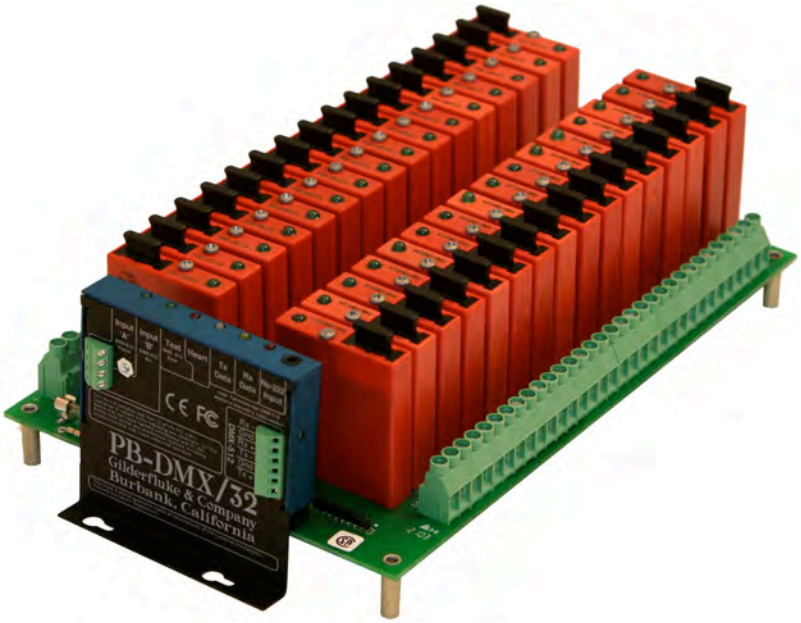
Pb-DMX/32

Digital Relay Output Show Control System



The **Pb-DMX/32** is a complete, stand-alone Show Control System that plugs right onto eight, sixteen, twenty-four or thirty-two position Grayhill 'G5' relay mounting boards. The combination of the **Pb-DMX/32** controller and relays provides up to thirty two high current (rated at 3.5 amps each), high voltage (AC to 120 vac or 240 vac, DC to 60 vdc) outputs, and two trigger inputs. It can run from onboard nonvolatile memory, RS-232 serial port, or industry-standard DMX-512 input. The **Pb-DMX/32** is also capable of outputting a small number of DMX-512 channels which can be used to control light dimmers, smoke machines, wiggle lights, additional **Pb-DMX/32**s, or any other piece of DMX-512 compatible equipment.

The **Pb-DMX/32** 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/32** through the RS-232 serial port. The **Pb-DMX/32** 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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A note about this manual:

This manual covers the specifics of the **Pb-DMX/32**. To program the **Pb-DMX/32** you will also want to refer to the **PC•MACs** manual sections that cover the **PC•MACs** software.

The **Pb-DMX/32** is typically programmed in 'Software-only' or 'Hardwareless Realtime' mode. If you are using the **PC•MACs MACs-USB** for programming your **Pb-DMX/32** through the DMX-512 inputs, please refer to the **PC•MACs** 'Unlimited' mode.

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

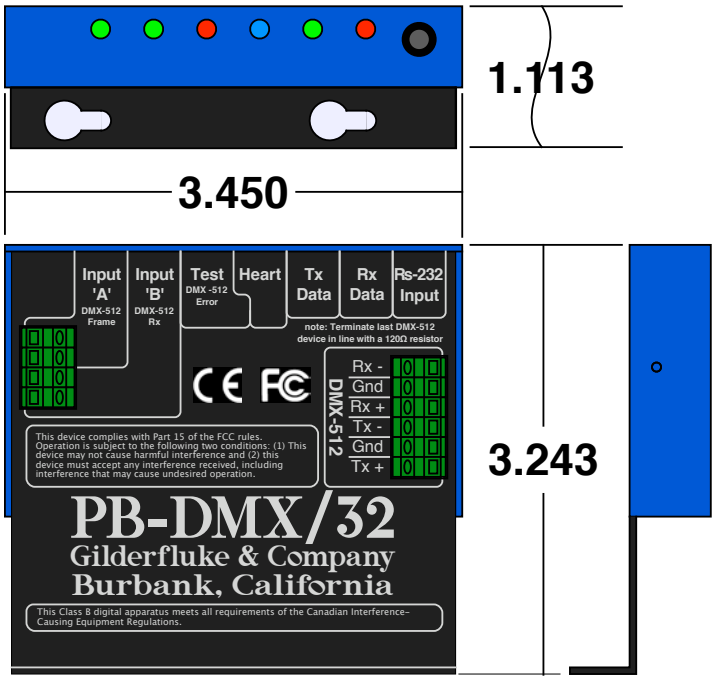
http:/ /www.gilderfluke.com

Pb-DMX/32 Overview

The **Pb-DMX/32** can be used to control animated shows and displays, fountains, fireworks, lighting, sound systems, simulators, slide and movie projectors, fiber optics, window displays, motors, pneumatic and hydraulic systems, special effects, signs, machines and machine tools in process control, or anything else that can be controlled by an electrical signal.

When combined with a Grayhill 'G5' relay module and relays, the **Pb-DMX/32** is a complete stand-alone Show Control System. 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/32s**, Smart Bricks, Dumb Bricks or Digital Audio Repeaters. To add sound, use a **Sd-10** or **Sd-25** Audio Repeaters.

Although the **Pb-DMX/32** can run a sequence from its on-board non-volatile memory, 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 can be wired with only a single shielded twisted pair of wires carrying DMX-512 daisy chained between each **Pb-DMX/32**.



The DMX-512 can come from any theatrical lighting board, or from any piece of Gilderfluke & Co. equipment which can output DMX-512. Most gilderfluke & Co. controllers can do this, but the most commonly used Gilderfluke products for transmitting DMX-512 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.

- **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 based upon time or position on the globe.

To program the onboard memory of a **Pb-DMX/32**, 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/32** in about twenty seconds through the standard RS-232 serial port on your PC. 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/32** will run by itself.

With the optional **PC•MACs** 'RealTime' license or **PC•MACs** hardware (**MACs-USB Smpte Card** and a programming console), 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'** 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/32** 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/32** will run by itself.

Features of the Pb-DMX/32 include:

- Plugs onto a Grayhill 'G5' eight, sixteen, twenty-four, or thirty-two position relay mounting boards. All **Pb-DMX/32** controllers are identical, and can be used freely with any available size relay module.
- Accepts or transmits standard DMX-512 data from light boards, **Br-Brain4**, **MACs-USB**, **Sd-50s**, or any other source of standard DMX-512. DMX-512 is the standard protocol used for controlling all theatrical lighting equipment.
- Each eight outputs splits the data from a single DMX-512 address. A fully loaded **Pb-DMX/32** 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/32** 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 mile, you can put the **Pb-DMX/32** 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 DMX-512 network is unavailable.
- The DMX-512 address is set through RS-232 serial port.
- Programming and operation are identical to a **Br-miniBrick8**, but with up to thirty-two outputs!

- Automatic 'program in place' download through the RS-232 serial port on your PC and the included **PC•MACs** software. It takes about thirty seconds to download a ten minute show.
- RS-232 port is connected using a 1/8" mini plug. Serial cables are available from Gilderfluke & Co. as the **Mp3-50/CBL**. If your PC does not have a serial port on it, we also offer the **USB-RS232/422** USB-to-serial port adapter.
- 'Test' button allows outputs to be manually turned on or off, one at a time.
- Each v1.1 **Pb-DMX/32** comes with a minimum of four MBytes of nonvolatile memory. This gives each **Pb-DMX/32** an onboard show capacity of about nine hours at thirty updates per second! If you are using less than the full thirty-two relay outputs, or lower the frame rate, the capacity will be extended proportionally.
- Once programmed, shows are saved for approximately forty years, with or without power applied.
- Two hundred fifty-five shows can be loaded onto a **Pb-DMX/32**.
- You can rewrite the show memory approximately fifty thousand times.
- Two non-polarized optoisolated inputs to synchronize **Pb-DMX/32s** with push-buttons or other real-time events.
- Each **Pb-DMX/32** 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.
- Multiple **Pb-DMX/32s** can be triggered simultaneously or sequentially.
- The **Pb-DMX/32** 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 **Pb-DMX/32** runs on anything from seven to twenty-four vdc. Use five volt 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.
- 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 Pb-nn mounting board.
- Sturdy aluminum case.

Pb-DMX/32 LEDs, Switches and Connections

There are only a small number of connections on each **Pb-DMX/32**. You will need to attach a power supply, whatever you are controlling, and (optionally):

a) A switch (or two) to start the **Pb-DMX/32**.

b) DMX-512 input and/or output cables.

LEDs:

1. Green 'Input 'A'' and Green 'Input 'B'' LEDs: Two green LEDs show the status of the two optically isolated inputs. These LEDs are located on the 'inside' of the optical isolators. They will operate if the input is receiving a signal, and it is getting to the **Pb-DMX/32's** microcontroller. When receiving DMX-512 or serial RealTime data, the **Pb-DMX/32** no longer needs the two trigger inputs or their indicator LEDs:

   a. The 'A' input's LED is borrowed to 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.

   b. The 'B' input's LED is borrowed to 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 DMX-512 data lines with a 120Ω resistor.

   c. Red 'Test' LED: 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'

4. Blue 'Heart' LED: This LED flashes to show that the **Pb-DMX/32** is receiving power and alive.

5. Yellow 'Tx Data' LED: One LED is attached to the serial data transmission line on the **Pb-DMX/32**. The Tx LED is used as a 'heartbeat' so that you can see that the **Pb-DMX/32** is alive. If the RS-232 serial port is attached to a PC, then the flash will be very short and quick, as the **Pb-DMX/32** sends out a 'f' to mark a frame, or a '.' if it is not currently running a show. When the RS-232 cable is disconnected, then this LED will flash with a 50%/50% duty cycle. If this LED doesn't flash at least once per second, you should power down the **Pb-DMX/32** and check the power supply and connections to the **Pb-DMX/32**.

6. Red 'Rx Data' LED: One LED is attached to the serial data received line on the **Pb-DMX/32**. 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.

Red 'Test' button:

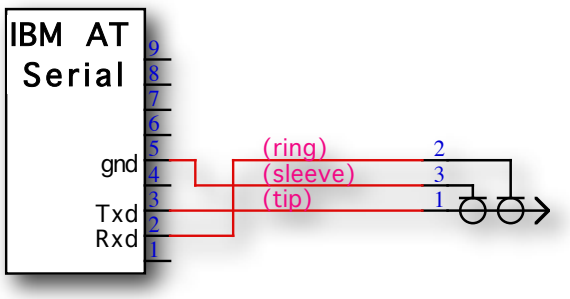
The Red 'Test' button is used forcing off all of the outputs of the **Pb-DMX/32**, and then selectively testing each of the outputs individually. When the Red 'Test' LED is flashing, ALL of the outputs are being forced 'off'. When the Red 'Test' LED is 'on', then one of the outputs is being held 'on'. 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/32** 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/32** 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/32** 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 cable should be used to connect the **Pb-DMX/32** to your PC. The only pins that the **Pb-DMX/32** 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/32**. It can also be used with any GilderTerm or any standard modem program to talk to the **Pb-DMX/32**.



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

The **Pb-DMX/32** 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 input/output on the **Pb-DMX/32** is active ONLY when the RS-232 serial cable is **not** connected.*

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

Although labeled as 'input' and 'output', the 'input' screw terminals are connected directly to the 'output' screw terminals inside the **Pb-DMX/32**. They can be used interchangeably.

When used as an input, The DMX-512 terminals accept standard DMX-512 data from any source of DMX-512 data. This DMX-512 can come from a lighting control board, **Br-SmartMedia**, **Br-Brain4**, **Sd-50**, or any other source of DMX-512. The **Pb-DMX/32** will accept data with or without GilderChecksums. If receiving GidlerChecksums, the **Pb-DMX/32** will not update its outputs on any DMX-512 packet that contains an error.

When used as an output, the **Pb-DMX/32** can send up to sixty-four channels worth of DMX-512 data to control dimmers, wiggle lights, smog machines, strobe lights, or any other devices which accept DMX-512 data.

If used to send DMX-512 data to any Gilderfluke devices (other **Pb-DMX/32s**, **SER-DMX**, etc.), the GilderChecksums can 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. If GilderChecksums are enabled, the the DMX-512 packets will normally be limited to 256 channels (plus two channels for the GilderChecksums) unless the data stored on the eeprom extends past the 256th channel. This will cause the packets to be 512 channels in length.

To connect the **Pb-DMX/32** to another DMX-512 device, wire the screw terminals as follows:

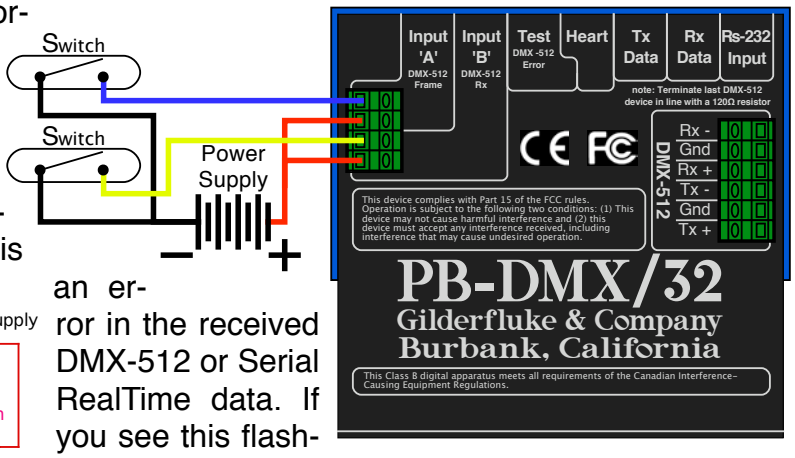
1. Connect the DMX-512 shield to the **Pb-DMX/32** DMX-512 terminal labeled ‘ground’. This is the power supply ‘ground’ for the **Pb-DMX/32**. This signal is normally found on pin #1 of a standard DMX-512 XLR-5 connector.
2. Connect the DMX-512 negative data to the DMX-512 ‘-’ input. This signal is normally found on pin #2 of a standard DMX-512 XLR-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-5 connector.

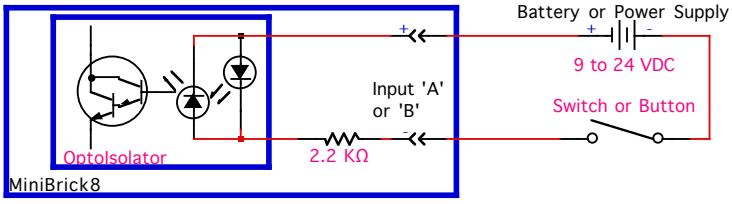
The **Pb-DMX/32** uses a maximum of four data channels from the DMX-512. The first channel is used for the first eight digital outputs. The next consecutive DMX-512 channel is used for the second eight outputs, and so on. The base address used for the DMX-512 and serial RealTime data is set using the configuration menu, or by sending an AutoDownload file to the **Pb-DMX/32** with the desired base address offset.

When receiving DMX-512 data, the **Pb-DMX/32** no longer needs the two trigger inputs or their indicator LEDs. They are used as follows:

a. The ‘A’ input’s Green LED is borrowed to toggle on each frame received. If receiving DMX-512 data at 30 FPS, the LED will be flashing at 15 Hz.

b. The ‘B’ input’s Green LED is borrowed to 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 DMX-512 data lines with a 120Ω resistor.

If the Pb-DMX/32 receives a DMX-512 signal on this input, or even spurious noise that sounds to it a lot like DMX-512, it will stop running any animation sequence and stop to listen for 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' Trigger Inputs:

The trigger inputs can be used to start, stop, pause or select specific show sequences stored on the **Pb-DMX/32's** internal nonvolatile memory to play. 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 trigger it. The green LED lights when a trigger input is active.

Any event can be triggered on either the 'closing' or 'opening' edge of either 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 'steal' some juice from the **Pb-DMX/32's** power supply connections.

Power Supply:

The **Pb-DMX/32** 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. 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/32** 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 relay modules.

You can supply the power to the **Pb-DMX/32** through the 'Logic Supply' screw terminals on the Pb-08, Pb-16, Pb-24 or Pb-32 relay mounting board that the **Pb-DMX/32** 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 **Pb-DMX/32** power supply connection is protected from reversed polarity. An idle **Pb-DMX/32** 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/32** is controlling will draw far more current than the **Pb-DMX/32** itself.

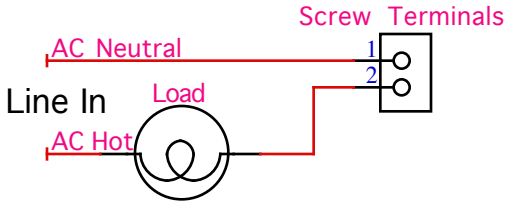
Relay Outputs:

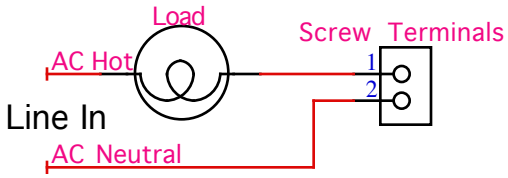
Each **Pb-DMX/32** has thirty-two digital outputs (hence, the name). When plugged into a Pb-08, Pb-16, Pb-24 or Pb-32 relay mounting board, you can connect up to thirty-two things to the **Pb-DMX/32**. With the appropriate AC or DC output relay modules plugged into the Pb-08, Pb-16, Pb-24 or Pb-32 relay 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/32** around the Grayhill 'G5' relay modules because of these fuses. Other similar relay modules use non-standard fuses that are difficult to find and/or replace.

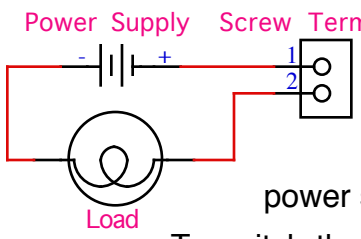
Each relay module has two screw terminals on the mounting board for you to connect whatever you will be controlling. The first relay uses screw terminal positions #1 and #2. The second relay uses #3 and #4, etc.. There are no connections between the secondary sides of any two relay modules. This allows 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:



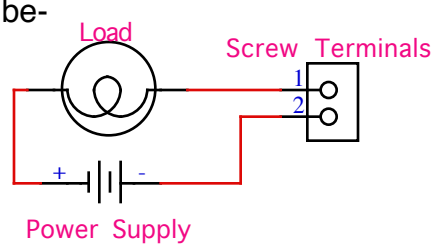


Direct Current (DC) loads will need to observe polarity. The 'odd' numbered screw terminals (#1, #3, #5, etc.) are the positive terminals. The 'even' numbered screw terminals (#2, #4, #6, etc.) are the negative screw terminals.



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 'Stock' memory capacity of a version 1.1+ **Pb-DMX/32** is 4 MBytes. This is actually just shy of 4.2 million bytes of storage. A very small amount of space is used for storing settings, and don't occupy much space in the flash memory.

If this is not sufficient, you have the option of purchasing your controller with an 'Extended' memory. This doubles the capacity to 8 MBytes.

When you save an AutoDownload file for storing on a **Pb-DMX/32**, PC•MACs will calculate exactly how much space this file will require and save this in the '.set' 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 shows[i] = 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 slow moving digital animatronic shows don't usually benefit from faster update rates, so you can program them at a lower rate (like 15 FPS) if you need the show capacity. This will effectively double the show capacity of a **Pb-DMX/32**.

The **Pb-DMX/32** 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.

The 'Show Capacities' shown are at 30 frames (updates) per second, with a memory of 4.1 million bytes available for the 'standard' memory, or 8.2 million bytes for the 'Extended' memory option. If you will be using 15 FPS, you can simply double the times shown. The typical capacities of **Pb-DMX/8, Pb-DMX/16, Pb-DMX/24** and **Pb-DMX/32** (if using only the onboard Show Control Outputs) are shown in **bold**.

[i] Length of show is in seconds

Number of Eight Bit Channels needed	Number of Bytes needed per Sec. (@ 30 FPS)	Standard Show Capacity (Seconds)	Standard Show Capacity (Minutes)	Standard Show Capacity (Hours)	Extended Memory Capacity (Seconds)	Extended Memory Capacity (Minutes)	Extended Memory Capacity (Hours)	
1	**30**	**136,667**	**2,278**	**38.0**	**276,667**	**4,611**	**76.9**	**←Pb-DMX/8**
2	**60**	**68,333**	**1,139**	**19.0**	**138,333**	**2,306**	**38.4**	**←Pb-DMX/16**
3	**90**	**45,556**	**759**	**12.7**	**92,222**	**1,537**	**25.6**	**←Pb-DMX/24**
4	**120**	**34,167**	**569**	**9.5**	**69,167**	**1,153**	**19.2**	**←Pb-DMX/32**
5	150	27,333	456	7.6	55,333	922	15.4	
6	180	22,778	380	6.3	46,111	769	12.8	
7	210	19,524	325	5.4	39,524	659	11.0	
8	240	17,083	285	4.7	34,583	576	9.6	
9	270	15,185	253	4.2	30,741	512	8.5	
10	300	13,667	228	3.8	27,667	461	7.7	
11	330	12,424	207	3.5	25,152	419	7.0	
12	360	11,389	190	3.2	23,056	384	6.4	
13	390	10,513	175	2.9	21,282	355	5.9	
14	420	9,762	163	2.7	19,762	329	5.5	
15	450	9,111	152	2.5	18,444	307	5.1	
16	480	8,542	142	2.4	17,292	288	4.8	
24	720	5,694	95	1.6	11,528	192	3.2	
32	960	4,271	71	1.2	8,646	144	2.4	
40	1,200	3,417	57	0.95	6,917	115	1.92	
48	1,440	2,847	47	0.79	5,764	96	1.60	
56	1,680	2,440	41	0.68	4,940	82	1.37	
64	1,920	2,135	36	0.59	4,323	72	1.20	
80	2,400	1,708	28	0.47	3,458	58	0.96	
96	2,880	1,424	24	0.40	2,882	48	0.80	
112	3,360	1,220	20	0.34	2,470	41	0.69	
128	3,840	1,068	18	0.30	2,161	36	0.60	
144	4,320	949	16	0.26	1,921	32	0.53	
160	4,800	854	14	0.24	1,729	29	0.48	
176	5,280	777	13	0.22	1,572	26	0.44	
192	5,760	712	12	0.20	1,441	24	0.40	
208	6,240	657	11	0.18	1,330	22	0.37	
224	6,720	610	10	0.17	1,235	21	0.34	
240	7,200	569	9.5	0.16	1,153	19.2	0.32	
256	7,680	534	8.9	0.15	1,081	18.0	0.30	
320	9,600	427	7.1	0.12	865	14.4	0.24	
384	11,520	356	5.9	0.10	720	12.0	0.20	
448	13,440	305	5.1	0.08	618	10.3	0.17	
512	15,360	267	4.4	0.07	540	9.0	0.15	

As you can see in the preceding chart, although you can download as many as 512 channels worth of data, when you get that many channels on a **Pb-DMX/32**, you can

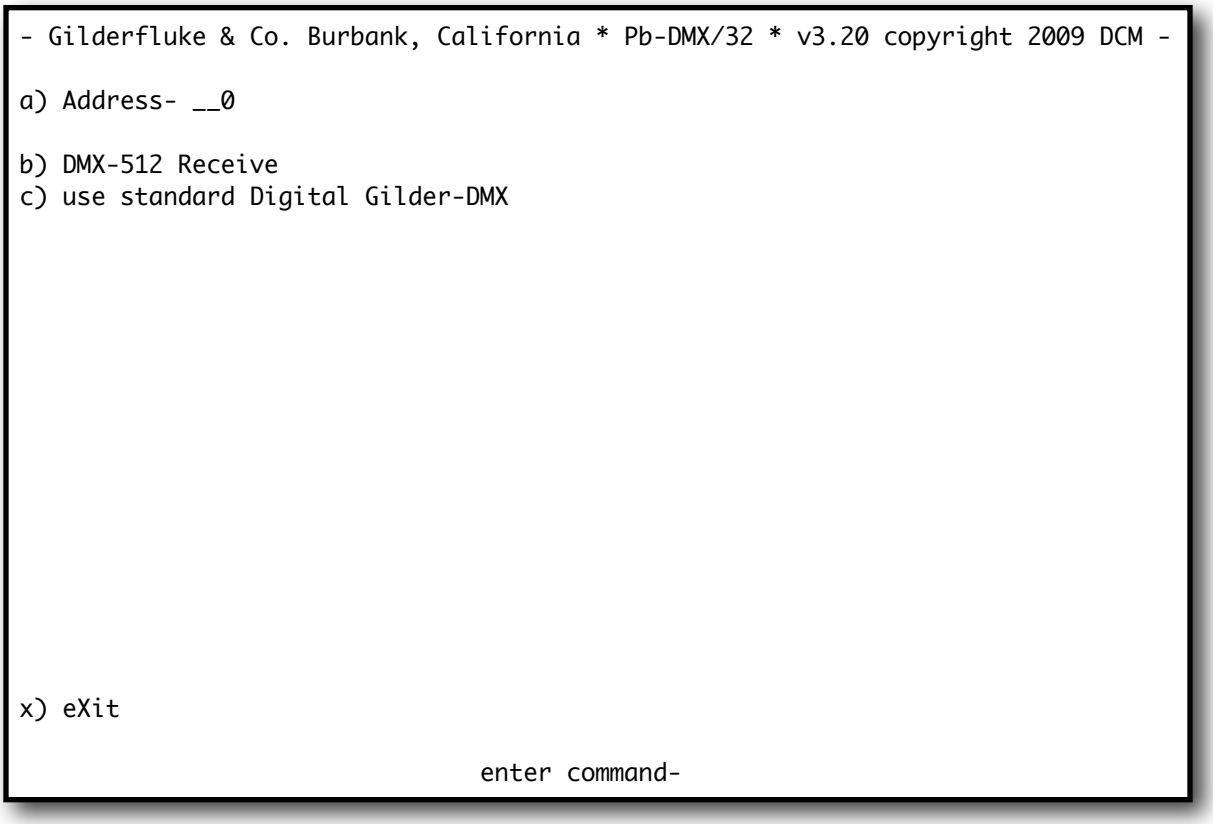
very quickly burn through the onboard flash memory. If loading up all 512 possible channels, it will hold only 4.4 minutes worth of show data (9.0 minutes with the 'Extended' memory option)!

If the standard 4 MBytes of flash memory is insufficient for your application, the **Pb-DMX/32s'** memory can be doubled to 8 MBytes. This will double all the numbers in the chart above.

If you find yourself in this situation, it is standard to use a second card that is made just to hold massive amounts of DMX-512 data. The **Br-Brain4** is designed to control as many as 2048 channels (four full DMX-512 universes). The **Br-Brain4** can hold days worth of data, even when loaded to the full 2048 channel capacity.

Configuration Menu

You will only rarely need any changes to the configuration. Using GIlderTerm, plug in the serial cable to the **Pb-DMX/32**. Press the 'configure' button to bring up the following menu:



As you can see, there aren't too many options available on this menu.

Set DMX-512 Address

This command is used to set the offset address for the **Pb-DMX/32**. By default the **Pb-DMX/32** uses DMX-512 or Serial RealTIme data starting at zero for the digital outputs. This command is one of two ways to set these offsets to any other address. No matter what the base address is set to, all four data channels the **Pb-DMX/32** will use are consecutive.

If using Serial RealTime data, keep in mind that there are only sixteen channels of data being transmitted. If the address is set above sixteen, then the **Pb-DMX/32** will never see that data, as they are above its maximum address range.

If using DMX-512 data, feel free to set the address to anywhere between 0 and 511. Keep in mind that most lighting boards and dimmers now number the DMX-512 addresses between 1 and 512 (our address '0' is their address '1'). If sending data from a non-Gilderfluke system, you will need to offset the address of either the **Pb-DMX/32** or the device which is sending the DMX-512 data by one address.

DMX-512

*The DMX-512 input/output on the **Pb-DMX/32** is active ONLY when the RS-232 serial cable is **not** connected.*

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

Press the ‘b’ key to select the mode of operation for the DMX-512 port. Your choices are:

1. DMX-512 Receive
2. DMX-512 Transmit
3. DMX-512 Transmit (w/checksums)

When used as an input, The DMX-512 terminals accept standard DMX-512 data from any source of DMX-512 data. This DMX-512 can come from a lighting control board, **Br-SmartMedia**, **BsBrain4**, **Sd-50**, or any other source of DMX-512. The **Pb-DMX/32** will accept data with or without GilderChecksums. If receiving GidlerChecksums, the **Pb-DMX/32** will not update its outputs on any DMX-512 packet that contains an error.

When used as an output, the **Pb-DMX/32** can send up to sixty-four channels worth of DMX-512 data to control dimmers, wiggle lights, smog machines, strobe lights, or any other devices which accept DMX-512 data.

If used to send DMX-512 data to any Gilderfluke devices (other **Pb-DMX/32s**, **SER-DMX**, etc.), the GilderChecksums can 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. If GilderChecksums are enabled, the the DMX-512 packets will normally be limited to 256 channels (plus two channels for the GilderChecksums) unless the data stored on the eeprom extends past the 256th channel. This will cause the packets to be 512 channels in length.

*Firmware revisions 3.20 and later of the **Pb-DMX/32s**:*

All GilderGear uses the eight individual bits in a channel of DMX-512 data as eight digital outputs. 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. Values above 50% turn the output ‘ON’. Values below 50% turn the output ‘OFF’. Press the ‘c’ key to toggle between the Gilderfluke-style digitals and ‘analog’ style digitals that lighting boards use. The digitals 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).

Exit Configuration

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

Pb-DMX/32 Serial Port Commands

The **Pb-DMX/32** can be accessed through the serial port from any computer running just about any modem program. The computer you are using doesn't even need to have any **PC•MACs** software installed on it. This is a feature that most users should never need to use.

We prefer to use our own 'modem' program, **GilderTerm**. If you don't have or can't download a copy of **GilderTerm**, then you can use just about any other terminal program. Typical modem programs you can use are Terminal.exe (which comes with Windows 3.1) and Hyper Terminal.exe (which comes with Windows '95 and '98, W2K, and XP). If you can, find a copy of Terminal.exe, as it is a better program than the later Hyper Terminal. You can not download files to a **Pb-DMX/32** when using Hyper Terminal.

To use the **Pb-DMX/32** with a terminal program, just connect it as you would normally with a straight nine position male to 1/8" stereo male cable. Configure your terminal program for 9600 baud, no parity, eight data bits, one stop bit and 'xon/xoff' handshaking. GilderTerm defaults to these settings.

If the **Pb-DMX/32** is not currently running a show, it will be printing the character '.' about once a second. This is the 'heartbeat' that you can see on the 'heart' LED on the **Pb-DMX/32**. When running a show, it will print the name of each show as it is started, and the frame number on each frame update. If you do not see any of these characters, then there is a problem with your physical connection or configuration.

Reset 'J5AA500'

This command will erase the EEprom on the **Pb-DMX/32**. The **Pb-DMX/32** will also determine the type and quantity of memory chips installed and report this and the software revision number when it accepts this command.

Status 'i00'

When it receives this command, the **Pb-DMX/32** will respond with the following information on the **Pb-DMX/32** (It will also print this information out when the **Pb-DMX/32** is first powered up or after a successful AutoDownload):

a) Firmware revision number and copyright.

b) Running status: Whether the **Pb-DMX/32** is running, looping or stopped. What show it is (or was) playing and the frame number into that show the **Pb-DMX/32** is on.

c) Input status: Whether each input is opened ('O') or closed ('C').

d) Name of the AutoDownload file that has been downloaded to the **Pb-DMX/32**.

Unlike most Gilderfluke & Co. products, the address for the **Pb-DMX/32** is fixed at '00'. This is why the address in this command is ALWAYS '00'.

AutoDownload 'sA5A500'

This is the format of the file that the **Pb-DMX/32** will receive and load into its EEprom memory.

An AutoDownload file is a binary file. Any AutoDownload file that has previously been saved can be sent to a **Pb-DMX/32** by selecting the 'send binary file' on your modem program and selecting the AutoDownload for sending. You must be sure that the modem program has not been set to 'gobble' any special characters (carriage returns, line feeds, etc.).

The Hyper Terminal program that comes with Windows '95 and '98, W2K and XP will not work for sending AutoDownloads. For some strange reason it has been written to randomly change any binary value that is larger than one hundred twenty-seven.

Unlike most Gilderfluke products, the address for the **Pb-DMX/32** is fixed at '00'. This is why the address in this command is ALWAYS '00'.

Echo mode ON 'a00'
Echo mode OFF 'b'

This command puts the **Pb-DMX/32** into a verbose mood, where it echos all serial port commands in plain English. This is a good way to diagnose the serial port operations of a **Pb-DMX/32**, as it will also tell you why it didn't respond to a serial port command too.

Unlike most Gilderfluke products, the addressed version of this command for the **Pb-DMX/32** is fixed at '00'. This is why the address in this command is ALWAYS '00'.

Start One 't00'
Start Global 'u'

This command starts the animation playing on the **Pb-DMX/32**. The shows will always start from the beginning. If the **Pb-DMX/32** was previously looping shows, it will have the 'LOOPING SHOWS' flag reset.

At the end of a show which has been started using this command, the **Pb-DMX/32** will simply stop. If you need the **Pb-DMX/32** to pay attention the 'at end' actions which were set when the show was downloaded, then you should use the 'loop' command instead.

If the **Pb-DMX/32** 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/32** 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/32**, 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/32** is already playing a show which has this option set, it will ignore this command.

Unlike most Gilderfluke products, the addressed version of this command for the **Pb-DMX/32** is fixed at '00'. This is why the address in this command is ALWAYS '00'.

Stop One 'x00'
Stop Global 'y'

This command unconditionally stops the **Pb-DMX/32**. The stop happens at the current frame being played, and the outputs are frozen in the condition they were in when the stop was received.

Unlike most Gilderfluke products, the addressed version of this command for the **Pb-DMX/32** is fixed at '00'. This is why the address in this command is ALWAYS '00'.

Loop One '!00'
Loop Global '""'

These command acts much like the START commands, except they also set the 'LOOPING SHOWS' flag. At the end of the show, the **Pb-DMX/32** will check for what was set as the 'at end' functions for the show which just completed, and take those ac-

tions. With this flag set, it is possible to set a sequence of shows playing in any order. Since the 'next' show can be any show you ask for, one show can be played over and over again, or you can set up a sequence of shows which will be repeated until the **Pb-DMX/32** is told to stop.

Unlike most Gilderfluke products, the addressed version of this command for the **Pb-DMX/32** is fixed at '00'. This is why the address in this command is ALWAYS '00'.

Stop at End Track '%00'
Stop at End Global '&'

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

Unlike most Gilderfluke products, the addressed version of this command for the **Pb-DMX/32** is fixed at '00'. This is why the address in this command is ALWAYS '00'.

Select Show Track ')00' (show#)
Select Show Global '*' (show#)

Up to two hundred fifty-five different animated shows can be stored on a single **Pb-DMX/32**. This command can be used to select an individual show on the selected **Pb-DMX/32**. Individual shows can be requested using Hexadecimal numbers with a range of 01 to FF. Once a show is selected, it will be played on the next serial port START or LOOP command. If a show is currently 'looping', the requested show will be played at the end of the next 'loop'.

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

Unlike most Gilderfluke products, the addressed version of this command for the **Pb-DMX/32** is fixed at '00'. This is why the address in this command is ALWAYS '00'.

Pause Show '<00'
Continue Show '>00'

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 playing any show playing which has previously been PAUSED.

Unlike most Gilderfluke products, the address for the **Pb-DMX/32** is fixed at '00'. This is why the address in this command is ALWAYS '00'.

Programming the Pb-DMX/32 with a Computer

*This section of the manual is for those of you who aren't installing the **MACs-USB** Smpte Card in their computer. If you do have a **MACs-USB** Smpte Card installed in your computer, please refer to the appropriate sections of this or the **PC•MACs** manual. All of the real-time features of **PC•MACs** are covered there.*

The **Pb-DMX/32** can be 'Programmed in Place' using Gilderfluke & Co.'s **PC•MACs** software. The instructions in this section cover 'Programing-In-Place' using our free **PC•MACs** software.

If you have ever drawn a 'timing chart' or schedule, this is exactly what you will be doing to program the **Pb-DMX/32**. 'Time' is shown along the top of the page, and you draw in an output where you want it 'on', and don't draw it in where you want it 'off'. All of the outputs can change on every single update (typically there are 30 updates each second). The **Pb-DMX/32** just doesn't care if an output changes or not.

The next section of the manual gives an overview of programming using the **PC•MACs** RealTime License. It assumes that you have already completed this section of the manual to learn how to install the **PC•MACs** software, create a show, populate it with figures and channels, and perform rudimentary editing functions on the OffLine Editing Screen.

This section of this manual is excerpted from the (much larger) **PC•MACs** manual. Even more commands and more details on the following commands can be found in other sections of the **PC•MACs** manual. It can be downloaded from the Gilderfluke & Co. website.

Install the Software.....

*If the **PC•MACs** software has already been installed on the computer you are using, you can skip this step.*

PC•MACs is usually distributed on a CD-ROM, downloaded from our web page, or received as a file attached to an Email. If you have the CD-ROM, just insert it in the appropriate receptacle in your computer. The CD will bring up a menu which will allow you to install **PC•MACs** and other Gilderfluke & Co. software. All Gilderfluke & Co.'s manuals are also on this disk, and can be read using the included Acrobat PDF reader.

If you have downloaded or received the **PC•MACs** software via Email, it will probably be compressed into a '.zip' file. You will first need to decompress this file. Your browser or Email program may do this for you automatically. If not, you will need a program like unzip.exe or Win Zip to decompress them. Once this is done, just run the 'Setup.exe' program and follow the steps as it installs **PC•MACs** on your computer.

Getting started.....

*If the **PC•MACs** software is already running on the computer you are using, you can skip this step.*

The installation process will have left a shortcut to **PC•MACs** under the Windows Start/Programs/Gilderfluke pulldown or on the desktop of your computer. You can start **PC•MACs** by double clicking on either of these aliases, or navigating directly to the **PC•MACs.exe** file and double clicking directly on it. If you tell the Windows registry about **PC•MACs**, then it can start automatically any time you double click on a show or site file.

Without the **MACs-USB** installed in your PC, you will be running in 'Software-Only' mode. When you start the **PC•MACs** software, it will display the 'main' window, with a message at its bottom that the Smpte Card hasn't been found, and the program is operating in 'Hardwareless' mode.

You will be able to access every feature of the **PC•MACs** program except for the real-time commands (Play, Record, Rehearse, Single Step, etc.).

Select the serial port.....

If a serial port has already been selected, or you aren't going to be downloading anything, you can skip this step.

If this is the first time that you have used **PC•MACs**, you will need to select the serial port you are using. You can do this by opening the dialog under the Preferences pulldown/Hardware/MiniBrick Interface.... Select the serial port you are going to be using. This serial port must not already be in use by any other function on your computer. If it is, **PC•MACs** will give you a nasty message when you try to do an AutoDownload.

The selected serial port is stored as part of the Gilder.ini file. If it is an actual serial port built in to your computer you will probably never need to select it again. If it is a USB-to-Serial adapter, you may need to repeat this selection process every time Windows looses the USB serial port connection. Windows does this fairly regularly.

Starting a new show.....

If you want to use a show that has already been created, just select the 'File pulldown/Open...' command to select and open an existing show. You can skip down to the 'Editing your show.....…' paragraph below.

To start a new Show and Site File, select File pulldown/'New...'. This opens the Show Information dialog. For now, all we will do is create a new Site File, but this is where you will normally set the length, frame rate and time code used with your show. All of these can be changed at any time, so don't worry about them too much

When using Hardwareless RealTime mode, the only valid choices for Timecode are 'Internal' and 'Audio'. In this case, we will choose 'Audio', so we can see a waveform displayed graphically on the editing screen a little later. Select the radio button next to the 'Audio' selection. To actually select the audio or video file that you will be locking to, press the 'Load Media File' button. You can select the 'Files of Type' popup and select either 'Audio Files' (any .wav, .mpa, mp2, mp3, .au or .aif file) or 'Video Files' (any .avi, .qt, .mov, .mpg or .mpeg file) to use. In this case, select 'Audio Files' and pick any audio file to use.

If the length of the audio file you selected is different from what you have set for the show length, **PC•MACs** will give you the opportunity of modifying the length. You can leave the length unchanged, or automatically match the length of the audio or video file.

New shows default to using the '**PC•MACs**' Site File. To create a new Site File, select 'New...' from the Site File popup. Give it a simple name like 'Test' when it asks for one. If you had already created your own Site File and wanted to use it again for your next show, you would just select it from the Site File popup.

Click the 'OK' button to close the Show Information dialog. At this point you have created a blank show and a 'new' blank Site File. You will now need to create some outputs so that you can program them. We'll do that in the next two steps……..

Creating some figures.....

Open the Channels pulldown/Channels List dialog. At this point this list should be pretty darned empty. After all, this *is* a brand new show!

FigureNames are used like a 'folder' on your computer's disk. You can put movement names into them to organize them and make them easier to manage. You can create a FigureName by using the Channels pulldown/'Create figure' command.

You can modify any FigureName by selecting it and choosing Channels pulldown/ 'Modify' command or by simply double clicking on the FigureName you want to change.

Creating some output channels.....

If you don't foresee ever using analog functions, then only create the digitals. If you don't foresee ever using digital functions, then only create the analogs.

Open the Channels pulldown/Channels List dialog (if it isn't already opened).

First select (highlight) one of the figures that you have created. As a shortcut we will then create eight, sixteen, twenty-four or thirty-two digital channels (depending on what size relay mounting board you will be using) followed by two analog channels by using the Channels pulldown/'Create Multiple...'. This command will ask you for the number of analog and digital channels you want to create. To keep things simple, select 'zero' analog and 'eight', 'sixteen', 'twenty-four' or 'thirty-two' digitals (match the size relay mounting board you will be using).

Now create an analog channel using the Channels pulldown/'Create Analog...'. set it for 8 bits of resolution.

This should have resulted in eight digital output channels addressed at 0.0 through 0.7, and one eight bit resolution analog channel. The analog channel would be used for a dimmer or other DMX-512 controlled device connected to the **Pb-DMX/32**. It will have the 'default' names.

The channels you have created are inside the 'figure' folders you previously created (you did highlight the figures before creating the channels, didn't you?) To see the channels you need to 'open' the FigureName. Left mouse click on the '>' at the left of one of the FigureNames. This will open up the FigureName (the '>' turns into a 'V') so you can see the channels within it. You can 'close' a FigureName by clicking on the 'V'.

You can also create analog and digital channels one at a time by using the Channels pulldown/'Create Analog' or Channels pulldown/'Create Digital'. If you select one of the FigureNames you have already created, any output channels you create will be added to this folder.

Name those channels.....

You can modify any figure or channel by selecting it and choosing Channels pulldown/'Modify' command or by simply double clicking on it. You can then set the default levels for analogs (or 'on' or 'off' for digitals), and the FigureName and figure assignment for a channel. **PC•MACs** won't let you change an address to overlap with any other existing channel. Leave the analog resolution at eight bits and don't modify the address or bit number (digitals functions only) just yet.

You can use the 'Next'/'Last' Buttons to view and edit the next or previous output channel.

Close the Channels List by using the 'Close' box in the upper right corner or Channels pulldown/'Hide Channels List' command.

Saving your show.....

At this point it is time to save the work you have done so far. Because this is a new show, the show remains 'Untitled'. You can find the 'Save' command under the File pulldown/'Save'. The first time you save a show, it will ask you for a ShowName. If you want to save any show under a different name, you can always use the File pulldown/ 'Save as...' command.

You should save the show often enough that you won't get really pissed off if the computer was to crash.

Editing your show.....

If you have already moved the channels you want to edit over to the OffLine window, you can skip the next step and open the OffLine window directly. Do this by pressing the OffLine button on the main window, or using the OffLine pulldown/'Show OffLine...' command. **PC•MACs** will always remember the last channels that were edited for a given site file.

Moving channels to the OffLine Editing window.....

Now that we have some channels created, we can start editing them. Open the OffLine pulldown/'Move to OffLine...' dialog. This dialog has two columns on it. In the left column are all the figures and channels you have created. In the right column are the channels you will be editing

You can select whole figures, or just some of the channels for editing by highlighting them and pressing the 'Move' button between the two columns. For this demo we have only created one analogs and between eight and thirty-two digitals. We might as well move them all over for editing. Press the 'OK' button when you are done. This will open the OffLine editing button.

On the OffLine Editing Window, you will see the analog functions displayed in the upper pane. Since nothing has been programmed on the one analog functions yet, it should appear as a horizontal colored line along the 50% mark at the middle of the analog pane.

Behind the analog functions is the waveform of the audio file you selected. If the sound you selected has a good 'beat', you will see regular pulses in it. The sound waveform is used as an editing aide to synchronize your sounds and movements. You can also 'paste' a sound waveform into an analog or digital animation function using the 'Yak' function.

The digital functions are shown in the lower pane. With nothing programmed into them, the eight digitals will appear as eight light blue lines running horizontally along the bottom of the digital window pane.

Where in the show are we?.....

'Show' Time is displayed along the top of the window.

The time shown at the lower left corner of the screen is the time at the left side of the window. The time shown at the lower right corner of the screen is the time at the right side of the window. The time shown at the bottom center of the screen is the time at the center of the window.

You can use the slider at the bottom of the screen to move to a different point in the show, or modify any of these times to move to a different part of the show.

Change the amount of show you see.....

You can zoom in to see just a few frames of your show, or zoom all of the way out to see the entire show at once. You can do this using the OffLine pulldown/Time Scale commands, or Zoom time In, Zoom Time Out buttons on the pulldown at the top of the screen.

You probably don't want to zoom in or out too far. If you zoom in too far you will only see a tiny piece of your show. If you zoom too far out, you may not be able to see short

events. By default, **PC•MACs** will display two to four seconds of a show (depending on screen resolution).

Which channel is which?.....

As you move the cursor over any analog or digital function, you will see its name displayed in the lower right corner of the window. This is how you can tell one channel from another. The names of the digital functions are also displayed in little tiny type at the left of the digital window pane.

Rules to remember.....

a. Channels are selected by clicking with the left mouse button.

b. If you left-click ON a channel, that ONE channel will be selected. If you click any where BUT on a channel, ALL of the channels on the OffLine Window will be selected.

c. Channels are modified by using the right mouse button.

d. Only the selected channels will be affected by any editing command. Channels that are not being displayed on the OffLine Screen, or channels that are not selected, will never be affected by anything that you do on the OffLine screen.

Selecting one or more channels for modification.....

You can select a single channel for a stretch of time by left-clicking on that channel and sliding the mouse to the left or right before releasing the mouse button. You can select all the channels that are being displayed by left-clicking anywhere on the screen but on a channel and sliding left or right before releasing the mouse button. You can see what channel(s) are selected by the width of the lines they are drawn with. When a channel is selected, the lines get fatter.

Changing the channels you selected.....

Individual channels can be selected or deselected by <shift>+left clicking anywhere ON the channel you want to select or deselect. The channel will fatten or thin up to show that it has been selected or deselected.

Another way to change the channels you selected.....

You can double check which channels are selected by clicking on the ‘Selected Channels' button at the bottom middle of the OffLine screen. This will bring up the ‘Move to OffLine...' dialog again. Any channels that are selected will be highlighted in the right column. You can change which channels are selected by highlighting and unhighlighting channels in the right column of this dialog before you close it and go back to the OffLine Window.

You can also use this dialog to move channels on or off the OffLine Editing window. In general, you want to keep the OffLine Editing window as clear as possible. Display only the channels you are going to be modifying.

Changing the amount of time selected.....

Once you have one or more channels selected, you can change the amount of time selected by modifying the times displayed at the bottom of the window. The entries that are used for ‘from’ and ‘to’ times, and the ‘amount of time selected’ are the main ones you might want to try changing. You can type in numbers, right-click or left-click, or click and slide up and down or use the up down buttons on the keyboard to modify these times. These numbers can be copied to other locations in the program, or copied from other locations using the little ‘clock face’ popups next to each entry.

A second way to change the amount of time selected is to <shift>+left click anywhere in the white background area of the window (anywhere but on a channel). The selected area will extend to the new click point.

Modifying digitals with a right mouse click.....

You can draw or undraw any digital function by right-clicking on it and sliding the mouse left or right. If you start on a point where the digital function is 'Off' (only a thin line is showing), it will be drawn in. If you click on a spot where the digital is 'On' (where the line is already fat), it will be turned 'Off' as you drag the mouse.

If you press down the <shift> on your keyboard and right mouse click on a digital, you can then 'shift' it left or right without changing its length.

Modifying analogs with a right mouse click.....

Before trying this, make sure that the Preferences pulldown/Rubberbanding.... dialog is set for 'Spline', with a default number of frames set to twenty.

Move the mouse over an analog function. Right Click on it and slide the mouse up or down. When you release the button, the wave shape will be modified. If a range of time has been selected, then the selected area will be Rubberbanded (instead of the default selection you made for twenty frames).

Spline is the most commonly used tool. You can go to the Preferences pulldown/ Rubberbanding.... dialog and try out some of the other tools. The 'Pencil' tool requires that a range of time be selected for it to work.

Cut, Copy and Paste, just like a word processor.....

Once one or more channels have been selected, you can use the standard cut/copy/ paste functions that are used in every word processor known to mankind. The only difference is that here you are editing movements instead of sentences. These commands are all found under the Edit pulldown.

Just like your work processor, if you cut out a paragraph, all the text after it will slide forward in your document to fill the void. The same thing happens when you cut out a stretch of one or more movements. Conversely, if you paste a sentence into a document, all the text after it will have to slide backwards to make room for it. The same thing happens when you edit movement(s) in **PC•MACs** too. If you select a paragraph in word processor and paste in a different paragraph that is exactly the same length, all the text after will not need to move. Again, **PC•MACs** works in exactly the same way.

Paste something a bunch of times.....

Something fun to try: Use the OffLine pulldown/'Move to OffLine...' command to leave only three or four digital functions in the right column. Click 'OK'. Now use the right mouse button to draw in a chase pattern on these digitals. You should end up with a pattern that looks something like a staircase. It can be an up or down staircase, at your option. The steps can overlap or not. Now use the left button to click in the white background of the window and select your staircase. Select the 'Copy' command under the Edit pulldown. Now select any single point on the OffLine Editing Window by clicking on it with the left mouse button. Now select the Edit pulldown/'Paste Multiple...' command. Enter in the number of times you would like to see this chase pattern repeat and click 'OK'.

Cut, Copy and Paste to a file.....

All of the cut, copy and paste commands you tried out in the last two sections can be used to save one or more movements to files instead of the 'clipboard'. Instead of using the standard editing commands, select the File pulldown/'Save Macro...', File pulldown/

'Insert Macro...' and File pulldown/'Insert Multiple Macros...' commands. This allows you to 'paste' in a movement that you 'copied' months ago. The only limitation to the number of Macro files you can save is the capacity of your hard disk.

Reverse events in time.....

Now that you have a bunch of staircases, select one or more of them by left-clicking anywhere except on the channels. Slide to the left or right until you have a complete sequence of steps selected and release the left mouse button. This selects all of the channels that are currently displayed on the OffLine screen. Now select and Edit pulldown/'Reverse' command. The selected stairway will now be reversed. This is useful for programming chase sequences.

Stretch and compress time.....

With one or more channel selected, you can then change the amount of time it takes for the movement to take place. To do this, move the cursor up into the time bar. As you do, you will see the cursor change into an 'I' beam. If you right-click and slide the mouse to the left or right, the selected channels will be compressed or stretched when you release the button. The data after the edit will slide forward or back in time to make room for your changes.

Analog functions are interpolated when you stretch or compress them, so they come out fairly cleanly. There aren't a lot of points between 'On' and 'Off' on a digital function, so you may see some rounding errors on the digital functions. You can minimize this by changing the new time to an even multiple of the original time.

Adding and subtracting time.....

If a function happens too soon or late, you may need to shift it in time. Select one or more channels for one or more frames worth of time. Use the Edit pulldown/'Add time' to move actions to a later time. Use the Edit pulldown/'Delete time' if you need the actions to happen sooner. The selected movement(s) will shift by the number of frames you have selected.

Generating a ramp between two points.....

If you are only using digital channels, you should skip this step.

Select one or more analog channels for one or more frames worth of time. Select the Edit pulldown/Inbetween command or <F10>. A ramp will be generated from whatever levels the analogs are at the beginning of the selected area to whatever level they are at the end of the selected area. The type of curve used for the ramp is set on the Preferences pulldown/Inbetweening dialog.

More ways to modify a digital channel.....

If you are only using analog channels, you may want to skip this step.

Select one or more digital channels for one or more frames worth of time. Under the Edit pulldown you can select the following commands to:

a. 'Clear to Default Values': Sets any selected digital(s) back to their default values (set for each channel under the Channels List). You can also use the 'Delete' key on your keyboard as a shortcut to this command.

b. 'Fill with First Value': The value at the start of the selected area is used to fill in the rest of it.

c. 'Invert Values': Where the digital was 'On', it is turned 'Off'. Where it was 'Off', it is tuned 'On'.

d. 'Reverse Values': The selected digital(s) are reversed in time.

e. 'Set to Yak...': Only if a Audio or video file is used for synchronization. The audio waveform is transferred into the digital function(s).

f. 'Set Digitals Off': The selected digital function(s) are turned 'Off' in the selected area.

g. 'Set Digitals On': The selected digital function(s) are turned 'On' in the selected area.

More ways to modify an analog channel.....

If you are only using digital channels, you may want to skip this step.

Select one or more analog channels for one or more frames worth of time. Under the Edit pulldown you can select the following commands to:

a. 'Clear to Default Values': Sets any selected analog(s) back to their default values (set for each channel under the Channels List). You can also use the 'Delete' key on your keyboard as a shortcut to this command.

b. 'Fill with First Value': The value at the start of the selected area is used to fill in the rest of it.

c. 'Invert Values': The selected analog channels(s) are inverted. As an example, a value that was at 25% will be inverted to 75%.

d. 'Reverse Values': The selected analog(s) are reversed in time.

e. 'Set to Yak...': Only if a .WAV file is used for audio synchronization. The audio waveform is transferred into the digital function(s).

f. 'Set Analogs to a Value...': You can enter a value for the selected analog(s).

g. 'Ramp to a value...': You enter the ending value for a ramp. A ramp is generated from the existing value at the start of the selected area to the value you enter at the end of the selected area. You can also select the type of curve to use for the ramp (linear 'straight line', spline or curve). The 'Curve' option often works best for this command.

h. 'Scale by Percentage...': The value you entered is added or subtracted from the selected analog channel(s).

i. 'Smooth': This command applies a filter to the selected analog channel(s). This will remove any jitter, and smooth out the highs and lows in an analog channel. The value of this filter is set under the Preferences pulldown/'Smoothing' dialog. A larger value will filter more. Each time you apply the filter to the same analog, it will be filtered more. Eventually, you will end up with a flat line.

Save your show (again).....

Now that you have something programmed, you can now download it to the Bricks you are using. You should save your work using the File pulldown/'Save' command. If you don't, **PC•MACs** will not let you download the show in the next step.

AutoDownload your show.....

If you have a Pb-DMX/32 attached to your PC, you will now want to try out the AutoDownload functions of **PC•MACs**. Jump forward to the 'AutoDownload Quick Start' section of this manual to give it a try!

Programming a Pb-DMX/32 with a RealTime License

*This part of the manual is for those of you who aren't installing the **MACs-USB** Smpte Card in their computer, but will be licensing the 'Hardwareless RealTime' mode. If you do have a **MACs-USB** Smpte Card installed in your computer or aren't licensing 'Hardwareless RealTime', you can skip reading this section of the manual.*

This section of this manual assumes that you have already gone through the previous section of this manual, where you learned how to create a show, and make the figures and output channels you will be programming, and edit them using the OffLine Editing Window.

This is excerpted from the (much larger) **PC•MACs** manual. Even more commands and more details on the following commands can be found in other sections of the **PC•MACs** manual. It can be downloaded from the Gilderfluke & Co. website.

Register your PC•MACs Software.....

*If the **PC•MACs** software has already been registered on the computer you are using, or you already have a **MACs USB RealTime Dongle** installed, you can skip this step.*

The **MACs USB RealTime Dongle** is the permanent license for the RealTime features of **PC•MACs**. Gilderfluke & Co. can issue a temporary RealTime License number as a temporary license, while the **MACs USB RealTime Dongle** is shipped to you. This will enable the RealTime features of **PC•MACs** for fourteen days.

To obtain the temporary license for the Realtime features of **PC•MACs**, you will need to register it with Gilderfluke & Co.. You can do this by opening the dialog under the Preferences pulldown/Hardware/MiniBrick Security Key.... This shows a sixteen digit 'System Serial Number' based upon your system's hard disk drive, Windows, and the date and time.

Contact Gilderfluke & Company with this number by phone, fax or Email, and we will return a eight to ten digit long 'Security Key'. When you enter this 'key' and press the 'Validate' button, all of **PC•MACs** RealTime features will be unlocked for fourteen days. During this time, a **MACs USB RealTime Dongle** will be sent to you. Once the **MACs USB RealTime Dongle** has arrived, it can be plugged into any PC that has our software installed to permanently enable RealTime programming.

Install MACs USB RealTime Dongle.....

*If the **PC•MACs** software has already been registered on the computer you are using, or you already have a **MACs USB RealTime Dongle** installed, you can skip this step.*

*Exit **PC•MACs** before beginning this procedure. It will not recognize the **MACs USB RealTime Dongle** unless it was in place before it has started running.*

The first time a **MACs USB RealTime Dongle** is plugged into a computer, Widows will proudly announce that it has found new hardware, and hasn't a clue where to find the appropriate drivers.

You will need to navigate Windows over to the C:/Programs/Gilderfluke/USB_Install to find the appropriate driver. Being Windows, you will probably have to do this twice.

Now if you look under the Preferences pulldown/Hardware/MiniBrick Security Key.... Dialog, it will show that the **MACs USB RealTime Dongle** has been installed.

Note that this installation process will need to be repeated for any other computers you want to install the **PC•MACs** software and Hardwareless Realtime programming.

The **MACs USB RealTime Dongle** can freely be moved between any number of computers. Only the computer that has the **MACs USB RealTime Dongle** installed at the time will have access to the RealTime features of **PC•MACs**.

Select the serial port.....

If a serial port has already been selected, you can skip this step.

If this is the first time that you have used **PC•MACs**, you will need to select the serial port you are using. You can do this by opening the dialog under the Preferences pulldown/Hardware/MiniBrick Interface.... Select the serial port you are going to be using. This serial port must not already be in use by any other function on your computer. If it is, **PC•MACs** will give you a nasty message when you try to do an AutoDownload.

The selected serial port is stored as part of the Gilder.ini file. If it is an actual serial port built in to your computer you will probably never need to select it again. If it is a USB-to-Serial adapter, you may need to repeat this selection process every time Windows looses the USB serial port connection. Windows does this fairly regularly.

You are going to be updating your outputs through the serial port. You will need to click ON the 'RealTime MiniBrick Updates' checkbox.

Plug in the Bricks.....

*If you have already plugged in your **Pb-DMX/32** to the serial port, you can skip this step.*

It is now time to plug the **Pb-DMX/32** into the serial port of your computer and power it up. To connect the **Pb-DMX/32** you will need a need a straight nine pin male to 1/8" stereo plug cable.

Power up the **Pb-DMX/32**. For testing purposes, your power supply can be as simple as a couple of nine volt transistor radio batteries wired in series.

Assigning programming console inputs.....…

*If you haven't done so already, open **PC•MACs** and the show you created in the previous section of the manual.*

Now that we have created some outputs in the previous section of this manual, we need to assign them to the programming console so we can start RealTIme programming. When operating in Hardwareless Realtime Mode, your only choice for a programming console is the 'Soft Console'.

Open the Soft Console using the RealTime pulldown/Show Soft Console command or press the <F5> hot key shortcut. The Soft Console supports up to eight digital functions and two analogs at one time. Outputs are assigned by popping up the 'Assign' popups. This will display a list of the first sixteen eight bit wide channels you have created. Analog functions are shown by name. Digital functions are shown as 'Digitals @ nn'. There are also entries in the popups to 'Unassign' inputs.

Popup the digital 'assign' popup and select one of the digital channels you created. If you have something attached to the outputs, you probably want to pick a channel that will be displayed on the outputs. The names of the individual digital bits will appear adjacent to each button on the Soft Console. You can then check the adjacent checkboxes for the channels you want to make active. Any bits that are left unchecked will be left in 'playback' and the data will not be changed. You can press the digital function buttons with the mouse on the screen, or use the number buttons '1' through '8' on your PC's keyboard. Note that not all PC keyboards will let you press all eight number keys at the same time. This is a limitation of the keyboards, and not **PC•MACs**.

Popup the analog ‘assign’ popup and select the analog channel you created. If you have. The analogs can be moved by clicking anywhere on the Soft Console and sliding the mouse left and right, up and down (depending on which slider you assigned it to).

The ‘Punch Out’ buttons allow you to temporarily place an input into ‘playback’ (they won’t alter the data) without unassigning them. The Momentary/Alternate button make the digital inputs alternate action (push on/push off) or momentary. The Forward/Reversed buttons allow you to reverse the sense of the two analog inputs.

Trying out your outputs.....

If you haven’t already, turn on ‘Manual Mode’ by pressing <F3> so that **PC•MACs** starts updating the outputs. If 'Manual' mode is 'On', then whatever you do on the console will be sent out through the serial port. If you have any output devices attached, you will see them change as you move the controls and/or push the digital buttons on the console.

Press the digital function buttons with the mouse on the screen, or use the number buttons ‘1’ through ‘8’ on your PC’s keyboard. Move the analog functions by moving the mouse to anywhere on the screen Soft Console Window and pressing the left mouse button. The analogs will remain active for as long as you keep this button depressed.

The ‘Punch Out’ buttons allow you to temporarily place an input into ‘playback’ (they won’t alter the data) without unassigning them. The Momentary/Alternate button make the digital inputs alternate action (push on/push off) or momentary. The Forward/Reversed buttons allow you to reverse the sense of the two analog inputs.

Saving console presets.....

If you want to save the assignments you just made on your console, you can save a ‘Console Preset'. This takes a snapshot of everything you have assigned on the console. Select RealTime pulldown/‘Save Console Preset...'. Give the Console Preset a name or use the list of 'Standard Console names' popup to use one that has already been saved. Once a Console Preset has been saved, it can instantly be recalled by the popup in the middle of the **PC•MACs** Main Window or by the RealTime pulldown/‘Load Console Preset....' dialog.

Now that some channel(s) have been assigned to the console, we can start programming.

Recording in RealTime.....

Press the ‘Record' button on the Main **PC•MACs** window (or use the Realtime Pulldown/Record command or or <control>+<F1> on the keyboard). **PC•MACs** will start advancing frames. Switch back to the Soft Console Window (if it got covered up) As you move the analog controls (press and click the left mouse button) and press the digital buttons you have assigned, whatever you do is being recorded as it is sent out the PC’s serial port. You can stop at any time by pressing the ‘Stop' button on the screen or <space bar> on the keyboard.

Playing it back.....

To see what you just did, you can press the ‘Play' button on the screen or <F1> on the keyboard. **PC•MACs** will then play back what you just recorded. You can stop the playback just as you stopped the Record, by pressing the ‘Stop' button on the screen or <space bar> on the keyboard.

Saving your show (again).....

At this point it is time to save the work you have done so far. Use the File pulldown/ 'Save' command. If you want to save any show under a different name, you can just use the File pulldown/'Save as...' dialog.

One step forward, three steps back.....

Now that you have done a pass or two, you can move on to programming some other output channels.

You are going to go back a few steps to change the assignments on the console (optionally saving this as a new console preset) and record some data onto these other channels too. You will see that as you record onto these new channels, the data you programmed into the previous channels will be played back as well.

This is how a show is programmed. You typically program a channel or two at one time, and then move on the next channels. Repeat these steps for as many channels as you want to record.

Editing your show.....

The last few steps of this 'QuickStart' jump you back into the OffLine editing screen from the last section of the manual. With RealTime features enabled, you can now review any changes you make instantaneously…….

If you have already moved the channels you want to edit over to the OffLine window, you can skip the next step and open the OffLine window directly. Do this by pressing the OffLine button on the main window, or using the OffLine pulldown/'Show OffLine...' command. **PC•MACs** will always remember the last channels that were edited for a given site file.

If you are running a show, pressing the OffLine button will open the OffLine Window in 'Single Step Mode'. This is a shortcut that you may want to use later.

Reviewing the changes you have made.....

After you make any edits, you can instantly review the changes you have made. You will want to try this after many of the following steps.

You can start a show playing at any time by selecting Realtime pulldown/Play, or hitting the <F1> shortcut. As the show plays, you will hear the audio file you selected and see a 'time bar' sweep across the screen to show where in time the show is. If the OffLine pulldown/Auto Scroll check is ON, the OffLine Window will scroll to follow the show as it plays.

You can stop a playback just as before, by selecting the Realtime pulldown/Stop, or hitting the <Space> shortcut.

Changing the playback start point.....

Unless you moved the 'Start' slider on the main **PC•MACs** window, playback will begin at the start of the show. You can always go back to the main window to change the start or stop sliders, but there are shortcuts to change them from the OffLine Window.

Position the OffLine window so you can see the part of the show you would like to review. Pop up the 'clock' shortcut at the lower left corner of the OffLine Window. Slide down to the command to 'Paste to Start Time'. This pastes the time at the left side of the screen into the 'Start' slider on the main window. Now click on the 'clock' shortcut at the lower right corner of the screen. Slide down to the command to 'Paste to Stop Time'. This pastes the time at the right side of the screen into the 'Stop' slider on the main window. Now when you start a 'Play', **PC•MACs** will playback the area displayed on the OffLine window and then stop.

Single Step Playback.....

You can enable Single Step Playback or Single Step Record using the commands found under the OffLine pulldown.

When in Single Step Mode, the frame at the center of the OffLine Editing Window is highlighted, and you can step your show forwards or backwards one frame at a time by using the left and right arrow keys on your keyboard. You can move the cursor more tan a single frame by editing any of the 'time' numbers on the screen, or by dragging the screen's scroll bar to another point in the show. The show will run at 'single step speed' to the newly selected point. (You can hit the <space bar> to cancel a long series of single Steps.)

Single Step Record Mode works identically, except that the programming console is 'active', and any data on it will be recorded as you step forward through your show. This is an easy way to define 'key' frames in your show, that you can easily InBetween towards.

Single Step Playback can also be started at any time from the main window by hitting the 'OffLine' button in the middle of a playback. This bounces you over to the OffLine Editing Window with the frame that was playing at the center of the screen and highlighted. This allows you to single step backwards and forwards to find any glitches that may have been present in your show.

Save your show (again).....

Now that you have something programmed, you can now download it to the Bricks you are using. You should save your work using the File pulldown/'Save' command. If you don't, **PC•MACs** will not let you download the show in the next step.

AutoDownload your show.....

If you have a Pb-DMX/32 attached to your PC, you will now want to try out the AutoDownload functions of **PC•MACs**. Jump forward to the 'AutoDownload Quick Start' section of this manual to give it a try!

AutoDownloading Your Shows to your Pb-DMX/32

This section of the manual is for those of you who are downloading your show(s) to a **Pb-DMX/32** for the first time. It will lead you through all of the steps necessary to send your show(s) through the serial port for permanent storage on a 'Brick'. You may need to refer to the manuals for the specific 'Brick' you are going to be downloading to

Your shows can have been programmed using **PC•MACs** in 'Software-Only', 'Hardwareless Realtime', or with a **MACs-USB** Smpte card installed in your PC.

This section of this manual is excerpted from the (much larger) **PC•MACs** manual. Even more commands and more details on the following commands can be found in other sections of the **PC•MACs** manual. It can be downloaded from the Gilderfluke & Co. website.

Select the serial port.....

If a serial port has already been selected, you can skip this step.

If this is the first time that you have used **PC•MACs**, you will need to select the serial port you are using. You can do this by opening the dialog under the Preferences pulldown/Hardware/MiniBrick Interface.... Select the serial port you are going to be using. This serial port must not already be in use by any other function on your computer. If it is, **PC•MACs** will give you a nasty message when you try to do an AutoDownload.

The selected serial port is stored as part of the Gilder.ini file. If it is an actual serial port built in to your computer you will probably never need to select it again. If it is a USB-to-Serial adapter, you may need to repeat this selection process every time Windows looses the USB serial port connection. Windows does this fairly regularly.

Downloading to the Bricks.....

Select the File pulldown/'Save as AutoDownload.....' command. This will bring up the AutoDownload dialog. If this selection is grayed out on the pulldown menu, it means that the serial port needs to be selected. See the previous step to set the serial port.

Plug in the Bricks.....

*If you have already plugged in your **Pb-DMX/32** to the serial port, you can skip this step.*

It is now time to plug the **Pb-DMX/32** into the serial port of your computer and power it up. **Pb-DMX/32** need a straight nine pin male to 1/8" stereo male cable.

Power up the **Pb-DMX/32**. For testing a **Pb-DMX/32**, your power supply can be as simple as a nine volt transistor radio battery.

Reset the Pb-DMX/32.....

To test if everything is hooked up OK, just press the 'Reset MiniBrick' button. A confirmation of the reset should appear on your screen (the 'Heart' LED on the **Pb-DMX/32** should also flash).

Choose the shows to go into the Pb-DMX/32.....

The show you have been working on will already appear on the list of shows to be Auto Downloaded. If you want to download more than one show to the **Pb-DMX/32**, just select the 'Add' button and you can select additional shows. If more than a single show is to be downloaded, you can use the 'Promote' and 'Demote' buttons to move selected file(s) up or down within the list.

If the same show is added to the list two or more times, only the first instance will actually use up memory space. All subsequent instances of the show will only generate a small header, which will refer to the data stored in the original instance.

At this point you probably only have one show to download. This would be the one you have been working on. Just leave this one show on the list of shows to be Auto Downloaded to the **Pb-DMX/32**.

How many channels to send to the Bricks?.....

You can now select the number of the channel to be downloaded to the Bricks. The **Pb-DMX/32** holds between one and four channels of digitals. You can download more channels to the Bricks, but this will just fill up the space in their memory needlessly.

The 'First Channel' and 'Last Channel' fields show the range channels to be downloaded:

1. If you created one analog channel and eight digital channels, the first eight digitals are located in channel '0'. The analog is addressed at channel '1'. You will want to set the download range from '0' to '0' for only the digitals, or '0' to '1' if you want to include the analog channel in the download.
2. If you created one analog channel and sixteen digital channels, the digitals are located in channels '0' and '1'. The analog is addressed at channel '2'. You will want to set the download range from '0' to '1' for only the digitals, or '0' to '2' if you want to include the analog channel in the download.
3. If you created one analog channel and twenty-four digital channels, the digitals are located in channels '0' through '2'. The analog is addressed at channel '3'. You will want to set the download range from '0' to '2' for only the digitals, or '0' to '3' if you want to include the analog channel in the download.
4. If you created one analog channel and thirty-two digital channels, the digitals are located in channels '0' through '3'. The analog is addressed at channel '4'. You will want to set the download range from '0' to '3' for only the digitals, or '0' to '4' if you want to include the analog channel in the download.

If you were downloading additional channels to control other items through the DMX-512 output of the **Pb-DMX/32**, you would increase the 'last' number as needed to include them.

Where to send the file.....

In most cases, you will want to set the 'Brick Serial Address' to zero when working with **Pb-DMX/32s**. Because only one **Pb-DMX/32s** can be installed on the RS-232 port at one time, they don't pay any attention to the 'Brick Serial Address' setting.

What will happen when the Brick is powered up?.....

What will happen when the **Pb-DMX/32s** are first powered up (and right after an AutoDownload). Touch the popup with the left mouse click and select the 'loop from first show' option (the other options are 'wait' and 'play first show'). You can also select any show that is on the AutoDownload file list as the first show that will be played.

Note that there is a subtle, yet very important difference between a 'play' and a 'loop' command. Both the 'play' and 'loop' will start a show. The difference is at the end of the show. A 'play' will simply get to the end of the show and do absolutely nothing. A 'loop' command will get the end of the show and then look around for what options have been set for the end of the particular show which just finished. This can be to 'do nothing', or to jump to another show. When in doubt, it is always safer to use a 'loop' command.

What will happen on each Brick input?.....

You can select what will happen on the two optically isolated inputs by selecting either the 'A', 'B', 'C' or 'D' 'radio buttons' and using the popups to select what happens

on each edge of each input. You can also set specific shows to be played on any edge of either input. A 'closing' is when you apply a voltage to an input. An 'opening' is when that voltage is removed.

The **Pb-DMX/32** has only two inputs. The 'C' and 'D' input selections are used for configuring inputs for **BR-MultiBrick32**, **Sd-50s** and other devices made by Gilderfluke & Company that have up to four inputs. Although any settings you make in the 'C' and 'D' inputs will be downloaded to the **Pb-DMX/32**, it won't do anything with them.

Note that there is a subtle, yet very important difference between a 'play' and a 'loop' command. Both the 'play' and 'loop' will start a show. The difference is at the end of the show. A 'play' will simply get to the end of the show and do absolutely nothing. A 'loop' command will get the end of the show and then look around for what options have been set for the end of the particular show which just finished. This can be to 'do nothing', or to jump to another show. When in doubt, it is always safer to use a 'loop' command.

What will happen at the end of each show?.....

Select any file in the list of shows to be Auto Downloaded. You can then use the popup below the list to set what will happen at the end of each show. If you set it to jump immediately back to itself, the show will loop back on itself until another show is started. You can also select whether another show can step on the one that is currently running.

Do the deed.....

Press the 'Download' button. This will open a standard Mac/Windows 'file save' dialog. The default name will be the name of the first show on the AutoDownload list. You can change the FileName to any other legal name you wish. Press 'OK' to start the download. If this FileName has been used previously, then **PC•MACs** will ask if it is OK to overwrite the older file. Go ahead and overwrite it.

A dialog with a progress bar will show the download taking place. You can cancel it if you like, but if you do stop the download mid way you may need to power down the **Pb-DMX/32** and reset it before it can be talked to again..

An AutoDownload to a **Pb-DMX/32** should take about twenty seconds at most. If you AutoDownload takes more than a minute, it probably means that you are sending more channels to the **Pb-DMX/32** than you should. Go ahead and cancel, power down and reset the **Pb-DMX/32**. Select the appropriate number of channels and try it again.

Enjoy the results.....

Because we set the Brick to play on power up, it will begin playing the show as soon as the AutoDownload finishes. You should also get a confirmation of the AutoDownload's success. If you selected any actions to take place on the two inputs, you can test these as well.

Did it all fit?.....

The Pb-DMX/32s have what is for most applications lots of extra memory space. Now that you have downloaded the shows, you can check on how much space they really occupy. Press the 'Report' button. This will open up a report that is generated at the same time as the AutoDownload file. This report is also saved to your disk under the same FileName as the AutoDownload file, but with the extension '.set'. You can open this with Windows Notepad.

The value shown as the 'Eprom End' for the last show in the set is the actual last byte of data sent to the EEprom of the **Pb-DMX/32**. This will have to be a bit below 65,536 to fit properly.

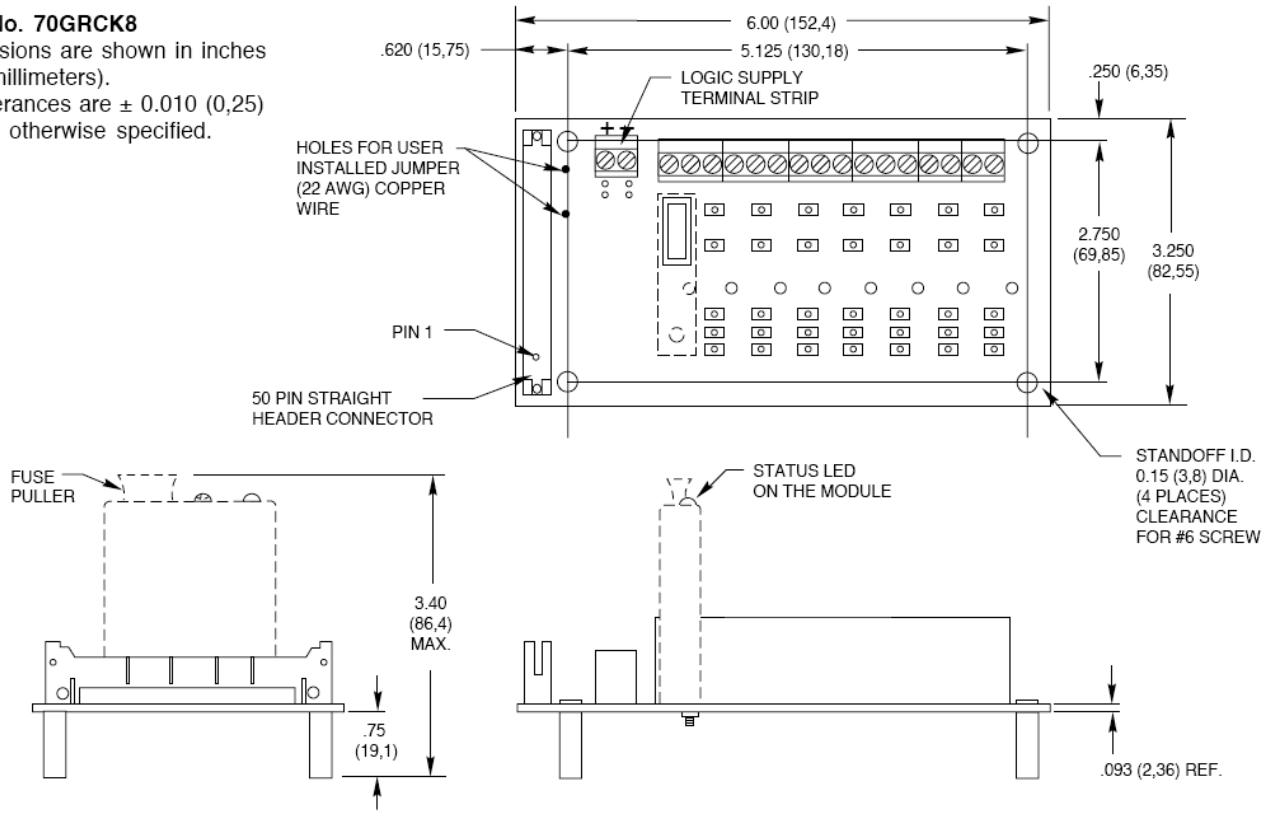
Rinse and repeat.....

If you want to make any changes in your show, you can close the AutoDownload dialog and use **PC•MACs** to make any more changes in the show. You can then AutoDownload again at any time. All the settings on the AutoDownload window will be saved so that you don't need to enter them again on the next AutoDownload. The EEprom memory on the **Pb-DMX/32** is rated for at least fifty thousand downloads.

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

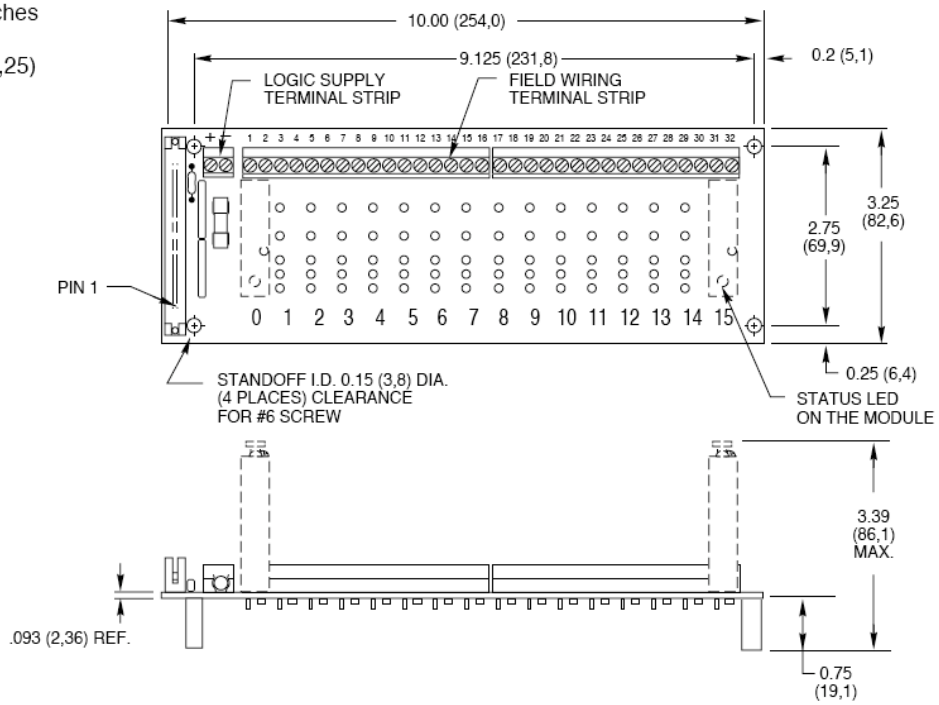
8 CHANNEL RACK: G5

Part No. 70GRCK8
Dimensions are shown in inches (and millimeters).
All tolerances are ± 0.010 (0,25) unless otherwise specified.



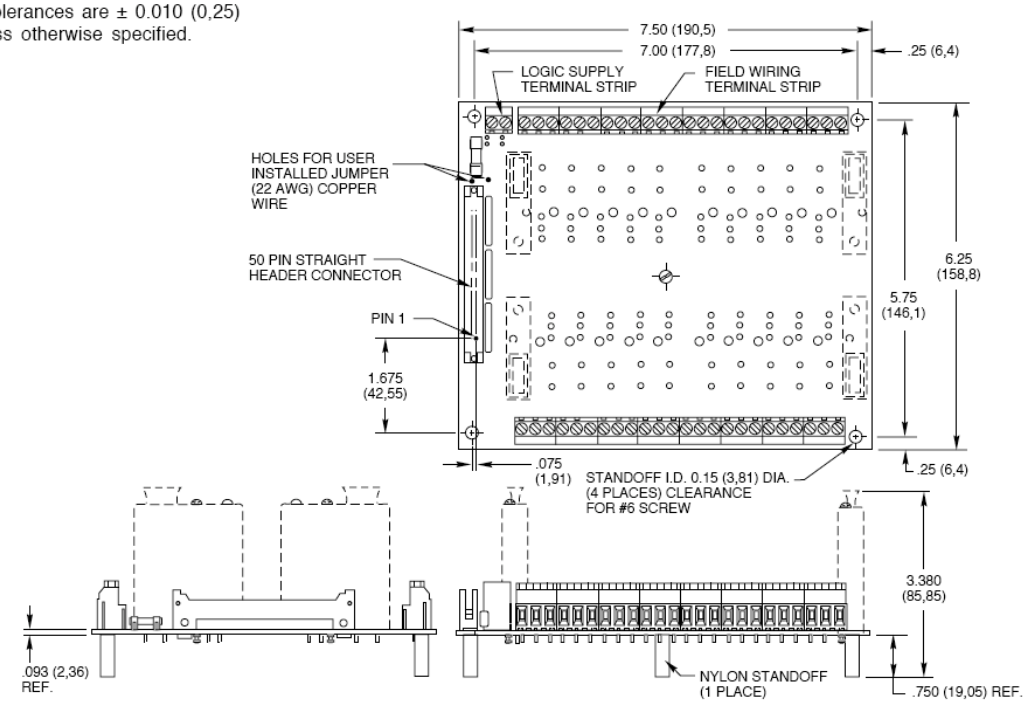
16 CHANNEL RACK: G5

Part No. 70GRCK16
Dimensions are shown in inches (and millimeters).
All tolerances are ± 0.010 (0,25) unless otherwise specified.



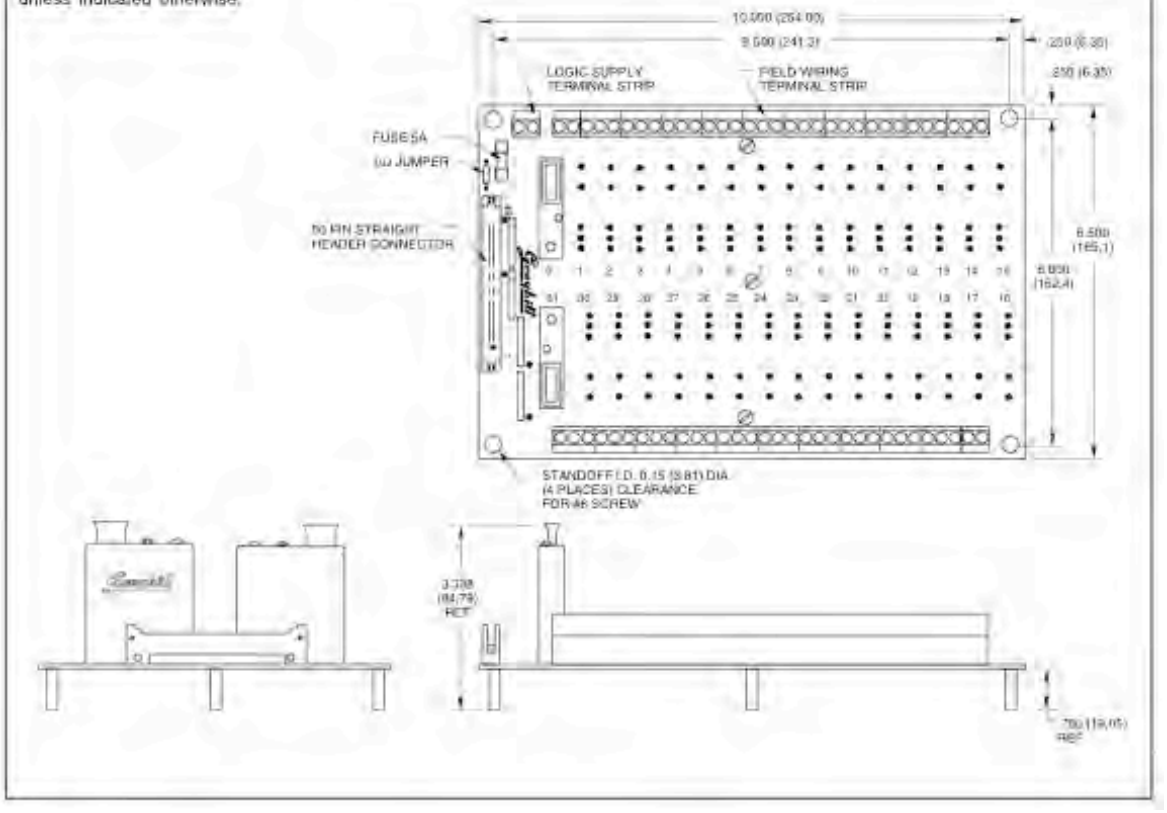
24 CHANNEL RACK: G5

Part No. 70GRCQ24
Dimensions are shown in inches (and millimeters).
All tolerances are ± 0.010 (0,25) unless otherwise specified.



32 CHANNEL RACK: G5

Part No. 70GRCM32
Dimensions are in inches (and millimeters).
All tolerances are ± 0.010 (0,25) unless indicated otherwise.



FCC and CE Compliance:

Pb-DMX/32s 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/32s** are low voltage DC devices, neither UL or CE require safety testing.

For fireproofing or additional radio frequency interference shielding, **Pb-DMX/32s** 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

Thursday, October 31, 2013

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/32**
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

Date: August 1, 2006

Signature: (signed)

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%