LEPRECON®

APC - Architectural Preset Control

Specifier and Installer's Manual

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1. Overview

The Leprecon Architectural Control Panel system (APC) is a wall-mounted DMX controller that can be used with any type of DMX compatible dimmer, fixture or device. There are a total of four different panels (1, 3, 6 or 12 presets) available. There are also two models of the external APC HUB that provides power, DMX isolation and buffering, and proper interconnection to the rest of the lighting system. Other types of power supplies may be used as well.

APC panels can be connected together to provide control from several building locations. Each panel has two RJ-45 connectors to allow daisy-chain connection from panel to panel.

An external DMX console can be used in conjunction with APC panels by routing the DMX signal from the console through the panels and out to the dimmers or DMX controlled fixtures. This configuration allows a very simple method of taking control from the panels when DMX signal is present from the console.

2. Specifying a system

Leprecon APC panels can be used in many different types of applications. Typical systems include:

1) Panel-only system - APC panels are used to directly drive DMX dimmers with no theatrical controller.

2) Interface with console - Panels are wired in a daisy chain configuration with another DMX controller. This allows automatic transfer of houselight control from panels to the console at the beginning of a performance, and back to panels at the end.

To ensure a reliable system, make sure to observe these guidelines:

· All systems will require a power supply for the APC panels. The Leprecon APC Hub is a pre-engineered solution that will provide power, wiring breakout, DMX isolation and DMX Deceleration in one package. If your system specification includes the APC Hub, instructions for use are included in this manual. If the Hub is not used (not recommended), a commercial power supply can be used. See the Power Requirements section for details.

· Up to ten panels can be connected in a single wire system. For the Power Hub, this is a ten panel limit. The Star Hub can power up to a total of 20 panels.

· All panels operate as a single set of presets, pressing Preset 1 on any panel will bring up the same scene, and all panels will light the Preset 1 LED.

· Panels **must** be connected in a daisy-chain configuration. The last panel in the system must have termination set on the DMX line.

· A DMX source is needed to program the APC system. If there is a DMX controller in the system, this can be used for programming. If the system consists of APC panels ONLY, a DMX controller must be connected to the system temporarily for setting up and storing scenes.

· Leprecon APC panels use reserved DMX start codes to communicate with each other. For this to work, all APC panels must be connected in the same DMX segment. If panels are separated by an optical isolator, the communication between panels may be blocked. For control to transfer properly there must not be an isolator between the controller and the APC panels.

· APC uses CAT5 wiring and connectors to distribute DMX signals. In studies done by ESTA, CAT5 was found to be acceptable for handling DMX data in a fixed installation. There is not a stated maximum cable length, but up to 1000 ft of CAT5 wiring 'should provide acceptable signal strength'. If your system calls for cable length approaching 1000 ft, it's worth considering specifying the APC Star Hub to support multiple cable routes.

· The APC Hub supports one cable run with up to 10 daisy-chained DMX panels, and a maximum cable length (including DMX from the control console of 1000 ft. If your particular system requires more than 10 panels, or if the planned panel locations require separate cable runs, the correct choice would be the APC Star Hub.

3. Using the APC Hub

The Leprecon APC Hub provides several important functions in an APC panel system.

1. DC power - the Hub will power up to ten APC panels using RJ45 terminated CAT5 cable.

2. DMX Interconnect - A five pin DMX input connector is wired internally to the APC CAT5 cable.

3. Optical Isolation - The Power Hub and Star Hub includes DMX isolation and buffering of the DMX output to provide the best signal integrity to the lighting system.

Two additional features of the Hub are designed to make it more tolerant of fixtures that do not fully comply with the DMX512 specification:

1. DMX Deceleration - data rates and time between packets are relaxed for fixtures that cannot cope with full speed DMX transmission.

2. Start Code Stripper - Some poorly designed fixtures or dimmers may respond to the internal panel communication used in an APC system. Filtering in the Hub prevents these signals from reaching the fixtures.

The Hub has two optional mounting accessories; pair of wall mount brackets and a pair of rack mount brackets. If your application requires either of these accessories, they are available from your Leprecon dealer.

Rear panel connections

The rear panel of the APC Hub contains all of the connectors needed to interface to the lighting system.

1. AC Power Input - IEC inlet with 5 amp fuse. A spare fuse is included in the fuse drawer in the lower part of the outlet. A locking wire bail can be used to secure the power cord.

2. DMX Input - 5 Pin XLR Male for connection to the lighting controller or console.

3. APC Panel connection - RJ45 jack to connect to the wall panels in the system.

4. DMX Output - 5 pin XLR female for connecting to the dimming system and DMX controlled fixtures.

Front Panel Indicators

The front panel of the APC Hub includes three LED indicators:

Power - this LED is lighted if the internal power supply is working properly.

Signal - This LED is lighted if an external DMX controller is connected to the Hub and is sending valid DMX data.

Ch1 - Levels on DMX OUT channel 1 are shown by the brightness of this LED. This provides a handy basic system test.

Connecting the APC Hub

Setting up the APC Hub is very simple.

1.   Connect the Hub to a 110V power source using the supplied IEC cable. Verify that the Power LED is lighted.

2.   Plug in the DMX cable from the control console to the DMX Input connector. If the permanent system will not include a controller, one must still be used for initial programming.

3.   Plug in the DMX cable to the dimmers or fixtures.

4.   With the panels still unplugged, verify that the DMX controller is properly addressing the fixtures in the system. The Ch1 LED indicates the level on DMX channel 1.

5.   Power off the Hub.

6.   Plug in the RJ45 connector and CAT5 cable from the panel system.

7.   Configure the panels as described in Section 8 with the power off.

8.   Program the panels as detailed in Section 10.

4. Using the APC Star Hub

The APC Star Hub provides features that are similar to those included in the basic Hub. DC power and DMX signal routing are handled by the Star Hub.

The Star Hub uses bi-directional DMX buffers to support up to four discrete sets of APC panels. This allows four cable runs to be used to connect up to a total of 20 panels.

Front Panel Indicators

The front panel of the Star Hub has two LED indicators:

1. **Power** – a lighted green LED indicates that the internal power supply is OK.

2. **Signal** – a lighted or rapidly flashing green LED indicates that DMX data is being output, either from panel activity or external DMX controller.

Rear Panel connections

All power and signal connections are made at the back of the Star Hub.
Features are:

Key	Function	Description	Value
A	Power Input	Neutrik PowerCon	110 – 240 VAC 2A max
B	Primary fuse	5 x 20 mm	5 amp
C	APC connection x 4	RJ45 or Ethercon	Standard RJ45
D	DMX In	5 pin XLR male	DMX512A standard
E	DMX Out	5 pin XLR female	DMX512A standard

* 3 pin XLR's and terminal strips are available for DMX - see ordering information.
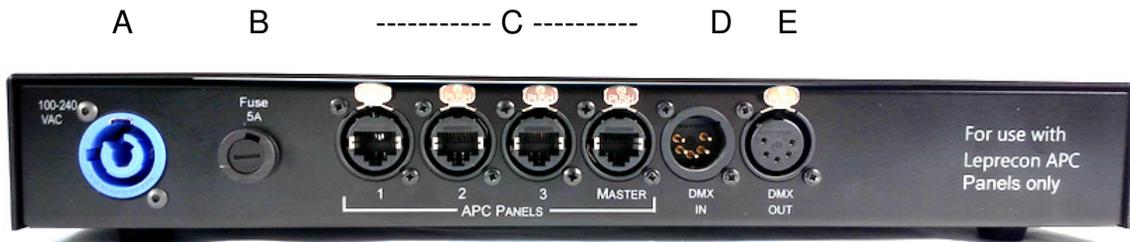
IMPORTANT NOTE:

In every APC system there must be **one** and **only one** panel designated as the **Master** panel. This is configured with a jumper on the back of the panel PCA.

When using the APC Star Hub, the **Master** panel **must** connect to the RJ jack on the Star Hub designated as **MASTER**. If the Master panel is connected to any of the other three jacks, communication between the panels will be blocked, and remote panels will not respond.

Terminal Strip option for Star Hub

If you've purchased the version of Star Hub that uses terminal strips for DMX in and out, here is the information you will need to terminate DMX cables.

- Panel mount connector: Neutrik NC3MAFH-PH

- Mating Plug (supplied): Phoenix connector type MSTB 2,5/3-ST. This plug uses screw terminals, and is rated for use with sizes from 24ga to 12 ga.

DMX connection shown below:

1 Gnd	2 D +	3 D -	1 D -	2 D +	3 Gnd
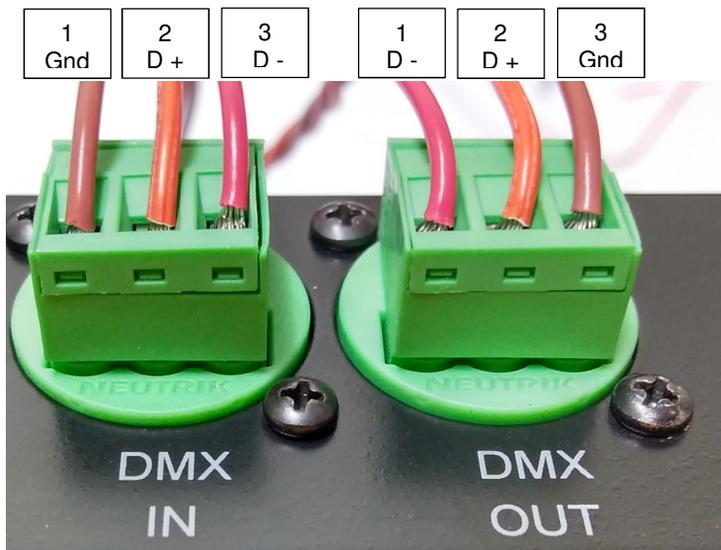
4. Panel Power Requirements

All APC panels require DC power for operation. The power is applied on the RJ45 cabling that also carries DMX signal from panel to panel and through the lighting system. If the system includes a Leprecon APC Hub or Star Hub, the power supply requirements are handled by the Hub.

Power supplies must be in the range of 9 to 12 volts DC. The DC common should be isolated from the AC chassis ground to prevent ground loops in the DMX system.

A supply capable of delivering 1 amp at 12V will power ten panels in a system. Connection to the panels is shown below.

Power supply common is tied to pins 3, 5 and 7, +12V is tied to pins 4, 6, and 8. Color code is based on the T568B standard.

APC RJ plug wiring

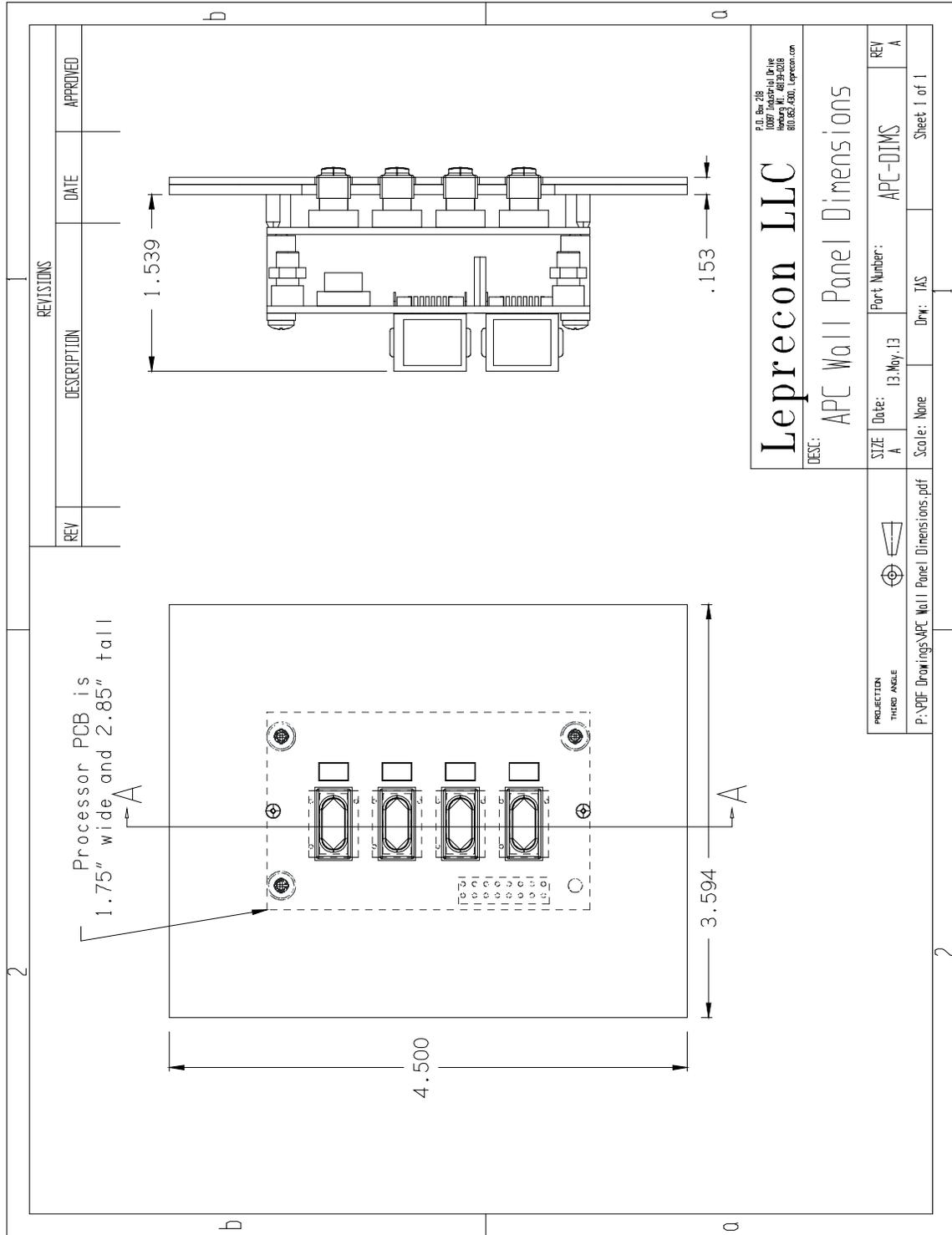| RJ 45 pin	Color	Function
1	white / orange	Data Minus
2	orange	Data Plus
3	white / green	Common
4	blue	V+
5	white / blue	Common
6	green	V+
7	white / brown	Common
8	brown	V+

5. Mounting requirements

APC panels fit in almost any standard electrical back box or low voltage box.
The required box for each panel is shown below:

Panel	Box size	Outside width
APC-1P	1 gang	3.59"
APC-3P	1 gang	3.59"
APC-6P	2 gang	5.41"
APC-12P	3 gang	7.22"

The panel faceplate extends beyond the edges of the back box.
If multiple faceplates are to be installed in the same back box, add 1 gang to the back box for each additional faceplate.

Each APC panel ships with mounting screws.

Mechanical detail of a typical panel is shown below:

Leprecon LLC
P.O. Box 218
10087 Industrial Drive
Hamburg MI. 48139-0218
810.652.4300, Leprecon.com

DESC: APC Wall Panel Dimensions

Part Number: APC-DIMS   REV A

SIZE A   Date: 13.May.13   Drw: TAS   Sheet 1 of 1

Scale: None

PROJECTION THIRD ANGLE

P:\PDF Drawings\APC Wall Panel Dimensions.pdf

REVISIONS
REV | DESCRIPTION | DATE | APPROVED

1.539

.153

Processor PCB is 1.75" wide and 2.85" tall

3.594

4.500

6. Panel Wiring

For APC standalone systems (no DMX controller), CAT5 cable with Ethernet type RJ45 connectors is used to interconnect panels and the dimmers or DMX fixtures together in a single daisy chain configuration. Each APC panel has two RJ45 jacks, making daisy chain connection simple to implement.

The APC cable is carrying DMX-512, so standard practice for DMX signals must be observed.

1. All wiring must be daisy chain connection ONLY. No Tee, star or multipoint connections are allowed.

2. Each end of the DMX chain must be terminated. Jumpers on the APC panels allow the last panel in the line to be terminated.

3. A single DMX512 source cannot connect to more than 32 devices without external buffer amplifiers.

The diagram below illustrates a typical system that includes a DMX controller. All panels and DMX devices must be connected in a daisy chain manner as shown.
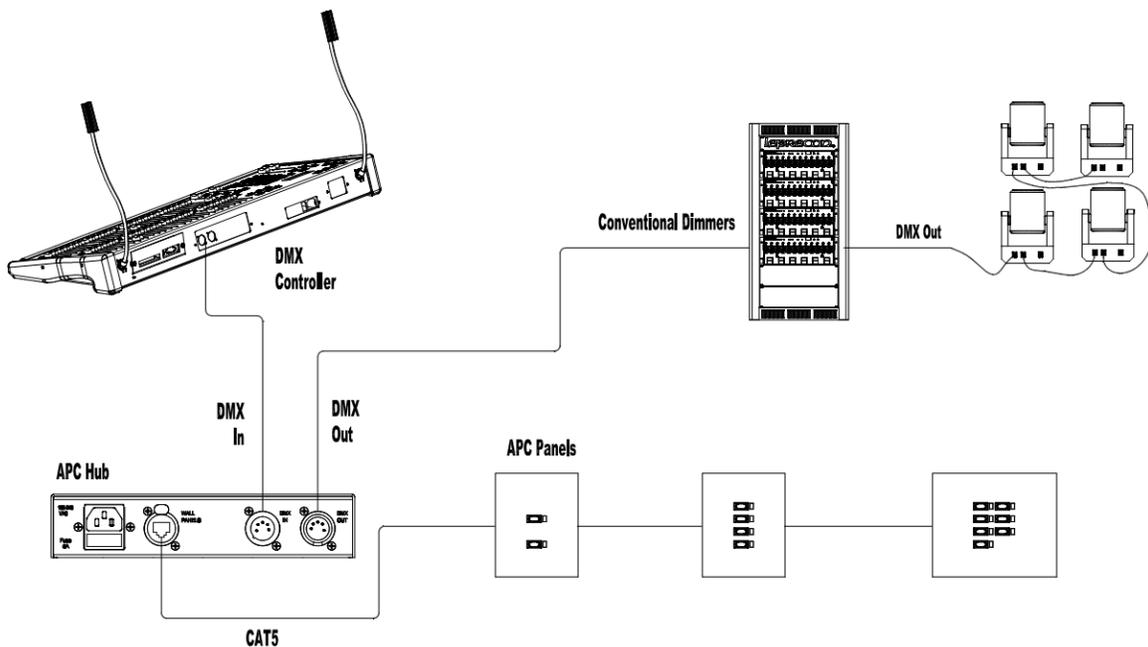
If the system does not include the APC Hub, DMX data connections to the panel are shown below:

| XLR Pin	Function	Color	RJ45 Pin
1	Common	white / green	3
2	Data Minus	white / orange	1
3	Data Plus	orange	2

For more information regarding properly designing and installing a DMX system, an excellent publication is available from PLASA. "Recommended Practice for DMX512", written by Adam Bennette, is the definitive guide to properly implementing a DMX network. It can be ordered from the Plasa website at www.plasa.org

7. System Configuration

Once all APC panels in the system are correctly cabled, the next step is to configure the panels for proper operation. Jumpers on the back of each board are used to select the panel function. See diagram below for jumper locations.

Note: Early hardware release has jumper JP1 (terminate) on the parts side of the board. It is necessary to remove the processor board from the button board to set termination on these boards.

Jumper	Function	Default state
1	DMX Terminate	Open - not terminated
2	Master enable	Open - Slave
3	Arch / backup	Open - Arch
4	Single Station	Open - multiple station
5	Not used	Open
6	No DMX when off	Open - DMX always on
7	Not used	Open
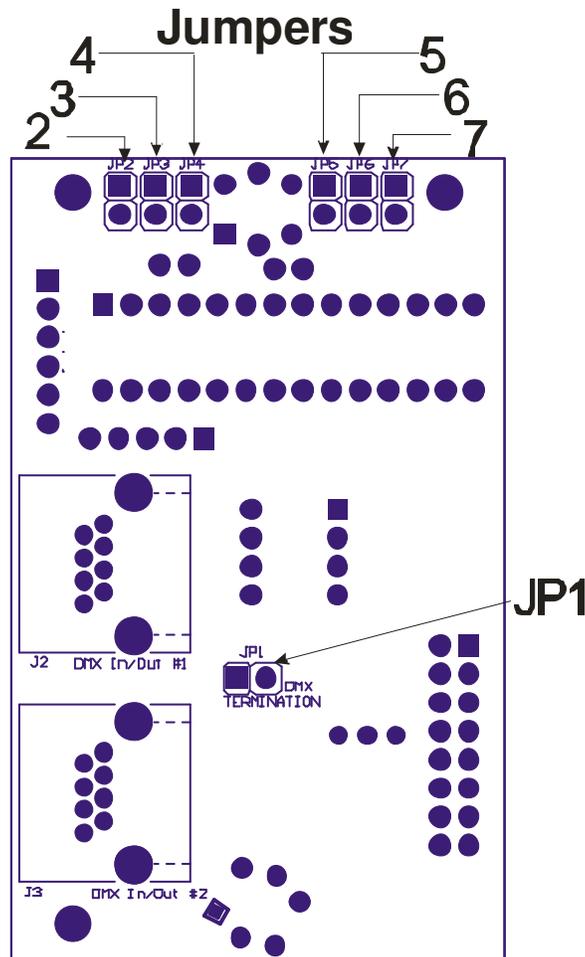
Notes regarding each jumper option:

1 - Termination
In a properly configured DMX system, there is a single transmitter, many receivers connected in a daisy chain, and the last receiver in the data line is terminated. Putting a jumper on JP1 will add 120 ohms across the DMX line, terminating the line to prevent reflection. This should be done on the last panel in the line.

2 - Master Enable
Each APC system **MUST** have one and **ONLY** one panel set as the 'Master' panel. This will be the panel that is used to program the system. Generally a position near the control console will be the easiest to program, although any panel can be set as Master. If different types of panels are used (3P, 6P, 12P) the Master panel must be the largest panel to allow all scenes to be programmed.

3 - Arch / Backup
When used with an external console, APC panels are disabled when DMX signal is present from the console.
When the console is turned off, there are two ways the panels can respond:
· Architectural mode - The APC panel will fade up the last preset selected.
· Backup mode - The APC panel will continue to send the last scene from the console. All panel presets will blink, prompting the operator to select a particular playback.

4 - Single Station
If only one panel is used in a system, set that panel as Master and Single Station.

6 - No DMX when off
When this mode is set by placing a jumper on JP6, the APC system will stop sending DMX when no console is present and no panel presets are on. This can be useful for turning off some intelligent fixtures that monitor the DMX line, and automatically 'lamp off' when there is no control signal.

NOTE:
SYSTEM WILL NOT WORK WITH CROSS-OVER NETWORKING CABLES

If the wall panel is not recording the DMX values, its most likely not setup as a Master if the red light is not blinking when pushed.

Masters - can be programmed only if the jumper is placed on JP2
Slaves - only follow the looks from the masters - NO JUMPERS

Holding down the red light on back and unplugging power / reconnecting power will clear all programmed presets

8. Installing panels and faceplates

APC panels consist of three parts:

· Faceplate - 1/8" aluminum snap-on cover, painted and screened.
· Mounting plate - Sub panel that screws to the mounting box.
· Board stack - button and processor boards that are pre-assembled to the mounting plate.

To install the panels:

1. Separate the faceplate from the mounting plate. A small screwdriver can be used to separate the panels. Remove the cover carefully to avoid bending the LED indicators.

2. Attach the mounting plate and board stack to the electrical box using the screws provided. Make sure all configuration jumpers are set before screwing down the panel.

3. Do not attach the faceplate for the Master panel until programming is complete. Faceplates can be installed on the slave panels, no further access is needed to these boards. Simply align the faceplate with the mounting plate, and gently press into position.

10. Programming

APC panels record and play back all 512 DMX channels for each preset provided. When the APC panels are wired, mounted and energized, presets can be stored to the Master panel.

Two hidden switches are used to program the Master panel. These switches are accessible with a small screwdriver or paperclip behind the mounting plate. The top switch is used to record scenes, the bottom switch is used to set fade times for all scenes, including 'Off'.
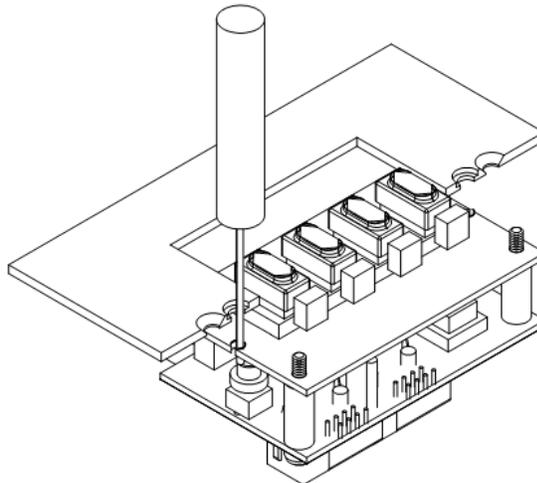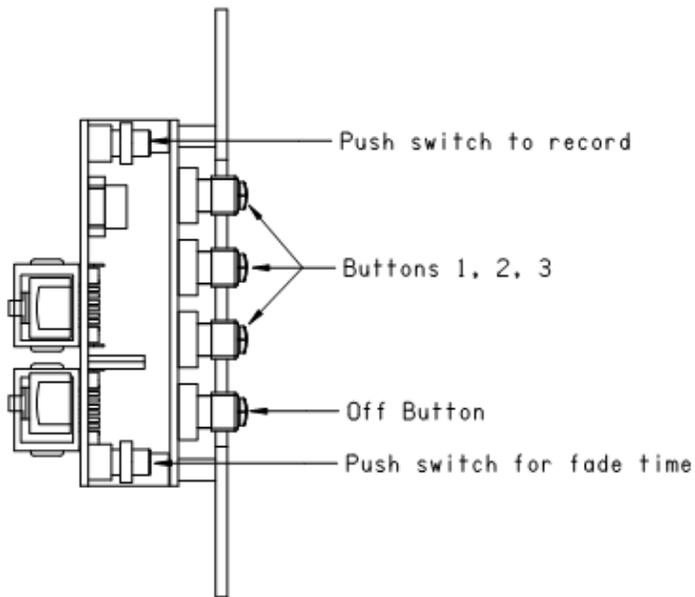
To Record Presets: (See Section 7 for jumper/system configurations)

1. Make sure the face plate is removed from the Master panel.

2. Turn on the DMX controller.

3. Set the scene to be recorded using the DMX controller. The Record LED behind the front panel will light.

4. Using a small tool, gently press the Record switch. The red Record LED will begin to blink.

5. Set the correct scene using the DMX controller. Once set, press the preset button that you wish to record.

6. The Record LED will stop flashing, but remain on.

7. Repeat steps 3 through 6 for each preset.

To set Preset Fade times:

1. Turn off the DMX controller. The Record LED behind the front panel will turn off.

2. Press a Preset button to select a preset, the adjacent LED will light.

3. Using a small tool, push the Time switch at the bottom of the panel. The yellow Time will turn on.

4. After three seconds, the yellow LED will blink once per second. Each blink indicates 1 second of fade time.

5. To set and store the fade time, press the Preset button again. The time between the first yellow LED blink and the button press will be captured as the fade time.

6. If the preset button is not pressed within 15 seconds, Time entry terminates, the yellow LED turns off, and the fade time for the preset is unchanged.

To set Preset OFF fade time:

Program the 'off' button fade time as described above. This sets the 'fade to black' time for all presets when the 'Off' button is pressed.

11. Preset Playback

Once presets are recorded, the APC system is ready for use.

If there is no control console in the system or if the console is turned off:

• Pressing any preset button will fade in the stored scene using the fade time that was set for that scene.

• Pressing a new preset button will start a fade from the old preset to the new preset.

• Pressing Off will fade out any scene.

The panels will be disabled if a control console begins transmitting data. The DMX line will be driven by the console, and the panels will be in 'standby'. All preset will be turned off, and all LED indicators on the panel will be off.

When the console is turned off, the panels will respond in one of two ways, depending on the setting of jumper JP3 on the Master panel. The default setting is for JP3 to be open, selecting Architectural mode. If a jumper placed on JP3, the system will operate in Backup mode.

• **Architectural mode** - The APC panel will fade up the last preset selected when the console is turned off.

• **Backup mode** - The APC panel will continue to send the last scene from the console. All panel presets will blink, prompting the operator to select a particular playback.

The 'Off' key can be programmed for a special function when the console is off and all panel presets are turned off. Installing a jumper on J6 on the master panel will program the system to turn DMX OFF instead of sending all zero channel data. This feature can be used to 'lamp off' some types of intelligent fixtures.

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