed polarity. An idle Br-Brain4 draws only about 200 milliamperes. The loads which the Br-Brain4 is controlling and the LEDs on its face will usually draw far more current than the Br-Brain4 itself.

E) Primary RS-422 Serial Port (on Card Cage)

(RJ-12 or RJ-45 Connector)

This is used for configuration, uploading and downloading configurations, status enquiries, AutoDownloading show data to Flash memory, 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-Brain4s, 'Smart' Brick Brains, Electronic FeedBack (EFB) 'Smart' Bricks and other cards through one connector on the card cage. The cards just need to be set to different serial addresses so they can be accessed individually.

The serial data signals from the Br-Brain4 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:

POSITION	WIRE #	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	Ground

Computers don't normally come with serial ports on them anymore. Instead, you use a USB-to-Serial (USB-RS232/422 or C-USB-RS232) adapter, BlueTooth-to-Serial (Bt-Rs232Rx and Bt-USBTx), Ethernet-to-Serial (Modem-Internet) adapter, or WiFi-to-Serial (Modem-Wi-Fly) adapter. For the Br-Brain4 you will need one that provides a RS-422 connection, instead of the more common RS-232. These are available from a number of different sources, including Gilderfluke & Company. Our part number is USB-RS232/422 for the USB-to-Serial adapter. It provides both RS-232 and RS-422 connections.

The Br-Brain4 expects to see the serial data in the following format:

ONE START BIT
EIGHT DATA BITS
ONE STOP BIT

Br-Brain4 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 enquiries, AutoDownloading show data to Flash memory, 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-Brain4s, Digital Audio Repeaters, 'Smart' Brick Brains and any other serially controlled devices. The only requirement is that

each unit be addressed to a unique serial address. On the Br-Brain4, the serial address is set using the rotary encoder switch on its front.

F) Secondary RS-422/RS-485 Serial Port

(Ribbon Cable and/or Screw terminals)
(RJ-12 Connector on Br-CC08, Br-CC10, Br-CC11 or Br-CC12 card cages)

This port is used for a variety of special functions on a Br-Brain4. The function, baud rate and mode of operation (RS-422 or RS-485) can be set through the serial configuration menus, accessed through the primary serial port.

If operating in RS-422 mode, two wires are used for transmitting data, and two wires are used for receiving data. In RS-485 mode, two wires are shared for both receiving and transmitting data.

The four active lines on this connector are brought out from the Br-Brain4 on the sixty position backplane connector. The card cages attach these pins to the forty position ribbon cable connector and/or screw terminals as follows:

WIRE #	COLOR	SIGNAL NAME:
25	green	Rs-422: Secondary Serial Port Tx - RS-485: Not used MIDI: #4 Tx Out +
26	blue	power supply ground MIDI: #2 Ground
27	violet	Rs-422: Secondary Serial Port Tx + RS-485: Not used MIDI: #5 Tx Out -
28	gray	power supply ground MIDI: #2 Ground
29	white	Rs-422: Secondary Serial Port Rx - RS-485: Secondary Serial Port Rx/Tx - MIDI: No Connection
30	black	power supply ground MIDI: #2 Ground
31	brown	Rs-422: Secondary Serial Port Rx + Rs-485: Secondary Serial Port Rx/Tx + MIDI: No Connection

On a Br-CC08, Br-CC10, Br-CC11 or Br-CC12, the secondary serial data signals from the Br-Brain4 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:

POSITION	WIRE #	COLOR	SIGNAL NAME:
LEFT	1	white	Signal Ground MIDI: #2 Ground
	2	black	Rs-422: Secondary Serial Port Tx - RS-485: Not used MIDI: #4 Tx Out +
	3	red	Rs-422: Secondary Serial Port Tx + RS-485: Not used MIDI: #5 Tx Out -
	4	green	Rs-422: Secondary Serial Port Rx - RS-485: Secondary Serial Port Rx/Tx - MIDI: No Connection
	5	yellow	Rs-422: Secondary Serial Port Rx + Rs-485: Secondary Serial Port Rx/Tx + MIDI: No Connection
RIGHT	6	blue	Ground MIDI: #2 Ground

Computers don't normally come with serial ports on them anymore. Instead, you use a USB-to-Serial (USB-RS232/422 or C-USB-RS232) adapter, BlueTooth-to-Serial (Bt-Rs232Rx and Bt-USBTx), Ethernet-to-Serial (Modem-Internet) adapter, or WiFi-to-Serial (Modem-Wi-Fly) adapter. For the Br-Brain4 you will need one that provides a RS-422 connection, instead of the more common RS-232. These are available from a number of different sources, including Gilderfluke & Company. Our part number is USB-RS232/422 for the USB-to-Serial adapter. It provides both RS-232 and RS-422 connections.

MIDI Connections

You can also use the Br-Brain4's secondary serial port to transmit standard MIDI Key Up/Key Down commands to another controller that receives MIDI. Because MIDI's bandwidth is so low, this is limited to just a few channels of digitals.

The secondary Serial Port's pins are connected as shown. The '#4 Tx Out +' and '#5 Tx Out -' pins each need to be run through a 220Ω series resistor to meet the MIDI signal standards.

G) ¼ J6 Trigger Inputs

(Ribbon Cable and/or Screw terminals)

These pins are used for bringing trigger signals from switch closures into the Br-Brain4 to start, stop, pause and etc., shows. The actual functions for each of these inputs are set during as you generate the AutoDownload file in Pc•MACs.

These signals are optoisolated, and arranged in the standard ¼ J6 pinout used throughout Gilderfluke & Company's Show Controllers:

Wire #	COLOR	SIGNAL NAME:
1	brown	circuit ground
2	red	¼ J6 Trigger Input Bit 7
3	orange	¼ J6 Trigger Input Bit 6
4	yellow	¼ J6 Trigger Input Bit 5
5	green	¼ J6 Trigger Input Bit 4
6	blue	¼ J6 Trigger Input Bit 3
7	violet	¼ J6 Trigger Input Bit 2
8	gray	¼ J6 Trigger Input Bit 1
9	white	¼ J6 Trigger Input Bit 0
10	black	+ power isolated input/output

If Switch Sw02 is set to 'External' power, the eight trigger inputs are optically isolated from the circuitry on the Br-Brain4, and you must provide an external source of power to pin #10. This can be anything from 5 to 24 vdc.

If Switch Sw02 is set to 'Internal' power, the power to run these eight inputs is 'borrowed' from the Br-Brain4. This means that the inputs are no longer isolated from the Br-Brain4.

The wiring for either 'External' or 'Internal' hookups are as shown:

(Brown) PIN #1	GROUND		(Brown) PIN #1	GROUND
(red) PIN #2	DATA BIT 7		(red) PIN #2	DATA BIT 7
(orange) PIN #3	DATA BIT 5		(orange) PIN #3	DATA BIT 5
(yellow) PIN #4	DATA BIT 6		(yellow) PIN #4	DATA BIT 6
(green) PIN #5	DATA BIT 4		(green) PIN #5	DATA BIT 4
(blue) PIN #6	DATA BIT 3		(blue) PIN #6	DATA BIT 3
(violet) PIN #7	DATA BIT 2		(violet) PIN #7	DATA BIT 2
(grey) PIN #8	DATA BIT 1		(grey) PIN #8	DATA BIT 1
(white) PIN #9	DATA BIT 0		(white) PIN #9	DATA BIT 0
(black) PIN #10	+ 5 to 24 VDC SUPPLY		(black) PIN #10	SUPPLY (not used)
External Power			**Internal Power**	

H) Green and Blue Trigger Inputs

(Ribbon Cable and/or Screw terminals)

These two additional inputs are used for bringing trigger signals from switch closures into the Br-Brain4 to start, stop, pause and etc, shows. The actual functions for each of these inputs are set during as you generate the AutoDownload file in Pc•MACs.

Unlike the optoisolators on the ¼ J6 inputs, these optoisolator inputs are uncommitted. If you place a DC voltage of anywhere between 5 and 24 vdc across either pair, it will trigger the input. These two inputs are non-polarized. The polarity of the DC voltage placed across them does not matter. The pinout of these inputs is:

WIRE #	COLOR	SIGNAL NAME:
17	violet	Green Trigger Input
18	gray	Green Trigger Input
19	white	Blue Trigger Input
20	black	Blue Trigger Input

I) Smpte TImecode Input

(Ribbon Cable and/or Screw terminals)
(RCA Jack on Br-CC08)

These two wires are the 600 ohm impedance inputs to the Smpte reader on the Br-Brain4. Any line level Smpte fed into the Br-Brain4 on these two

pins will he decoded and displayed on the LCD display of the Br-Brain4. If a show has been configured to listen to Smpte timecode in the AutoDownload file, it can be locked to the Smpte timecode. This input is transformer isolated from the circuitry on the Br-Brain4. The pinout of this input is:

WIRE #	COLOR	SIGNAL NAME:
21	brown	Smpte Timecode Input -
22	red	Smpte Timecode Input +

J) DMX-512 Data Input

(Ten pin Male header on Br-Brain4)

(Five Position Screw Terminal on Card Cage)

DMX-512 is received through the ten pin male header on the Br-Brain4. The card cage will route this from the five position screw terminal(s) on the card cage. This is identical to the DMX-512 reception on all other Gilderfluke & Company card cage mounted controllers.

The Br-Brain4 will stop listening to the 'Smart' Brick network and stop playing shows from the onboard Sd card memory whenever there is a DMX-512 signal present on this input. The DMX-512 input takes precedence over all other connections on the Br-Brain4.

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.

Addresses 256 and 257 are optionally used in GilderGear for transmitting a checksum. The Br-Brain4 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. Most GilderGear will automatically start requiring GilderChecksums after receiving DMX-512 that has GilderChecksums in it. Once it starts requiring GilderChecksums, the only way to get the Br-Brain4 to stop requiring it is to cycle power.

Note that at higher frame rates, not all 512 channels can be transmitted through DMX-512. This is why it is unusual to run shows over 30 FPS.

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.

K) DMX-512 Data Outputs

(Ten pin Male header on Br-Brain4)

(Five Position Screw Terminal on Card Cage)

The Br-Brain4 can send out up to four, 512 channel 'universes' of DMX-512. These can be used to control DMX-512 compatible dimmers, lights, strobes, smoke machines, and of course, GilderGear.

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.

All of the equipment on the DMX-512 network can be in one cabinet or control room, but are more commonly distributed throughout the installation. This allows the individual controllers to be prewired to whatever they are controlling and completely pretested before the installation even starts. During installation, instead of running hundreds (or thousands) of wires to each control point, a single DMX-512 network is daisy-chained through each local controller.

A DMX-512 network can be as long as a mile, or as short as a few inches. The DMX-512 network needs to be one long line, with no long side branches. If the network is longer than a few feet, you may need to provide a terminating resistor at the two far ends of the network (120Ω, ½ Watt is typically used). The resistors suppress 'echos' on the DMX-512 wires.

If the network runs throughout a facility, it is prudent to use a some isolated splitters. These will keep an electrostatic zap or lightning hit on the network from damaging the entire network. An isolated splitter also allows you to run side branches on the network, since each isolated branch is treated as a separate DMX-512 network (daisy chained from DMX-512 'Slave' to 'Slave', it can be run up to a mile, and may need its own termination resistors).

The first universe of DMX-512 is transmitted through the ten pin male header on the Br-Brain4. The card cage will route this to the five position screw terminal(s) on the card cage. This is identical to the DMX-512 transmission on all other Gilderfluke & Company card cage mounted controllers.

The second, third and fourth universes of DMX-512 come out of the Br-Brain4 on the sixty position backplane connector. The card cage routes them to pins 11 through 16 of the ribbon cable connector:

WIRE #	COLOR	SIGNAL NAME:
11	brown	DMX-512 Universe b Tx -
12	red	DMX-512 Universe b Tx +
13	orange	DMX-512 Universe c Tx -
14	yellow	DMX-512 Universe c Tx +
15	green	DMX-512 Universe d Tx -
16	blue	DMX-512 Universe d Tx +

The typical wires used for carrying a DMX-512 network are a single shielded twisted pair or wires. For short runs, just about any 'microphone cable' can be used. For longer runs, a low capacitance twisted pair is recommended. Recommended wires include:

Manufacturer	Part #	Gauge	Wire Stranding
Belden	3105A	22 AWG	7 x 30
Belden	3106A	22 AWG	7 x 30
Belden	9841	24 AWG	7 x 32
Belden	7200A	24 AWG	41 x 40 (high flexibility)
Proplex	PC222P	22 AWG	19 x 34
Dataplex	WDP222TBK	22 AWG	16 x 0.2mm

Recent revisions of the DMX-512 standards have included specifications for running raw DMX-512 signals through standard Cat-5 (or better) ethernet cables. The recommended pinout is as follows:

Pair	Wire #	Color	Function	DMX-512 Pin
Pair 2	1	White / Orange	Data 1+	DMX-512 Pin 3
	2	Orange	Data 1-	DMX-512 Pin 2
Pair 3	3	White / Green	no connection	no connection
	6	Green		
Pair 1	4	Blue		
	5	White / Blue		
Pair 4	7	White / Brown	Signal Common	DMX-512 Pin 1
	8	Brown		
Shield		Drain		

Br-Brain4 Hardware Configuration

There are only a hand full of switches and a single trimpot which can be used to configure the Br-Brain4. 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.

A) Contrast

(Single Turn Trimpot)

> This potentiometer is used to adjust the contrast on the LCD display. It is located adjacent to the rotary encoder and battery on the Br-Brain4. There is a small hole through the front plate to allow you to adjust this pot while the Br-Brain4 is mounted in a card cage.

B) Write Protect Switch

(Slide Switch On Sd Cards)

> Although the Br-Brain4 doesn't have its own 'write protect' switch, you can use the one on the Sd flash card to protect the memory of the Br-Brain4 as well.

> When this switch is 'Lock' position, the Br-Brain4 will protect the onboard flash memory and configuration EEprom from accidental alterations. With the switch in the 'Unlocked' position, reads and writes can take place normally. This switch must be in the 'Un locked' position for shows to be downloaded to the Br-Brain4. With the memory locked, the Br-Brain4 should retain whatever has been programmed into it for at least twenty years.

C) ¼ J6 Power

(Slide Switch)

> This switch is used to select whether the 'J8' power for the optoisolators is provided by the same power supply as the Br-Brain4, or is provided by an external isolated source.

write a poem

Br-Brain4 Software Configuration

Most of the configuration on the Br-Brain4 is done from within Pc•MACs. The menus within the Br-Brain4 are used to review these values for diagnostic purposes, but not to change them. The major exceptions are the configuration of the BrickNet port and secondary serial port.

The Br-Brain4 can be accessed through the serial port from any computer running just about any modem or terminal program. We provide a free terminal program called GilderTerm that makes working with GilderGear through the serial port a little easier. 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-232 or RS-422 Serial ports. The Br-Brain4 has a two RS-422 serial ports on it, but only the primary serial port can be used to configure and control it. Up to 256 different cards and devices can be attached to the same serial lines, to form a complete RS-422 'multi Drop' network. Anywhere on this network you can attach operator panels to access and control it, or you can use a WiFi or Ethernet 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 don't have access to GilderTerm, typical modem programs you can use are Terminal.exe (which came with Windows 3.1) and HyperTerm.exe (which comes with later versions of Windows). The terminal program must support VT-52 commands to position the cursor and clear the screen.

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 by clicking on the menus.

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. To talk to the Br-Brain4, just configure your terminal program for 9600 baud, no parity, eight data bits, one stop bit and no flow control handshaking.

Computers don't normally come with serial ports on them anymore. Instead, you use a USB-to-Serial (USB-RS232/422 or C-USB-RS232) adapter, BlueTooth-to-Serial (Bt-Rs232Rx and Bt-USBTx), Ethernet-to-Serial (Modem-Internet) adapter, or WiFi-to-Serial (Modem-Wi-Fly) adapter. For the Br-Brain4 you will need one that provides an RS-422 connection, instead of the more common RS-232. These are

available from a number of different sources, including Gilderfluke & Company. Our part number is USB-RS232/422 for the USB-to-Serial adapter. It provides both RS-232 and RS-422 connections.

You should set your program NOT to insert an extra LineFeed (LF) character after each Carriage Return (CR) it receives. You should also tell it NOT to scroll automatically after the eightieth column is filled. If either of these are on, the screen will be displayed 'double spaced'. This won't cause any problem, but will make it hard to see the whole screen at one time.

If you have hooked up the Br-Brain4 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-Brain4 and short between the Tx data out and Rx data in pins on your USB-to-Serial converter. For a RS-422 port, this means temporarily shorting the Rx+ to the Tx+, and Rx- to the Tx-, so two jumpers will be needed. On the USB-Rs232/422, the pinout is as follows:

POSITION	WIRE #	COLOR	SIGNAL NAME:
LEFT	1	white	Signal Ground
	2	black	Rx- data in to Converter
	3	red	Rx+ data in to Converter
	4	green	Tx- data out of Converter
	5	yellow	Tx+ data out of Converter
RIGHT	6	blue	Ground

While still running the modem program, anything you type should be shown on the screen while these jumpers are in place, while nothing will appear when you remove them. 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-Brain4. If you get characters on the screen even with the jumpers removed from the serial port, it means you probably need to set the 'echo' mode to 'none' or 'full duplex' and try this test again.

To enter the configuration mode you need to press the 'configure' button on GilderTerm, or type the following if you are not using GilderTerm. The (address) is replaced by the 'Serial Address' set in your AutoDownload file, ur using the encoder and LCD display on the front of the Br-Brain4:

m5AA5(address)

If any other card is in configuration mode (or even if it just thinks another card is in configuration), the Br-Brain4 won't be able to enter configuration mode. To exit any other card from configuration type 'XN'. You can then try entering configuration again.

At the top of all Br-Brain4 menu screens the following is displayed:

a) Company, copyright and product name

b) Revision number of the firmware on the Br-Brain4

c) Number of shows in the AutoDownload file

d) Number of channels in the shows

e) Offset to first DMX-512 address of the first channel stored in the AutoDownload file (this is usually 'zero')

f) Name of the AutoDownload file

g) Name of the Br-Brain4 that was given to it in the Pc•MACs program

h) Serial address of the Br-Brain4

i) Name of the currently loaded Show

j) Whether the currently loaded show is running, stopped, paused, etc.

k) Current Frame number into the current show

l) If the AutoDownload file isn't found, then 'not found' will appear in this space at the top of the screen, with 'x's for the show and file names

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

All alphanumeric entries consist of one or more ASCII characters followed by a <RETURN> (<ENTER> on some keyboards). Some commands that are asking for a single character do not require the <RETURN>. 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.

The Br-Brain4 does not have a write protect switch on it. Instead, you can use the 'Lock' switch on the Sd card to lock the configuration on the Br-Brain4.

Once you have configured a Br-Brain4, you can 'lock' the configuration by moving the Sd card's 'Lock' switch to the 'Locked' position. This should protect your configuration from anything short of a lightning hit. The menu will change to show that the Flash

Memory 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-Brain4, you should use the <ESC>ape key to redraw the screen while 'saving to file' in the modem program running on your computer. This file can be printed out at any time, or spliced into the documentation package for your project.

Main Menu

The initial menu that comes up when you enter configuration is the 'Main Menu':

```
- Gilderfluke & Co. - Br-Brain4 Smart Brick Brain - v4.05 - copyright 2012 DCM -
              Shows: 8, Ch: 123 @___0, ADL: AutoDownload_Filename
                       Control Room1 / Address- __0
              __1 Show_FileName.sho looping @ frame ____1363


a) Sequencer 'A': Br-Brain4_DeviceName
b) Seq. 'A' Disabled, banked 123 deep  | c) Channels list for sequencer 'A'
d) DMX-512: Tx & Rx wo/CS              | e) zero-based (a__0 to a471)
f) BrickNet: transmit from sequencer 'A'
h) time (zone -8:00): 12:34:56 Saturday November 09, 1956
t) dsT: 02:00 2nd Sunday in March to 02:00 1st Sunday in November
j) Output to monitor: 1234 = 123 [analog 8]
                            FigureName: OutputName


_____0=open_1=open_2=open_3=CLOS_4=open_5=open_6=open_7=open_G=open_B=open
 CLOSING  |Start_|_____|Start_|random|E-Stop|_____|_____|Seqent|pause_|_cont_
__EDGES___|_123__|_____|_123__| 123  |_123__|_____|_____| 123  |_____|_____
 opening  |Start_|Start_|_____|  to  |EClear|_____|_____|  to  |_cont_|pause_
__edges___|_123__|_123__|_____|_234__|_123__|_____|_____|_234__|_____|_____


i) show Info    m) More....    o) lOad defaults p) Play a show   s) Stop a show
n) Next output  l) Last output  r) save configs  v) Verify shows  x) eXit config

                            Command-
```

A) Sequencer:

This command is used to select which of the eight possible sequencers on the Br-Brain4 is to be displayed on the menus, and will be the default target for the 'play' and other commands. Pressing <control>+"a" increments through all the available sequencers.

B) Sequencer Enable/Disable:

This toggle enables and disables reading the AutoDownload file from the Sd card. When selected, you will be asked 'are you sure' before the Br-Brain4 will toggle this enable/disable.

When OFF, nothing will be output from the AutoDownload file on the Sd card for the selected sequencer. Any output data must come from either the DMX-512 or Serial Port inputs.

If it is ON, then the data from the AutoDownload file on the Sd card will be sent out.

C) Channels List for Sequencer:

This is identical to the Main Menu's command

D) DMX-512 mode:

This command is unavailable if an AutoDownload file on the Sd card is being used. It simply displays the DMX-512 settings stored in the AutoDownload file.

If there isn't an AutoDownload file being used, this command is a toggle which can be used to enable and disable the DMX-512 reception and transmission, as well as the GilderChecksums.

The GilderChecksums allow GilderGear to recognize errors in DMX-512 data. With GilderChecksums, the outputs won't be updated when a bad data packet is received. GilderChecksums should be left ON whenever sending DMX-512 to other GilderGear.

The Br-Brain4, and most other GilderGear will automatically sense when it is receiving GilderCheckSums. Once it does this, the GilderGear will have to be reset before it will accept DMX-512 data without GilderCheckSums.

E) Zero or One-Based DMX-512:

This command is unavailable if an AutoDownload file on the Sd card is being used. It simply displays whether the AutoDownload file settings are to display DMX-512 addresses as 0-511 numbers, or as 1-512 numbers.

If there isn't an AutoDownload file being used, this command is a toggle between displaying DMX-512 addresses as 0-511 numbers, or as 1-512 numbers.

F) BrickNet:

This is one of the few settings which must be set on the Br-Brain4, and can't be set in Pc•MACs and downloaded as part of the AutoDownload file.

This command allows you to select between the following settings for the Br-Brain4's BrickNet port:

1) BrickNet Port Disabled

2) Receive BrickNet

3) Transmit BrickNet from Sequencer 'a'

4) Transmit BrickNet from Sequencer 'b'

5) Transmit BrickNet from Sequencer 'c'

6) Transmit BrickNet from Sequencer 'd'

7) Transmit BrickNet from Sequencer 'e'

8) Transmit BrickNet from Sequencer 'f'

9) Transmit BrickNet from Sequencer 'g'

10) Transmit BrickNet from Sequencer 'h'

When BrickNet reception is enabled, a show will only listen to it if the 'BrickNet' checkbox has been checked on the 'File Menu/Show Information….' dialog before building the AutoDownload file. Since the BrickNet only transmits or receives a single sequencer's time line, any show that is set up for using BrickNet for its time code should only be used on one sequencer.

H) Time:

This command is unavailable if the Br-Brain4 has had the GPS clock enabled on the auxiliary serial port, and is receiving data from an external GPS antenna. In this case, the current time from the GPS antenna will be displayed, and the internal RTC chip on the Br-Brain4 will be set to the current GPS time once each minute (on the half minute).

If there is no GPS attached to the Br-Brain4, this command will ask for the current year, month, date, hour and minute. When you press the <Return> key after entering the minute, the seconds will be set to zero as the time is set in the clock.

T) dsT (Daylight Savings Time):

This command is used to:

1) Toggle whether this Br-Brain4 will be using Daylight Savings Time or not

2) What the starting and ending rules are for the local Daylight Savings Time

3) The Time Zone relative to GMT that the Br-Brain4 will be operating in

I) Show Info:

This command displays information on the currently loaded AutoDownload file:

a) FileName of this AutoDownload file (this is set during the AutoDownload process when you save the file to disk)

b) Name of the Br-Brain4 card that this AutoDownload is intended for. This is set on the 'Device Settings' dialog. The 'Device Settings' dialog is accessed either by:

   1) Opening the Channels List, changing the 'Show by' to 'Show by Devices', and double clicking on the Br-Brain4 you will be downloading to

   2) Clicking on the 'Device Settings' button at the top of the AutoDownload dialog (next to where you select the target device)

c) AutoDownload file version number (as of this writing, this will be 'v1.1')

d) The number of sequencers in this AutoDownload file (this is set on the ' Device Settings' dialog, where between one and eight sequencers can be assigned to a single Br-Brain4. The 'Device Settings' dialog is accessed either by:

   1) Opening the Channels List, changing the 'Show by' to 'Show by Devices', and double clicking on the Br-Brain4 you will be downloading to

   2) Clicking on the 'Device Settings' button at the top of the AutoDownload dialog (next to where you select the target device)

e) The date and time when this AutoDownload file was created

f) Number of DMX-512 channels per universe. This will normally be 512, unless the frame rate is set above 32 frames per second. Above about 44 frames per second, there is not enough time to send out all 512 channels. Higher speeds are not recommended for large shows on the Br-Brain4 without consulting Gilderfluke & Co. first.

g) Range of DMX-512 channels in the AutoDownload file. This will normally start with universe 'a' channels, unless the 'first channel' on the AutoDownload has been offset to begin beyond the first universe.

h) Smpte Error Count. This is the number of good consecutive frames of Smpte that the Br-Brain4 must receive before it believes it. Typically this

set to around five. This is set on the 'Device Settings' dialog. The 'Device Settings' dialog is accessed either by:

1) Opening the Channels List, changing the 'Show by' to 'Show by Devices', and double clicking on the Br-Brain4 you will be downloading to

2) Clicking on the 'Device Settings' button at the top of the AutoDownload dialog (next to where you select the target device)

i) The name of each sequencer, along with the show that each loads at startup and if it waits or plays the show. This is set for each sequencer during the AutoDownload

j) The EaseIn Speed and EaseIn Threshold for each sequencer. These are set on the 'Sequencer Settings' dialog. The 'Sequencer Settings' dialog is accessed by:

1) Opening the Channels List, changing the 'Show by' to 'Show by Sequencers', and double clicking on the sequencer you want to change

2) Selecting the sequencer you would like to modify and clicking on the 'Sequencer Settings' button on the AutoDownload dialog (next to where you select the sequencer for the startup and input actions)

3) Opening the 'Device Settings' dialog and pressing the 'Sequencer Settings' buttons

k) If there is an attempt to start a show while another show which is unsteppable[3] is already running, these 'early' starts can be 'banked'. This setting shows how deeply stored starts can be 'banked'. These are set on the 'Sequencer Settings' dialog. The 'Sequencer Settings' dialog is accessed by:

1) Opening the Channels List, changing the 'Show by' to 'Show by Sequencers', and double clicking on the sequencer you want to change

2) Selecting the sequencer you would like to modify and clicking on the 'Sequencer Settings' button on the AutoDownload dialog (next to where you select the sequencer for the startup and input actions)

3) Opening the 'Device Settings' dialog and pressing the 'Sequencer Settings' buttons

---

[3] Uninterruptible if a new show request arrives while this show is playing

l) Show Names. This displays both the 'short' (DOS 8.3) names and the longer names saved in the v1.1 AutoDownload extended header

m) v1.0 AutoDownload file header

n) Each of the shows including:

    1) Show's numeric position in the AutoDownload file

    2) Show's 'short' (DOS 8.3) name

    3) Offset to the 'start' of the show

    4) Length of the show (in frames)

    5) Under the 'S', whether the show is

        1) 'Steppable' (interruptible if a new show request arrives while this show is playing) is shown by a 'Y'

        2) 'non-Steppable' (uninterruptible if a new show request arrives while this show is playing) is shown by a 'N'

    6) Under the 'L', whether the show is

        1) 'Loopable' (Plays to the end of the show, then performs the 'at end' actions as set on the AutoDownload dialog) is shown by a 'Y'

        2) 'non-Loopable' (Plays to the end of the show, and stops and waits for the next start command) is shown by a 'N'

    7) The frame rate for the show

    8) The 'next' show defined for the show during the AutoDownload

    9) The number of plays for this show

J) Output To Monitor:

This command is used to set the output address that will be monitored on the Main Menu. The resolution and current value for the monitored output will be displayed on the main menu. This can also be set on using the LCD screen and encoder on the front of the Br-Brain4.

L) Last Output:

This command decrements the value of the Output to Monitor, which is normally set using the 'j) Output to Monitor' command above.

M) More....:

This command is used to access the different menus inside the Br-Brain4:

A) Aux. serial port Menu

M) Main Menu

S) Show viewer Menu

T) sTring viewer Menu

$) Deadbeat Menu (The default password is 'DCM', but can be changed on the Deadbeat menu)

N) Next Output:

This command increments the value of the Output to Monitor, which is normally set using the 'j) Output to Monitor' command above.

O) Load Defaults:

This command sets all the configuration settings that are not part of the AutoDownload file to their default values. Some of these values will be overwritten from the AutoDownload file when the Br-Brain4 is reset or a Sd card is inserted.

P) Play a Show:

This command is used to select which show is to be played. Once selected, the show will be played on the currently selected sequencer.

If there is only one show loaded in the AutoDownload file, the Br-Brain4 won't bother to ask which show you would like it to play. Instead it will play the one and only show.

If you would like to select and play a show on a different sequencer, you can:

a) First select the sequencer using the 'a) sequencer' command', then select the show to play.

b) A shortcut is to use the control button when pressing the 'p) play' command. The Br-Brain4 will first ask for the sequencer number, then the show to play.

R) Save Configs:

This command sends the configuration from the eeProm to the serial port where it can be captured to disk for later restoration.

S) Stop a Show:

This command simply stops the current show on the current sequencer. If you would like to stop at its end, simply press and hold the <Control> key while you hit the 'S' Key.

V) Verify:

This command is used to verify shows, schedule and GPS files. If any file does not pass this verification test, then it has become corrupted. Often reloading your show from a fresh copy onto the Sd card will repair the problem. If this happens regularly, you should consider replacing your Sd card with a new one.

X) Exit Config:

This command is used to exit the configuration mode. It is the command which GilderTerm sends when you press the 'Exit Config' button on GilderTerm.

Many of the configuration commands in the Br-Brain4 don't immediately save the changes to the configuration eeProm. Instead it starts a timer that writes the configuration when it expires.

You should ALWAYS exit the configuration when you are done working on the configuration of the Br-Brain4. If you power down the Br-Brain4 without exiting configuration mode first, you may loose unsaved changes.

Auxiliary Serial Port Menu

The initial menu that comes up when you enter configuration is the 'Main Menu' If you select the 'm) More…' option, you can select the Auxiliary Serial Port Menus.

The Auxiliary Serial Port on the Br-Brain4 is a RS-422 (four wire) or RS-485 (two wire) serial port. It can be used for a number of different purposes. This menu will change to reflect the various operating 'modes' available on the Auxiliary Serial Port.

Depending on the operating mode selected for the Auxiliary Serial Port, the Auxiliary Serial Port Menu may be strictly a 'viewer', with no commands available to change the configuration, or a fully active menu, where you can change the parameters of the particular operating 'mode'.

As of this writing, you can use the Auxiliary Serial Port to:

1) 'not used' mode

```
- Gilderfluke & Co. - Br-Brain4 Smart Brick Brain - v4.05 - copyright 2012 DCM -
          Shows: 8, Ch: 123 @___0, ADL: AutoDownload_Filename
                     Control Room1 / Address- __0
              __1 Show_FileName.sho looping @ frame ____1363

a) Sequencer 'A': Br-Brain4_DeviceName

b) Secondary Serial Port operating mode- not used
secondary serial port baud rate- 9600




i) show Info    m) More....    o) lOad defaults p) Play a show    s) Stop a show
                              r) save configs  v) Verify shows   x) eXit config

                        Command-
```

This is the mode to select when you are simply not using the Auxiliary Serial Port, or are using it to simply send serial strings from Pc•MACs or the AutoDownload file, control and lock the Br-Brain4 to a Pioneer Laserdisc/DVD player, or any solid state player that uses the same command set.

Auxiliary Serial Port Menu - 'Not Used' mode

The baud rate for the secondary serial port is set in Pc•MACs on the 'Device Settings' dialog. The 'Device Settings' dialog is accessed either by:

a) Opening the Channels List, changing the 'Show by' to 'Show by Devices', and double clicking on the Br-Brain4 you will be downloading to.

b) Clicking on the 'Device Settings' button at the top of the AutoDownload dialog (next to where you select the target device).

If the baud rate is set to 'MIDI', you can use this mode for sending handcrafted MIDI control strings, rather than using the MIDI mode of operation to send MIDI 'note on' and 'note off' messages.

2) GPS Mode

This mode is used when you attach a GPS receiver and antenna for precise scheduled show triggering. There are no user-settable GPS options on this menu. The baud rate is automatically 'forced' to the appropriate 4800 baud when this mode is selected.

```
- Gilderfluke & Co. - Br-Brain4 Smart Brick Brain - v4.05 - copyright 2012 DCM -
              Shows: 8, Ch: 123 @___0, ADL: AutoDownload_Filename
                       Control Room1 / Address- __0
                  __1 Show_FileName.sho looping @ frame ____1363


a) Sequencer 'A': Br-Brain4_DeviceName

b) Secondary Serial Port operating mode- GPS
secondary serial port baud rate- 4800 [FORCED!]

GPS:
Lat- 12°11'92.25"N
Lon- 118°17'51.71W
Alt- 234m
speed- 123k
heading- 180°
satellites- 123
hdop- 1.4m



i) show Info    m) More....    o) lOad defaults p) Play a show   s) Stop a show
                               r) save configs  v) Verify shows  x) eXit config


                             Command-
```

Auxiliary Serial Port Menu - 'GPS' mode

Although there are no GPS-related settings that you can change on this menu, it does display some interesting information from the GPS receiver:

a) Latitude

b) Longitude

c) Altitude

d) Ground Speed

e) Heading

f) Number of satellites that the GPS is using to determine its position

g) HDOP: Horizontal Deviation of Position tells you how accurate the current GPS fix is (in meters). If you draw a circle around the receiver using the HDOP as the radius (in meters), the position of

the receiver is reporting will be somewhere within this circle.

The current time from the GPS receiver is displayed on the Main Menu, so it isn't repeated on this menu.

3) MIDI Mode

This mode is used to send MIDI notes from the animation data stored on the Br-Brain4:

```
- Gilderfluke & Co. - Br-Brain4 Smart Brick Brain - v4.05 - copyright 2012 DCM -
              Shows: 8, Ch: 123 @___0, ADL: AutoDownload_Filename
                        Control Room1 / Address- __0
              __1 Show_FileName.sho looping @ frame ____1363

a) Sequencer 'A': Br-Brain4_DeviceName

b) Secondary Serial Port operating mode- MIDI
secondary serial port baud rate- MIDI [FORCED!]

c) MIDI Sequencer- 'A'
d) MIDI DMX start- a123
e) MIDI voice- 1
f) MIDI first note- 48, last note- 83
g) MIDI press vel- 64
h) MIDI release vel- 64
i) MIDI Use Key Down/Key Up command




i) show Info    m) More....    o) l0ad defaults p) Play a show   s) Stop a show
                              r) save configs  v) Verify shows  x) eXit config

                              Command-
```

Auxiliary Serial Port Menu - 'MIDI' mode

While in MIDI mode, the secondary serial port is forced to the MIDI baud rate of 31,250 bits per second.

MIDI was designed for sending data from electronic keyboards and instruments to one another. This feature allows you to define up to sixteen consecutive bytes of animation data (128 digital bits) to emulate a MIDI keyboard.

Each of the MIDI key up/key down string is three bytes long. At the relatively slow 31,250 baud rate MIDI uses (3125 bytes per second), it is possible to overrun the buffer used for sending data from the Br-Brain4. 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-Brain4 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 system. They come directly from the MIDI standards. These are the reasons why MIDI is not often used for any professional Show 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 16,384 digitals controls stored on a single Br-Brain4, there can be 16,384 on and off events per frame, or 491,520 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.

There are many settings required for the MIDI mode:

a) MIDI Sequencer: MIDI can operate on only one of the eight sequencers on the Br-Brain4 at one time. This command is used to select the sequencer number you would like to use for MIDI.

b) MIDI DMX start: This command sets the DMX-512 address of the first byte used in this way. The other fifteen consecutive bytes follow. Once the address is set using this command and the configuration mode exited, the Br-Brain4 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.

c) MIDI voice: This command is used to set which of sixteen possible MIDI 'instruments' the key commands are sent to.

d) MIDI first note / MIDI last note: This command allows you to limit the range of notes sent out by the Br-Brain4. Normal keyboards only have 88 keys. The digitals monitored by the Br-Brain4 are mapped with a standard keyboard right in the middle. There are twenty notes below C1 (Note #21) and twenty notes above C8 (Note #108). Middle 'C' (C4) is found on the 60th digital. This translates to bit four of the seventh byte that is being monitored.

   If you were to set the 'first note' to #60, and the last note to #71, then one octave worth of notes would be sent out, starting with 'middle' C and ending with B4

e) MIDI press velocity: The default MIDI press 'velocity' 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 press 'velocity' value of zero will turn off a note, even on a MIDI 'key down' message.

f) MIDI release velocity: The default MIDI press 'velocity' 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.

g) MIDI Use Key Down/Key Up command / MIDI Use Key Down/Key down w/zero velocity: This command lets you choose between

   1) Using separate MIDI 'Key Up' and 'Key Down' commands to turn the 'notes' on and off

   2) Using only MIDI 'Key Down' commands to turn the 'notes' on and off. This uses a 'zero' press velocity for the messages that turn a note 'off'

A) Sequencer:

   This is identical to the Main Menu's command

B) Secondary Serial Port Operating Mode:

   This command toggles through the Auxiliary Serial Port's operating modes. The menus will change to show the commands and options available for each of these:

I) Show Info:

> This is identical to the Main Menu's command

M) More....:

> This is identical to the Main Menu's command

O) Load Defaults:

> This is identical to the Main Menu's command

P) Play a Show:

> This is identical to the Main Menu's command

R) Save Configs:

> This is identical to the Main Menu's command

S) Stop a Show:

> This is identical to the Main Menu's command

V) Verify:

> This is identical to the Main Menu's command

X) Exit Config:

> This is identical to the Main Menu's command

Show Viewer Menu

The initial menu that comes up when you enter configuration is the 'Main Menu' If you select the 'm) More…' option, you can select the Show Viewer Menu:

```
- Gilderfluke & Co. - Br-Brain4 Smart Brick Brain - v4.05 - copyright 2012 DCM -
              Shows: 8, Ch: 123 @___0, ADL: AutoDownload_Filename
                        Control Room1 / Address- __0
                    __1 Show_FileName.sho looping @ frame ____1363

a) Sequencer 'a': Br-Brain4_DeviceName
b) Show to view: __1: Croom1, Show "a"
c) Channels list for sequencer 'A'

time code- LaserDisk/DVD              | 'next'- __1: Croom1, Show "a"
bridge time code dropouts- yes        | Steppable- Yes
frame rate- 30 per second             | Loop at end- Yes
Show length- ____750 00:00:30.00      | PopOut Show- Yes


start string- StringName, StringContent
multi-disk string- StringName, StringContent
end string- StringName, StringContent
video #1- ____1000  video #3- ____3000  video #5- _____0  video #7- _____0
video #2- ____2000  video #4- 12345678  video #6- _____0  video #8- _____0

i) show Info    m) More....     o) l0ad defaults p) Play a show   s) Stop a show
n) Next show    l) Last show    r) save configs  v) Verify shows  x) eXit config

                            Command-
```

Show Viewer Menu

The Show Viewer Menu is used to see the settings for each of the shows in the AutoDownload file on the Br-Brain4. All of these settings are made from within Pc•MACs, and saved in the AutoDownload file for the Br-Brain4. None of these settings can be changed from within the Br-Brain4. They are

1) **Time Code:** Internal, External, LaserDisc/DVD or Smpte

2) **Bridge Timecode Dropouts:** If using LaserDisc/DVD or Smpte, this tells the Br-Brain4 to bridge across gaps in the incoming timecode

3) **Frame Rate:** Number of updates per second in this show. Typically, all shows loaded on the Br-Brain4 will use the same frame rate

4) **Show length:** Displayed in both frames and hours, minutes, seconds and frames

5) **'Next' show:** This is the show that is set to follow this show in the AutoDownload file

6) **Steppable:** Whether another show can be started and interrupt this show. If the show is non-steppable (uninterruptible), then the show which tried to start can optionally be 'banked', and will start as soon as the non-steppable show ends.

7) **Loop at end:** Whether the show will simply 'stop at end', or will check to see if it should start whatever show has been set as the 'next' show at its end

8) **PopOut Show:** A PopOut show allows you to have all the outputs in the show follow the timecode and show of sequencer 'A', and break out on another timeline when a PopOut show is started on another sequencer. An example of this feature's use would be to have a stage full of animated figures that are all playing along a the same song. At any point in the show, a trigger can be received that will start another sequencer playing an 'ad-lib' show. All the characters that have their outputs assigned to that newly triggered sequencer will start following the 'ad-lib' show, with any analog channels that need to doing an automatic EaseIn to the new show. The 'ad-lib' show will run through to its end while the main show on sequencer 'A' continues on at its normal rate. At the end of the 'ad-lib' show, all the outputs that were following the 'ad-lib' will rejoin the main show on sequencer 'A', performing an automatic EaseIn on the analog channels as needed.

9) **Start String:** This is the string that can be sent out the secondary serial port at the start of a show. All strings are displayed as with the StringName, followed by the content of the string. The string body is displayed exactly as it is entered in Pc•MACs. ASCII text that is entered as text will be displayed in exactly the same way. Entries that are entered as numeric values (hex, decimal or octal) will be displayed in the same way. Characters that are to be 'fetched' by the serial port are shown in parentheses.

10) **Multi-Disk String:** If a Multi-disk string has been defined, it will automatically be sent before the Start String once for each of the non-zero video 'Start' frames (starting from the last, and working down towards the first). After the last non-zero video 'Start' frames is found, the normal Start String will be sent. All strings are displayed as with the StringName, followed by the content of the string. The string body is displayed exactly as it is entered in Pc•MACs. ASCII text that is entered as text will be displayed in exactly the same way. Entries that are entered as numeric values (hex, decimal or octal) will be displayed in the same way. Characters that are to be 'fetched' by the serial port are shown in parentheses.

11) **End String:** This is the string that can be sent out the secondary serial port at the end of a show. All strings are displayed as with the StringName,

followed by the content of the string. The string body is displayed exactly as it is entered in Pc•MACs. ASCII text that is entered as text will be displayed in exactly the same way. Entries that are entered as numeric values (hex, decimal or octal) will be displayed in the same way. Characters that are to be 'fetched' by the serial port are shown in parentheses.

12) **Video #1 through Video #8:** The Br-Brain4 supports up to eight serial ports attached to the Br-Brain4's single secondary serial port through the Br-SDC8 serial multiplexer. If controlling multiple LaserDisc/DVD players (or their solid-state equivalents), these normally hold the frame number on the disk for each of the players. For any non-zero value in any of these, the multi-disk string (if defined) will be sent, starting with the last non-zero value and working its way down to the first. After the last multi-Disk string is sent, the Start String is automatically sent.

A) **Sequencer:**

This is identical to the Main Menu's command

B) **Show To View:**

This command is used to select which of the 255 possible shows on the Br-Brain4 is to be displayed on this menu.

C) **Channels List for Sequencer:**

This is identical to the Main Menu's command

I) **Show Info:**

This is identical to the Main Menu's command

L) **Last show:**

This decrements the show that is being viewed.

M) **More....:**

This is identical to the Main Menu's command

N) **Next show:**

This increments the show that is being viewed.

O) Load Defaults:

>This is identical to the Main Menu's command

P) Play a Show:

>This is identical to the Main Menu's command

R) Save Configs:

>This is identical to the Main Menu's command

S) Stop a Show:

>This is identical to the Main Menu's command

V) Verify:

>This is identical to the Main Menu's command

X) Exit Config:

>This is identical to the Main Menu's command

String Viewer Menu

The initial menu that comes up when you enter configuration is the 'Main Menu' If you select the 'm) More…' option, you can select the String Viewer Menu.

```
- Gilderfluke & Co. - Br-Brain4 Smart Brick Brain - v4.05 - copyright 2012 DCM -
                Shows: 8, Ch: 123 @___0, ADL: AutoDownload_Filename
                        Control Room1 / Address- __0
                    __1 Show_FileName.sho looping @ frame ____1363


a) Sequencer 'a': Br-Brain4_DeviceName


secondary serial port baud rate- 9600 baud
string retries- 123
LaserSearch retries- 123
DVD preroll- 123


StringName, StringContent
StringName, StringContent
StringName, StringContent
StringName, StringContent


string trigger channel: a123: 12h/123  | Bin/Hex/BCD channel: a124: 12h/123
j) triggered strings: 123 of 123: StringName, StringContent


i) show Info    m) More....     o) lOad defaults p) Play a show   s) Stop a show
n) Next string  l) Last string  r) save configs  v) Verify shows  x) eXit config


                            Command-
```

String Viewer Menu

There are three types of strings in the AutoDownload file:

1) Pause, Continue, E-Stop and E-Clear Strings

There can be one set of these four strings for each of the eight potential sequencers (32 strings in total on a Br-Brain4). It is unusual to have more than one sequencer on a Br-Brain4 sending serial strings. The Pause, Continue, E-Stop and E-Clear Strings are entered in Pc•MACs in one of two places:

1) Show String Setup Dialog: This is accessed from the File menu/Show Information… dialog by pressing the 'strings' button. This dialog is used to also set up the Show Start, Show MultiDisk, and Show End Strings. Only the Pause, Continue, E-Stop and E-Clear Strings for the currently loaded sequencer will be shown here. If you need to setup the strings for a different sequencer, you will need to exit the Show Information Dialog and

select a different active sequencer from the Main Transport dialog. Note that the Show Start, Show MultiDisk, and Show End Strings are stored as part of each show (up to three strings per show), and the Pause, Continue, E-Stop and E-Clear Strings are stored in the site file for each sequencer (up to 32 strings per site file).

2) The Pause, Continue, E-Stop and E-Clear Strings can also be edited on the 'Sequencer Settings' dialog. The 'Sequencer Settings' dialog is accessed either by:

1) Opening the Channels List, changing the 'Show by' to 'Show by Sequencers', and double clicking on the sequencer you want to change

2) Selecting the sequencer you would like to modify and clicking on the 'Sequencer Settings' button on the AutoDownload dialog (next to where you select the sequencer for the startup and input actions)

2) Triggered Strings

These are the strings that are created and placed on the OffLine Window in Pc•MACs. There can be up to 255 of these strings in an AutoDownload file.

3) Show Start, Show MultiDisk, and Show End Strings

The String Viewer Menu is used to review the Pause, Continue, E-Stop, E-Clear and Triggered Strings in the AutoDownload file. The Show Start, Show MultiDisk, and Show End Strings can be viewed on the Show Viewer Menu.

These strings are set up from the File menu/Show Information… dialog by pressing the 'strings' button. This dialog is used to also set up the Pause, Continue, E-Stop and E-Clear Strings. Note that the Show Start, Show MultiDisk, and Show End Strings are stored as part of each show (up to three strings per show), and the Pause, Continue, E-Stop and E-Clear Strings are stored in the site file for each sequencer (up to 32 strings per site file).

The settings for the secondary serial port are also displayed on the Serial String Viewer Menu. These include:

a) secondary serial port baud rate

b) string retries

c) LaserSearch retries

d) DVD preroll

All strings are displayed as with the StringName, followed by the content of the string. The string body is displayed exactly as it is entered in Pc•MACs. ASCII text that is entered as text will be displayed in exactly the same way. Entries that are entered as numeric values (hex, decimal or octal) will be displayed in the same way. Characters that are to be 'fetched' by the serial port are shown in parentheses.

A) Sequencer:

>   This is identical to the Main Menu's command

I) Show Info:

>   This is identical to the Main Menu's command

J) Triggered Strings:

>   This command is used to select which of the 255 possible triggered strings on the Br-Brain4 is to be displayed on this menu. These are the strings that are created and placed on the OffLine Window in Pc•MACs. There can be up to 255 of these strings in an AutoDownload file.

L) Last string:

>   This decrements the string that is being viewed

M) More….:

>   This is identical to the Main Menu's command

N) Next string:

>   This increments the string that is being viewed

O) Load Defaults:

>   This is identical to the Main Menu's command

P) Play a Show:

>   This is identical to the Main Menu's command

R) Save Configs:

>	This is identical to the Main Menu's command

S) Stop a Show:

>	This is identical to the Main Menu's command

V) Verify:

>	This is identical to the Main Menu's command

X) Exit Config:

>	This is identical to the Main Menu's command

Deadbeat Timer/Counter Menu

This menu is used to set any of the sixteen different possible Lock Counter/Timers. These are used to lock up a system after a certain number of shows play, after a certain number of hours or minutes, or after an unauthorized person has modified the configuration of the Br-Brain4. This screen is also where you reset the counters that keep track of the number of times each show has been played.

```
- Gilderfluke & Co. - Br-Brain4 Smart Brick Brain - v4.05 - copyright 2012 DCM -
                            Card Address- __0
                        DeadBeat Timer/Counter Menu
     timer | time  |  date  | counts |  keys  | message line 1 | message line 2
0) ....... ........ ........ ........ ........ ................ ................
1) Sho 123 01:23:45 09/10/12 expired! 98252683 _____I_Am_____ ____Expired_____
2) ....... ........ ........ ........ ........ ................ ................
3) hours   01:23:45 09/13/12 55792236 65645265 _____Hour_____ ____Deadman_____
4) ....... ........ ........ ........ ........ ................ ................
5) ....... ........ ........ ........ ........ ................ ................
6) reset a 01:23:45 02/10/12 72870636 54332172 _____I_Am_____ __User Cleared__
7) ....... ........ ........ ........ ........ ................ ................
8) any sho 01:23:45 09/13/12 _____646 __123456 __Any_Show_(8)__ __123456_=_key__
9) config. 01:23:45 01/10/12 _____0 12345678 _Configuration__ Tampering_Sensed
A) ....... ........ ........ ........ ........ ................ ................
B) minutes 01:23:45 09/13/12 12341148 01234567 _____Minute_____ ____Deadman_____
C) ....... ........ ........ ........ ........ ................ ................
D) tamper  01:23:45 09/15/12 ____8795 89ABCDEF ___Tampering____ _DeadBeat_Timer_
E) ....... ........ ........ ........ ........ ................ ................
F) sho 255 01:23:45 09/13/12 ___46072 44063770 __I_am_tired_of_ this_damned_show
z) config- DCM_____  g) DeadBeat- DCM_____  k) klear show counts
i) show Info    m) More....   o) l0ad defaults p) Play a show   s) Stop a show
                             r) save configs  v) Verify shows  x) eXit config
                                Command-
```

Deadbeat Timer/Counter Menu

Lock Counter/Timers can be used to assure payments arrive in a timely manner, or that a show is serviced when scheduled. When any Lock Counter/Timer expires, the Br-Brain4 will lock up. The strings you have entered for that Lock Counter/Timer will be displayed on the front of the Br-Brain4. Once a Br-Brain4 has locked up, you cannot enter configuration without first entering the key(s) that clear any Lock Counter/Timers that have expired.

Keys are entered using the encoder knob and LCD on the front of the Br-Brain4. No compute or tools of any kind are needed. Any Lock Counter/Timer can be cleared before it has expired by entering the key for that timer from the encoder and LCD on the Br-Brain4's front. Once User Cleared, the count will be frozen and that timer will not expire in the future.

To keep track of when the timers have been set, cleared, or expired, the time and date is recorded when any major event happens on the a timer. The options for the Lock Counter/Timers are:

1) Decrement on any show that plays

This type of counter will decrement even if the same show which is starting is also used for any other type of counter. Since this type of timer is decremented on show starts, once any counter has expired, it will not be decremented until it is cleared.

2) Decrement when a specific show plays

This type of counter will decrement even if the same show which is starting is also used for any other type of counter. Since this type of timer is decremented on show starts, once any counter has expired, it will not be decremented until it is cleared.

3) Decrement on each minute the Br-Brain4 is powered up

This is completely separate from the Real Time Clock on the Br-Brain4, and is unaffected by changing the time, or even completely removing the RTC chip. To discourage resetting the Br-Brain4 to attempt to defeat the minute counter, each time the Br-Brain4 powers up, a minute is decremented. Because this counter is time based, it will continue to tick away even after another Lock Counter/Timer has expired.

4) Decrement on each hour the Br-Brain4 is powered up

This is completely separate from the Real Time Clock on the Br-Brain4, and is unaffected by changing the time, or even completely removing the RTC chip. To discourage resetting the Br-Brain4 to attempt to defeat the hour counter, each time the Br-Brain4 powers up, a hour is decremented. Because this counter is time based, it will continue to tick away even after another Lock Counter/Timer has expired.

5) Tampering

This counter will decrement on each show start after the Br-Brain4 senses that there has been an attempt to change its configuration. The only settings that is allowed to be changed are the time on the RTC and the

settings on this screen. Any other change will trigger the tampering sensor. This is shown by the word 'tampering' being printed in upper case letters ('TAMPERING') on this screen. If the card is write protected, then the tampering sensor will not be triggered by attempts to change the configuration. Once the tampering sensor has been triggered, it can only be stopped by clearing the counter or changing the settings for the counter from this screen. Because the tampering counter decrements on each show start, you can set it to expire on the first show that plays (by setting the counter to zero), or after some number of shows. This can be used to really mess with the mind of the potential tamperer.

The settings for the Lock Counter/Timers are stored in a separate EEprom. Replacing it will immediately lock up the system (A 'Dead Beef' error will be displayed on the LCD). If a tampering counter has been set, changing the main configuration EEprom without also moving the Lock Counter/Timers EEprom will cause the tampering sensor to be triggered. Changing, or even completely removing the real time clock chip will have no effect upon the Lock Counter/Timers. They keep track of the amount of time that the Br-Brain4 is powered up, independent of the clock chip or GPS.

The counters all will expire as the decrement to a negative value. If you set a counter to a value of zero, it will take one count until it expires. If you set it to ten, it will take eleven counts before it expires. Expired counters are displayed with zero values. Although you can enter values up to 16,777,215, You should keep the settings below one million. This is the guaranteed lifespan for rewriting the EEprom. Values beyond this may wear out the EEprom before they expire. One million minutes is approximately two years. One million hours is equivalent to about 114 years. A letter follows expired/cleared Lock Counter/Timers to show what type of timer it was prior to being cleared/expired.

Keys to clear individual Lock Counter/Timer can be any combination of from one up to eight numbers 0-9 and characters 'A' through 'F' characters. This gives you 4,294,967,295 possible combinations. If you don't enter a password for an individual Lock Counter/Timer through the encoder and LCD on the front of the Br-Brain4, you will not be able to clear it except from this screen. This means that your end users, who presumably won't have access to this screen, will not be able to clear it themselves.

The strings you enter for each password are displayed on the LCD screen on the front of the Br-Brain4 once a password has expired. i.e.: "call me you cheap bastard!" You can use the strings to remind you what lock is that has expired. Although you can enter non-printing characters, the LCD will simply ignore most of them. If you don't like the way the Br-Brain4 'centers' the text you have entered, then you can use 'spaces' to center how ever you would prefer.

Once expired, passwords must be entered to unlock the Br-Brain4. Passwords can be cleared before they expire, and will then never expire. Clearing passwords is done using the encoder and LCD on the front of the Br-Brain4.

Alternatively, the Smart Brick System can be set up to be cleared over a modem line or through the internet using the appropriate modem and software.

I) Show Info:

>This is identical to the Main Menu's command

G) DeadBeat Menu Password:

>This command is used to set the alphanumeric password which is required to enter the DeadBeat Menu. The password to enter this screen defaults to 'DCM'. The password can be changed to any combination of from one up to sixteen alphanumeric characters. If you have changed this password and forget what you changed it to, you will need to return the Br-Brain4 to Gilderfluke & Company so that we can temporarily install firmware to allow us to access this screen [4]. Since most end users will have access to this manual, we strongly suggest you do change it to something else and keep a good record of what it was changed to. Since employees often change over time, do not entrust this information to the keeping of a single employee. Companies that install large numbers of systems may want to standardize on a single password for all Br-Brain4s so that their field service people aren't scrambling to find different passwords.

K) Klear Show Counters:

>The 'Klear show counters' command is used to clear the count of shows that have run on the Br-Brain4. The counts are displayed from the main configuration screen using the 'i) Show Info' command. They can be used to track the popularity of different shows, or to keep records for billing on shows where the client must pay a fee for each run. The latter is occasionally found on motion base attractions, where there is a pay-per-play copyright license on the film. These counters are not automatically cleared when you reload defaults for this menu or change AutoDownload files. You must specifically clear them from the DeadBeat Menu.

---

[4] This is not a warranty repair. The customer will be responsible for shipping and labor charges.

M) **More….:**

> This is identical to the Main Menu's command

O) **Load Defaults:**

> This is identical to the Main Menu's command

P) **Play a Show:**

> This is identical to the Main Menu's command

R) **Save Configs:**

> This is identical to the Main Menu's command

S) **Stop a Show:**

> This is identical to the Main Menu's command

V) **Verify:**

> This is identical to the Main Menu's command

X) **Exit Config:**

> This is identical to the Main Menu's command

G) Configuration Password:

> This command is used to set the alphanumeric password which is required to enter configuration mode on the Br-Brain4. The password to enter this screen defaults to cleared (no password needed). The password can be changed to any combination of from one up to sixteen alphanumeric characters. If you have changed this password and forget what you changed it to, you will need to return the Br-Brain4 to Gilderfluke & Company so that we can temporarily install firmware to allow us to access this screen [5]. Since most end users will have access to this manual, we strongly suggest you do change it to something else and keep a good record of what it was changed to. Since employees often change over time, do not entrust this information to the keeping of a single employee. Companies that install large numbers of

---

[5] This is not a warranty repair. The customer will be responsible for shipping and labor charges.

systems may want to standardize on a single password for all Br-Brain4s so that their field service people aren't scrambling to find different passwords.

Optically Isolated Trigger Input Actions

The following Input Actions are used to start, stop, and generally control the Br-Brain4 through its ten optically isolated trigger inputs. The optically isolated trigger inputs can be used as the sole method to control the Br-Brain4, or as an adjunct to the Br-Brain4's primary serial port.

You set what each of the Trigger Inputs will do on the AutoDownload dialog, (usually) after you have finished programming all of your shows and are ready to send them to the Br-Brain4.

The Br-Brain4 has ten Trigger Inputs. You can set different Input Actions for the 'closing Edge' [6] on the input and the 'opening Edge' [7].This allows you to do things like 'pause' a show on a closure of an input, and then 'continue' it on the opening of the same input.

What you would like each Input to do needs to be set for all the sequencers you are using. You do this by selecting each of the sequencers from the drop down right above where the 'power up actions' and 'Input Actions' are set [8], and then selecting which of the ten inputs you would like to configure.
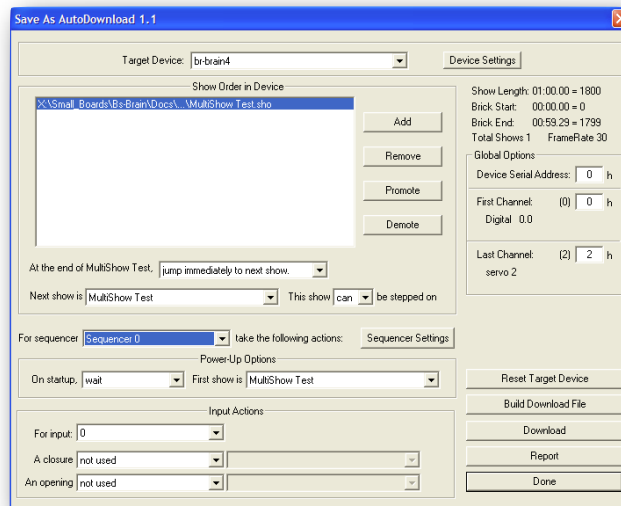
Pc•MACs uses the 'Target Device' to know what options are available for the Trigger Inputs, number of sequencers available, and even the size of the AutoDownload

---

[6] The 'closing edge' is when current starts flowing through the optically isolated input, which is usually when an attached switch 'closes'. The status of all the Trigger Inputs can be seen on the Br-Brain4's 'status' command and 'main' menu.

[7] The 'opening edge' is when current stops flowing through the optically isolated input, which is usually when an attached switch 'opens'. The status of all the Trigger Inputs can be seen on the Br-Brain4's 'status' command and 'main' menu.

[8] If you don't see all the sequencers you are expecting in the drop down, check that the appropriate 'Target Device' is selected at the top of the screen, and press the 'Device Settings' button at the top of the screen to check that all desired sequencers have been selected.

memory available. It looks this up from the GilderGearList each time you do an AutoDownload, so if new features have been added to the Br-Brain4 since your last AutoDownload, you will be able to access them.

Some of the Input Actions require you to enter a second or third value from the drop downs just to their right. Typically these will be a show, or range of shows for the Input Action to use.

A) not used:

This is the default setting for all inputs. Leave any unused inputs as 'not used'

B) Start Show:

This is the most commonly used trigger input command. It tells the Br-Brain4 to start the selected show with the 'looping' flag set. On the LCD display and Br-Brain4's menus, the show status will be shown as 'looping', to indicate that the show will check the 'at end' actions that have been set for the show when it completes playing.

Use the drop down to the right of the Input Action to select whether this Input Action will start playing 'whatever is next' in the AutoDownload list of shows, or a specific show. All the shows in the AutoDownload list will be shown in the drop down, and you can select the specific one you would like to start.

C) Stop Show:

This tells the Br-Brain4 to stop playing a show on a sequencer immediately. The show is frozen at the current frame, as are the analog and digital outputs. On the LCD display and Br-Brain4's menus, the show status will be shown as 'STOPPED', to indicate that the show was not allowed to play to completion. On starting another show on this sequencer, all the analogs will be EasedIn to the new show.

D) Stop At End:

This is the Input Action you use when you want to stop a show which is playing on a sequencer, but allow it to play through to its natural end. On the LCD display and Br-Brain4's menus, the show status will be shown as

'playing', to indicate that the show will NOT check the 'at end' actions that have been set for the show.

E) Pause Show:

This pauses the show playing on the selected sequencer immediately. The analog and digital outputs are frozen at their current states. On the LCD display and Br-Brain4's menus, the show status will be shown as 'paused'.

F) Continue Show:

The opposite of the 'Pause' Input Action, this will allow a paused show to return to playing. On the LCD display and Br-Brain4's menus, the show status will be shown as 'looping' or 'playing', depending on what its status was before the 'pause'.

G) E-stop Show:

This stops a sequencer playing immediately, and prevents the sequencer from being restarted until the 'Clear E-Stop' input action is received, or the Br-Brain4 is reset.

Use the drop down to the right of the Input Action to select whether this Input Action will freeze the outputs at the 'Current Frame' or outputs the first frame of a specific show (Analog outputs will be EasedIn so they don't jump). All the shows in the AutoDownload list will be shown in the drop down, and you can select the specific one you would like to use for E-Stops.

Freezing at the current frame is used when additional movements on the analog outputs is more hazardous than leaving them right where they are (which is often the case on motion bases).

Jumping to the first frame of a specified show allows you to define the E-Stop output levels for all analogs and digitals. Use this to turn on emergency lighting, open doors, and return all outputs to a safe 'home' position.

The E-Stop Input Action is most commonly used on the 'opening' edge input. This is so a wire break or other fault between the Br-Brain4 and an E-Stop button will 'fail safe' on the Br-Brain4.

On the LCD display and Br-Brain4's menus, the show status will be shown as 'E-Stop', to indicate that the sequencer has been locked up and will not be allowed to start any other shows until the E-Stop is E-Cleared.

H) Clear E-stop:

This just clears the lock that the E-Stop puts on a sequencer. This lock prevents it from starting any other shows until it has been cleared.

The 'Clear E-Stop' Input Action is most commonly used on the closing edge of the same input that triggers the E-Stop. This is so that pulling the E-Stop mushroom switch back to it's 'ready' position will also clear the E-Stop lockout.

I) Sequential From List:

This input action can only be selected for the 'Closing' edge on an input. It allows you to define a range of shows that will be played when the input closes. The range can be as short as two shows up to all the shows that are loaded on the Br-Brain4.

Use both of the drop downs to the right of the Input Action to select the 'first' and 'last' show to play from this Input [9]. On the first activation of this input, the Br-Brain4 will play the 'first' show you selected. On subsequent activations it will select and play the shows until it plays the 'last' show you selected. On the next activation, it will start over by playing the 'first' show again.

It is possible to use the 'Sequential from List' and 'Random from List' Input Actions with overlapping ranges for multiple sequencers and multiple inputs. This is all legal to do, but there is only one 'already played' flag for each show. If one sequencer or input has already played a show that is in a range that overlaps with another input or sequencer, that other input or sequencer will consider that show as 'already played' too.

You can tell the Br-Brain4 to reshuffle this list at any time by using the 'Reshuffle List' input action.

J) Random From List:

This input action can only be selected for the 'Closing' edge on an input. It allows you to define a range of shows that will be played when the input closes. The range can be as short as two shows up to all the shows that are loaded on the Br-Brain4.

---

[9] The range of shows shown on the drop downs will change to limit your selection to 'legal' ranges of shows.

Use both of the drop downs to the right of the Input Action to select the 'first' and 'last' show to play from this Input [10]. On each activation of this input, the Br-Brain4 will pick at random a show that falls between the shows you defined as 'first' and 'last' and play it. When it has played all the shows in this range (including the 'first' and 'last'), it will 'reshuffle' the list. On the next activation it will pick and play any show *except* the most recently played show.

It is possible to use the 'Sequential from List' and 'Random from List' Input Actions with overlapping ranges for multiple sequencers and multiple inputs. This is all legal to do, but there is only one 'already played' flag for each show. If one sequencer or input has already played a show that is in a range that overlaps with another input or sequencer, that other input or sequencer will consider that show as 'already played' too.

You can tell the Br-Brain4 to reshuffle this list at any time by using the 'Reshuffle List' input action.

K) Reshuffle List:

This input action can only be selected for the 'Closing' edge on an input. It is used in conjunction with the 'Sequential from List' and 'Random from List' Input Actions to reset the 'already played' flags for a range of shows. The range can be as short as two shows up to all the shows that are loaded on the Br-Brain4. The two drop downs to the right of the Input Action are used to select the 'first' and 'last' show have their 'already played' flags reset.

L) Select RTC Schedule:

Normally the Real Time Clock picks the schedule to use based on the date, and then the day of the week (as set in the schedule file). This Input Action allows you to force the Br-Brain4 to pick and use a specific schedule. The drop down to the right of the Input Action is used to select the schedule, or 'clear' if you want to return to using the schedule set by the date or Day of Week as set in the schedule file.

This feature can be used if you want to suppress scheduled shows when a switch is thrown, or if the system is told when to start and stop running

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[10] The range of shows shown on the drop downs will change to limit your selection to 'legal' ranges of shows.

scheduled shows based upon and input from a central energy control system.

M) Select GPS Schedule:

Normally the GPS picks the schedule to use as set in the GPS file). This Input Action allows you to force the Br-Brain4 to pick and use a specific schedule. The drop down to the right of the Input Action is used to select the schedule, or 'clear' if you want to return to using the schedule set in the schedule file.

N) Binary Bit:

This Input Action allows you to use as many as eight of the trigger inputs to select and play shows using a binary pattern of bits. This allows you to select and play up to 255 shows through the Optically Isolated Trigger Inputs. It is often used with our Kp-200 keypads, which can be stacked together to provide up to 256 buttons.

You can define any of the inputs to any of the binary bits zero through seven. Each of the binary bits should only be used once.

When any of the inputs that are assigned as a binary bit changes, the entire binary byte is scanned. If the result is non-zero, the binary value is used to select and play a show. Care must be taken that all the binary bits are switched simultaneously. Some PLCs have an output update rate which is slower than the Br-Brain4's input scan rate, which can result in unexpected shows being selected and played.

Serial Port Commands

The following commands are used to start, stop, and generally control the Br-Brain4 through its primary serial port. The serial port commands can be used as the sole method to control the Br-Brain4, or as an adjunct to the Br-Brain4's ten optically isolated trigger inputs.

The Br-Brain4's serial port can be accessed 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.

One of the easiest and most flexible types of operator interfaces for accessing the serial network are the many touch screen operator panels. These can be a part of an existing PLC or room automation system (including AMX, Crestron, etc.). Stand-alone touch screen operator panels with serial port outputs are available from a number of different suppliers (Maple Systems and QSI Corp., etc.). These will easily attach directly to the Br-Brain4's (and other GilderGear's) four wire RS-422 serial network. Most of touch screens are sold with a Windows program that will allow you to 'draw' buttons and user interface icons on their screens, attach ASCII strings to these 'buttons', and then download the final configuration to the operator panel. They need no PC or other hardware once they are programmed.

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 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-Brain4 with a terminal program, just configure it for 9600 baud, no parity, eight data bits, one stop bit and no handshaking. If you are using GilderTerm, all the settings are preset. All you will need to do is select the appropriate 'COM' port.

In all the following commands, the command (shown in "quotes") is the ASCII command. You can type these from your keyboard. The commands are all UPPER/lower case sensitive.

The "(card address)" is the serial address of the single card that the will respond to the command. In most cases, the serial address for a card is set either in the serial menu for the card, or in the case of Br-ANAs, by the rotary switches on its face. It represents a two digit ASCII hexadecimal address for the targeted card. Valid characters

are "0" through "9", and "A" through "F". If you set the GilderGear's serial address using a decimal number, the chart on the back page of this manual will help you translate it into hexadecimal.

The "(show #)" is the desired show's position in the AutoDownload list when the AutoDownload file is saved. Valid characters are "0" through "9", and "A" through "F". If you set the GilderGear's serial address using a decimal number, the chart on the back page of this manual will help you translate it into hexadecimal.

The "(sequencer #)" is the sequencer on the targeted Br-Brain4 that the will respond to the command. Valid characters are "A" through "H" (or a through h). If you set the GilderGear's serial address using a decimal number, the chart on the back page of this manual will help you translate it into hexadecimal. Only the Br-Brain4 supports multiple sequencers. The commands for all other GilderGear just omits the (sequencer #).

A) Echo Commands:

"a"(card address)   *Echo On:*
"b"   *Echo Off:*

The 'Echo ON' command will turn on a special mode that will cause all the other serial port commands to echo on the selected card. This used when you are setting up serial commands so you can verify all the commands you are issuing are being received correctly. The sequencer number ('A' through 'H') will be included in most of the echo responses. In the following examples, the 'echo' responses are shown in bold italics:

If you send "a00", on the card addressed at 00h the echo mode will be turned ON:

"card __0, echo mode"

If you send "*03A" to request a specific show on all cards:

"card __0, Sequencer 'A', requested show __3 ShowName3"

If you send "t00A" to start the requested show playing on a specific card:

"card __0, Sequencer 'A', starting show __3 ShowName3"

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

"card __0, Sequencer 'A', looping show __4 ShowName4"

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

"card __0, Sequencer 'A', stopped show __5 ShowName5"

Error messages will be returned whenever you ask the card to do something that it cannot do at the current time.

The 'Echo OFF' command turn off the echo mode on all the cards in the system. It does not echo anything.

B) Card Reset:

"j5AA5" (card address)

This command will erase the AutoDownload file on the Sd Flash Card on the Br-Brain4. Needless to say, this command is only rarely used in a completed installation.

C) Card Status:

"i" (card address)

The status screen is a snapshot image of the current status of the Br-Brain4. If you want to update the status information displayed, you must hit the 'Card Status' command again.

When the Br-Brain4 receives this command, it will respond with the following:

```
Gilderfluke & Co.
Br-Brain4 Smart Brick Brain
v4.05 - copyright 2012 DCM
Shows: 2, Ch: 123 @ ___0, ADL: AutoDownload_Filename
Leofoo Br-brain4 @ Serial Address: __0
Sequencer 'A' , show #__1 Show_FileName looping @ frame _____38
Sequencer 'B' , show #__1 Show_FileName paused  @ frame ____3554
Sequencer 'C' , show #__1 Show_FileName playing @ frame ____4077
Sequencer 'D' , show #__1 Show_FileName disable @ frame ____3373
Sequencer 'E' , show #__1 Show_FileName stopped @ frame ____3224
Sequencer 'F' , show #__1 Show_FileName looping @ frame ____3076
Sequencer 'G' , show #__1 Show_FileName STOPPED @ frame ____2914
Sequencer 'H' , show #__1 Show_FileName E-Stop  @ frame ____2778
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
```

Status Dump

The Status Dump shows:

a) number of shows in the AutoDownload file

b) number of channels in the AutoDownload file

c) address offset of the first channel in the AutoDownload file

d) name of the AutoDownload file

e) name of the AutoDownload target device

f) serial address of the AutoDownload target device

g) for each of the sequencers:

  a) show number the sequencer is playing

  b) name of the show

  c) playing status (looping, playing, stopped, paused, E-Stopped, etc.)

  d) frame number into the current show

h) Status of all ten of the optically isolated trigger inputs

D) Start Commands:

"t" (card address) (sequencer #)   ***Start Track:***
"u" (sequencer #)   ***Start Global:***

Instead of the 'start' commands, the 'loop' commands are generally a better choice. The difference between the 'start' and 'loop' commands are that at the end of a show which is started with a 'loop', it will check to see if any actions were set for the end of the show. A show that is started with the 'start' command will play to the end and then just stop and wait for the next command.

These commands start the animation playing on the Br-Brain4(s) addressed by the command. The shows will always start from the beginning (frame zero). If an addressed Br-Brain4 is looping shows, it will have the 'LOOPING SHOWS' flag reset.

If the Br-Brain4 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-Brain4 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-Brain4, 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-Brain4 is already playing a show which has this option set, it will ignore this command.

E) Stop Commands:

"x" (card address) (sequencer #)   ***Stop Track:***
"y" (sequencer #)   ***Stop Global:***

These commands stop the selected Br-Brain4(s) unconditionally. The stop takes place at the current frame being played.

F) Loop Commands:

"!" (card address) (sequencer #)   ***Loop Track:***
" " " (sequencer #)   ***Loop Global:***

Instead of using the 'start' commands, the 'loop' commands are generally a better choice. The difference between the 'start' and 'loop' commands are that at the end of a show which is started with a 'loop', it will check to see if any actions were set for the end of the show. A show that is started with the 'start' command will play to the end and then just stop and wait for the next command.

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-Brain4 is told to stop.

G) Stop at End Commands:

"%" (card address) (sequencer #)   ***Stop at End Track:***
"&" (sequencer #)   ***Stop at End Global:***

These commands reset the 'LOOPING SHOWS' flag in the selected Br-Brain4(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, instead of stopping in the middle. The STOP commands are used when you want to stop a show immediately.

H) Select Show Commands:

")" (card address) (show#) (sequencer #)   ***Select Show Track:***
"*" (show#) (sequencer #)   ***Select Show Global:***

Up to two hundred fifty-five different animated shows can be stored on a single Br-Brain4. These commands can be used to select an individual show on the selected Br-Brain4(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.

I) Show Pause Commands:

"<" (card address) (sequencer #)   ***Pause Show:***
">" (card address) (sequencer #)   ***Continue Show:***

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.

Br-Brain4 Firmware Updates

The firmware in a Br-Brain4 can easily be upgraded at any time. To update the firmware:

1) Download the BRAIN4.FRM file from the [Gilderfluke & Co.](#) website

2) Unzip the file (if needed)

3) Place the BRAIN4.FRM file onto a formatted Sd/SdHC flash card

4) Power down whatever the Br-Brain4 is controlling. You don't want your show to do anything unexpected during the update

5) While the Br-Brain4 is running, remove the Sd/SdHC flash card it is using

6) Replace it with the Sd/SdHC flash card that has the BRAIN4.FRM file on it

7) The Br-Brain4 will update itself

8) Once the firmware update has completed, remove the Sd/SdHC flash card that has the BRAIN4.FRM file on it

9) Insert the the Sd/SdHC flash card with your shows on it

10) Power back up (or enable) whatever the Br-Brain4 is controlling.

During firmware updates, the LCD will also display information on which stage of the update the Br-Brain4 is on and the eight green sequencer LEDs will flash in a circular pattern.

The first stage is comparing the BRAIN4.FRM file on the Sd card. It then flashes a little slower as it reads the BRAIN4.FRM file in from the Sd card. It then flashes much more quickly as it reprograms the microcontroller in the Br-Brain4.

Under no circumstances remove power from the Br-Brain4 while firmware is being updated. A partial firmware update may 'brick' the Br-Brain4, and then it will need to be returned to the factory for reprogramming.

write down your earliest memory from childhood

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HEXadecimal to Decimal to Percentage

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

decimal	HEX	ASCII	%	decimal	HEX	ASCII	%	decimal	HEX	ASCII	%	decimal	HEX	ASCII	%
00	00	null	0	64	40	@	25%	128	80	(null)	50%	192	C0	(@)	75%
1	01	soh/^A		65	41	A		129	81	(soh)		193	C1	(A)	
2	02	stx/^B		66	42	B		130	82	(stx)		194	C2	(B)	
3	03	etx/^C		67	43	C		131	83	(etx/)		195	C3	(C)	
4	04	eot/^D		68	44	D		132	84	(eot)		196	C4	(D)	
5	05	eng/^E		69	45	E		133	85	(eng)		197	C5	(E)	
6	06	ack/^F		70	46	F		134	86	(ack)		198	C6	(F)	
7	07	bell/^G		71	47	G		135	87	(bell)		199	C7	(G)	
8	08	bs/^H		72	48	H		136	88	(bs)		200	C8	(H)	
9	09	ht/^I		73	49	I		137	89	(ht)		201	C9	(I)	
10	0A	lf/^J		74	4A	J		138	8A	(lf)		202	CA	(J)	
11	0B	vt/^K		75	4B	K		139	8B	(vt)		203	CB	(K)	
12	0C	ff/^L		76	4C	L		140	8C	(ff)		204	CC	(L)	
13	0D	cr/^M		77	4D	M		141	8D	(cr)		205	CD	(M)	
14	0E	so/^N		78	4E	N		142	8E	(so)		206	CE	(N)	
15	0F	si/^O		79	4F	O		143	8F	(si)		207	CF	(O)	
16	10	dle/^P		80	50	P		144	90	(dls)		208	D0	(P)	
17	11	dc1/^Q		81	51	Q		145	91	(dc1)		209	D1	(Q)	
18	12	dc2/^R		82	52	R		146	92	(dc2)		210	D2	(R)	
19	13	dc3/^S		83	53	S		147	93	(dc3)		211	D3	(S)	
20	14	dc4/^T		84	54	T		148	94	(dc4)		212	D4	(T)	
21	15	nak/^U		85	55	U		149	95	(nak)		213	D5	(U)	
22	16	syn/^V		86	56	V		150	96	(syn)		214	D6	(V)	
23	17	etb/^W		87	57	W		151	97	(etb)		215	D7	(W)	
24	18	can/^X		88	58	X		152	98	(can)		216	D8	(X)	
25	19	em/^Y		89	59	Y		153	99	(em)		217	D9	(Y)	
26	1A	sub/^Z		90	5A	Z		154	9A	(sub)		218	DA	(Z)	
27	1B	ESC		91	5B	[		155	9B	(ESC)		219	DB	([)	
28	1C	FS		92	5C	\		156	9C	(FS)		220	DC	(\)	
29	1D	GS		93	5D	]		157	9D	(GS)		221	DD	(])	
30	1E	RS		94	5E	^		158	9E	(RS)		222	DE	(^)	
31	1F	VS		95	5F	_		159	9F	(VS)		223	DF	( )	
32	20	SP	12.5%	96	60	`	37.5%	160	A0	(SP)	62.5%	224	E0	(`)	87.5%
33	21	!		97	61	a		161	A1	(!)		225	E1	(a)	
34	22	"		98	62	b		162	A2	(")		226	E2	(b)	
35	23	#		99	63	c		163	A3	(#)		227	E3	(c)	
36	24	$		100	64	d		164	A4	($)		228	E4	(d)	
37	25	%		101	65	e		165	A5	(%)		229	E5	(e)	
38	26	&		102	66	f		166	A6	(&)		230	E6	(f)	
39	27	'		103	67	g		167	A7	(')		231	E7	(g)	
40	28	(		104	68	h		168	A8	(()		232	E8	(h)	
41	29	)		105	69	i		169	A9	())		233	E9	(i)	
42	2A	*		106	6A	j		170	AA	(*)		234	EA	(j)	
43	2B	+		107	6B	k		171	AB	(+)		235	EB	(k)	
44	2C	'		108	6C	l		172	AC	(')		236	EC	(l)	
45	2D	-		109	6D	m		173	AD	(-)		237	ED	(m)	
46	2E	•		110	6E	n		174	AE	(•)		238	EE	(n)	
47	2F	/		111	6F	o		175	AF	(/)		239	EF	(o)	
48	30	0		112	70	p		176	B0	(0)		240	F0	(p)	
49	31	1		113	71	q		177	B1	(1)		241	F1	(q)	
50	32	2		114	72	r		178	B2	(2)		242	F2	(r)	
51	33	3		115	73	s		179	B3	(3)		243	F3	(s)	
52	34	4		116	74	t		180	B4	(4)		244	F4	(t)	
53	35	5		117	75	u		181	B5	(5)		245	F5	(u)	
54	36	6		118	76	v		182	B6	(6)		246	F6	(v)	
55	37	7		119	77	w		183	B7	(7)		247	F7	(w)	
56	38	8		120	78	x		184	B8	(8)		248	F8	(x)	
57	39	9		121	79	y		185	B9	(9)		249	F9	(y)	
58	3A	:		122	7A	z		186	BA	(:)		250	FA	(z)	
59	3B	;		123	7B			187	BB	(;)		251	FB	( )	
60	3C	<		124	7C			188	BC	(<)		252	FC	( )	
61	3D	=		125	7D	l		189	BD	(=)		253	FD	(l)	
62	3E	>		126	7E	~		190	BE	(>)		254	FE	(~)	
63	3F	?		127	7F	del		191	BF	(/)		255	FF	(del)	100%