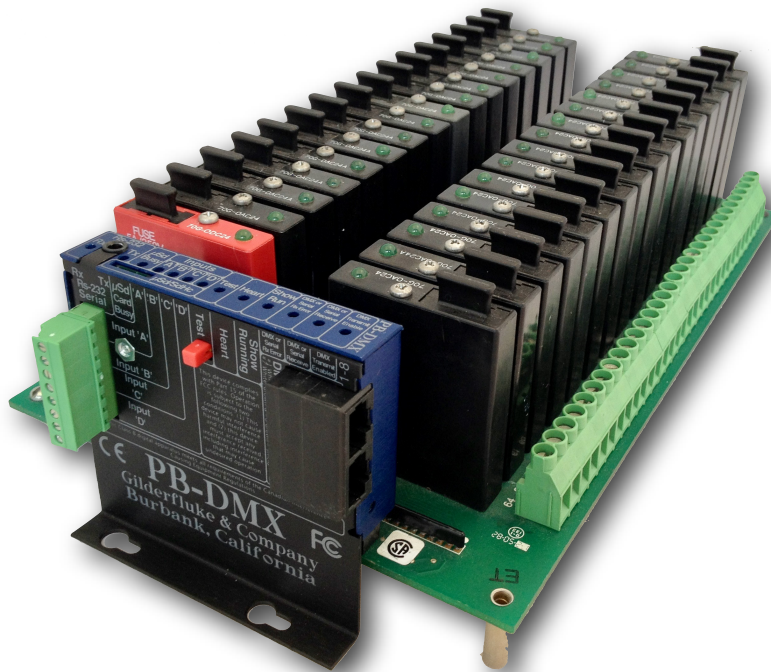


Pb-DMX/

Digital Relay Output Show Control System



The **Pb-DMX/** is a complete, stand-alone Show Control System that plugs right onto Grayhill 'G5' relay mounting boards. The combination of the **Pb-DMX/** controller and relays provides up to thirty two high current (rated at 3.5 amps each), high voltage (AC to 240 vac, DC to 60 vdc) outputs, and four trigger inputs. It can run from a μ Sd/ μ SdHC flash card, RS-232 serial port, or industry-standard DMX-512 input. The **Pb-DMX/** is also capable of receiving or transmitting a full universe of DMX-512. The DMX-512 can be used to control light dimmers, smoke machines, wiggle lights, additional **Pb-DMX/s**, or any other piece of DMX-512 compatible equipment.

The **Pb-DMX/** is typically programmed using our **Pc•MACs** Show Control software. Once a program is 'drawn' using the **Pc•MACs** software, data is sent to the **Pb-DMX/** through the RS-232 serial port. The **Pb-DMX/** can then be disconnected from the PC and it will run all by itself.

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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Getting Started with an Pb-DMX/ (quickly).....	7
Starting a New Show in Pc•MACs:.....	8
Open Pc•MACs Program:.....	8
Select 'New...' show from Pc•MACs' 'File' menu:.....	8
Select a 'new' or existing 'Site' file:.....	8
Save your new show into a new 'Project folder':.....	9
Close the 'New Show' dialog / Open the 'Channels List' dialog:.....	9
Select the 'Add Device with Channels' command:.....	10
Add Audio/Video Device to the Channels List:.....	10
Triggering Audio/Video Files:.....	11
Add an Audio/Video device:.....	11
Add a Trigger:	11
Programming Your Show:.....	13
AutoDownloading Shows:.....	14
Open the 'Save to AutoDownload' dialog:.....	14
Pick the 'Target Device' for this AutoDownload:.....	14
Pick the Range of Channels for this AutoDownload:.....	14
Pick the 'Shows to AutoDownload to Target Device':.....	14
Set what the Target Device does on StartUp:.....	14
Set what the Target Device does on each Trigger Input:.....	15
Build your AutoDownload file:.....	15
Close the AutoDownload dialog:.....	15
Pb-DMX/ Overview.....	17
Pb-DMX/ LEDs, Switches and Connections.....	21
LEDs:.....	21
Red 'Test' button:.....	22
RS-232 Serial Port:.....	22
DMX-512 Input/Output:.....	23
'A', 'B', 'C' & 'D' Trigger Inputs:.....	25
Power Supply:.....	25
Relay Outputs:.....	26
Shows Capacities for Pb-DMXs.....	28
Optically Isolated Trigger Input Actions.....	29
not used.....	30
Start Show.....	30
Stop Show.....	30
Stop At End.....	30
Pause Show.....	30
Continue Show.....	30
E-stop Show.....	31
Clear E-stop.....	31
Sequential From List.....	31
Random From List.....	32
Reshuffle List.....	33
Analog Limit.....	33
Binary Bit.....	33
Initialize Down Counter:.....	34
Decrement Down Counter:.....	34

Pb-DMX/ Configuration Menu.....	35
First DMX-512 address:.....	39
Digitals use analog/digital data:.....	39
Sequencer Enabled:.....	40
DMX Mode:.....	40
Strobe Timer:.....	40
Numbering:.....	41
DMX 0/1-Based:.....	41
Halt.....	41
AutoDownload File Info.....	41
Address to Test:.....	41
Test Output.....	42
Last.....	42
Next.....	42
Load Defaults.....	43
Play.....	43
Verify.....	43
Set Virtual Trigger Address:.....	43
eXit Configuration.....	43
Pb-DMX/ Serial Port Commands.....	44
Echo Commands.....	45
“a” (card address) Echo On.....	45
“b” Echo Off.....	45
Card Reset.....	46
“j5AA5” (card address).....	46
Card Status.....	46
“i” (card address).....	46
Start Commands.....	47
“t” (card address) Start Track.....	47
“u” Start Global.....	47
Stop Commands.....	48
“x” (card address) Stop Track.....	48
“y” Stop Global.....	48
Loop Commands.....	48
“l” (card address) Loop Track.....	48
“ ” Loop Global.....	48
Stop at End Commands.....	48
“%” (card address) Stop at End Track.....	48
“&” Stop at End Global.....	48
Select Show Commands.....	48
“)” (card address) (show#) Select Show Track.....	48
“*” (show#) Select Show Global.....	48
Show Pause Commands.....	49
“<” (card address) Pause Show.....	49
“>” (card address) Continue Show.....	49
Pb-08, Pb-16, Pb-24 and Pb-32 Dimensions.....	50
FCC and CE Compliance:.....	52
EC DECLARATION OF CONFORMITY.....	52
HEXadecimal to Decimal to ASCII to Percentage.....	53

Getting Started with an Pb-DMX/ (quickly)

The following instructions describe how to quickly let the latest versions of Pc•MACs set up and play shows from a **Pb-DMX/**.

These instructions assume that you are using a version of Pc•MACs that supports the new drag-n-drop Audio/Video triggers (later than PcMACs 2.0.217.1). This is available from the [Software/Drivers](#) page on the [Gilderfluke & Co. website](#) for download.ⁱ

For these demos, you don't need to actually connect the **Pb-DMX/** to whatever you are eventually going to be controlling. If you just want the LEDs on the **Pb-DMX/** to blink, you can just power it up, program and load your shows.

If you do want to hook up everything first, the [connections](#) for the **Pb-DMX/** outputs can be found elsewhere in this manual.

The following instructions cover creating a show, but only minimal instructions on the actual programming of the show once it has been created. A primer on programming the show can be found in the Pc•MACs manual or in our [GilderYouTube](#) video tutorials.

i Once the software or firmware has been added to your cart, you can hit the 'checkout' button (which is hidden in the top or bottom margin of the window). The web page makes it look like you are buying something when all you need to do is a download. Just set the 'shipping' to 'download' when you are checking out and our web page will send the latest version of Pc•MACs to you gratis.

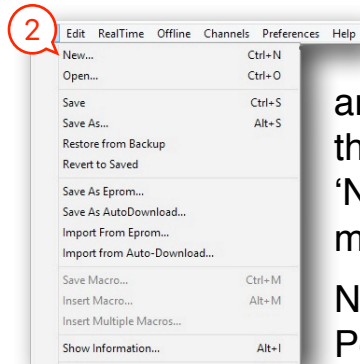
Starting a New Show in Pc•MACs:

To start a new Pc•MACs show for a **Pb-DMX/** (or any other GilderGear!), just take the following few easy steps:

1) Open Pc•MACs Program:

You can do this by double clicking on Pc•MACs icon or the shortcut it left on your desktop during the installation.

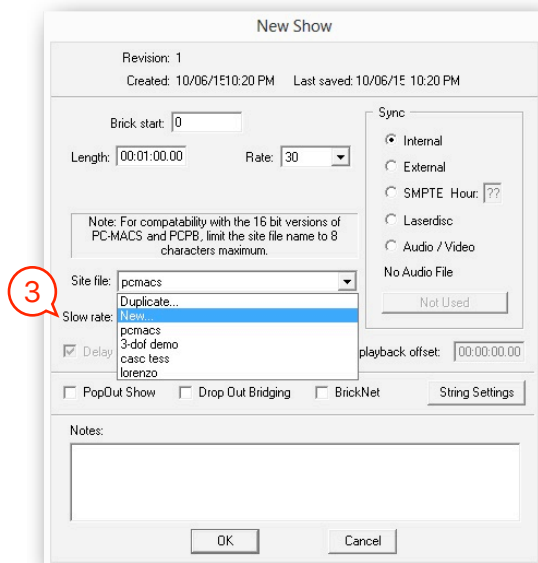
2) Select 'New...' show from Pc•MACs' 'File' menu:



This will open the 'New Show' dialog. There aren't too many things that need to be set up here, and anything you do set can be changed later by accessing the 'Show Information' dialog (which is identical to the 'New Show' dialog, which is also found under the 'File' menu).

No settings for your shows are chiseled in stone under Pc•MACs. You can change the frame rate, length, time code or anything else from the 'Show Information' dialog at any time in the future.

3) Select a 'new' or existing 'Site' file:



The 'Site' file is where Pc•MACs stores information about everything Pc•MACs is controlling at a specific 'site'. This includes types of inputs and outputs, the names you have given them, the console and other presets, AutoDownload settings, and much more.

Depending on the type of shows you build, a 'Site' could be an attraction at a theme park, a display in a museum, a fountain, or a stand-alone 'prop' built by the dozens for the haunt market. No matter what type of shows you are building, each 'Site' should have its own unique 'Site' file. You should not use the default 'PcMACs.ste' 'Site' file for any 'real' shows. If you do, you have a good chance of screwing up your shows if you use it again on another installation.

All the shows that run at a given 'Site' must use the same 'Site' file. Using the same site file keeps you from needing to enter the channel information each time you start a new show. If you modify or add a preset,

change the name of an output, or anything else, it will instantly and automatically be applied to all other shows which use the same 'Site' file.

To select an existing 'Site' file, there is a drop-down that lists every 'Site' file that you have ever used on your computer. If you are new to Pc•MACs, this list of previous projects will be short. You can select one of these existing site files, if appropriate. If you are starting a new site file, scroll to the top of the list to choose a 'New' site file. Enter the name for your new site file.

You can guess about the length of your show, but if you will be adding audio or video files to the show, Pc•MACs can automatically do this for you a bit later if your show is longer than a the default one minute length.

Just leave the 'sync' radio buttons set for 'internal'. Although this is where we used to select the audio or video file to use, it is now easier to do on the OffLine Editing Window.

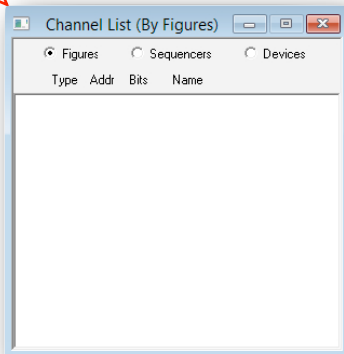
4) **Save your new show into a new 'Project folder':**

Use either the 'Save' or 'Save as...' command under the 'File' menu. First create a new 'Project folder' on your desktop, in your 'Documents' older, or somewhere that you will be able to find later. We typically give all 'project folders' the name of the site, followed by the two words 'Project Folder'. The 'Project folder' will be used for ALL the files used on your Pc•MACs project for this site. When you want to back up your project, you just back up this 'Project folder'. Every file you have used will then be backed up.

Once you have created your 'Project' folder, save your new show. Any other shows you make for use in this project should also be saved into this folder.

5) **Close the 'New Show' dialog / Open the 'Channels List' dialog:**

5



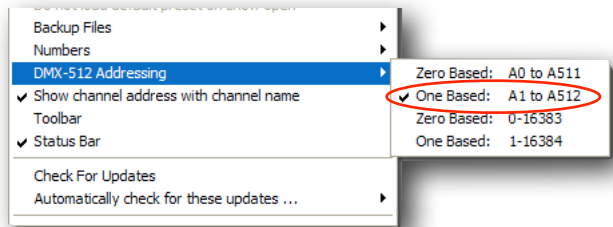
If you are reusing an existing 'Site' file, you can skip down to 'Add Audio/Video Device to the Channels List'.

If you are using a new 'Site' file for this show, when you close the 'New Show' dialog, the 'Channels List' will automatically open. It will be very empty (see at left). The next step is to fill it in (see next page)...

In all the following 'Channels List' commands, you can use the command from the 'Channels' menu, or just right+click in the Channels List and pick the command from

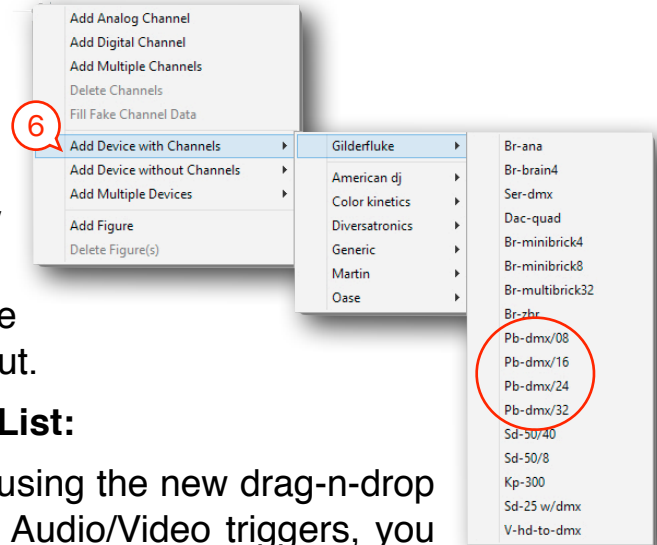
the contextual menu that will magically appear.

Before you add anything to the channels list, you will want to check that the DMX-512 addressing is set to the more commonly used ‘one-based’ (1 to 512) DMX-512. This is near the bottom of the ‘Preferences’ menu.



6) Select the ‘Add Device with Channels’ command:

Slide over to pick whatever GilderGear and third party hardware you need in your show. Repeat this as needed. At least one of these devices should be the Pb-DMX/ you are programming. If you are adding several of the same items, you can use the ‘Add Multiple Devices’ command as a shortcut.

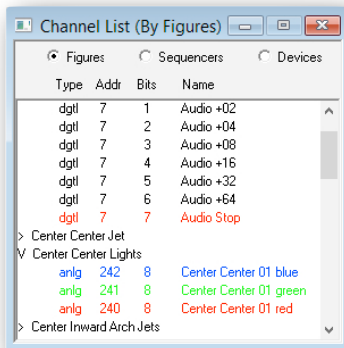


7) Add Audio/Video Device to the Channels List:

If your ‘Site’ file that is already set up for using the new drag-n-drop Audio/Video triggers, or you won’t be using Audio/Video triggers, you can skip down to ‘Triggering Audio/Video Files’.

At least one of these devices should be the an Audio/Video player if you want to try the new drag-n-drop Audio/Video triggers later in this demo.

The DMX-512 address order is determined by the order in which you add channels to the Channels List. Pc•MACs, GilderGear, and other DMX-512 devices don’t really care about the order in which you add them. Always set the DMX-512 address of any GilderGear or third party gear to match the DMX-512 address shown in the ‘addr’ column on the Channels List.



To help you keep your Channels List orderly, you can use the ‘Add Figure’ command to create folders, and drag and drop individual outputs or entire figures into it. Folders can now be nested several layers deep in your Channels List.

Hint: If you create a figure and highlight it, any analog or digital channels or devices you add will go right into that folder, saving you the trouble of moving them later.

Triggering Audio/Video Files:

If you won't be using Audio/Video triggers, you can skip down to 'Programming Your Show'.

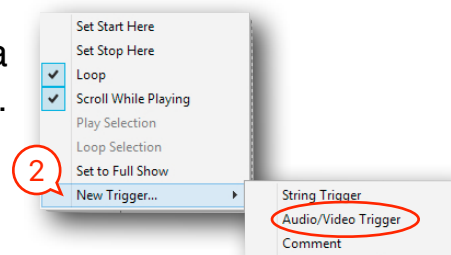
An Audio/Video device can be an Sd-25 w/DMX, Sd-50/8 or Sd-50/40 audio player/amplifier or a BrightSign video player triggered using its GPIO port via a v-Hd-to-DMX or v-Hd-to-1/4J6 and running the GilderScript. You may want to connect your Audio/Video device to the Pb-DMX/ via DMX-512, as well as your speakers and a power supply.

1) Add an Audio/Video device:

Add at least one Audio/Video device to your channels list, as described above.

2) Add a Trigger:

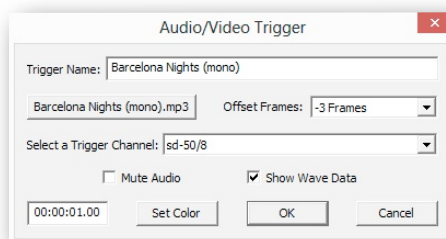
To add a drag-n-drop Audio/Video trigger to a show, just open the OffLine Editing Window. Right+Click anywhere on the main window, except on an analog or digital channel. A contextual menu will appear...



Select 'New Trigger'. This will give you the option of adding:

a) String Trigger: Text to be sent out through the Br-Brain4's secondary COM port. You can name each string as you create it. The same string can be selected by name and reused in any other show that uses the same site file. The default 'name' for the trigger is the name you give to the string you are sending.

b) Audio/Video Trigger: Here's where you now add Audio/Video playback to a show. Just pick the player from the pulldown (Sd-25 w/DMX, Sd-50, BrightSign video player, etc.), and choose your Audio/Video file. That's really all you need to do!

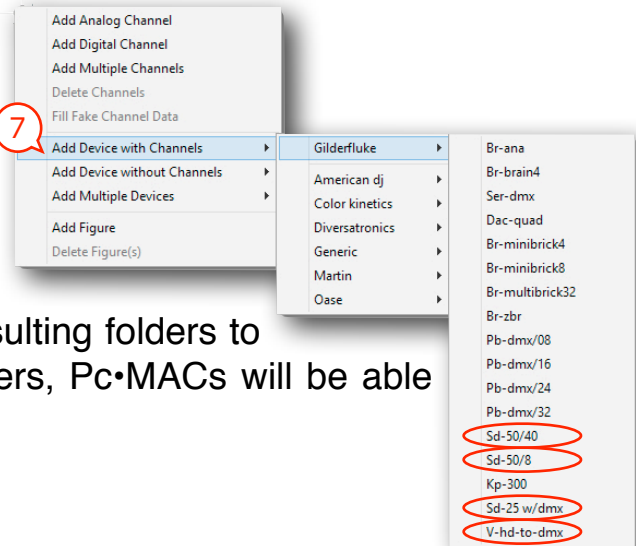


c) Comment: Allows you to make notes to yourself that appear as part of the timeline. These are used to display dialog from a show, or just for notes to yourself. The default 'name' for the trigger is the text you enter.

You can have multiple drag-n-drop Audio/Video triggers in each show, and Pc•MACs will keep track of them for you, only downloading the Audio/Video files you have used. Pc•MACs will automatically add an offset to compensate for any triggering delays when it 'draws' in the Audio/Video

triggers during the AutoDownload process. If needed, you can adjust this using the 'offset frames' dropdown on the Audio/Video Trigger dialog. While you are working in Pc•MACs, you can also choose whether you want to mute audio or video output from your computer, and if the waveform is displayed on the OffLine Window.

If you want your Audio/Video files to play back from your Audio/Video devices, just do a quick AutoDownload, and drag the resulting folders to the players. Once the files are on the players, Pc•MACs will be able to trigger them too.



Programming Your Show:

At this point you can program the rest of your show. You can reference the [GilderYouTube](#) video tutorials, or the Pc•MACs manual for details on how to get started with show programming.

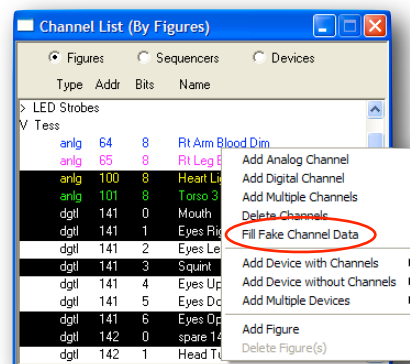
OffLine Editing Window programming can be as simple as:

- 1) Press the 'Selected Channels' button at the bottom middle of the OffLine Editing Window. This opens the 'Move to OffLine' dialog.
- 2) Select all the other Show Control channels you created and move them from the left 'Not Editing' column to the right 'Editing' column.
- 3) Move any the 'Audio Triggers' from the right 'Editing' column to the left 'Not Editing'. You don't want any extraneous data in these channels!
- 4) Click OK to close the 'Move to OffLine' dialog and automatically open the OffLine Editing Window.
- 5) Draw 'lines' all over the Digital channels using the right mouse button. Mush around the analogs using the rubberbanding and other editing commands.

Without a Pc•MACs RealTime license, you can program the first 16 channels (128 digitals, 16 analog channels, or a combination of the two) in realtime by connecting your **Pb-DMX/** to your PC using a [C-USB-RS232](#) and [Mp3-50/CBL](#). Just select the serial port from the Preferences/Hardware Setup/Serial Port Options dialog and check ON the 'manual' mode. The Soft Console can be opened from under the Realtime/Show Soft Console command (shortcut = [F5]). You can assign your Analogs and Digitals to the Soft Console, and control and program them using your mouse and keyboard, or using a gaming joystick.

With a [MACs-License](#) and one or more [USB-DMX512 Adapter](#), you can program hundreds or even thousands of channels.

You can also select random channels in the Channels List, and use the 'fake data' command to instantly fill those channels with, as you might expect, fake data. Analogs ramp up and down (triangle waves) and digitals pulse on and off. The period for these are chosen randomly for each output channel. Don't put 'fake' data into the audio trigger channels!



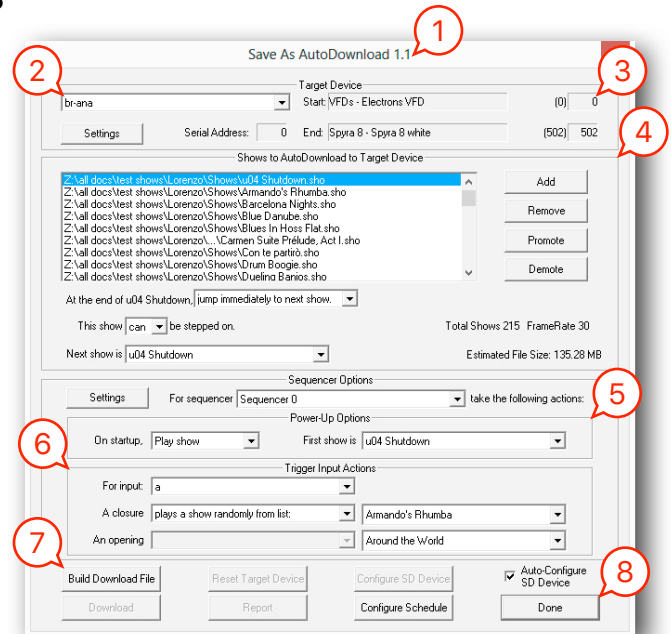
AutoDownloading Shows:

The final step in programming any show is to generate an AutoDownload file to run on the permanent Show Control System. In this case, this will be your Pb-DMX/. An 'AutoDownload Quick Start', as well as full instructions on AutoDownloading shows is found in the Pc•MACs manual. Pc•MACs automates most of this process for you.

All you need to do is:

1) Open the 'Save to AutoDownload' dialog:

The 'Save to AutoDownload' dialog is found under the 'File' menu. The AutoDownload dialog has four sections. You start at the top of the dialog, and work your way to its bottom to complete your AutoDownload:



2) Pick the 'Target Device' for this AutoDownload:

Pc•MACs automatically picks the most likely 'Target Device' for your AutoDownload. This will probably be your Pb-DMX/. If you want to build the AutoDownload file for another device in your Channels List (if your Pb-DMX/ are not going to be used as the DMX-512 'master' in your installation), just pick it from the drop-down.

3) Pick the Range of Channels for this AutoDownload:

Unless you tell it otherwise, Pc•MACs will automatically download ALL the channels in your Channels List, or at least as many as the target Device can hold. You can pick the range of channels using either the name if the channel or DMX-512 address for the channel.

4) Pick the 'Shows to AutoDownload to Target Device':

Use this section to choose which shows will go into this AutoDownload file. You can reorder them as needed, and pick one or more show files at a time to set what happens at the end of the show, and whether it can be stepped upon (or not) by another show request coming in while it is still running.

5) Set what the Target Device does on StartUp:

Use this section to set which show gets loaded and what happens when power is applied to the Target Device. It can play the show, or just load the first frame of data from your startup show and wait for the first trigger to arrive. Most shows use only a single sequencer. On Multi-Sequencer Shows for a Br-Brain4, you can set this for each sequencer.

6) Set what the Target Device does on each Trigger Input:

Different Target Devices have different numbers of trigger inputs, and different things they can do with them. You can pick one input at a time, and set what will happen on both the opening and closing edges of the input you have chosen. Most shows use only a single sequencer. On Multi-Sequencer Shows running on a Br-Brain4, you can set this for each sequencer.

7) Build your AutoDownload file:

Once you have completed all the settings, you can use the 'Build Download File' button to simply build the AutoDownload file. You can rename the AutoDownload when Pc•MACs asks you for a name, or use the default name and location. Your previous files will be moved to the 'old AutoDownloads' folder.

The AutoDownload files by default will be stored in a folder Pc•MACs creates named 'Download Files' in your 'Project folder'. Inside of this will be a folder with the same name as the site file used for your shows. Inside this are the individual drag-n-drop folders for each 'Target' or Audio/Video device used in your shows. At the end of the AutoDownload, Pc•MACs automatically opens the AutoDownload Target's folder for you. This makes it easy to drag the AutoDownload and set files to your flash card.

8) Close the AutoDownload dialog:

Once you have completed the AutoDownload, you can close the AutoDownload dialog.

The drag-n-drop folders that Pc•MACs creates can all be found in the 'Download Files/SiteFileName/' folder text to the folder where your shows are stored. Pc•MACs will open this for you when it completes the AutoDownload.

The drag-n-drop folder Pc•MACs creates for a **Pb-DMX/** AutoDownload target device contains:

- 1) AutoDownload file for your shows (only for the 'AutoDownload target device'). This file typically has the filename extension of 'a00'.
- 2) 'Set' file: A text file with information about the files that are contained in the AutoDownload file. You can open this text document with Windows' Notepad or WordPad.

If you have used the drag-n-drop Audio/Video triggers in your shows, and have the 'Auto Configure SD Device' checked (it's 'on' by default), Pc•MACs will gather up all the audio and video files used by your shows, put them in the proper order for the player(s), configure the player(s) for you, and 'draw' in all of the Audio/Video triggers in the shows to start the Audio/Video files playing at the appropriate times.

If you are AutoDownloading to an Sd-50/8 or Sd-50/40, the only question Pc•MACs will ask you is if you want to use the built-in amplifier or not. Pc•MACs

only asks this on the first AutoDownload for an Sd-50/8 or Sd-50/40, and uses whatever you picked for all subsequent AutoDownloads.

The drag-n-drop folder Pc•MACs creates for each Sd-50/8 or Sd-50/40 contains:

- 1) 'SOUNDS' folder for all the SoundFiles used in your shows
- 2) SD-50.CFG configuration file for the Sd-50/8 or Sd-50/40
- 3) Sd-50 Config.exe program incase you need to manually open the SD-50.CFG configuration file if needed (this won't normally be needed)
- 4) AutoDownload file for your shows (only if the Sd-50/8 or Sd-50/40 is selected as the 'AutoDownload target')
- 5) 'Set' file: A text file with information about the files that are contained in the AutoDownload file (only if the **Sd-50/8** or **Sd-50/40** is selected as the 'AutoDownload target')

For Sd-25s w/DMX, Pc•MACs creates a drag-n-drop folder for each Sd-25 in your installation. Inside this drag-n-drop folder are all the SoundFiles needed by the Sd-25, along with a text file telling you what the proper settings for the dipswitches are, and listing out the SoundFiles that are in this folder.

For each BrightSign video player triggered thru GPIO using either the v-Hd-to-DMX or v-Hd-to-1/4J6 and running the GilderScript, Pc•MACs will create a drag-n-drop folder. Within this folder, Pc•MACs will create the 'playlist' folders and place the video files you have used into each of these. You will need to manually add the GilderScript to the folder. Optionally, you can also add a 'Background loop' folder to any video drag-n-drop folder. Any VideoFiles found in a 'Background loop' folder will be played whenever no triggered files are being played.

At the end of the AutoDownload process, Pc•MACs will have made a drag-n-drop folder the Target Device and every Audio/Video device that your installation uses. Pc•MACs automatically opens the folder for the AutoDownload 'Target Device', which contains the actual AutoDownload file and 'set' fileⁱⁱ. Just drag-n-drop the content of each of these folders (NOT the entire folder!) onto blank flash cards, and insert them into your players.

ii The 'Set' file is a simple text file with the listing of the shows and settings which were used in the AutoDownload file.

Pb-DMX/ Overview

The **Pb-DMX/** can be used to control animated shows and displays, fountains, fireworks, lighting, sound systems, simulators, audio and video sources, slide and movie projectors, fiber optics, window displays, motors, pneumatic and hydraulic systems, special effects, signs, machines and machine tools in process control, or anything else that can be controlled by a digital (on/off) electrical signal.

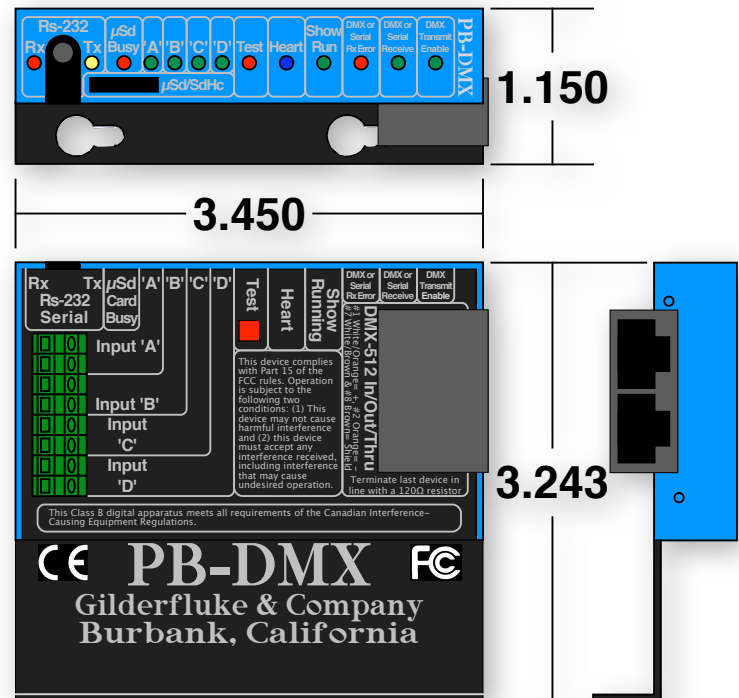
When combined with a Grayhill 'G5' relay module and relays, the **Pb-DMX/** is a complete stand-alone Show Control System for controlling digital (On/Off) functions. Each of the thirty-two outputs is capable of providing 3.5 amps of continuous AC or DC output power. It can be used singly, or in combination with additional **Pb-DMX/s**, Smart Bricks, Dumb Bricks or Digital Audio Repeaters. To add sound, use a **Sd-25** Audio Repeater. For video, use a [BrightSign video player](#) with a [v-Hd-to-DMX](#) adapter and [v-HdGilderScript](#).

Although the **Pb-DMX/** can run a sequence from its on-board μ Sd flash card, in many applications it will be using the data from a DMX-512 network. In this way, all the primary side wiring of an installation with thousands of outputs (up to 4096) can be wired with only a single Rj-45 (Ethernet-style) cable carrying DMX-512 daisy chained between each **Pb-DMX/**.

The DMX-512 can come from any theatrical lighting board, or from any piece of Gilderfluke & Co. equipment which can output DMX-512. All but one of Gilderfluke & Co. controllers can do transmit DMX-512. The most commonly used Gilderfluke products for transmitting DMX-512 to a Pb-DMX/ are:

- *Br-Brain4: The Br-Brain4 combines the functions of earlier Smart Brick Brains with the DMX-512 storage and output features of the Br-SmartMedia.*

The DMX-512 output of the **Br-Brain4** can control up to 2048 channels on four full DMX-512 universes. Within the DMX-512 streams, eight separate 'sequencers' can be run independently of all the others, each with their own triggers. This means that some of the outputs can be used to control one show while the other outputs are divided among the seven other sequencers, each



independently running their own shows. Multiple Br-Brain4s can be linked together for even more outputs.

- *Sd-50/8 or Sd-50/40: The Sd-50 series of products are the successors of the earlier Mp3-50 products.*

The **Sd-50/8** and **Sd-50/40** units combine built in animation and lighting control (DMX-512 in and out), audio repeaters, and amplification. The **Sd-50s** are even available with 'Atomic' clock or GPS-based triggering which can be used to synchronize Sd-50s wherever they are on the Earth.

To program the onboard memory of a **Pb-DMX/**, you can 'draw' the sequence you need on the screen of your computer using our included **Pc•MACs** software. When you have all of your shows completed (or just want to take a look at them), you can download them to a **Pb-DMX/** to a μ Sd flash card. You can then make additional changes and download again and again until you are completely satisfied with your show. Once your show is perfect, the PC can then go away. The **Pb-DMX/** can run by itself.

If your installation uses less than 16 DMX-512 channels, or you have the optional **Pc•MACs** 'RealTime' license and hardware ([USB-DMX512 Adapter](#), [USB-Slider Console](#) programming console, etc.), you can program in RealTime. **Pc•MACs** will remember exactly what you do and precisely when you did it. You can then use **Pc•MACs**' powerful graphical editing tools to perfect the sequences you have programmed in RealTime. When you have all of your shows completed, you can download them to a **Pb-DMX/** through the standard RS-232 serial port on your PC. You can then make additional changes and download again and again until your show is perfect. The PC can then go away. The **Pb-DMX/** will run by itself.

Features of the Pb-DMX/ include:

- Plugs onto a Grayhill 'G5' eight, sixteen, twenty-four, or thirty-two position relay mounting boards. All Pb-DMX/ controllers are identical, and can be used freely with any available size relay module.
- Accepts standard DMX-512 data so it can be used as a 'slave' as part of a larger control system. To speed field wiring, two RJ-45 'ethernet' jacks are used for the DMX-512 in/out/thru. DMX-512 is the standard protocol used for controlling all theatrical lighting equipment.
- Outputs a full universe (512 channels) of standard DMX-512. It can be used as a 'master', controlling other Pb-DMX/s (or RGB LEDs, light dimmers, wiggle lights, strobe lights, Audio/Video players, etc.).
- If you have a number of Pb-DMX/s on the same network, whichever one you plug the μ Sd card into will automatically become the DMX-512 'master' for that network.
- Integrates directly with the Kp-700/1020 touchscreens if you need an operator panel. Just a single button push configures the Kp-400/500 from the Pb-DMX/.

They are then ready to play any show on the Pb-DMX/ using their on-screen buttons.

- Each eight outputs splits the data from a single DMX-512 address. A fully loaded Pb-DMX/ with thirty-two relays only required four consecutive DMX-512 addresses. This means you can control up to 2048 relays using a single twisted pair of wires carrying DMX-512.
- If more outputs are needed, additional Pb-DMX/ and relay boards can be added as needed, and networked together using a single twisted pair of wires carrying a DMX-512 signal.
- Because DMX-512 networks can be run up to a kilometer, you can put the Pb-DMX/ and their relays right where you need them. DMX-to-Ethernet and DMX-to-Wireless adapters are available from a number of different suppliers for applications where a hardwired DMX-512 network is unavailable.
- The DMX-512 address for each Pb-DMX/ is set using its serial port.
- Programming and operation are identical to a Br-miniBrick8, but with up to thirty-two outputs!
- RS-232 port is connected using a 1/8" mini plug. An adapter cable is available from Gilderfluke & Co. as part number Mp3-50/CBL. If your PC does not have a serial port on it, we also offer the [C-USB-RS232](#) or [USB-RS232/422](#) USB-to-serial port adapters.
- Red 'Test' button allows outputs to be aturnmdded on and off one at a time for testing your field wiring. No programming is needed, and this feature is available as soon as power is applied.
- Each Pb-DMX/ has a show capacity limited only by the size of the μ Sd flash card used!
- Once programmed, shows are saved with or without power applied.
- Like all GilderGear, two hundred fifty-five shows can be loaded onto a Pb-DMX/.
- Four non-polarized optoisolated inputs to trigger Pb-DMX/s from push buttons, motion sensors, or any other type of switch. The screw terminals used to connect to these inputs are pluggable.
- Each Pb-DMX/ input can be set to start, stop, pause, continue, or directly select a specific show. LEDs show all input activity.
- Shows can be accessed sequentially or directly using the two optoisolated inputs or serial port. Supports foreground/background shows.
- The 'next' show can be set for the end of any show, allowing you to loop a single show or build 'chains' of shows.
- The Pb-DMX/ supports update rates from one frame per second to a maximum of one hundred frames per second when using the Pc•MACs software. Different shows can each be programmed at different frame rates. This allows you to program a 'delay' show that ticks along at a low frame rate between your main shows.

- The power supply for the Pb-DMX/ is attached to the 'Logic Supply' screw terminals in the Pb-08, Pb-16, Pb-24 or Pb-32 relay module. The Pb-DMX/ runs on any voltage from seven to twenty-four vdc. The majority of applications use twenty-four volts for the Pb-DMX/, so 24 vdc relay modules are normally provided. If needed, we can provide five volt relay modules for running from supply voltages up to nine volts, or 15 volt relay for running with supply voltages from 11 to 21 volts.
- Both AC and DC relay output modules are available. Typical current capacity is 3.5 amps each. You can freely mix both AC and DC relay output modules on any relay mounting board.
- Each relay module's output is protected by a standard 5mm x 20mm 5 amp fuse.
- Sturdy aluminum case.

Pb-DMX/ LEDs, Switches and Connections

There are only a small number of connections on each **Pb-DMX/**. You will need to attach a power supply to the two marked terminals on the Grayhill Relay board, whatever you are controlling, and (optionally):

- a) A switch (or up to four) to start the **Pb-DMX/**.
- b) DMX-512 input and/or output cables.

LEDs:

1. **Red 'Rx Data' LED:** One LED is attached to the serial data received line on the **Pb-DMX/**. If the RS-232 serial port is attached to a PC, you will see this LED flash each time a data is received through the serial port. If the RS-232 serial cable is disconnected, then the LED will flash at a high rate of speed as DMX-512 data is being received.
2. **Yellow 'Tx Data' LED:** One LED is attached to the serial data transmission line on the **Pb-DMX/**. It will flash each time the **Pb-DMX/** transmits a character out the serial port.
3. **μ Sd card Busy:** This LED will be lit when the **Pb-DMX/** is writing to the μ Sd card. (This does not happen very often.) The μ Sd card should NOT be removed or the **Pb-DMX/** powered down when this LED is lit.
4. **Green 'Input 'A'', 'Input 'B'', 'Input 'C' and 'Input 'D' LEDs:** Four green LEDs show the status of the four optically isolated inputs. These LEDs are located on the 'inside' of the optical isolators. They will operate if the input is receiving a voltage, and it is getting to the **Pb-DMX/s** microcontroller. These LEDs will also chase back and forth if a firmware upgrade is taking place, the **Pb-DMX/** is reading in a new show file, or any other operation that take the **Pb-DMX/** away from running a show.
5. **Red 'Test' LED:** This LED has several modes:
 - a) When the Red 'Test' LED is flashing quickly, ALL of the outputs are being forced 'off' from the red 'test' button.
 - b) When the Red 'Test' LED is 'on', then one of the outputs is being held 'on' from the red 'test' button.
 - c) When the Red 'Test' LED is flashing slowly, a test from the **Pb-DMX/s** internal menu is being run.
6. **Blue 'Heart' LED:** This LED flashes to show that the **Pb-DMX/** is receiving power and alive.
7. **Show Running LED:** This LED will be lit steadily if the **Pb-DMX/** is running a show from its μ Sd flash card. It will toggle on each frame received via DMX-512 or Serial RealTime data. If receiving data at 30 FPS, the LED will be flashing at 15 Hz.
8. **DMX or Serial Update Error LED:** This LED will flash each time there is an error in the received DMX-512 or Serial RealTime data. If you see this flashing any more than occasionally, check your DMX-512 wiring. You may need to terminate the two ends of the DMX-512 network with 120 Ω resistors.
9. **DMX or Serial RealTime LED:** This LED will be lit if receiving DMX-512 or serial RealTime data. It will stay lit for approximately ten seconds after the DMX-512 or

serial RealTime data is removed. The **Pb-DMX/** is then ready to start running shows from its μ Sd card.

10. **DMX Transmitter Enabled:** If a **Pb-DMX/** has a μ Sd card with a valid AutoDownload file on it, and DMX-512 transmission hasn't been specifically disabled in the AutoDownload or the **Pb-DMX/s** menu, it is capable of becoming the DMX-512 'master' for the network. If a **Pb-DMX/** is transmitting DMX-512, it is acting as the DMX-512 master, and this LED will be lit. If the **Pb-DMX/** hears another device transmitting DMX-512 on the network, it will stop transmitting DMX-512, and this LED will be extinguished. If you see this LED turning on and off, you should disable DMX-512 transmission on all but one of the devices on the network.

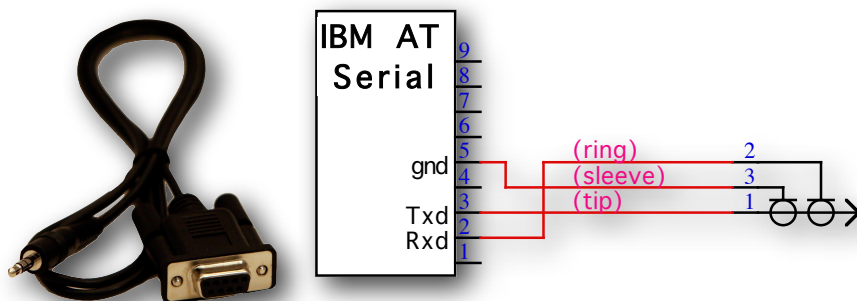
Red 'Test' button:

The **Red 'Test' button** is used forcing off all of the outputs of the Pb-DMX/, and then selectively testing each of the outputs individually. When the Red 'Test' LED is flashing, ALL of the outputs are being forced 'off'. When the Red 'Test' LED is 'on', then one of the outputs is being held 'on'. The **Red 'Test' button** is used as follows:

1. Press and hold for five seconds to enter the 'test' mode. This first step forces 'off' all of the outputs. The **Red 'Rx Data' LED** will be flashing.
2. On each subsequent press of the **Red 'Test' button**, the first, and then each subsequent output will be selected and forced 'on'. The **Red 'Rx Data' LED** will now be lit. Note that this will step through ALL thirty-two possible outputs, even if you have the **Pb-DMX/** plugged into a smaller (eight, sixteen or twenty-four) position relay module or have some relays removed.
3. After the last (thirty-second) relay output has been tested, the **Pb-DMX/** returns to normal operation.
4. If an individual output has been selected to be forced 'on', you can force it 'off' by pressing and holding the **Red 'Test' button** for approximately five seconds. The **Red 'Rx Data' LED** will be flashing.
5. If an individual output has been selected to be forced 'off', you can force it 'on' by pressing and holding the **Red 'Test' button** for approximately five seconds. The **Red 'Rx Data' LED** will stop flashing and light steadily.
6. To exit the 'test' mode at any time, press and hold the **Red 'Rx Data' LED** for ten seconds. This will return the **Pb-DMX/** to normal operation. The **Red 'Rx Data' LED** will be extinguished.

RS-232 Serial Port:

This is a standard RS-232 serial port connection. A nine pin male to 1/8" stereo plug [Mp3-50/CBL](#) cable should be used to connect the Pb-DMX/ to your PC' serial port. The only pins that the Pb-DMX/ actually uses are the Txd, Rxd and ground (pins #2, #3 and #5 on the DE-09 end). This connection is used to download data to the Pb-DMX/. It can also be used with any GilderTerm or any standard modem program to talk to the Pb-DMX/.



The mnemonic for remembering the connections are: Ring = Receive, and Tip = Transmit.

The Pb-DMX/ expects to see the serial data in the following format:

**ONE START BIT
EIGHT DATA BITS
ONE STOP BIT**

DMX-512 Input/Output:

The DMX-512 output on the Pb-DMX/ is active ONLY when no other DMX-512 ‘masters’ are attached to the DMX-512 network. If the Pb-DMX/ hears another DMX-512 ‘master’ transmitting, it will turn off its DMX-512 transmission.

DMX-512 is the serial data standard used to control ALL professional theatrical lighting equipment.

Although labeled as ‘input’ and ‘output’, the two Rj-45 jacks are connected in parallel in the Pb-DMX/. If you have more DMX-512-controlled devices on the network, run the DMX-512 into one jack, and out of the other jack to connect to the next device in line. The jacks can be used interchangeably. The USITT official standard for wiring these RJ-45 connections 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	no connection	no connection
	5	White / Blue		
Pair 4	7	White / Brown	Signal Common	DMX-512 Pin 1
	8	Brown		
Shield		Drain		

When used as a DMX-512 ‘Slave’, The Pb-DMX/ accepts standard DMX-512 data from any source of DMX-512 data. This DMX-512 can come from a lighting control board, any other piece of GilderGear, or any other source of DMX-512. The Pb-DMX/ will accept data with or without GilderChecksums. If receiving GilderChecksums, the Pb-DMX/ will not update its outputs on any DMX-512 packet that contains an error.

When used as a DMX-512 'Master', the Pb-DMX/ can send up to 512 channels worth of DMX-512 data to control other GilderGear, dimmers, wiggle lights, smog machines, strobe lights, or any other devices which accept DMX-512 data. If any of the DMX-512 addresses that are used for transmitting GilderCheckSums are not being used for other purposes, then the Pb-DMX/ will use them for transmitting GilderCheckSums.

If used to send DMX-512 data to any Gilderfluke devices (other Pb-DMX/s, SER-DMX, etc.), the GilderChecksums should be enabled to assure that the data is received perfectly before it is used.

When GilderChecksums are not enabled, DMX-packets will be 512 channels in length. This will allow frame rates up to about 40 FPS.

To connect the Pb-DMX/ to another DMX-512 device, wire the screw terminals as follows:

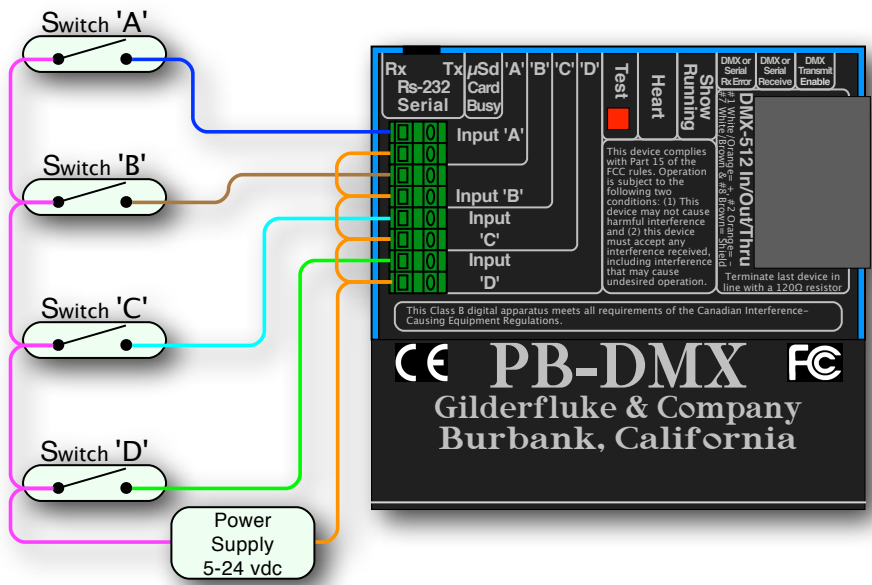
1. Connect the DMX-512 shield to the **Pb-DMX/** DMX-512 terminal labeled 'ground'. This is the power supply 'ground' for the **Pb-DMX/**. This signal is normally found on pin #1 of a standard DMX-512 XLR-3 or XLR-5 connector.
2. Connect the DMX-512 negative data to the DMX-512 '-' input. This signal is normally found on pin #2 of a standard DMX-512 XLR-3 or XLR-5 connector.
3. Connect the DMX-512 positive data to the DMX-512 '+' input. This signal is normally found on pin #3 of a standard DMX-512 XLR-3 or XLR-5 connector.

The Pb-DMX/ uses a maximum of four data channels from the DMX-512. The first channel is used for the first eight digital outputs. The next consecutive DMX-512 channel is used for the second eight outputs, and so on. The base address used for the DMX-512 and serial RealTime data is set using the configuration menu, or by sending an AutoDownload file to the Pb-DMX/ with the desired base address offset.

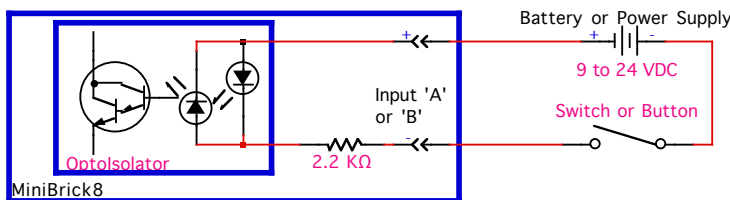
If the Pb-DMX/ receives a DMX-512 signal on this input, it will stop running any animation sequence to listen for additional valid DMX-512 data. If no DMX-512 is received, then the animation sequence can be restarted by whatever means it has been configured to use (trigger or power-up).

'A', 'B', 'C' & 'D' Trigger Inputs:

The trigger inputs can be used to start, stop, pause or select specific show sequences stored in the Pb-DMX/'s μ Sd flash card slot. Any type of switch can be used. This can be a pushbutton, motion detector, IR beam, step mat, or anything else that will give you a 'switch closure'. The trigger input is non-polarized and optoisolated. You must feed a voltage in to a trigger input, but it doesn't matter if which pin is positive and which is negative. The green LED lights when a trigger input is active.



Any event can be triggered on either the 'closing' or 'opening' edge of any input. A 'closing' is when you apply a voltage to an input. An 'opening' is when that voltage is removed. The inputs can be triggered on any voltage from 5 to 24 VDC. If you don't have an external source of power for these



two inputs, you can 'borrow' some juice from the Pb-DMX/'s power supply connections.

Power Supply:

The Pb-DMX/ will run on any voltage from 9 through 24 VDC. Whatever voltage you use will also be used to run the primary side of the relays on the Pb-08, Pb-16, Pb-24 or Pb-32 relay mounting board. These screw terminals are on a 0.25" / 6.35 mm centers. Use five volt relay modules for supply voltages up to nine volts. Use 15 volt modules with supply voltages from 11 to 21 volts. Use 24 volt modules for supply voltages from 18 to 32 volts. The Pb-DMX/ itself uses very little current. Size your power supply so it will provide enough current to run all of your loads. Unless otherwise specified, Gilderfluke will always provide 24 volt AC or DC relay modules.

You supply the power to the Pb-DMX/ through the 'Logic Supply' screw terminals on the Pb-08, Pb-16, Pb-24 or Pb-32 relay mounting boards that the Pb-DMX/ is plugged into. The polarity marked on the circuit board must

be followed when attaching the power supply. This same power supply connection is used to power the primary side of the relay modules. It has absolutely no connection to the secondary side of the relay modules.

It is highly unlikely that it will ever be needed, but this power supply connection is protected by a standard five millimeter diameter, twenty millimeter long (5x20 mm) glass fuse rated at five amps (Littelfuse part number 217005 or equivalent). The same fuses are used on each of the output modules.

The Pb-DMX/ power supply connection is protected from reversed polarity. An idle Pb-DMX/ draws only about twenty-five milliamperes. It can run for days on just a single nine volt battery. The primary side of the relays that the Pb-DMX/ is controlling will draw far more current than the Pb-DMX/ itself.

Relay Outputs:

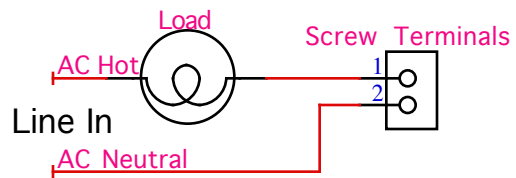
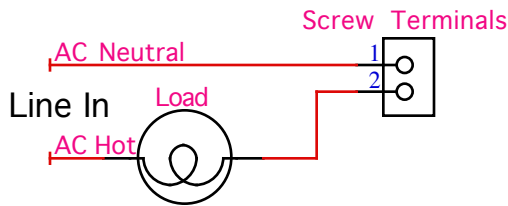
Each Pb-DMX/ has thirty-two digital outputs. When plugged into a Pb-08, Pb-16, Pb-24 or Pb-32 relay mounting board, you can connect up to thirty-two things to the Pb-DMX/. With the appropriate AC or DC output relay modules plugged into the Pb-08, Pb-16, Pb-24 or Pb-32 relay mounting board, you can control small motors, contactors, solenoid valves, relays, small lamps, or anything else that needs up to 3.5 amps of continuous current to run.

Each relay module is protected by a standard five millimeter diameter, twenty millimeter long (5x20 mm) glass fuse rated at five amps (Littelfuse part number 217005 or equivalent). These can be removed and replaced from the relay modules without using any tools. We chose to build the Pb-DMX/ around the Grayhill 'G5' relay modules because of these fuses. Many other similar relay modules use non-standard fuses that are difficult to find and/or replace when one blows unexpectedly.

Each relay module has two screw terminals on the mounting board for you to connect whatever you will be controlling. These screw terminals are on a 0.25" / 6.35 mm centers. The first relay uses screw terminal positions #1 and #2. The second relay uses #3 and #4, etc.. There are no connections between the secondary sides of any two relay modules. This allows you to freely mix both AC and DC relay modules on the same mounting board.

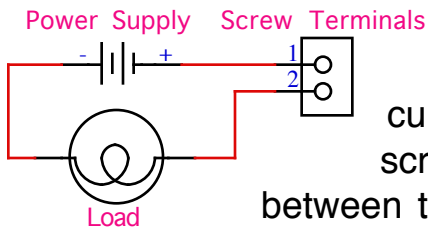
One of the two wires that control your load will need to be routed into one of these screw terminals, and out the other in order to control your

load. Alternating Current (AC) loads can use either of the two screw



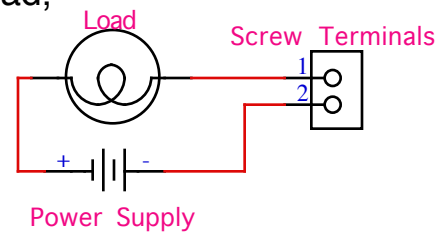
terminals interchangeably:

Direct Current (DC) loads will need to observe polarity. The ‘odd’ numbered screw terminals (#1, #3, #5, etc.) are the positive terminals. The ‘even’ numbered screw terminals (#2, #4, #6, etc.) are the negative screw terminals.



To switch the positive side of your load, connect the positive lead from your high current power supply to to the ‘odd’ numbered screw terminal(s). Your load(s) are then connected between the the ‘even’ numbered screw terminal(s) and the negative lead of your high current power supply.

To switch the negative side of your load, connect the negative lead from your high current power supply to to the ‘even’ numbered screw terminal(s). Your load(s) are then connected between the the ‘odd’ numbered screw terminal(s) and the positive lead of your high current power supply.



There are ‘flyback’ diodes in the DC output modules. If you have the polarity reversed, current will flow through this diode and your load will never turn ‘off’. If you have an output that never turns off, it will either be a blown relay module, or it has been wired in reverse.

Shows Capacities for Pb-DMXs

The show capacity of the **Pb-DMX/** is limited largely by the size of the μ Sd card used in it, and the limitations of the FAT32 file format used on the μ Sd card.

The **Pb-DMX/**, like most GilderGear, allows you to load up to 255 shows, each with a length of up to about six days (16,777,221 frames at 30 FPS).

The limiting factors are that Pc•MACs will only allow you to enter a show length of up to 99 hours, 59 minutes, 59 seconds and 29 frames.

In addition, the FAT32 card formatting used on the Sd cards limits the size of the AutoDownload file to 4 GBytes.

The AutoDownload dialog will display an estimate of the size of your AutoDownload file before building it. When you build your AutoDownload file, Pc•MACs will calculate exactly how much space this file will require and save this in the '.set' file. You can also see this report by pressing the 'Report' button on the AutoDownload dialog. This won't be available until you have built your AutoDownload file.

If you need to 'ballpark' how big your show is going to be, the formula to calculate the capacity of the memory is:

(Number of Channels x frame rate) x length of showsⁱⁱⁱ = length in bytes

The 'Number of Channels' is how many eight bit bytes of storage each frame of data will need. Eight digital (on/off) functions fit within one eight bit channel. If even just one digital output is used in an eight bit channel, the entire byte will need to be stored. Analog functions are typically eight bits in 'resolution' and occupy a single eight bit channel. There are exceptions to this, and analog functions can be created that occupy twelve bits, sixteen bits, twenty-four or thirty-two bits as well. These will occupy 1.5, two, three or four bytes of storage per frame. Resolutions above sixteen bits are not often (i.e.: never) used.

The 'Frame Rate' is typically 30 frames (updates) per second (30 FPS) in the US (where video runs at about 30 FPS). In countries where video runs at 25 FPS, it is not uncommon to use 25 FPS for shows. Fountains and animatronic shows don't usually benefit from faster update rates, and our analog cards up-sample the show frame rate by at least four times, so that they are updated at 120 FPS or higher.

The **Pb-DMX/** allow you to mix shows with different frame rates in the same AutoDownload file. You can make 'delay' shows that tick along at one or two FPS between the main shows that may run at 15 or 30 FPS.

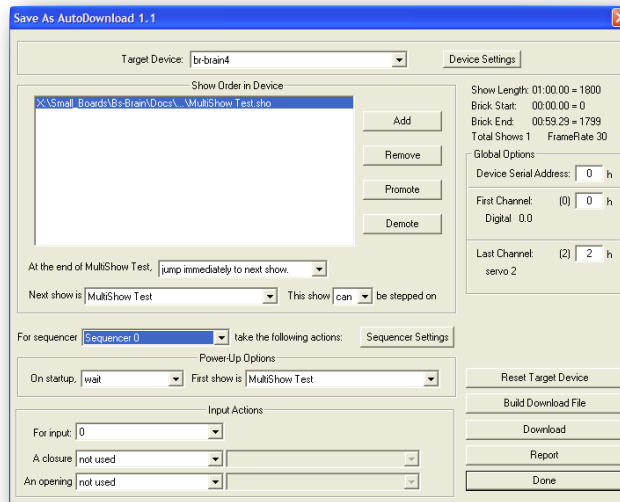
ⁱⁱⁱ Length of show is in seconds

Optically Isolated Trigger Input Actions

The following Input Actions are used to start, stop, and generally control the **Pb-DMX/** through its four optically isolated trigger inputs. The optically isolated trigger inputs can be used as the sole method to control the **Pb-DMX/**, or as an adjunct to the **Pb-DMX/**'s Rs-232 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 **Pb-DMX/**.

The **Pb-DMX/** has four optically isolated Trigger Inputs. You can set different Input Actions for the 'closing Edge' ^{iv} on the input and the 'opening Edge' ^v. 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.



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. It looks this up from the GilderGearList each time you do an AutoDownload, so if new features have been added to the **Pb-DMX/** 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.

^{iv} 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 Pb-DMX/'s 'status' command and 'main' menu.

^v 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 Pb-DMX/'s 'status' command and 'main' menu.

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 **Pb-DMX/** to start the selected show with the 'looping' flag set. On the **Pb-DMX/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 **Pb-DMX/** to stop playing a show immediately. The show is frozen at the current frame, as are the analog, ServoMotor and DMX-512 outputs. On the **Pb-DMX/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, 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, but allow it to play through to its natural end. On the **Pb-DMX/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 immediately. The analog, ServoMotor and DMX-512 outputs are frozen at their current states. On the **Pb-DMX/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 **Pb-DMX/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 an **Pb-DMX/** playing immediately, and prevents the **Pb-DMX/** from being restarted until the 'Clear E-Stop' input action is received, or the **Pb-DMX/** 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. 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 moving back to the 'parked' position (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 **Pb-DMX/** and an E-Stop button will 'fail safe' on the **Pb-DMX/**.

On the **Pb-DMX/'s** menus, the show status will be shown as 'E-Stop', to indicate that the **Pb-DMX/** 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 an **Pb-DMX/**. 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 **Pb-DMX/**.

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 ^{vi}. On the first activation of this input, the **Pb-DMX/** 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 inputs. This is all legal to do, but there is only one 'already played' flag for each show. If one input has already played a show that is in a range that overlaps with another input, that other input will consider that show as 'already played' too.

You can tell the **Pb-DMX/** 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 **Pb-DMX/**.

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 ^{vii}. On each activation of this input, the **Pb-DMX/** 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 inputs. This is all legal to do, but there is only one 'already played' flag for each show. If one input has already played a show that is in a range that overlaps with another input, that other input will consider that show as 'already played' too.

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

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

You can tell the **Pb-DMX/** 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 **Pb-DMX/**. 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) Analog Limit

Normally the analog outputs will follow the complete range of motion you programmed in your shows, only limited by the analog endpoints you set on the **Pb-DMX/** 'minimum' and 'maximum' settings.

This feature can be used if you want to scale the analog outputs to limit them to a lower level when a switch is thrown. This is most commonly used to connect the switched 'threshold' outputs of anemometers used with fountain shows, or to 'gentle' motion base attractions for younger riders.

In a fountain application, if the wind level gets to the preset 'threshold', the anemometer 'closes' this input. This tells the **Pb-DMX/** to scale the analog outputs, and thereby the height that the fountain will squirt the water. When the wind level drops below the 'threshold', the anemometer opens this output and a 'Analog Limit' action on the 'opening' edge of the same input tells the **Pb-DMX/** to scale the outputs to 100%, and return the fountain to normal operation.

In a motion base attraction, a simple switch closure can 'scale' motion base's movement for an extremely young (or old) load of passengers.

Use the drop down to the right of the Input Action to select the desired scaling value to use. A 'zero' value sets all of the outputs to the voltage set in the 'minimum' endpoint column. A value of 100% returns the **Pb-DMX/** to normal operation.

M) Binary Bit

This Input Action allows you to use as many as two of the trigger inputs to select and play shows using a binary pattern of bits. This allows you to select and play up to 3 shows through the Optically Isolated Trigger Inputs.

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 **Pb-DMX/s** input scan rate, which can result in unexpected shows being selected and played.

N) Initialize Down Counter:

This Input Action sets one of the four internal downcounters to the value selected on the dropdown just to the right of the 'input action' dropdown.

In real-world applications, you can use these downcounters to:

- Count coins in a coin drop, if it takes more than one coin to start the show.
- Count the number of golfballs that have passed a sensor, before a show will start.
- To count how many baskets/hits/holes in one, etc. have been made in a game.
- Require a splash pad sensor be triggered a certain number of times before it plays the “gully swamper” show.

In Virtual Trigger applications, you can use this feature to:

- In a quiz game, to count number of 'Correct' and 'Wrong' answers given. If the game requires a 'best of five' to win or lose, two counters would be preset to '3'. One counter is decremented on 'Correct' answers. The other counter is decremented on 'Wrong' answers. The first counter to reach terminal count (zero) would start the 'you won' or the 'you suck' show.

O) Decrement Down Counter:

This Input Action decrements one of the four internal downcounters. when the counter reaches a value of zero, the show selected on the dropdown just to the right of the 'input action' dropdown will be played.

Pb-DMX/ Configuration Menu

You will only rarely need any changes to the configuration of the Pb-DMX/. In most cases, you will need to set the DMX-512 address, and that's about all. This is set by typing the letter 'a' until the Pb-DMX/ asks you for the DMX-512 address, then typing in the desired DMX-512 address. You can then 'exit configuration'. The new address will automatically be saved into non-volatile memory.

The Pb-DMX/ 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 easier. If all you need to do is address the Pb-DMX/, the computer you are using doesn't need to have the Pc•MACs software installed on it.

Most Gilderfluke & Co products can be controlled through their RS-232 or RS-422 Serial ports. The Pb-DMX/ has a single RS-232 serial port on it, using a 3.5mm female jack.

GilderTerm is available free from Gilderfluke & Co. for use with all of our products. It is available both as a stand-alone program, and as part of Pc•MACs under the RealTime menu. It can be downloaded from our web page, and is included on all of our GilderThumbDrives. 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, most the settings are preset as needed. All you will need to do is select the appropriate 'COM' port from the 'File' menu and the serial address for the attached GilderTerm at the top left corner of the GilderTerm window (on most cases, it will be zero).

Buttons at the top of the GilderTerm window allow you to clear the screen, display the card status, enter configuration, or open a small control dialog that allows you to send serial commands to the attached GilderGear.

If you press the 'Configure' button, the attached GilderGear will display its built-in menu. The 'Configure' button will also change to 'Config Done'.

The commands in on the menu are shown as a number or letter at the left, with the description of the command just to the right. To invoke a command, you can type a the command letter (shown to the left of the command description) on your keyboard, or use your mouse to left+click on the text to the right of the command letter.

When you are finished configuring the Pb-DMX/, you should always exit the configuration mode. If you don't, there is a chance you might squirt some random serial data that could change your configuration inadvertently. Just press the 'Config. Done' button to finish configuration. If you are using the GilderTerm that is built into Pc•MACs, then close the GilderTerm window so you can return Pc•MACs back to normal operation.

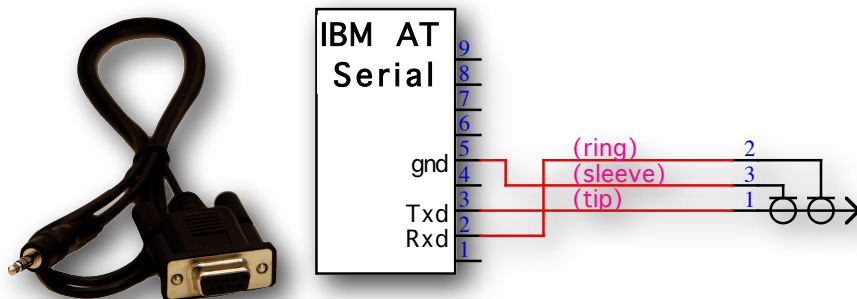
Computers don't normally come with serial ports on them anymore. Instead, you use a USB-to-Serial ([USB-RS232/422](#) or [C-USB-RS232](#)) adapter, BlueTooth-to-Serial ([Bt-Rs232Rx](#) and [Bt-USBTx](#)), or Ethernet-to-Serial ([Modem-Internet](#)) adapter. For the Pb-DMX/ you will need one that provides 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.

If not using GilderTerm, your terminal emulation program must support VT-52 terminal emulation to do cursor positioning, clearing the screen, and a handful of other functions. To talk to the Pb-DMX/, just configure your terminal program for 9600 baud, no parity, eight data bits, one stop bit and no flow control handshaking. 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 Pb-DMX/ 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 with what we call the 'paperclip' test.

Disconnect the Pb-DMX/ and short between the Tx data out and Rx data in pins on your USB-to-Serial converter. For an RS-232 port, this means temporarily shorting between pins #2 and #3 on the male DE-09 connector using a paperclip, small screwdriver, or similar metal object. For the 1/8" (3.5mm) end to the Mp3-50/CBL, it means shorting between the tip and the middle 'ring'. With the paperclip in place, you should see whatever you type on the GilderTerm main window. With the paperclip removed, you shouldn't see anything that you type.

The USB-Rs232/422 Mp3-50/CBL pinouts are as follows:



Using GilderTerm, plug in the serial cable to the Pb-DMX/. Press the 'configure' button to bring up the following menu:

```

- Gilderfluke & Co. - Pb-DMX Relay Control - version 3.32 - copyright 2017 DCM -
  DeviceName @ Serial Address- __0
  ADL file: AutoDownload_FileName.a00 w/123 ch. @ 1234 offset
  Show 123 (of 123) Show_FileName looping @ 00:00:00.00

inputs: a/green:    | B/RED: ON
          c/blue:   | d/white:
a) 1st addr- __0 (Autodownload)
b) digital use analogs 50% on/off
c) sequencer enabled- yes
d) DMX: Tx & Rx wo/CS, g) 1-based
e) strobe timer- 12.3 seconds
f) numbering- decimal

j) addr. to test- __0 [8bitRez]
k) test output- none
figure: FigureName
output: OutputName

y) set v-trigger address- 123

i) ADL file Info, o) load default, p) Play, h) Halt, r) save, v) Verify, x) exit

Command-
    
```

The upper seven lines on the screen display information about the Pb-DMX/ and the AutoDownload file. If you are using the Pb-DMX/ as a DMX-512 'slave', you don't usually need to put a μ Sd card into the Pb-DMX/, and most of this menu will be blank or displaying the default values.

On the second line of the Pb-DMX/ menu header, the 'DeviceName' and serial port address are set in the AutoDownload file. If nothing has been set, or there is no AutoDownload or μ Sd card, these will be displaying the default DeviceName and a serial address of 0. If you want to change either of these, you will need to change them on the 'Device Setup' dialog in Pc•MACs, then AutoDownload a file to a μ Sd card for this Pb-DMX/.

The third line of the menu header, information about the AutoDownload file is displayed. This includes the name of the AutoDownload file, the number of channels of data in the AutoDownload file, and the offset to the first channel's DMX-512 address in this AutoDownload file. In virtually every case, this offset will be a zero offset.

The fourth line of the menu header displays information about the show that is currently running. The first item on the line is the number of the currently running show, followed by the total number of shows found in the AutoDownload file. Next is the name of the show, and the running status of the show:

1. 'looping': Show was started using a 'looping' command, so it will check at its end for the 'next' show to play.
2. 'playing': Show was started using a 'play' command. This show will play to its end and just stop.
3. 'stopped': This is displayed if no show is playing. The data from the first frame or last frame of the show will be output by the **Pb-DMX/**, depending on if it is has yet to be played, or if it has already played through to its end.
4. 'paused': A show was playing or looping, but has been temporarily stopped at the current frame by a 'pause' command. The show data from the frame where the show was paused will be output from the **Pb-DMX/**.
5. 'STOPPED': This is displayed if a show was stopped prematurely, before it reached it's end. The show data from the frame where the show was stopped will be output from the **Pb-DMX/**.

The final item on the fourth header line is the display of the hours, minutes, seconds and frames into the show. Whether the count is moving or not, the data at the frame displayed on this counter is what the Pb-DMX/ will be sending out. If it is at zero, then the first frame of the show will be sent out. If stopped at the end of the show, or anywhere in between, that will be the data that the Pb-DMX/ will be outputting.

The fifth line displays the current value of the DMX-512 address selected by the 'j) addr to test' command. This address can also be increment or decremented by using the 'n) next' and 'l) last' commands.

The sixth and seventh lines of the menu header show the current status of the Pb-DMX/'s four trigger inputs. These update in near real time. If an input is active, it will be changed as shown on the B/Red input above. If you are having a triggering problem, you can press the buttons attached to the trigger inputs, and monitor the results on this menu.

a) First DMX-512 address:

This command is used to set DMX-512 Address for the Pb-DMX/. Pressing the 'a' key rotates through three options for the DMX-512 addressing:

- 1) Address stored in the AutoDownload file. This automatically addresses the **Pb-DMX/** to the first DMX-512 address stored in the AutoDownload file, This is shown as the AutoDownload file 'offset', shown on line three of the menu headers, and is usually zero (which is used for DMX-512 address 'one' if using the default one-based DMX-512 addressing).

If this option is chosen, but no AutoDownload file has been loaded, the Pb-DMX/ will display '(def. until ADL)', and use the default (one) address until an AutoDownload file is found.

If an AutoDownload file has been loaded, but is subsequently removed, the Pb-DMX/ will display '(from ADL/NO ADL)'. It will continue to use the address from the AutoDownload until it is reset or a new AutoDownload file is loaded.

- 2) Default address. This simply sets the **Pb-DMX/** to start with DMX-512 address one.
- 3) Addressed at a location you specify. This will prompt you to enter the DMX-512 address you would like to use for this **Pb-DMX/**. This is the most commonly used option.

No matter what the 'first' DMX-512 address is set to, all four data channels the Pb-DMX/ will use are consecutive DMX-512 addresses.

If using Serial RealTime data to control the Pb-DMX/ while programming from Pc•MACs, keep in mind that there are only sixteen channels of data being transmitted. If the addresses used by the Pb-DMX/ extend above sixteen, then those channels addressed above sixteen on the Pb-DMX/ will never see any RealTime data, until the show is AutoDownloaded to the local μ Sd flash card.

If using DMX-512 data, feel free to set the address to anywhere between 1 and 512 (one-based DMX-512).

b) Digitals use analog/digital data:

To help keep this from being switched inadvertently, this command will ask you 'Are you sure?' before being applied.

All GilderGear uses the eight individual bits in a channel of DMX-512 data as eight digital outputs. The Pb-DMX/ will use one ((Pb-DMX/8s), two (Pb-DMX/16s), three (Pb-DMX/24s) or four (Pb-DMX/32s) consecutive DMX-512 channels after the 'First' DMX address (set above).

Lighting boards can't do this. They can only send analog values in each DMX-512 channel. They have to use a whole DMX-512 channel to do just one digital. Analog values above 50% turn the output 'ON'. Analog values below 50% turn the output 'OFF'. This 'wastes' 7/8 of the data in each DMX-512 address.

Press the 'b' key to toggle between the Gilderfluke-style digitals and 'analog' style digitals that lighting boards use. If using analogs data, the outputs will be assigned to the eight (Pb-DMX/8s), sixteen (Pb-DMX/16s), twenty-four (Pb-DMX/24s) or thirty-two (Pb-DMX/32s) consecutive DMX-512 channels after the 'DMX address' (set above).

c) Sequencer Enabled:

To help keep this from being switched inadvertently, this command will ask you 'Are you sure?' before being applied. When you exit configuration mode, the Pb-DMX/ will warn you again if the sequencer is disabled.

This toggle enables and disables the Pb-DMX/ ability to use the Animation Data found in the AutoDownload file on the μ Sd flash card. When it is OFF, nothing will be output from the AutoDownload file stored on the micro μ Sd/SdHC flash card. 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 micro μ Sd/SdHC flash card will be sent out normally.

d) DMX Mode:

If using a v1.1 AutoDownload file, this will be set automatically for you in the AutoDownload file. If you try to change it, the Pb-DMX/ will tell you that: 'This is set in your AutoDownload file'.

If there isn't a v1.1 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 Pb-DMX/, and most other GilderGear will automatically sense when it is receiving GilderCheckSums. This will prevent any GilderGear from updating its output if it receives a bad frame of data. Once any GilderGear hears a certain number of DMX-512 frames with GilderCheckSums in it, the GilderGear will have to be reset before it will accept DMX-512 data without GilderCheckSums.

e) Strobe Timer:

This is a special function to support GilderStrobes, or any other device that may be damaged if it is left 'ON' for too long.

The default value for this function is zero, which disables it.

Each of the 32 outputs on the Pb-DMX/ have timers that are started when the output is turned 'ON'. The maximum amount of time an output is allowed to stay on is set by the value you enter for the 'Strobe Timer' (in 10th of seconds). This allows you to limit the time the outputs will stay on from 1/10th of a second up to 25.5 seconds.

The outputs are typically programmed to turn off in the show before the Strobe Timer has a chance to expire.

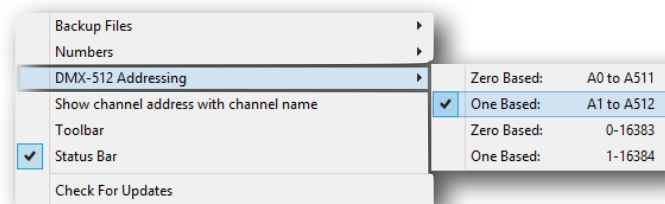
f) Numbering:

You can choose to display and enter numeric values as either decimal numbers or as Hexadecimal numbers.

g) DMX 0/1-Based:

If using a v1.1 AutoDownload file, this will be set automatically for you in the AutoDownload file. If you try to change it, the Pb-DMX/ will tell you that: 'This is set in your AutoDownload file'.

It is set in Pc•MACs by the Preferences Menu's 'DMX Addressing' command:



Whatever you have selected when you build your AutoDownload file will be what is used on the AutoDownload target device. If there isn't a v1.1 AutoDownload file being used, this command is a toggle between displaying DMX-512 addresses as 0-511 numbers, or as 1-512 numbers.

h) Halt

This command stops any show that is playing on the Pb-DMX/ immediately. The status for the Pb-DMX/ on line four will be 'STOPPED', to indicate that the show was stopped mid stream.

i) AutoDownload File Info...

This displays a variety of the settings for the Pb-DMX/ and the AutoDownload file that it is using.

j) Address to Test:

This command is used to set the output address that will be used by the 'Test Output' commands.

If there is a AutoDownload file open, then the range of DMX-512 addresses that can be selected is limited to the range of channels in the AutoDownload file. If no AutoDownload is loaded, then any address in the DMX-512 universe (between 1 and 512 (or 0-511)) can be chosen.

The Pb-DMX/ will assume that all channels are digitals if output resolution data is unavailable (v1.0 AutoDownload or no AutoDownload file is found).

Off-Board addresses are only transmitted through the DMX-512 outputs. Their addresses can be anywhere in the range of the channels in the AutoDownload file, or between 1 and 512 (or 0-511) if no AutoDownload file is found.

If the AutoDownload file is a v1.1 or later, the FigureName and OutputName will be displayed just below the 'Test Output' command.

You can also use the n) Next or l) Last commands to increment or decrement the Address to Test.

k) Test Output

When toggled to 'Test One Output', the single output selected by the 'Output to Test & Adjust' command will be toggled on and off (for digital outputs) and ramped up and down (for analog outputs). The ramp time for analogs is about 5 seconds. The time the output dwells at each extreme is about one second.

When pressed a second time, this command will toggle to 'Local Digital Outputs'. All thirty-two Pb-DMX/ outputs will be toggled on and then toggled off in turn.

When using these test functions, the DMX-512 output will also carry this test data. This allows you to plug into the DMX-512 'master' for an installation, and toggle (digitals) or ramp (analog) any output in the system.

l) Last

Decrements the 'Address to Test'.

If there is a AutoDownload file open, then the range of DMX-512 addresses that can be selected is limited to the range of channels in the AutoDownload file. If no AutoDownload is loaded, then any address in the DMX-512 universe (between 1 and 512 (or 0-511)) can be chosen.

If the AutoDownload file is a v1.1 or later, the FigureName and OutputName will be displayed just below the 'Test Output' command.

n) Next

Increments the 'Address to Test'.

If there is a AutoDownload file open, then the range of DMX-512 addresses that can be selected is limited to the range of channels in the AutoDownload file. If no AutoDownload is loaded, then any address in the DMX-512 universe (between 1 and 512 (or 0-511)) can be chosen.

If the AutoDownload file is a v1.1 or later, the FigureName and OutputName will be displayed just below the 'Test Output' command.

o) Load Defaults

This command will ask you 'Are you sure?' before being applied.

This reloads the dozen or so default settings for the Pb-DMX/.

p) Play

If there is only a single show in the AutoDownload file, it will begin playing immediately. If there are more than one show in the AutoDownload file, you will be prompted to enter the number of the show that you wish to play.

If you don't remember which show is what number, you can refer to the text file that is generated when you build an AutoDownload, or use the 'i) AutoDownload File Info' command to list out the shows.

v) Verify

This command stops any shows that are currently playing and verifies the integrity of the AutoDownload file. If this fails, it probably means that you need to replace the μ Sd card on the Pb-DMX/.

y) Set Virtual Trigger Address:

Virtual trigger allow you to use a DMX-512 channel for triggering an event within a show that looks to the Show Controller like an externally triggered input has occurred. The Virtual Trigger inputs are configured on the AutoDownload dialog in Pc•MACs, just like any real world trigger input, and can include any command that the controller is capable of processing.

The most commonly used commands used with the V-Triggers are those that

- start a show chosen randomly from a range of shows
- start a show chosen sequentially from a range of shows
- Set a downcounter within the Show Controller to its starting count
- Decrement a downcounter within a Show Controller, starting the selected show when the downcounter reaches zero
- Forcing an EaseIn on the Show Controller's analog outputs

The DMX-512 address used for the eight Virtual Trigger inputs can be set by the AutoDownload file, or if the names of the digital channels or the folder that contains them contains the phrase 'V-Trig', or manually by using this command.

x) eXit Configuration

Press the 'x' key, or the 'Config Done' button on GilderTerm to exit configuration.

If you pressed the 'x' key, you will then be asked to press the 'y' or 'n' key to complete the process of exiting configuration mode.

Pb-DMX/ Serial Port Commands

The following commands are used to start, stop, and generally control the **Pb-DMX/** through its Rs-232 serial port. The serial port commands can be used as the sole method to control the **Pb-DMX/**, or as an adjunct to the **Pb-DMX/s** four optically isolated trigger inputs.

The **Pb-DMX/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 port are the many touch screen operator panels. These can be a part of an existing PLC or room automation system (including [AMX](#), [Crestron](#), etc.).

The **Kp-700** (7" diagonal) and **Kp-1020** (10.20" diagonal) touch screen operator panels are self-configuring operator panels for use with most GilderGear.

You just plug the **Kp-700/1020** to your GilderGear control system (which can be anything from a **Br-miniBrick8** to a **Br-Brain4**, including the **Pb-DMX/**). Just as on the GilderTrigger, press the 'configure' button. The keypad will query the control system for all the shows it has on it, and populate the on-screen buttons with those shows.

You can then start pressing the on-screen buttons and the **Kp-700/1020** will send the appropriate messages to select and play your shows on the GilderGear.

You can also manually edit, delete or create new buttons. You can change the text displayed, the color of the buttons, or even the data they send. You can easily add buttons to pause and continue shows, adjust volume levels, or remotely control any other feature of the control system.

If If you have shows that you don't want to appear on the screen, just append a '[~]' to the end of the show's name. The **Kp-700/1020** won't make a button for it.

If you have shows that are only used for maintenance, append a '[!]' to the end of the show's name. The buttons will only be visible when the password protected maintenance mode is entered.

If you are using PopOut Shows or multiple sequencers on a Br-Brain4, just append the sequencer letters to the end of each show name. If you added '[bdf]' to the end of a PopOut show's filename, the **Kp-700/1020** will make a single button for this show. When it is pressed it will simultaneously be started on sequencers 'b', 'd' and 'f'.

GilderTerm is a simple terminal program 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 GilderThumbDrives. 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 **Pb-DMX/** with a third party terminal program, just configure it for 9600 baud, no parity, eight data bits, one stop bit and no handshaking. It will need to support at least some of the most basic VT-52 terminal commands, as GilderGear uses these to clear the screen, position the cursor, and various other things.

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 examples, 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. The '(card address)' for a **Pb-DMX/** is usually '00'.

The "(show #)" is the desired show's position in the AutoDownload list when the AutoDownload file is saved. The '(show #)' represents a two digit ASCII hexadecimal number for the desired show. Valid characters are "0" through "9", and "A" through "F". The chart on the back page of this manual will help you translate decimal show numbers into hexadecimal show numbers.

1) 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. In the following examples, the 'echo' responses are shown in bold italics:

If you send "a00", to the card with the serial address of 00h the echo mode will be turned ON for that one card, and turned off on any other cards that are listening to the same serial buss:

"card __0, echo mode"

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

"card __0, requested show __3 ShowName3"

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

"card __0, starting show __3 ShowName3"

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

"card __0, looping show __4 ShowName4"

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

“card __0, 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.

2) Card Reset

“j5AA5” (card address)

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

3) Card Status

“i” (card address)

The status screen is a snapshot image of the current status of the **Pb-DMX/**. If you want to update the status information displayed, you must hit the ‘Card Status’ command again.

When the **Pb-DMX/** receives this command, it will respond with the following:

```
Gilderfluke & Co.  
Pb-DMX/  
v3.17 - copyright 2013 DCM  
Shows: 2, Ch: 123 @ ___0, ADL: AutoDownload_Filename  
Pb-DMX/ Name @ Serial Address: __0  
show #__1 Show_FileName looping @ frame _____38  
input A: open  
input B: open  
input C: open  
input D: 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 the show which is loaded:
 - a) show number the **Pb-DMX/** 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 both of the optically isolated trigger inputs

4) Start Commands

“t” (card address) Start Track

“u” 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 **Pb-DMX(s)** addressed by the command. The shows will always start from the beginning (frame zero). If an addressed **Pb-DMX/** is looping shows, it will have the ‘LOOPING SHOWS’ flag reset.

If the **Pb-DMX/** 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 **Pb-DMX/** 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 **Pb-DMX/**, 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 **Pb-DMX/** is already playing a show which has this option set, it will ignore this command.

5) Stop Commands

“x” (card address) Stop Track

“y” Stop Global

These commands stop the selected **Pb-DMX/(s)** unconditionally. The stop takes place at the current frame being played.

6) Loop Commands

“!” (card address) Loop Track

“ “ ” 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 **Pb-DMX/** is told to stop.

7) Stop at End Commands

“%” (card address) Stop at End Track

“&” Stop at End Global

These commands reset the ‘LOOPING SHOWS’ flag in the selected **Pb-DMX/(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.

8) Select Show Commands

“)” (card address) (show#) Select Show Track

“*” (show#) Select Show Global

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

9) Show Pause Commands

“<” (card address) Pause Show

“>” (card address) 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.

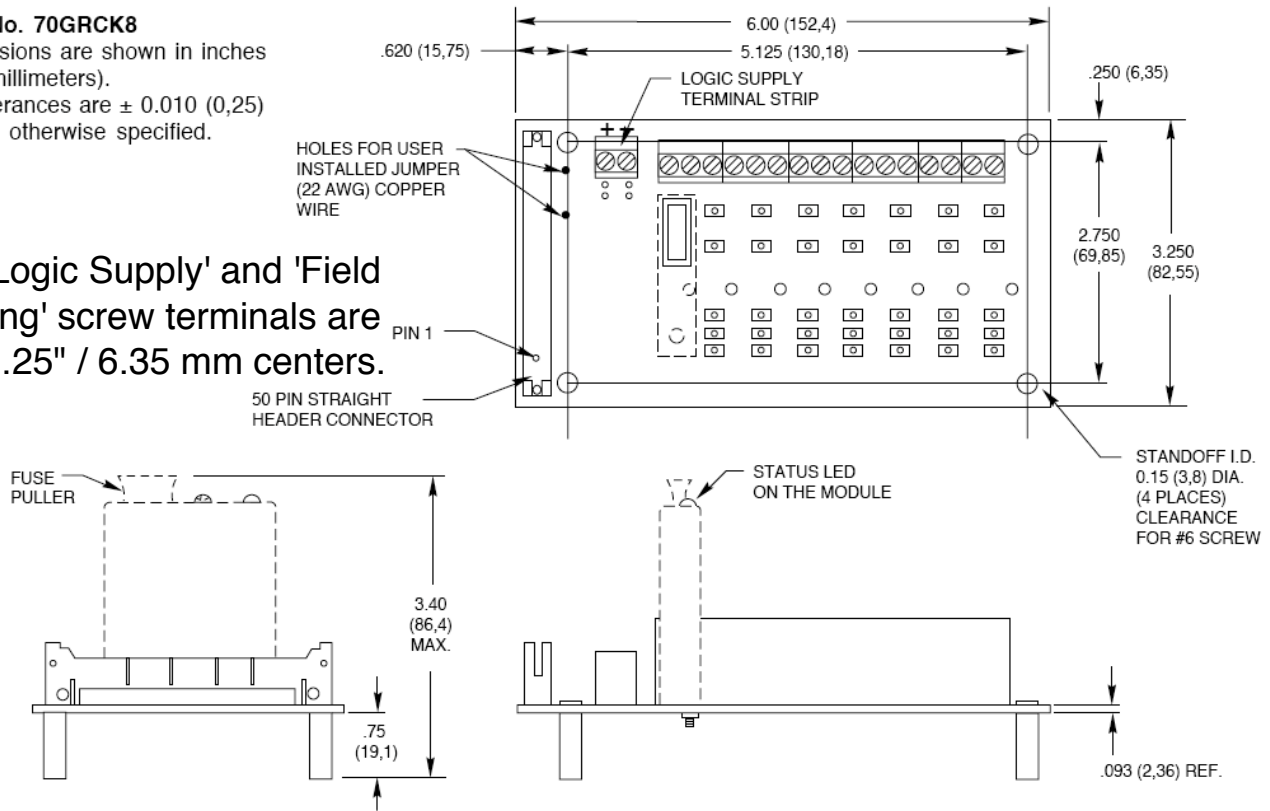
Pb-08, Pb-16, Pb-24 and Pb-32 Dimensions

8 CHANNEL RACK: G5

Part No. 70GRCK8

Dimensions are shown in inches (and millimeters).
All tolerances are ± 0.010 (0,25) unless otherwise specified.

'Logic Supply' and 'Field Wiring' screw terminals are on 0.25" / 6.35 mm centers.

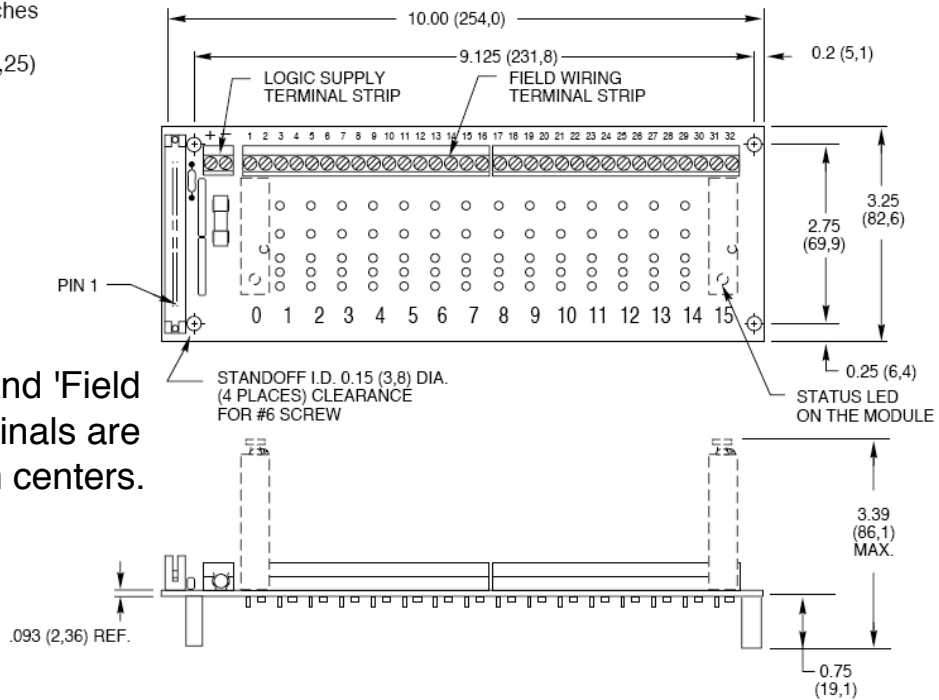


16 CHANNEL RACK: G5

Part No. 70GRCK16

Dimensions are shown in inches (and millimeters).
All tolerances are ± 0.010 (0,25) unless otherwise specified.

'Logic Supply' and 'Field Wiring' screw terminals are on 0.25" / 6.35 mm centers.

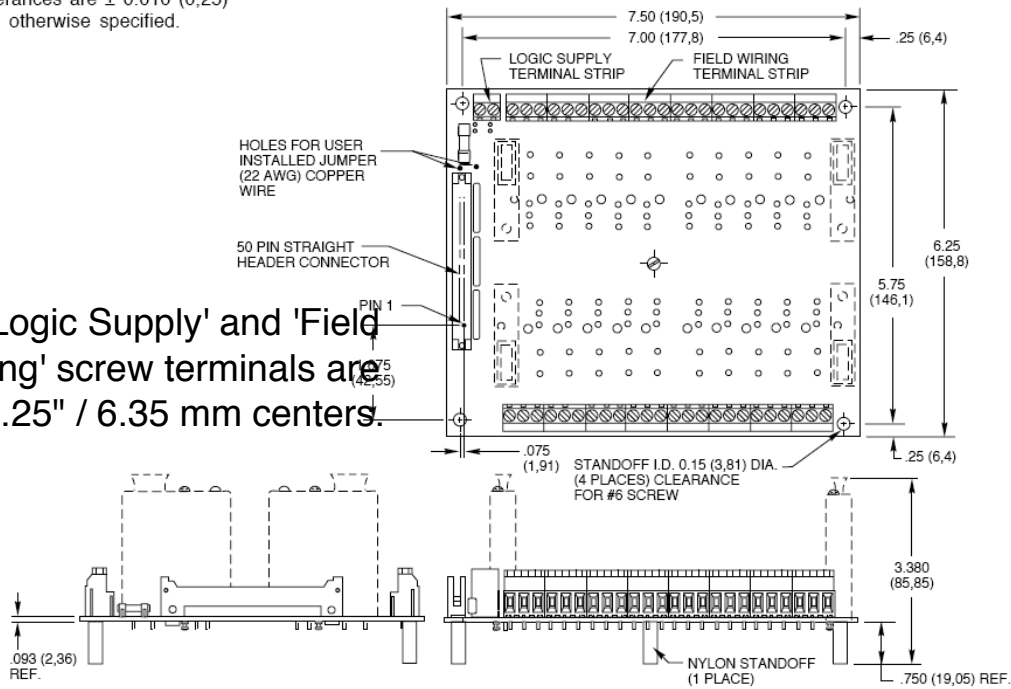


24 CHANNEL RACK: G5

Part No. 70GRCQ24

Dimensions are shown in inches
(and millimeters).
All tolerances are ± 0.010 (0,25)
unless otherwise specified.

'Logic Supply' and 'Field
Wiring' screw terminals are
on 0.25" / 6.35 mm centers.

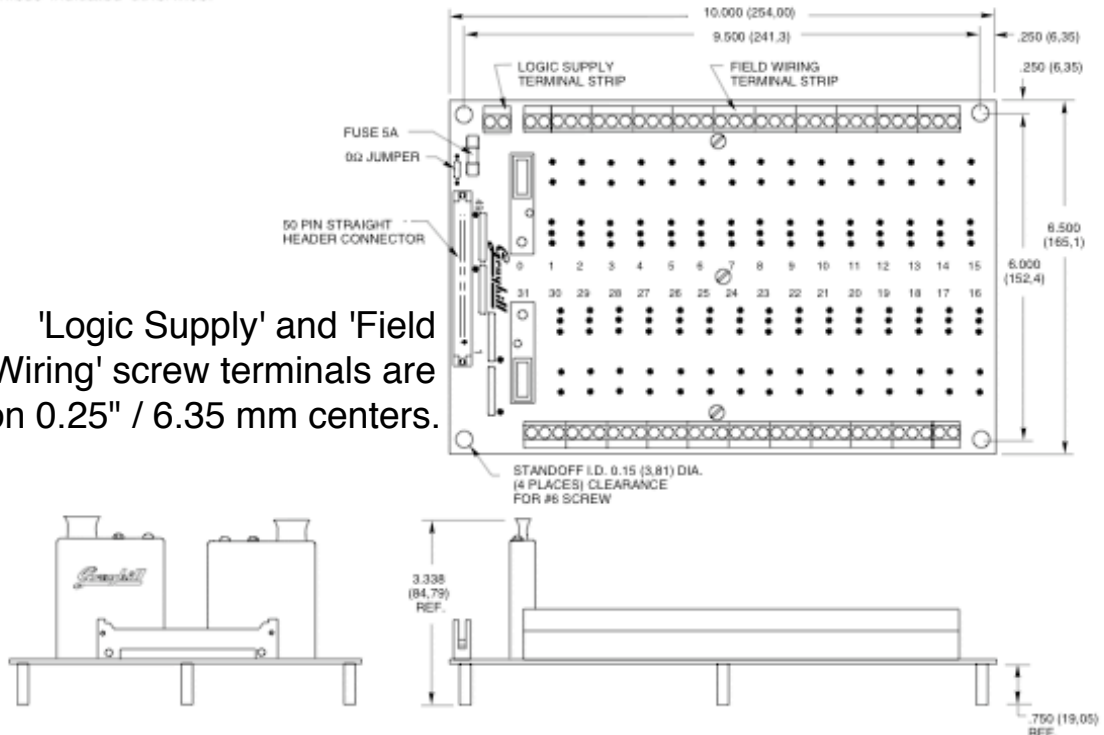


32 CHANNEL RACK: G5

Part No. 70GRCM32

Dimensions are in inches (and millimeters).
All tolerances are ± 0.010 (0,25)
unless indicated otherwise.

'Logic Supply' and 'Field
Wiring' screw terminals are
on 0.25" / 6.35 mm centers.



FCC and CE Compliance:

Pb-DMX/s which are hardware revision 3.0 or later have been tested to comply with FCC and CE requirements. Revisions earlier than this may have passed testing, but were not certified at the time of manufacture.

Because **Pb-DMX/s** are low voltage DC devices, neither UL or CE require safety testing.

For fireproofing or additional radio frequency interference shielding, **Pb-DMX/s** can be mounted in a fire rated metallic case. Typically, this would be a NEMA-rated electrical enclosure or 19" electrical rack.

FCC Instruction to User:

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This equipment has been verified to comply with the limits for a class B computing device, pursuant to FCC Rules. In order to maintain compliance with FCC regulations, shielded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio and TV reception. The user is cautioned that changes and modifications made to the equipment without the approval of manufacturer could void the user's authority to operate this equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numerique de la classe B respecte toutes les exigences du Reglement sur le materiel brouilleur du Canada.

EC DECLARATION OF CONFORMITY

Monday, February 26, 2018

Application of Council Directives:

EMC Directive, 89/336/EEC

Manufacturer's Name:

Gilderfluke & Co., Inc.

Manufacturer's Address:

205 South Flower St., Burbank, California 91502 USA

Importer's Name:

Importer's Address:

Type of Equipment:

Entertainment and Lighting Control

Equipment Class:

Commercial and Light Industrial

Model:

Pb-DMX/

Conforms to the following Standards:

EN 55103-1: 1996 and EN 55103-2: 1996

Year of Manufacture:

2006

I the undersigned, hereby declare that the equipment specified above conforms to the above directive(s) and standard(s).

Place: Burbank, California

Signature: (signed) _____

Date: August 1, 2006

Full Name: Doug Mobley

Position: CEO

HEXadecimal to Decimal to ASCII to Percentage

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

decimal	HEX	ASCII	%	decimal	HEX	ASCII	%	decimal	HEX	ASCII	%	decimal	HEX	ASCII	%
00	00h	null	0%	64	40h	@	25%	128	80h	(null)	50%	192	C0h	(@)	75%
1	01h	soh/^A		65	41h	A		129	81h	(soh)		193	C1h	(A)	
2	02h	stx/^B		66	42h	B		130	82h	(stx)		194	C2h	(B)	
3	03h	etx/^C		67	43h	C		131	83h	(etx/)		195	C3h	(C)	
4	04h	eot/^D		68	44h	D		132	84h	(eot)		196	C4h	(D)	
5	05h	eng/^E		69	45h	E		133	85h	(eng)		197	C5h	(E)	
6	06h	ack/^F		70	46h	F		134	86h	(ack)		198	C6h	(F)	
7	07h	bell/^G		71	47h	G		135	87h	(bell)		199	C7h	(G)	
8	08h	bs/^H		72	48h	H		136	88h	(bs)		200	C8h	(H)	
9	09h	ht/^I		73	49h	I		137	89h	(ht)		201	C9h	(I)	
10	0Ah	lf/^J		74	4Ah	J		138	8Ah	(lf)		202	CAh	(J)	
11	0Bh	vt/^K		75	4Bh	K		139	8Bh	(vt)		203	CBh	(K)	
12	0Ch	ff/^L		76	4Ch	L		140	8Ch	(ff)		204	CCh	(L)	
13	0Dh	cr/^M		77	4Dh	M		141	8Dh	(cr)		205	CDh	(M)	
14	0Eh	so/^N		78	4Eh	N		142	8Eh	(so)		206	CEh	(N)	
15	0Fh	si/^O		79	4Fh	O		143	8Fh	(si)		207	CFh	(O)	
16	10h	dle/^P		80	50h	P		144	90h	(dls)		208	D0h	(P)	
17	11h	dc1/^Q		81	51h	Q		145	91h	(dc1)		209	D1h	(Q)	
18	12h	dc2/^R		82	52h	R		146	92h	(dc2)		210	D2h	(R)	
19	13h	dc3/^S		83	53h	S		147	93h	(dc3)		211	D3h	(S)	
20	14h	dc4/^T		84	54h	T		148	94h	(dc4)		212	D4h	(T)	
21	15h	nak/^U		85	55h	U		149	95h	(nak)		213	D5h	(U)	
22	16h	syn/^V		86	56h	V		150	96h	(syn)		214	D6h	(V)	
23	17h	etb/^W		87	57h	W		151	97h	(etb)		215	D7h	(W)	
24	18h	can/^X		88	58h	X		152	98h	(can)		216	D8h	(X)	
25	19h	em/^Y		89	59h	Y		153	99h	(em)		217	D9h	(Y)	
26	1Ah	sub/^Z		90	5Ah	Z		154	9Ah	(sub)		218	DAh	(Z)	
27	1Bh	ESC		91	5Bh	[		155	9Bh	(ESC)		219	DBh	([)	
28	1Ch	FS		92	5Ch	\		156	9Ch	(FS)		220	DCh	(\)	
29	1Dh	GS		93	5Dh	]		157	9Dh	(GS)		221	DDh	(])	
30	1Eh	RS		94	5Eh	^		158	9Eh	(RS)		222	DEh	(^)	
31	1Fh	VS		95	5Fh	`		159	9Fh	(VS)		223	DFh	(`)	
32	20h	SP	12.5%	96	60h	~	37.5%	160	A0h	(SP)	62.5%	224	E0h	(~)	87.5%
33	21h	!		97	61h	a		161	A1h	(!)		225	E1h	(a)	
34	22h	"		98	62h	b		162	A2h	(")		226	E2h	(b)	
35	23h	#		99	63h	c		163	A3h	(#)		227	E3h	(c)	
36	24h	\$		100	64h	d		164	A4h	(\$)		228	E4h	(d)	
37	25h	%		101	65h	e		165	A5h	(%)		229	E5h	(e)	
38	26h	&		102	66h	f		166	A6h	(&)		230	E6h	(f)	
39	27h	'		103	67h	g		167	A7h	(')		231	E7h	(g)	
40	28h	(		104	68h	h		168	A8h	(())		232	E8h	(h)	
41	29h	)		105	69h	i		169	A9h	())		233	E9h	(i)	
42	2Ah	*		106	6Ah	j		170	AAh	(*)		234	EAh	(j)	
43	2Bh	+		107	6Bh	k		171	ABh	(+)		235	EBh	(k)	
44	2Ch	,		108	6Ch	l		172	ACH	(,)		236	ECh	(l)	
45	2Dh	-		109	6Dh	m		173	ADh	(-)		237	EDh	(m)	
46	2Eh	.		110	6Eh	n		174	Aeh	(.)		238	EEh	(n)	
47	2Fh	/		111	6Fh	o		175	AFh	(/)		239	EFh	(o)	
48	30h	0		112	70h	p		176	B0h	(0)		240	F0h	(p)	
49	31h	1		113	71h	q		177	B1h	(1)		241	F1h	(q)	
50	32h	2		114	72h	r		178	B2h	(2)		242	F2h	(r)	
51	33h	3		115	73h	s		179	B3h	(3)		243	F3h	(s)	
52	34h	4		116	74h	t		180	B4h	(4)		244	F4h	(t)	
53	35h	5		117	75h	u		181	B5h	(5)		245	F5h	(u)	
54	36h	6		118	76h	v		182	B6h	(6)		246	F6h	(v)	
55	37h	7		119	77h	w		183	B7h	(7)		247	F7h	(w)	
56	38h	8		120	78h	x		184	B8h	(8)		248	F8h	(x)	
57	39h	9		121	79h	y		185	B9h	(9)		249	F9h	(y)	
58	3Ah	:		122	7Ah	z		186	BAh	(:)		250	FAh	(z)	
59	3Bh	;		123	7Bh			187	BBh	(;)		251	FBh	(;)	
60	3Ch	<		124	7Ch			188	BCh	(<)		252	FCh	(<)	
61	3Dh	=		125	7Dh	l		189	BDh	(=)		253	FDh	(l)	
62	3Eh	>		126	7Eh	~		190	BEh	(>)		254	FEh	(~)	
63	3Fh	?		127	7Fh	del		191	BFh	(/)		255	FFh	(del)	100%