

**INSTRUCTION SHEET
FOR Intelli-Flash® AF16
MODEL 650302
16-CHANNEL PROGRAMMABLE HIGH SIDE FLASHER**

SAFETY MESSAGE TO INSTALLERS



The lives of people depend on your proper installation and servicing of Federal products. It is important to read and follow all instructions shipped with the products. In addition, listed below are some other important safety instructions and precautions you should follow:

- To properly install this kit: you must have a good understanding of automotive electrical procedures and systems, along with proficiency in the installation and use of safety warning equipment.
- When drilling into a vehicle structure, be sure that both sides of the surface are clear of anything that could be damaged. Remove all burrs from drilled holes. To prevent electrical shorts, grommet all drilled holes through which wiring passes.
- This flasher is a high current device. In order for this flasher to function properly, the ground connection must be attached to the negative (-) battery terminal. The positive (+) lead should be attached to a positive source and should be fused at the source. The installer should fuse the input. The selection of the fuse size and the size of the input power wiring should be determined by qualified personal.
- Never attempt to install aftermarket equipment, which connects to the vehicle wiring, without reviewing a vehicle-wiring diagram - available from the vehicle manufacturer. Insure that your installation will not effect vehicle operation or mandated safety functions or circuits. Always check vehicle for proper operation after installation.
- Locate control so the VEHICLE and CONTROLS can be operated safely under all driving conditions.
- File these instructions in a safe place and refer to them when maintaining and/or reinstalling the product.

Failure to follow all safety precautions and instructions may result in property damage, serious injury, or death to you or others.

I. GENERAL.

The Intelli-Flash AF16 flasher is a 16 channel LED or Halogen light flasher. It is designed to operate on 12-24VDC vehicular circuits and has a current capacity of 40-amperes total. The outputs can be either LED or Halogen loads.

The flasher is designed to operate in two different applications:

- **KKK-A-1822E Application:** Each output of the flasher is designed to control a light head. In Primary Mode all lights flash. For KKK approved patterns, all channel 1 lights flash at the same time. All channel 2 lights flash 180 degrees out of phase with channel 1 lights. In Secondary Mode, the clear front upper center light, the red grille and fender lights, and two auxiliary lights are cut off.
- **NFPA 1901 Application - Zone Control:** There are four zones: A, B, C, and D, with four outputs in each zone. Activation of the control line activates the four outputs in the zone. Turning off a zone cuts off all heads in the zone. The flasher is capable of switching any number of heads in the zone with each zone fused at 10-amperes on the flasher.

Patterns available are:

- In Primary/Secondary Mode Operation, there are twenty-one (21) different patterns available. In each mode, the flasher can flash either the first or alternate pattern.
- Alternate pattern selection is accomplished by activating the pattern select input.
- Changing the pattern is accomplished by activating the Program pin either through the leads at the terminal block or temporarily shorting the white two-position header on the flasher.
- **Zone Control:** There are four zone inputs. Activating the zone input turns on the four heads associated with that zone. An alternate pattern can be chosen by activating the Pattern Select Input. There is a choice of 29 different patterns in zone control operation.
- Primary/Secondary Mode Operation has priority over Zone Control operation.

Each output is High Side, switching +VDC to a load rather than pulling a load to ground. Each group of four

outputs is rated for 10-amperes per 4-channels or zone. A 10-ampere fuse is located on the flasher for each zone or group of 4-channels. Terminations for the outputs are made via terminal blocks. Terminations for the negative leads are not provided at the flasher. The flasher has an aluminum chassis, powder painted black with a conformal-coated board. User-supplied hardware is required to mount the flasher and user-supplied switches are required to activate the flasher.

The Intelli-Flash AF16 flasher is controlled by 8 discreet inputs and the initiation lines are terminated in an 8-position plug in terminal block. Each input is High Side initiated. The inputs lines determine if the flasher is activated in Primary Mode, Secondary Mode, or utilize Zone Control, activating Zones A-D. There is an input for selection of the alternate pattern along with a program input.

II. SPECIFICATIONS.

- Operating Voltage: 9-28 VDC.
- Output Current Rating: Fused at 10 Amps per zone or group of four channels.
- Maximum Unit Current: 40 Amps.
- Conducted Emissions: The Equipment Under Test's (EUT's) power leads passed Class 3 Limits of Surface Vehicle Standard SAE J1113/41 - Limits and Methods of Measurement of Radio Disturbance Characteristics of Components and Modules for the Protection of Receivers Used on Board Vehicles. (Issued May 2000)
- Radiated Emissions: The Equipment Under Test (EUT) passed Class 3 Limits of Surface Vehicle Standard SAE J1113/41 - Limits and Methods of Measurement of Radio Disturbance Characteristics of Components and Modules for the Protection of Receivers Used on Board Vehicles. (Issued May 2000)
- Immunity to Electromagnetic Fields: The Equipment Under Test (EUT) passed a Region 1 Level of performance (The unit shall operate as designed during and after exposure to a disturbance), with a test severity level of L6 (100 Volts/Meter) of Surface Vehicle Standard SAE J1113/21 - Immunity to Electromagnetic Fields: Limited to 26 MHz - 1000 MHz.

II. INSTALLATION.

WARNING

DO NOT connect flasher to brake light circuit of ANY vehicle.

DO NOT connect flasher to the headlight circuit of any vehicle.

Connection of aftermarket electrical equipment to this circuit may interfere with the brake shift interlock.

This could cause the vehicle to unexpectedly move forward causing possible property damage, injury or death to the vehicle operator or others.

A. Mounting.

CAUTION

Never mount the flasher in the vehicle's engine compartment. It is recommended that the flasher be installed in a compartment, somewhere in the cab of a vehicle, or in the trunk of the vehicle.

1. Locate a suitable mounting location for the flasher.
2. Using the flasher as a template, scribe drill position marks on the mounting surface.

CAUTION

Before drilling holes in ANY part of a vehicle, be sure that both sides of the mounting surface are clear of parts that could be damaged; such as brake lines, electrical wiring or other vital parts.

3. Drill mounting holes at the previously scribed drill position marks.
4. Use user supplied hardware to secure the flasher to the vehicle.

B. Wiring.

WARNING

The selection of wire gauge for the input power and the determination of the current rating of the fuse for the input power are important. It should be determined by a technician having a good understanding of automotive electrical procedures and systems, along with proficiency in the installation and use of safety warning equipment.

WARNING

Do not connect this system to vehicle battery until ALL other electrical connections are made and mounting of all components is complete.

WARNING

The lamps WILL NOT flash if improperly grounded. Be sure that the lamp grounds are connected to a good vehicle ground/ negative (-) battery terminal.

See figure 1 when performing the following procedure.

Input power is terminated in a 2-position cage clamp terminal block. Connect the flasher GND (-) to a good vehicle ground/ negative (-) battery terminal. Tighten the negative lead to the flasher with the screw on the terminal block.

Connect the Fused (+) Power lead to the +DC terminal on the 2-position cage clamp terminal block.

1. KKK-A-1822E Ambulance Application.

Specification KKK-A-1822 E defines an Emergency Lighting System Configuration, in part, as follows:

The ambulance standard emergency warning light system shall contain twelve fixed red lights, one fixed clear light, and one or two fixed amber or SAE "selective yellow" lights. These lights shall function in a dual mode system as shown in Table 1 below. The upper body warning lights shall be mounted at the extreme upper corner areas of the ambulance body, below the horizontal roofline. The single clear light shall be centered between the two front facing, red, upper corner lights or in a dedicated housing mounted forward of the body on the cab roof. If due to limited body dimensions and physical size of the outboard forward facing lights, the lights may also be mounted in

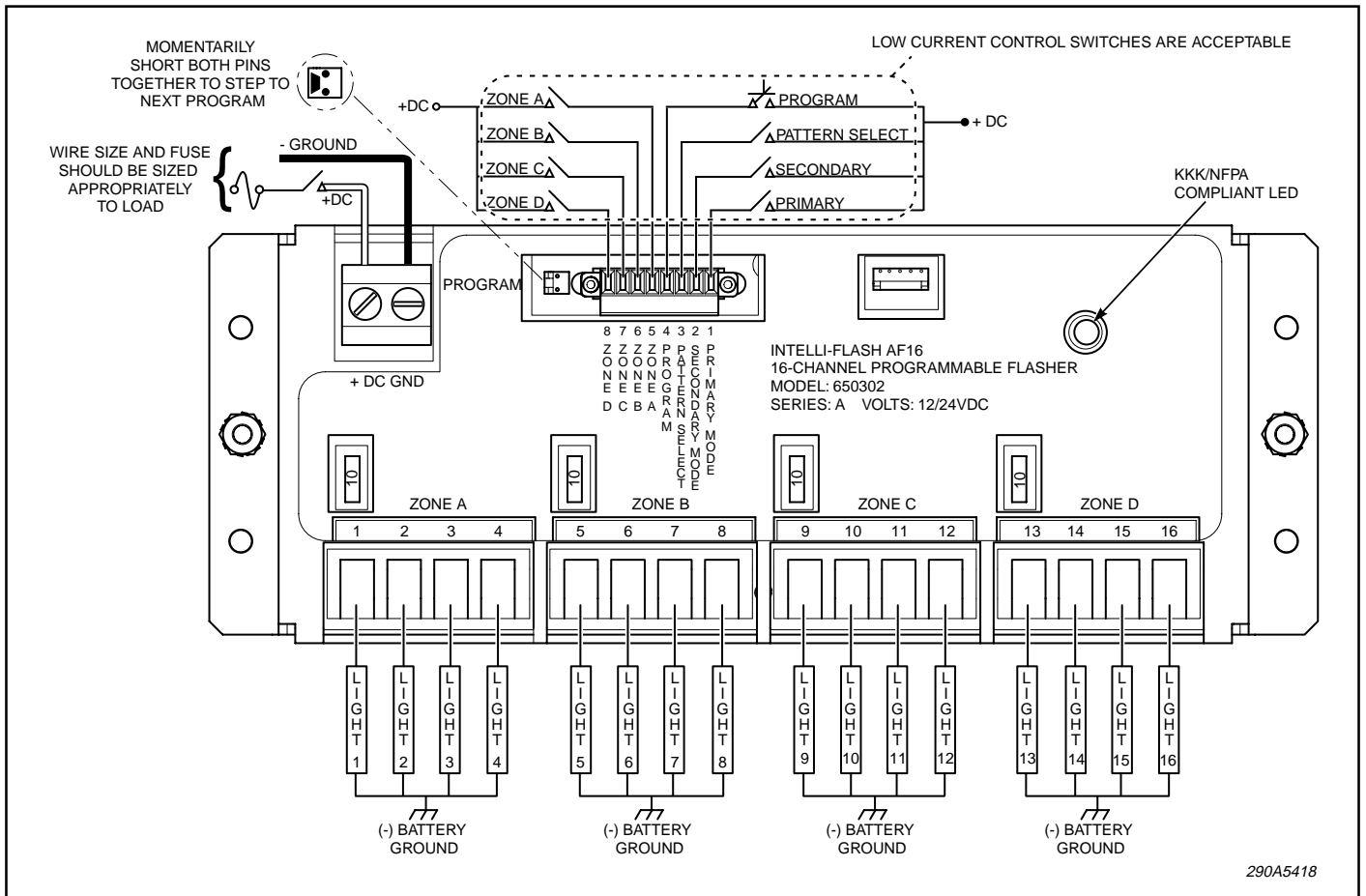


Figure 1.

Table 1.

Intelli-Flash AF16 Flasher Primary Mode/Secondary Mode Patterns		
Pattern	Description	KKK
1	95 FPM Alternating C1 & C2	X
2	120 FPM Alternating C1 & C2	X
3	75 FPM Alternating C1 & C2	X
4	76 FPM Alternating Quad Flash C1 & C2	X
5	87 FPM Overlapping Pentaflash C1 & C2	X
6	Overlapping Alternate 95 Patterns/Min C1 & C2	X
7	175 FPM Alternating Single Flash C1 & C2	
8	Simultaneous/Overlapping Triple/Nine C1 & C2	
9	Alternating Single C1 & C1	
10	Alternating With Overlap 5/2 Flash C1 & C2	
11	2@60 FPM Quad Flash Then 2@60 Sim Flash C1 & C2	
12	Flashing C1 With Alternate C2 53 Patterns/Min	
13	Double Flashing C1 With Alt. C2 170 Patterns/Min	
14	Walking Strobe 75 Patterns/Minute	
15	Walking Strobe 167 Patterns/Minute	
16	Wraparound Flash - 75 Patterns/Min	
17	Alternating Triple Flash - 75 FPM	X
18	Triple Flash Alternating C1 & C2 - 75 FPM	X
19	Scrolling Chaser - 83 Patterns Per Minute	
20	Variable Rate Chaser	
21	Steady Burn - End Of Pattern List	

Channel Definitions

C1 Channel 1: 5, 6, 7, 8, 13, 14, 15, 16

C2 Channel 2: 1, 2, 3, 4, 9, 10, 11, 12

KKK-A-1822E Flash Specification Notes:

1. Each emergency light shall flash 75 to 125 times per minute.
2. All channel 1 lights flash at the same time. All channel 2 lights flash 180 degrees out of phase with channel 1 lights.
3. In secondary mode, output 1,2,3,4, and 9 are cut off.
4. Two rear amber lights may be used to the rear in lieu of single center light.

Default Intelli-Flash AF16 Flash Patterns

<u>Mode</u>	<u>Pattern</u>	<u>ALT Pattern</u>
Primary	95 FPM Alternating C1 & C2	Alternating Triple Flash - 75 FPM
Secondary	120 FPM Alternating C1 & C2	Triple Flash ALT C1 & C2 - 75FPM



The default flash patterns are designed to be compliant with the Federal Specifications for Ambulances: KKK-A-1822E. Before choosing a pattern that does not meet the KKK-A-1822E specifications, check with your local codes or regulations to see if you are allowed to use non-compliant patterns.

dedicated housings on the cab roof. The amber light(s) shall be symmetrically located between the two rear facing red lights.

Each emergency light shall flash 75 to 125 times per minute. In Primary "Clear the Right-Of-Way" Mode, all of the lights flash as defined in Table 1. All of the Channel 1 lights flash at the same time and alternate with all of the channel 2 lights, which flash 180 degrees out of phase with the Channel 1 lights. In SECONDARY "Hazard-Vehicle Stopped on Right-Of-Way" Mode, the clear light mounted on the Front Upper Center and the Grille and Fender lights are turned off.

Each output of the flasher is designed to control a particular light head on the ambulance. It is important for proper control that each light head on an ambulance to be connected according to figure 2.

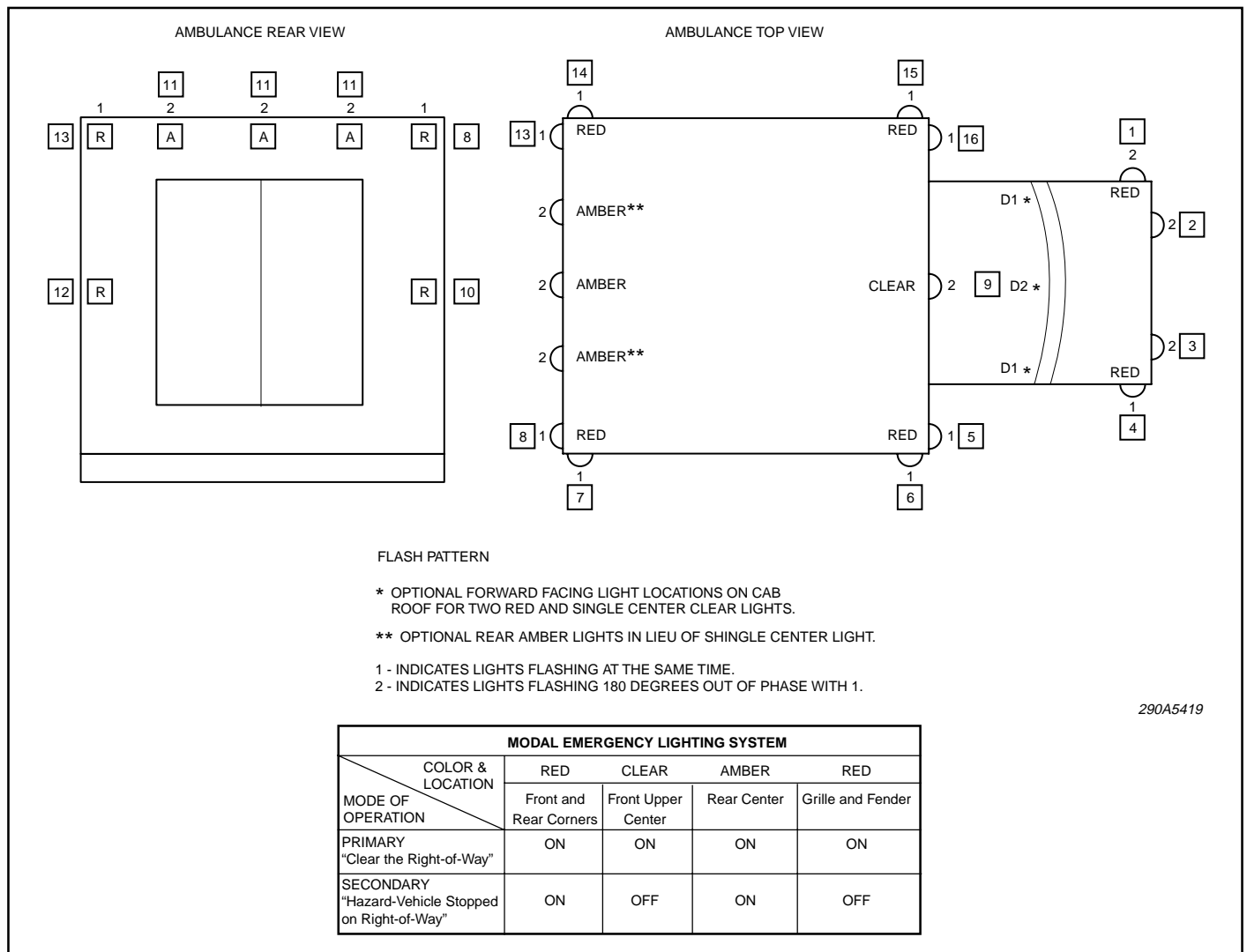
CAUTION

Each light head on the ambulance should go to the designated terminal on the flasher. Failure to do so may not allow the vehicle's lights to flash in the intended KKK-A-1822E pattern.

The Intelli-Flash AF16 flasher has 16 outputs that switch +DC voltage to the load. The grounding of each light head is left up to the installation of the installer. The ground of each light head needs to be terminated to a good vehicle ground/negative (-) battery terminal connection.

WARNING

The lamps WILL NOT flash if improperly grounded. Be sure that the lamp grounds are connected to a good vehicle ground/ negative (-) battery terminal.



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Figure 2.

There are four Inputs to the flasher via the eight-position, plug-in terminal block used in Ambulance Primary/Secondary Mode applications. When +VDC is applied to the Primary Mode Input, the flasher will flash the selected pattern on all 16 outputs. When +12VDC is applied to the Secondary Mode Input, the flasher will flash the programmed pattern for Secondary Mode. The Grille Lights, outputs 1, 2, 3, 4, and the front center clear light output 9 are cut off. The Primary Mode input has a higher priority than the Secondary Mode Input.

The third input is Pattern Select. When the flasher is operating either in Primary Mode or Secondary Mode, an alternate pattern can be chosen while that Mode is operating.

As an example, if the Primary input is at +12VDC and the Pattern Select input is open, the flasher will be flashing the first user selected pattern. If the Pattern Select input is changed to +12VDC, the flasher will now flash the second user-selected pattern. Refer to Figure 1 for proper connection of the Pattern Select input.

2. NFPA 1901 Application - Zone Control. See figure 3.

There are four zones: A, B, C, and D, with four outputs in each zone. Activation of the control line activates the four outputs in the zone. Turning off a zone cuts off all heads in the zone. The flasher is capable of switching any number of heads in the zone with each zone fused at 10 Amps on the flasher.

There are twenty-nine (29) different patterns available when the flasher is used in Zone Control. In each mode, the flasher can flash either the first or alternate pattern. Alternate pattern selection is done by activating the pattern select input. Changing the pattern is done by activating the Program pin either through the leads at the terminal block or temporarily shorting the white two-position header on the flasher.

Each output is High Side, switching +VDC to a load rather than pulling a load to ground. Each group of four outputs are rated for 10 Amps per 4-channels or zone. A 10-Amp fuse is located on the flasher for each zone or group of 4-channels. Terminations for the outputs are made via terminal blocks. Terminations for the negative leads are not provided at the flasher. The flasher has an aluminum chassis, powder painted black with a conformal-coated board. User-supplied hardware is required to mount the flasher and user-supplier switches are required to activate the flasher.

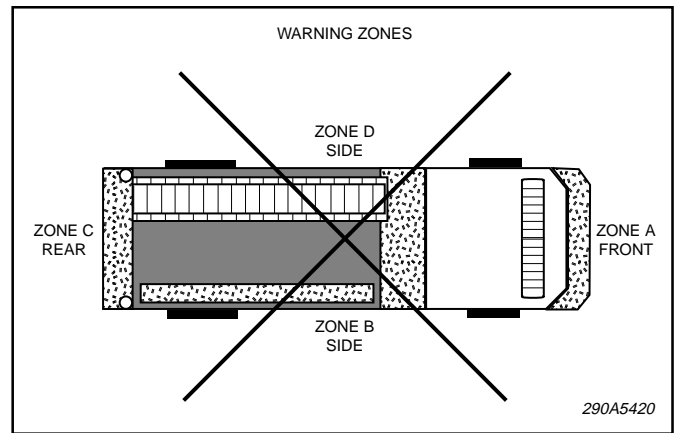


Figure 3.

The Intelli-Flash AF16 flasher is controlled by 8 discreet inputs and the initiation lines are terminated in an 8-position plug-in terminal block. Each input is High Side initiated. The four inputs lines dedicated for Zone Control are marked as Zone Control, activating Zones A-D. There is an input for selection of the alternate pattern along with a program input.

C. Programming.

1. KKK-A-1822E (see table 1).

In Primary/Secondary Mode Operation, the flasher will provide the end user with two preselected flash patterns. The preselected flash patterns are to be chosen from the 21 factory programmed patterns provided with each flasher. It is recommended that the preselected flash patterns be determined and programmed during installation. The default pattern for the flasher in Primary Mode is Pattern 1 and with Pattern Select activated Pattern 17. The default pattern in Secondary Mode is Pattern 2 and with Pattern Select activated Pattern 18.

When operating in Primary/Secondary Mode, the green LED will be illuminated when a KKK-A-1822 E COMPLIANT flash pattern is selected. When a non-KKK-A-1822 E compliant flash pattern is selected, the LED will be red.

With the Primary or Secondary input active, momentarily apply +DC signal to the Programming line. The flasher will stop briefly and then flash all of the heads the number of times equal to the flash pattern. Having Pattern Select along with the corresponding Mode will program the alternate pattern.

2. NFPA 1901 (see table 2).

In Zone Control Operation, the flasher will provide the end user with two preselected flash pat-

Table 2.

Intelli-Flash AF16 Flasher Zone Patterns		
Pattern	Description	NFPA
1	Single-Flash 680 - 340 SFPM / Per Lamp	
2	Single-Flash 240 - 120 SFPM/ Per Lamp	X
3	Single-Flash 120 - 60 SFPM / Per Lamp	
4	Simultaneous Single-Flash 240 - 240 SFPM	
5	Doubleflash 240 - 120 Alternating DFPM	X
6	Doubleflash 120 - 60 Alternating DFPM	
7	Simultaneous Double Flash 240 - 240 Simul DFPM	
8	Quad Flash - 60 Alternating Quad FPM	
9	Simultaneous Quad Flash - 120 Sim Quad Fpm	X
10	Multi-Flash 1- 2 Quad Flash / 4 X 150 SFPM / 2 Quad Flash	
11	Simultaneous Multi-Flash 1 - Like Multi-Flash 1, But Simultaneous	
12	Multi-Flash 2 - 60 SFPM To 180 Alternating SFPM	
13	Simultaneous Multi-Flash 3 - 120 Simul SFPM To 360 SFPM	
14	Warning Alert - 60 Alternating Flashes Per Minute	
15	Simultaneous Warning Alert - 120 Simultaneous FPM	X
16	Dual Speed Zone Chaser - Chaser Pattern At Two Different Rates	
17	Zone Chaser - 60 Revolutions Per Minute	
18	Fast Zone Chaser - 120 Revolutions Per Minute	X
19	Ultra-Fast Zone Chaser - 240 Revolutions Per Minute	
20	Double Zone Chaser - 2 Lights On At All Time - 120 RPM	X
21	Fast Double Zone Chaser - 2 Lights On At All Times - 240-RPM	
22	Multi-Flash 3 - Double Zone Chaser Followed By 4 Single-Flash Flashes	
23	Multi-Flash 4- 2 Quad Flashes Followed By Zone Chaser	
24	Multi-Flash 5 - Fast Quad, Slow Quad, Followed By Zone Chaser	
25	Multi-Flash 6 - Simultaneous Quad, Simultaneous Fastfire, Zonechaser	
26	Multi-Flash 7-Quad, Zonechaser, 3-Simquad, Zonechaser, 3-Single-Flash	
27	“Q” Flash - Variable Rate Chaser	
28	NFPA 75 - 75 Alternating Single Flashes Per Minute	X
29	Steady Burn - End Of Pattern List	

Zone 1= Head 1, Head 2, Head 3, Head 4 Zone 2= Head 5, Head 6, Head 7, Head 8
 Zone 3= Head 9, Head 10, Head 11, Head 12 Zone 4= Head 13, Head 14, Head 15, Head 16

Flash Rate and Failure Definition from FS NFPA Guide:

The minimum flash rate allowed is 75 flashes per minute for any single optical source and 150 flashes per minute from all of the light sources visible at any data point (i.e., at least two warning lights are required in each zone. Failure of a lighting device should not leave a data point without a signal.

Default Intelli-Flash AF16 Zone Flash Patterns

<u>Mode</u>	<u>Pattern</u>	<u>ALT Pattern</u>
Z1, Z2, Z3, or Z4	Single-Flash 240 - 120SFPM	NFPA 75 - 75 ALT SFPM



The default flash patterns are designed to be compliant with the NFPA. Before choosing a pattern that does not meet NFPA specifications, check with your local codes or regulations to see if you are allowed to use non-compliant patterns.

terns. The preselected flash patterns are to be chosen from the 29 factory programmed patterns provided with each flasher. It is recommended that the preselected flash patterns be determined and programmed during installation. The default pattern for the flasher in Zone Control is Pattern 2 and with Pattern Select activated Pattern 28.

When operating in Zone Control, the green LED will be illuminated when a NFPA COMPLIANT flash pattern is selected. When a non-NFPA compliant flash pattern is selected, the LED will be red.

With the Zone Control input active, momentarily apply +DC signal to the Programming line. The flasher will stop briefly and then flash all of the heads the number of times equal to the flash pattern. Having Pattern Select along with the corresponding Zone Input will program the alternate pattern.

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