

Digital P-45AF W/TC Firing Panel, Operating Instructions



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A reminder on the safe use of Electronic Pyrotechnic Firing Systems

- **Never energize Electronic firing equipment when personnel or spectators would be jeopardized by unintentional ignition.**
- *Prevent water or conductive liquids or powders from contacting firing system components (Firing Panel, firing modules, splitters, cable ends etc.)*
- *Never drive over or place heavy objects on firing cables*
- Do not wrap multiple wiring attached to igniters around conductive supports as the insulation can be abraded from shells yanking the wires, causing multiple shorts.
- When inserting the igniter wires into the firing module, separate the insulation and leave less than 1/4” copper showing above the connector. Allowing long copper leads has caused multiple un-intentional firing or shunting.
- Always keep the internal batteries charged. All batteries have a self-discharge rate. It’s much worse if the equipment is left on and put in storage. When the battery voltage drops below 10.6 volts under light loading on a Lead-Acid cell battery, **it’s damaged and has become un-reliable for Pyrotechnic work. Period. End of story.**

▪ **Note:**

For Multiple Igniter use

This system is designed to use Series Igniters Only

Any use of Parallel igniters may result in a no fire condition.

Description

The Digital P-45 AF firing System is a self-contained manual and script fired pyrotechnic initiation control panel that interfaces to external firing modules. The Digital P-45 AF firing system allows the use of Digital P-45 and Smartfire SM-32T firing modules and is meant to suggest a blend of the Nighthawk user control surface and the Smartfire digital firing module technology combined in one system. Allowing the use of digital modules provides increased number of unique firing addresses and distance and accessibility features in addition to the option of Wireless operation.



Common Features of the Digital P-45 AF Panel

- Auto Power Off after 2 hours idle
- Continuity and Fired Status for each of the available firing circuits
- Digital Battery Voltage display with Low Battery warning
- 100 minute elapsed time display with pause and reset
- Detachable panel lamp with On/Off switch
- Splash proof and dust proof firing switches
- Chemical, scratch and burn resistant electrically isolated front panel
- 45 individual firing switches
- 45 pin status LED indicators
- 14 LED Group select indicators
- Show Timer accuracy to within +/- 0.5 seconds over 100 minutes
- 3 firing scripts of 3200 entries each
- Select, View, Edit, Clear, Load and Send any of the 3 available scripts

Features of the Firing Mode

- Both SM32 digital and FM45 digital modules can be used together.
- Module status mode
- Continuity and Fired Status for each of the 45 firing circuits
- Each selectable Firing Module has a resettable memory of what has been fired
- Manual fire single module
- Retain and review history of a fired show by firing module
- 3168 discrete shots, organized as 99 firing modules of 32 shots each when using SM32 digital modules.
- 4500 discrete shot organized as 100 firing modules of 45 shots each when using FM45 digital modules.
- Smart status mode directed by selected script in ARMED state
- Manual fire grouped modules
- Grouping modules together using group selects during manual fire mode.
- Timed firing of script
- Stepped fire of script
- Synced firing of script
- Multiple pins on the same module may be fired simultaneously
- Multiple pins across multiple modules may be fired simultaneously
- Total of 3200 scripted entries

Digital P-45 AF Panel Controls

Power Switch

This power Toggle switch located in the upper left-hand corner of the panel is a Momentary switch. To turn power on press switch up and system will boot up. To power down Hold switch up until LCD reads hold to turn off, Then Release power now, In the event power is accidentally left on Panel will automatically turn off after 2 hours of inactivity.

Panel Lamp On/Off Switch

This switch controls the detachable panel lamp only when the system is on.

Charge Jack

The charging jack is a P5 jack and is used to charge the internal batteries. It requires a supply that delivers 12.0 VDC at 1.5 amps. The center pin is positive. The battery charging circuit will charge the battery even when the Panel is turned on. Charging is automatic and you cannot overcharge.

Charge LED

This two-color LED indicator will be active when the charger power supply is plugged into the Charge Jack. If the indicator is green, the charge cycle has completed and the battery is at its full condition. When the indicator is red the internal batteries are being charged.

ARM Key Switch

The ARM key switch is located in the upper left-hand side of the panel, to the right of the power switch. It is a two-position key lock switch, with OFF and ARM positions to the left and right. The key cannot be removed in the ARM positions. When the system is powered and the switch is turned to the ARM position, the ARM status light will go from green to red and tone will sound. The ARM switch places the system into the Module test and firing mode, which means that a firing circuit can be activated because the firing voltage supply has been enabled. Crew must always be warned and removed from the proximity of pyrotechnic effects before the ARM key is set to ARM., Digital modules may be tested as well as fired only from the ARMED condition. This control is the primary safety interlock between the operator and the firing of effects.

Remote Fire Control

The remote fire connector is located in the upper left-hand side of the panel, to the right of the power switch and under the ARM key switch. It is a 5 pin DIN connector that uses the HOLDFIRE/Trigger cable assembly. This control is the secondary safety interlock between the operator and the firing of effects for TIMED fire, STEPPED fire and SYNCED fire modes of operation.

DB9 Serial Port

The DB9 connector is configured as an RS232 serial port. It provides the means to load and transfer firing scripts to the firing panel.

2-Line Text Display

The text display is a monochrome LCD, 16 characters long by 2 lines. It is backlit to allow viewing in low light conditions. It provides information on the currently selected mode of operation, access to the system menus and warnings when they occur. The top line typically displays text legends indicating the specific numeric data that appears on the bottom line directly below it, or in other cases, it may show a menu selection option. ***The LCD display cover is Plexiglas and should only be cleaned with mild soap and water. Never use alcohol or any industrial solvent to clean the front of the firing panel. The plastic face of the Text display is made from polycarbonate which will craze when cleaned with alcohol and other solvents.***

Mode Button

To the right of the text display is a vertical row of 2 pushbuttons. The top button is the Mode button. This pushbutton switch accesses a mode sensitive menu through the 2-line text display. The options displayed in the text display depend on the current mode of operation.

Select Knob

The knob at the bottom of the row is a multi-action control. It responds to rotations clockwise, counter-clockwise and pressing in. This rotary control is mode sensitive and is used to select modes of operation and to view module status. Module status is accessed by rotating the knob and selecting the modules by depressing while in the ARM state. Rotating the knob clockwise has the effect of increasing numbers, and counter-clockwise of decreasing numbers. It is primarily used to select modules when no menu options are showing in the text display. Depressing the select button is to act on prompted menu items in both key off and key on conditions.

Group Switch

The group switch is to the right of the top row of firing switches and is used for accessing the 14 assignable module groups, With the ARM key off it is used to select and assign modules to each group and when armed it is used to select module groups to fire. In the safe state, the switch behaves as a toggle, allowing entry to and exit from the Group edit mode. In ARM state, the switch acts as a momentary where the select group feature is active only while the switch is held. More on this later.

Fire Status (1 - 45)

The Cue status indicators show the current continuity and status of each of the 45 firing circuits of the selected Firing Module. They use two-color LED lamps for long life and to provide more information than a single color could. There are 4 basic conditions that are displayed, with additional advanced status possible. The continuity circuit is the green side of a two-color LED with a current limiting resistor. It has a 1/6th duty cycle to conserve battery power. The two-color LED is directly controlled by the panel electronics and is used to communicate captured status of various kinds.

The 1st condition for the indicator is off completely, which occurs when the system is off or if there is no igniter present in the selected firing circuit and the circuit hasn't been fired since the last show or rail memory reset.

The 2nd condition for the indicator is green, showing that there is some type of electrical connection present in the firing circuit.

The 3rd condition for the indicator is a red color, showing that the firing circuit for the selected Firing Module has been fired since the last module or show memory reset.

The 4th condition for the indicator is both green and red, indicating that the igniter is still providing an electrical connection somehow after being fired and the status re-acquired.

The third and fourth conditions are modified by having the red color flashing, showing the last fired cue for the selected firing module in Manual Fire mode.

Firing Status definitions in Status Mode

Condition	Color	Description
1	Off	Not fired, no continuity
2	Green	Not fired, continuity
3	Red	Fired, no continuity
4	Green + Red	Fired, continuity. Possible error, shorted igniter?

Firing Status definitions in Manual Fire Mode

Condition	Color	Description
1	Off	Not fired, no continuity
2	Green	Not fired, continuity
3	Red	Fired, no continuity
4	Green + Red	Fired, continuity. Possible error, shorted igniter?
5	Flashing Red	Last fired cue of selected module.
6	Green + Flashing Red	Last fired cue of selected module, system armed similar to condition 4.

Firing Switch (1 to 45)

There are 45 firing switches arranged in 3 rows of 15 switches. The switch locations are numbered 1 thru 45 on the panel, with the number positioned between the firing switch and the associated firing status. Each switch is connected to a firing circuit. A firing switch will only fire an igniter when the ARM key switch is turned to the ARM position.

Group Select buttons (1-14)

The module Group selector switches are the top row of firing switches 1-14 and are active when in the group select mode. When a desired group is selected, the Blue LED above the switch illuminates and the memory for what previous activations of the firing switches is recalled and displayed on the fire status LEDs. When a group is selected the number of modules in the group is shown on the right hand side of the top line of the text display while group select is active.

4 pin XLR Communications Port

The female 4 pin XLR connector is used to communicate with Smartfire and Nighthawk Digital firing module systems.

Built In Functions

Digital Voltage Display

The system battery voltage is shown as a condition under normal operation. The conditions are “FULL”, “GOOD”, “FAIR” and “LOW”. When the system voltage strays outside of these ranges, the numeric value is shown instead. This can occur when the panel is being charged. Panel system voltage is displayed from 0.0 to 30.0 volts with 0.1-volt resolution. When the voltage drops below 21.2 volts, a low voltage message will appear in the voltage display area. In the firing modes, battery voltage is superseded by output firing voltage, which is what is applied to the +24V pin of the XLR connector or reported from a digital module.

Battery/Power Status Display

The left side of the bottom line of the text display shows the battery current status when the power switch is turned on. If the battery charger is plugged into the charging jack, the battery status field will show the voltage of the batteries while charging. The statuses are “Full”, “Good” “Fair”, “Low” and the current voltage when outside of these ranges.

Firing Module Memory

Each of the selectable firing modules has a memory associated with it that tracks firing history. The operator can individually reset each firing module history. The information saved is the accumulated fired shots for that module and the last fired shot. This information is retained when the panel is turned off,. This fired information is used for the red fire status indicators in the different modes of operation.

Elapsed Timer

There is an elapsed time function that is present in the panel that tracks the time from an initiating event. The initiating event is a firing switch activation in MANUAL fire mode or a remote fire trigger press. The show timer is paused when the mode that it was running in is changed or the timer reaches 99:59.9. The maximum timer value is 99 minutes 59.9 seconds with 0.1-second resolution. There are a couple actions that will cause the show timer to pause during normal operation. See the appropriate firing mode sections for further information.

Module Group Memory

There is a special feature available It can be described as a form of grouped module firing. Essentially it uses an entered list of module addresses assigned to one of the group buttons (1-14). When a firing switch is pressed while a Group is selected, the same pin on each of the grouped modules will fire simultaneously.

Power On/Version Display

When the panel is turned on, it will display the Version number of the internal software while a LED indicator display sequence is active , and then it transitions to the Default screen.

Batt	Time	FM
Full	0:00.0	1

Digital P-45 AF Firing Panel Operational Modes

Safe Mode

This mode is when the firing system is SAFE. In this mode, the firing system displays the previously acquired module continuity status and the fired status of each of the firing switches 1- 45 circuits' for each accessed firing module. The text display shows the battery condition, current elapsed time and the selected firing module or selected Group. The firing module memory for the selected display is reflected on the firing status indicators, but without the last fired information which normally is indicated by flashing red only in ARMED state.

Batt	Time	FM
Full	0:00.0	1

Safe Menu Modes –

The menu selection is accessed by pressing the MODE button to the right of the text display.

MENU MODE ROTATE SELECT

Options of the menu mode are accessed by rotating the SELECT knob clockwise for Script options and counter-clockwise for Reset options. Pressing the SELECT knob will perform the Reset option shown on the top line, or will enter the Script option mode. Reversing the direction of rotation will immediately jump to the beginning of the Reset or Script menu options.

Reset Timer –

The RESET Timer menu selection will clear the Show Timer to 0:00.0. It will not affect any other system settings or memory. No confirmation other than pressing the SELECT knob is required to perform this action. It is also allowed in the Manual Fire mode, but only while Paused.

Reset Module –

The RESET Module menu selection has the effect of wiping out the pin continuity and pin fired history of the currently selected Module and in addition, clearing the Show Timer to 0:00.0. No confirmation other than pressing the SELECT knob is required to perform this action. This reset option is only available when a module is selected and the show timer is Paused.

Reset Group –

The RESET Group menu selection has the effect of wiping out the pin continuity and the pin fired history of the currently selected modules assigned to the Group and in addition clearing the Show Timer to 0:00.0. No confirmation other than pressing the SELECT knob is required to perform this action. This reset option is only available when a Group is selected and the show timer is Paused.

Reset Modules –

The RESET Modules menu selection has the effect of wiping out the pin continuity and the pin fired history of all the Modules and in addition clearing the Show Timer to 0:00.0. No confirmation other than pressing the SELECT knob is required to perform this action.

Select Script –

The Select Script menu selection is used to set the system to one of three available firing scripts.

View Script –

The View Script menu selection is used to inspect the currently selected firing script.

Edit Script –

The Edit Script menu selection is used to enter or modify the currently selected firing script. Use the Select script option to 1st set the active script. Empty scripts start at the 1st entry of the script. If the script contains entries, the last entry is shown.

Clear Script –

The Select Script menu selection is used to clear one or more firing scripts. Once the Clear Script mode is entered by pressing the SELECT knob, any of the 3 scripts can then be selected and cleared. All three scripts are accessed by rotating the SELECT knob and then cleared by pressing the SELECT knob.

Load Script –

The Load Script menu selection is used to load an externally generated firing script into one of three available firing scripts using the DB9 serial port. Any of the three scripts can be selected and loaded while using this menu option.

Send Script –

The Select Script menu selection is used to transfer one of three available firing scripts to an external destination thru the DB9 serial port.

TIMECODE Mode –

The Timecode Mode menu selection is used to view FSK timecode quality thru the DB9 serial port. FSK timecode operations require an external Pyromate FSK Timecode modem attached to the DB9 serial port using the appropriate serial cable. When the timecode view mode is active, the text display shows:

0	m:ss.t
0	1 E

The top line shows the decoded FSK received in the “m:ss.t” field, and the time deviation or jitter between timecode records in the 1st field measured in milliseconds. The second line tracks the maximum jitter value and the number of errors that occurs during timecode reception. Messages will briefly appear on the bottom line when FSK timecode errors are detected. Pressing the SELECT knob during TC reception will reset the time fields, errors and jitter values.

Edit Script mode

Edit script mode allows the entry of simple scripts. Only the end entry of a script can be changed or deleted. This feature is not meant to take the place of PC based scripting software. Scripts of medium to long length would be challenging to enter by hand.

Enter mode by choosing “Edit Script?” option then pressing SELECT to enter the mode. Press SELECT again to confirm entry into Edit script mode when the display shows:

To EDIT Script
Press Select

The system enters EDIT Script mode and the initial line will be the last entry if the script contains something. For an empty script, the initial condition will be at L0001, S0001, time 00:00.00 and M001. The initial adjustment defaults to TIME.

Adjust Time vs. Adjust Module display

Adjust Time	Adjust Module	
L0001 00:00.00< S0001 M001	L0001 00:00.00 S0001 M001<	Group switch up
L0001 00:00.00+ S0001 M001	L0001 00:00.00 S0001 M001+	Group switch depressed

Pressing the SELECT knob toggles between adjustment of TIME and MODULE. The adjustment occurs by rotating the SELECT knob in the CW (+) or CCW (-) directions.

When the GROUP switch is held depressed in ADJUST MODULE, the adjustment is increased by times ten. This is to allow more rapid changes of module address.

In ADJUST TIME, the time changes by 0.1 seconds. When the GROUP switch is held depressed the time changes by 0.01 seconds.

When the GROUP switch is held depressed, pressing the SELECT knob will advance the time by the difference between the previous line time and the current line time, or a minimum of .01 if there is no difference. This is to aid in rapid entry of equally timed shots.

When the GROUP switch is held depressed, pressing the MODE button will delete the current module pin entries or the current line if there are no pins entered.

A pin is added or removed from the current line by pressing the firing switch 1-32/45 depending on the module address showing. Modules of 1-99 are restricted to firing pins 1-32. Modules of 100-199 allow all 45 pins. If no pin is showing at the current Module, pressing a firing switch (1-45) will toggle one on.

If the time is advanced and a new pin added to the first module of the new time, the shot # always advances.

When entering shot time, the new time will always be or greater than or equal to the previous time. If time is equal, the entry is part of the previous shot. If greater than the previous shot, it becomes a new SHOT.

When entering module address, the module will be limited to an address greater than or equal to the previous entry if new entry is not the 1st one of a new SHOT. If it is a new SHOT, the minimum address is 1 with a maximum of 199.

When the script is done being edited, exit the mode by pressing the MODE button. This will save the changes to the script. Exiting by pressing the POWER switch without first exiting the edit mode will cause uncertain results related to any changes made.

Edit mode actions table

Function	Action
Save and Exit	Press MODE button
Time/Module	Press SELECT knob
Toggle pin	Press firing pin 1-45
Module + 1	Rotate SELECT CW while display indicates Module adjust
Module - 1	Rotate SELECT CCW while display indicates Module adjust
Module + 10	While pressing GROUP switch, Rotate SELECT CW while display indicates Module adjust
Module - 10	While pressing GROUP switch, Rotate SELECT CCW while display indicates Module adjust
Time +0.1	Rotate SELECT CW while display indicates Time adjust
Time -0.1	Rotate SELECT CCW while display indicates Time adjust
Time +0.01	While holding GROUP switch depressed, Rotate SELECT CW while display indicates Time adjust
Time -0.01	While holding GROUP switch depressed, Rotate SELECT CCW while display indicates Time adjust
Advance time	While holding GROUP switch depressed, press SELECT knob
Delete entry	While holding GROUP switch depressed, press MODE button

Group Edit mode

This Safe mode is necessary to allow the operator to assign module addresses to group select buttons. This module grouping function will fire 1 to 15 modules per group.. When one or more modules are assigned to a Group select button, rapid switching from group to group can be accomplished by first pressing and holding the group switch and then the pressing the corresponding fire button 1-14. When multiple modules are assigned to a group, the sum of the pins on all of the grouped modules is presented for each module group.

The control used to set up the groups is the select knob, and the Fire buttons 1-14, The SELECT knob is used to set the module address to add to the current group. Depress the select knob to add the module that is showing to the group. The module address will advance to the next sequential address. If the address is turned to a module already

assigned to a group, pressing the SELECT knob will remove the module from its present assigned group. In addition, the MODE button allows a couple group clearing options.

```
Remove Group?  
Press Select
```

```
Remove Groups?  
Press Select
```

```
Select a Group  
Group Edit Mode
```

Once the idea of module/Group association is understood, entry is fast and intuitive. Some of the constraints are: 14 Groups with a maximum of 15 modules per Group. Module addresses of 01-99 and 100-199. Any module can be assigned to a group up to a maximum of 15. The module addresses are saved in ascending order. The save process is completed when the Group Edit mode is terminated using the Group switch by actuating it until the selected group light stops flashing and then turn off the panel.

To learn module assignment, it's best to start with a clean slate. So, first the Group Edit must be entered by pressing the Group button. Then the RESET button is pressed until REMOVE GROUPS is showing. Press SELECT to clear all Group memory.

This is the display for working with groups. Hold Group Button and select group number.

```
Group 01 Has 0  
Group Edit Mode!
```

Depress mode button again until it displays Select a group and one of the blue lights starts to flash.

```
Select a Group  
Group Edit Mode
```

Turn knob to desired module and press SELECT. This represents a selection of 1 module and it is Number 5, Hit mode and this will be saved.

```
Group 01 has 1  
--.- G-- ??? 5
```

Continue in this manner to add a module to each of the 14 Groups. Removing a module is accomplished by rotating the SELECT knob counter clock wise to the module number that you wish to remove and depress select.

When done editing, exit the group edit mode by pressing the GROUP toggle switch and then turn off the panel. Turn the panel back on, Enter GROUPS mode. Verify that the groups are still present selecting each group in turn using fire switches 1-14

What makes this advanced feature useful and powerful is that once a group has been entered, it can be accessed by pressing the Group switch along with the desired group

selector switch. The accumulated module status is displayed on the LED status LEDs, but a single modules' status can be retrieved by using the select knob.

There are a couple advantages to setting up Groups. If a group is selected during ARMED Status mode, the set of modules assigned to the group can be queried just by pressing the SELECT knob rather than having to individually select and status each one. Rapid transitions from module to module can be accomplished just by using the GROUP switch combined with the appropriate fire switch when a single module is assigned to a group.

System ARMED Mode

There are 6 main operation modes available in the SYSTEM ARMED condition. They are MANUAL STATUS, MANUAL fire, TIMED fire, STEPPED fire, SYNCED fire and SMART STATUS mode. TIMED fire, STEPPED fire and SYNCED fire modes require the presence and use of the Remote fire control cable to function.

ARMED Status mode is immediately available when the ARM key is set to ARM. Manual fire operation now requires the additional step of using the MODE button to reach it. This change was made to allow a Status only state that reduces the possibility of accidentally firing product when performing module status testing.

MANUAL fire, TIMED fire and STEPPED fire are accessed by pressing the MODE button and then rotating the SELECT knob to the desired mode. Pressing SELECT will then enter the mode. You can exit any of the firing modes by pressing the MODE button until the Status mode state is displayed.

ARMED Status Mode

This is the 1st available mode of the ARMED firing system, and is entered when the panel is on and the ARM key lock switch is set to the ARM position. The text display will show something similar to this:

```
0.03 Status FM
--.- G-- ??? 1
```

Or this:

```
0.11 Status FM
24.3 G01 ARM 1
```

Attempts to fire a pin while in Status mode will result in an error beep, as Manual fire now has its own distinct firing mode and must be deliberately selected to fire manually.

In this mode, the top line display will show the load current being drawn by the XLR connector in the spot normally shown as BATT. The field below the output current number is the output voltage reported by the selected module. The output current draw area has a resolution of 0.01 amps. The typical range of voltage will be between 21 to 25 volts.

The Firing Module can be selected and accessed by selecting the desired Firing Module with the selector switch, which will then display the status history of that Firing Module. As noted above, if any of the cues have been fired from the Firing Module, the last fired cue is flashing red to make it easier to locate quickly. Press the SELECT knob to retrieve the selected module’s status from the connected module. If the selected module is not connected to the system, the display may appear like:

```
0.00 Status FM
--.- G-- ??? 1
```

A Group can also be selected while in Status mode. Even if Groups are not used in Manual fire mode, they can still be quite useful to acquire the status of the modules used

for the show. If a Group is active (indicated by one of the BLUE group LEDs lit), all the modules assigned to the group will be accessed when the SELECT knob is pressed. Then the individual module can be inspected by rotating the SELECT knob to see how the module responded.

Reset options are only available while in Status mode. They include resetting the show time, the active module, the active group and all the modules. These options are accessed by pressing the MODE button and then rotating the SELECT knob to the left (counter-clockwise). Once selected, the reset option must be accepted by pressing the SELECT knob, otherwise just press the MODE button again to exit without action.

ARMED Manual Fire Mode

To access the MANUAL Fire mode, press the MODE button until the display shows:

```
MENU MODE
ROTATE SELECT
```

Then rotate the SELECT knob to the right until the display shows:

```
Manual Fire?
Press SELECT
```

Press the SELECT knob to enter Manual fire mode. The display will briefly show:

```
MANUAL FIRE MODE
Use fire switches
```

Then transition to:

```
0.03 Time FM
24.1 0:00.0 1
```

In this mode, the top line display will show the load current being drawn by the XLR connector in the spot normally shown as BATT. The output current draw area has a resolution of 0.01 amps. The number below it is the system main power voltage that is present on the +24V pin of the XLR jack with a 0.1 volt resolution. The typical range of voltage will be between 21 to 25 volts. If the voltage field drops to 0.00 the output +supply fuse has probably tripped. In that case the output current field on the top line will display "Fuse".

The show timer has a display resolution of 0.1 seconds and will be paused when the mode is first entered. Any firing switch presses will start the show timer running. The show timer can be stopped by pressing the MODE button once, without exiting the MANUAL fire mode. Pressing the MODE button again will back out of the MANUAL fire mode and allow another firing mode to be selected, or if repeatedly pressed the panel will return to the Status mode.

Module Firing

To fire in straight Manual Mode you must first enter MANUAL firing mode before pushing the fire buttons will have any effect. Single module firing is accomplished by rotating the SELECT knob to the desired module. You may change back and forth through the module range with the select Knob. Any rotation of the SELECT knob in MANUAL fire module will disable Group fire. The currently selected modules' status can be retrieved by pressing the SELECT knob. This is possible in Paused or when the timer is running.

The text display will look like this in MANUAL Fire mode:

0.00 Time	FM
24.7 m:ss.t	1

The first line contains the XLR power amperage, the "Time" heading to show that it is in the manual fire and the FM (firing module) heading. The second line shows the XLR voltage output and the current show timer and current module address or GROUP. The Time text area shows the elapsed time from when the first cue was fired until the timer was stopped. The timer resolution is in 0.1-second increments. The timer may be stopped by pressing the MODE button once. This is the suggested method for stopping the timer. It will also be stopped if the ARM key is set to safe or the POWER switch is briefly pressed, but will also exit the fire mode.

The Last text area shows the currently selected Firing Module. If there has been any cue fired from the currently selected Firing Module, the last fired cue will be flashing.

When the elapsed time is paused, it will start or continue as soon as a firing switch is activated, and will run until the operator does some action to stop it or the timer reaches 99:59.9.

Always try to turn the panel ARM key switch to OFF before turning the panel power off.

Group Firing

This manual mode of fire allows individual modules or multiple modules to be grouped together and associated with a Group switch and indicator to fire the same pin on each module with a firing switch activation. If the group is selected by pressing the Group switch and the associated Group button 1-14, and the Group is empty it will show

Select a Group Firing Inhibited

Group Firing is accomplished by pressing and holding down the group switch and then selecting the desired group 1-14 thru the firing switches 1-14. Care should be taken to insure that the GROUP switch is the 1st switch depressed and must be held depressed while selecting the desired Group. While in group select mode, any group selected will flash blue. When the group switch is released, the selected group will become active and

the group indicator will stop flashing and stay on. While the group button is activated the firing mode will be locked out.

```
Group -- Has 0  
FIRING INHIBITED
```

Once a group is selected it will be indicated by the Blue led above the Group and you may fire from that group at this time. You may change groups in the same manner or simply turn the select knob to leave the group fire mode and manually select the desired module. The new combined status of each module assigned to the group will be retrieved when the SELECT knob is pressed while paused or during firing.

The text display indicates that Group fire is active when the module address field contains the 'G' character and a number value of 01-14.

```
0.00 Time FM  
24.7 m:ss.t G01
```

Always try to turn the panel ARM key switch to OFF before turning the panel power off.

ARMED Timed Fire Mode

TIMED fire mode, STEPPED fire mode and SYNCED fire mode requires the use of the Remote control cable to control and initiate the firing of scripts. The front panel firing switches will not have any effect on firing of the script.

The TIMED fire mode is used for automated firing of a pre-arranged firing script based on time as the event trigger. A single press of the Remote Fire Trigger will initiate the firing of the currently selected script when all conditions are met, i.e. (ARMED, TIMED FIRE mode entered, valid script selected and HOLDFIRE pressed).

To access the Timed Fire mode, press the MODE button until the display shows:

MENU MODE
ROTATE SELECT

Then rotate the SELECT knob to the right until the display shows:

Timed Fire?
Press SELECT

Press the SELECT knob to enter Manual fire mode. The display will show:

Press HOLDFIRE
Sfx Show Script

The bottom line displays the currently selected firing script. If the script is empty, an error message will be displayed, reporting that the script is empty and to select another script.

Script Empty!
Select Another

To select a valid script, the operator must exit the ARMED state by turning off the ARM key. Then the MODE button must be pressed and the SELECT knob rotated until the “Select Script?” option is shown in the display. Once a valid script is selected, the ARMED Timed fire mode can be used.

Press HOLDFIRE

When in this state of the fire mode (HOLDFIRE released), the position in the firing script for the beginning/next shot can be set by rotating the SELECT knob. Using this feature allows shots to be skipped or the order of the shots to be changed at the users’ discretion. The LED pin status display will indicate the first module and its pins that will be fired when the trigger is pulled. The continuity information is not displayed during auto-firing modes to avoid visual clutter and distraction from what is going to fire.

The timer is stopped whenever the HOLDFIRE button on the remote fire cable is not depressed. Depressing the HOLDFIRE button on the remote fire cable will transition to the next fire state.

Press Fire Trigger

The display will briefly show:

TIMED FIRE MODE
1 0:00.0 1

Then transition to:

24.3 0:00.0 FM
1 0:00.0 1

The top line displays the XLR + supply voltage, the show timer and the heading for the firing module field. The bottom line displays the next shot that will occur as shot number, firing time and 1st firing module number of the shot. The top line timer field will be paused until the first trigger pull or when the last shot of the script has been sent out.

Timed firing

When the remote fire trigger has been pressed, the show timer will begin to run, unless the end of the script has been reached. If that happens, the show time doesn't change. If there are still shots left to be sent, the show timer will run and shots will be sent to the firing modules as their times are met. If the last SHOT is fired, the panel will beep and display an "End of List!" message, and the show timer will stop.

The LED pin status display will indicate the first module and its pins that will be fired when the trigger is pulled. The continuity information is not displayed during auto-firing modes to avoid visual clutter and distraction from what is going to fire.

The show timer can be stopped either by releasing the HOLDFIRE button or by pressing the MODE button once.

The time can be adjusted while the show timer is running by pressing and holding down the SELECT knob and then rotating it clockwise to advance the time or counter-clockwise to retard the timing by 1/10th second increments.

Always try to turn the panel ARM key switch to OFF before turning the panel power off.

ARMED Stepped Fire Mode

TIMED fire mode, STEPPED fire mode and SYNCED fire mode requires the use of the Remote control cable to control and initiate the firing of scripts. The front panel firing switches will not have any effect on firing of the script.

The STEPPED fire mode is used for automated firing of a pre-arranged firing script based on the event being triggered from the Remote control cable. A single press of the Remote Fire Trigger will initiate the firing of a single SHOT in the currently selected script when all conditions are met, i.e. (ARMED, TIMED FIRE mode entered, valid script selected and HOLDFIRE pressed). Each SHOT is defined by sequential entries with the *same firing time*.

To access the Timed Fire mode, press the MODE button until the display shows:

MENU MODE
ROTATE SELECT

Then rotate the SELECT knob to the right (clockwise) until the display shows:

Stepped Fire?
Press SELECT

Press the SELECT knob to enter Stepped fire mode. The display will show:

Press HOLDFIRE
Sfx Show Script

The bottom line displays the currently selected firing script. If the script is empty, an error message will be displayed, reporting that the script is empty and to select another script.

Script Empty!
Select Another

To select a valid script, the operator must exit the ARMED state by turning off the ARM key. Then the MODE button must be pressed and the SELECT knob rotated until the “Select Script?” option is shown in the display. Once a valid script is selected, the ARMED Stepped fire mode can be used.

Press HOLDFIRE

When in this state of the fire mode (HOLDFIRE released), the position in the firing script for the beginning/next shot can be set by rotating the SELECT knob. Using this feature allows shots to be skipped or the order of the shots to be changed at the users’ discretion. The LED pin status display will indicate the first module and its pins that will be fired when the trigger is pulled. The continuity information is not displayed during auto-firing modes to avoid visual clutter and distraction from what is going to fire.

The timer is stopped whenever the HOLDFIRE button on the remote fire cable is not depressed. Depressing the HOLDFIRE button on the remote fire cable will transition to the next fire state.

Press Fire Trigger

The display will briefly show:

STEP	FIRE	MODE
1	0:00.0	1

Then transition to:

24.3	0:00.0
1	0:00.0
	1

The top line displays the XLR + supply voltage, the show timer captured when the last shot occurred, and the last firing module of the shot. The bottom line displays the next shot that will occur as shot number, running show timer and 1st firing module number of the shot. The bottom line show timer field will be paused until the first trigger. The show timer will continue to run even after the last shot of the script has been fired.

Step Firing

When the remote fire trigger has been pressed, the show timer will begin to run, unless the end of the script has been reached. Each time the remote control fire trigger is pressed, the SHOT that is indicated on the bottom line of the text display will be sent to the firing modules. If the last SHOT is fired, the panel will beep briefly and display an "End of List!" message.

The LED pin status display will indicate the first module and its pins that will be fired when the trigger is pulled. The continuity information is not displayed during auto-firing modes to avoid visual clutter and distraction from what is going to fire.

The show timer can be stopped either by releasing the HOLDFIRE button or by pressing the MODE button once.

Always try to turn the panel ARM key switch to OFF before turning the panel power off.

ARMED SYNCED Fire Mode

TIMED fire mode, STEPPED fire mode and SYNCED fire mode requires the use of the Remote control cable to control and initiate the firing of scripts. The front panel firing switches will not have any effect on firing of the script.

The SYNCED fire mode is used to coordinate automated firing of a pre-arranged firing script to externally triggered time code. This firing mode is the most complicated firing method. In order to use this mode, an external FSK timecode must be delivered to a timecode modem attached to the DB9 serial port on the front panel. This FSK timecode stream must be aligned with the selected firing script if the show is to have any relevance to the external events.

To begin firing a script in SYNCED fire mode the following conditions must be met. The panel must be ARMED, the SYNCED fire mode selected, the HOLDFIRE button must be held depressed, the remote trigger must have been pressed and the external timecode must be running.

A single press of the Remote Fire Trigger will initiate the firing of the currently selected script when all conditions are met, i.e. (ARMED, TIMED FIRE mode entered, valid script selected and HOLDFIRE pressed).

To access the SYNCED Fire mode, press the MODE button until the display shows:

MENU MODE
ROTATE SELECT

Then rotate the SELECT knob to the right until the display shows:

Synced Fire?
Press SELECT

Press the SELECT knob to enter Manual fire mode. The display will show:

Press HOLDFIRE
SFX Show Script

The bottom line displays the currently selected firing script. If the script is empty, an error message will be displayed, reporting that the script is empty and to select another script.

Script Empty!
Select Another

To select a valid script, the operator must exit the ARMED state by turning off the ARM key. Then the MODE button must be pressed and the SELECT knob rotated until the “Select Script?” option is shown in the display. Once a valid script is selected, the ARMED Timed fire mode can be used.

Press HOLDFIRE

Press HOLDFIRE
Sfx Show Script

When in this state of the fire mode (HOLDFIRE released), the position in the firing script for the beginning/next shot is set to the first shot of the script on initial entry. Arbitrary starting point is controlled by the external FSK timecode signal. The continuity information is not displayed during auto-firing modes to avoid visual clutter and distraction from what is going to fire.

The timer is stopped whenever the HOLDFIRE button on the remote fire cable is released. Depressing the HOLDFIRE button on the remote fire cable will transition to the next fire state.

Press Fire Trigger

The display will show:

SYNC FIRE MODE
Pull trigger

Pressing the Fire Trigger will transition to:

Waiting for FSK>
1 0:00.0 1

At this point, the FSK timecode signal is required to start the show script timer. Until a valid FSK timecode is detected, the firing panel will remain paused.

Waiting for FSK

The top line displays “Waiting for FSK>” until valid timecode is received, then the display changes to the XLR + supply voltage, the show timer and the heading for the firing module field. The bottom line displays the next shot that will occur as shot number, firing time and 1st firing module number of the shot.

Synced firing

When valid FSK timecode is recognized, the show timer will begin to run at the time that matches the received timecode, unless the end of the script has been reached. If that happens, the show time doesn't change. If there are still shots left to be sent, the show timer will run and shots will be sent to the firing modules as their times are met. If the last SHOT is fired, the panel will beep and display an “End of List!” message, and the show timer will stop.

The show timer is kept in synchronization with the decoded FSK timecode while valid timecode is being received. If the FSK timecode is interrupted, the firing panel will continue to run on the internal clock. If the timecode jumps or varies from the internal show timer, the show timer will be updated and the next shot entry is changed to reflect the new time. This allows for interrupting the show and re-synchronizing the script to external show requirements.

While the script is being executed by the firing panel, the text display will appear similar to the TIMED fire mode, with the addition of a character to the right of the XLR voltage field on the top line indicating one of several different conditions. The following table describes these conditions.

Sync indicator	Synced condition description
w	Waiting for first valid timecode after pausing from HOLDFIRE
s	Receiving valid sequential timecode with show timer running
blank	Executing firing script from internal show timer, no timecode
j	Adjustment made to the show timer that may have jumped the next firing point in the script

The continuity information is not displayed during auto-firing modes to avoid visual clutter and distraction from what is going to fire.

The show timer can be stopped either by releasing the HOLDFIRE button or by pressing the MODE button once.

These are the steps necessary to accomplish Synced firing:

ARM the firing panel using the ARM KEY.

Then access the SYNCED Fire mode by pressing the MODE button until the display shows:

```
MENU MODE
ROTATE SELECT
```

Next, rotate the SELECT knob to the right until the display shows:

```
Synced Fire?
Press SELECT
```

Press the SELECT knob to enter Manual fire mode. The display will show:

```
Press HOLDFIRE
your script name
```

Next, press and hold the HOLDFIRE button on the remote.

```
SYNC FIRE MODE
Pull trigger
```

Press the Fire Trigger to transition to:

```
waiting for FSK>
1 0:00.1 1
```

At this point, the FSK timecode signal is required to start the show script timer. Until a valid FSK timecode is detected, the firing panel will remain paused. When valid timecode is received by the panel, the script will begin executing and show:

```
24.7s m:ss.t mmm  
line m:mm.s mmm
```

The top line contains the XLR output voltage, the sync status, the current show timer, and the last module address fired. The second line shows the next shot line number, the next shot time and the next shot module address. When the end of the script is reached, the display shows:

```
24.7s m:ss.t mmm  
End of list!
```

And beeps continuously until the HOLDFIRE is released or the ARM key is turned off.

To interrupt Synced fire mode, release the HOLDFIRE button. To re-sync to the external signal, just press and hold the HOLDFIRE and then pull the trigger to begin waiting for timecode.

When scripting a show to be firing in Synced Fire mode, a timecode leader of 30 seconds is strongly suggested to allow a enough time to execute s fault recover plan. Such a case is required if something prevents the timecode from being received by the modem.

Always try to turn the panel ARM key switch to OFF before turning the panel power off.

ARMED SMART Status Mode

This is the last available mode of the ARMED firing system. This mode is used to compare the selected script to what the modules report as status of pins and armed state. The SMART status will only access the modules used in the select script.

To access the Timed Fire mode, press the MODE button until the display shows:

MENU MODE
ROTATE SELECT

Then rotate the SELECT knob to the right until the display shows:

Smart Status?
Press SELECT

Press the SELECT knob to enter SMART STATUS mode. The display will show:

SMART STATUS
Use SELECT knob

If the script is empty, an error message will be displayed, reporting that the script is empty and to select another script.

Script Empty!
Select Another

To select a valid script, the operator must exit the ARMED state by turning off the ARM key. Then the MODE button must be pressed and the SELECT knob rotated until the “Select Script?” option is shown in the display. Once a valid script is selected, the ARMED Timed fire mode can be used.

When the SELECT knob is rotated, the panel will increment or decrement the module address of the list of modules contained in the script. If the modules’ pin memory matches the scripts’ module pin memory, the display text will show:

Module matches
SSSS AAA

Where SSSS is the module arm condition and AAA is the current module address from 1 to 199.

SSSS	Description
????	Module arm condition is unknown, no valid status has been received
armed	Module is armed and ready to fire
test	Module is set to respond to status command but not to a fire command

The following table describes the module to script pin condition display.

Pin Status definitions in SMART Status Mode

Condition	Color	Description
1	Off	Not in script, no continuity
2	Green	In Script, continuity
3	Red	In Script, no continuity
4	Green + Red	Not in script, continuity. Misplaced igniter?

When the current modules' status doesn't match the script module image, the text display will show:

MODULE MISMATCH! SSSS MMM

Pressing and holding the SELECT knob will advance thru the scripted module addresses and briefly show modules that do not match the selected script. This is a way to quickly acquire the scripted modules pin status. Once they are acquired, the individual modules' condition can be checked using the SELECT knob to access the memory.

SMART Status mode will ignore attempts to fire a pin.

More about Scripts

There are two time formats that pertain to firing scripts. They are **event time** and **fire time**.

Event time scripting is used during the creation of the show script while using a pyrotechnic choreography software package. It represents the time that an effect will appear to the audience vs. when the device is fired. Many pyrotechnic devices have a time interval from when they are ignited to when the effect actually is perceived. This interval is often referred to as the Prefire time or delay.

A script created using Event time is converted to Fire time by combining the event time and the Prefire delay to end up with the real fire time. Scripts formatted as Fire time are necessary to fire the show from the Pyromate firing panels. The downloaded script is always formatted as fire time.

Scripts that are targeted for *Timed Fire mode* will typically start at 0:00.0 time with a device that is immediately visible. This approach allows the panel operator the best opportunity to align the firing script with some external event such as the start of music. If the first effect has a Prefire delay time that is greater than 0, a conflict can occur if the event time script starts at 0:00.0, as negative time is not possible!

Scripts that are targeted for *Synced Fire mode* will typically start approximately 0:30.0 event time with a device that can have a Prefire delay time, although it is still recommended that a 0 Prefire delay device is the 1st entry. This still allows the script to be used if Timed fire mode becomes necessary when the show must be fired. The 30 second offset to the beginning of the show is to allow the show operator time to execute a fault recovery plan in the event that the timecode has failed before the panel can lock to it.

Scripts that are created to be fired using *Step Fire mode* consist of shots separated by unique times in sequential order. It is a recommended practice to separate shots by an amount greater than 10 seconds so that if the firing panel were placed in the *Timed Fire mode* by mistake, the whole show wouldn't be zipped thru before the mistake was recognized. Each shot can have more than one pin fired at the same time.

PYROMATE^{INC.}

FIRING SYSTEMS

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DISCLAIMER;

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