# Single Door Access Module   ELK-M1KAM

APPLICATION

A single door access interface module for use on the M1 and M1EZ8 Control Panels. The M1KAM connects to the 4 wire keypad data bus in place of a traditional M1 Keypad. Since the maximum number of keypads on an M1 or M1EZ8 is 16, the maximum number of M1KAM modules (and controlled doors) is 16, minus any installed keypads. Even though an M1 Keypad can accept a 26 bit access reader, the M1KAM is a more powerful and less expensive access solution. For example; the M1KAM includes a relay (door unlock) output with form "C" dry contacts, making it compatible with most door lock devices regardless of the voltage rating and style (AC or DC). The M1KAM accepts many types of card swipe or proximity readers conforming to the 26 bit wiegand format. As an added benefit, the M1KAM also accepts Dallas "One-Wire" iButton readers/devices. The M1KAM also has additional inputs and outputs, including: a request to exit (RTE) button or device and a Door Contact (Sensor) input. Both inputs are supervised with a 2,200 EOL resistor. Outputs on the M1KAM consists of a voltage output for Door Held Open Alarm, a voltage output for System Ready to Arm, and a voltage output for System Armed. These outputs are switched negative (pull to ground). The M1KAM is mounted in a universal surface mount plastic housing with knockouts for surface mount raceways.
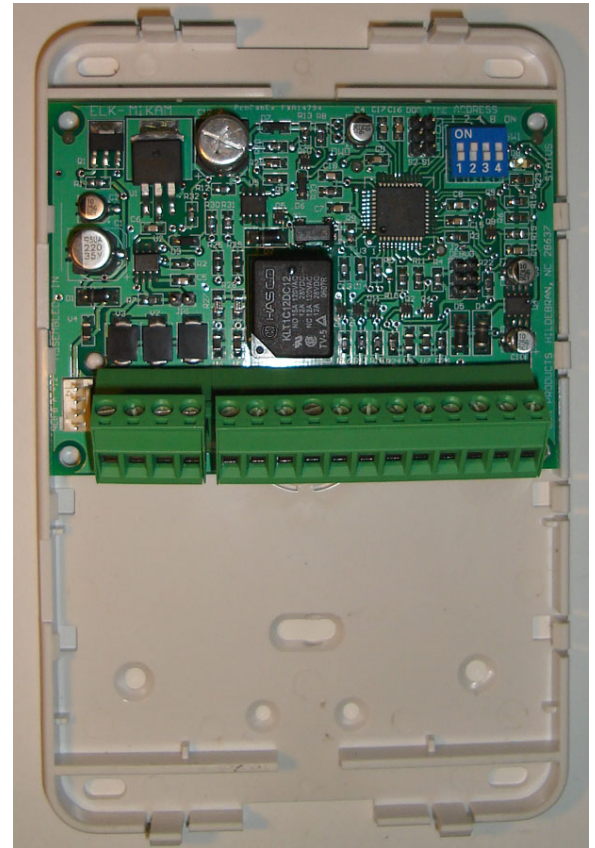
FEATURES:

- Input for a 26 bit Wiegand Reader
- Input for a Dallas "One-Wire" iButton Reader
- Heavy Duty Form "C" Relay Contacts for Switching Door Strike Power
- Low Current (50mA) Switched Negative (pull to ground) Output for Door Held Open Alarm
- Low Current (10mA) Switched Negative (pull to ground) Output for System Ready To Arm indication
- Low Current (10mA) Switched Negative (pull to ground) Output for System Armed indication
- Supervised Input for RTE (Request To Exit) Button/Device
- Supervised Input for Door Status Sensor
- Installs in place of an M1 Keypad and operates from the RS-485 4-Wire Keypad Data Bus
- Four selectable Time settings for "Request to Exit" and "Door Held Open"
- Hardware Watchdog Circuit

SPECIFICATIONS:

- Connections: Unpluggable Screw Terminals, 16 Position
- Operating Voltage: 13.8 VDC
- Current Draw: Less than 30 mA with min. activity, 44 mA fully active
- Housing Dimensions: 4.25" x 6.375" x 2.125"
- Circuit Board Dimensions: 3.95" W x 2.875" H x .95" D

Features and Specifications subject to change without notice.

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INSTALLING THE ELK-M1KAM

Mount the M1KAM within 25ft of the door being controlled. Since It connects to the 4-wire keypad data bus the M1KAM can be located from the control up to the maximum distance of the data bus. The location should have an ambient temperature range between 32˚ and 120˚ F (0° to +49˚ C). CAT5 or CAT6 wire (4 pair, 8 conductor) is recommended for all data bus cables as the spare wires may be required for data return paths where multiple homeruns or devices are installed. **NOTE: Refer to the M1 or EZ8 Installation Manual for information about Data Bus termination when multiple homerun cables are installed.** Recommended min. conductor size is 22 or 24 gauge. Maximum resistance per wire is 25 Ohms. **DO NOT SPLICE OR CONNECT WIRES WITH THE CONTROL POWER ON.**

Wiring Connections:

1. Turn OFF all power on the M1 or M1EZ8 Control before making any wiring connections.

2. Connect the 4-wire data bus **+12V**, **Data A**, **Data B**, and **Neg** wires coming from the M1 or EZ8 to the identically marked terminals labeled **M1 DATA BUS** on the M1KAM. NOTE: The M1KAM features unpluggable terminals blocks for ease and installation and service.

3. Install a separate local power supply for the locking device (door strike or mag lock).
   NEVER attempt to power an electric door strike or mag lock from the +12VDC of the M1/EZ8 Data Bus.

4. The **Relay** (Output) on the M1KAM operates as an On/Off switch between the locking device and the power source.   Depending on how the wiring is connected the voltage to the locking device can either be "turned On" or "turned off" when the Relay (Output) becomes energized.   Connect the wires in one of the following manners:
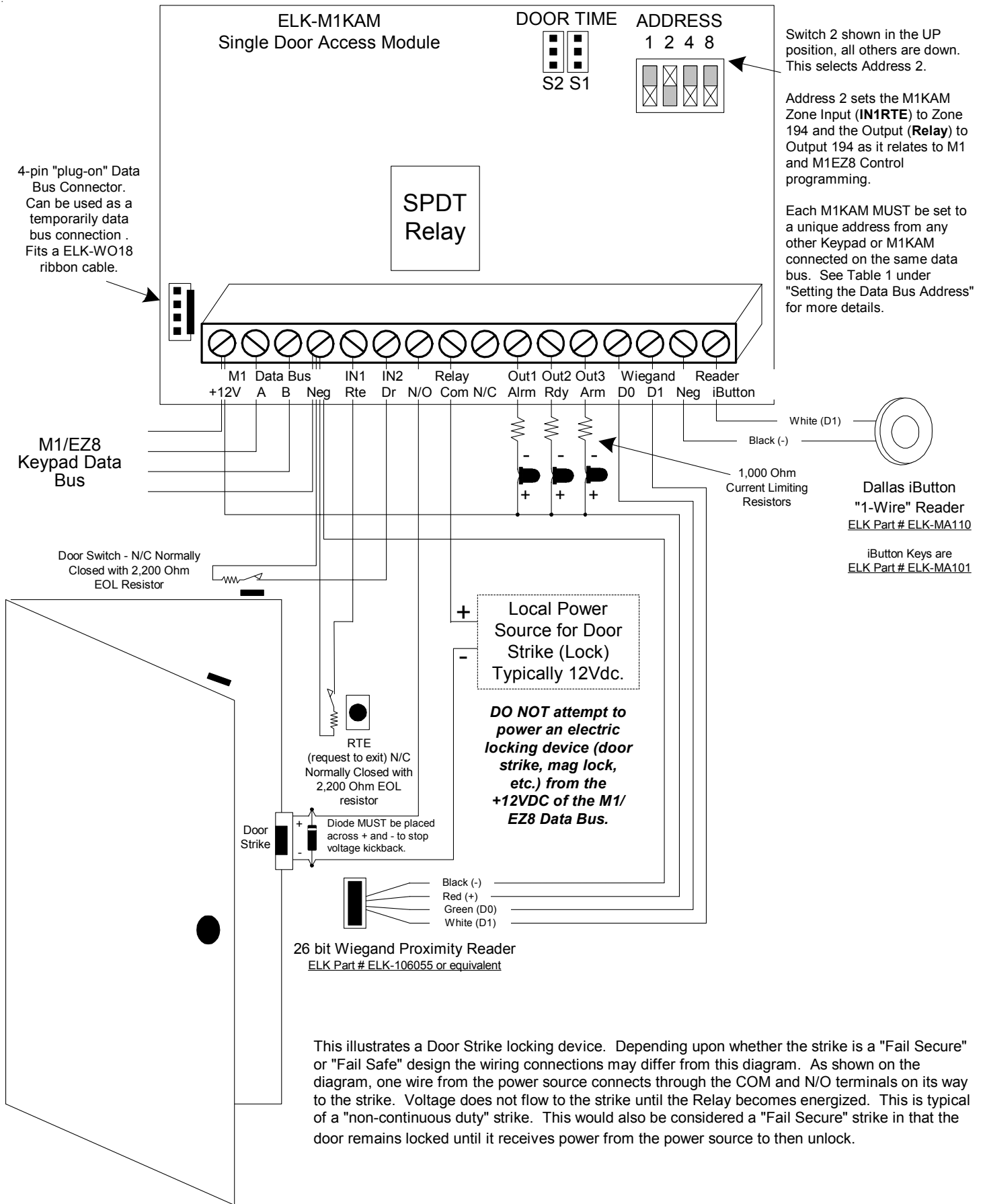
   Cut one of the two wires leading from the power source to the locking device. Strip and connect one end to the **RELAY COM** terminal.
   N/C - If the locking device is "Fail Safe" (unlocks when power removed), connect the other end of the wire to the **RELAY N/C** terminal.
   N/O - If the locking device is "Fail Secure (stays locked until power applied), connect the other end of the wire to the **RELAY N/O** terminal.

   Important points to follow:
   1) A general purpose blocking diode (supplied) MUST BE INSTALLED on Door Strikes (at the strike) across the + and - connections as shown in the hookup diagram. This helps stop voltage kickback 'transient' when the strike coil releases.
   2) The M1KAM requires a Whenever/And/Then Rule to be written using the ElkRP software. The rule instructs the Relay (Output) on a specific M1KAM module to energize when a valid access credential (card, fob, iButton) is read. See page 5 for an example of an M1 Access Rule.
   3) The Output ID (Identification) of the **Relay** (Output) on the M1KAM is based on the Data Bus Address of the M1KAM. See Table 1 under "Setting the Data Bus Address" for more details.

5. Install a proximity reader ("26 BIT" Wiegand compatible) OR a Dallas iButton reader and connect it to the M1KAM as follows:
   - 26 Bit Wiegand Reader - Requires a 4 wire connection, 2 for power and 2 for data to the M1KAM. Ideally the reader should be powered from the local power supply being used for the locking device. It is important for the Negative (-) sides of both power sources (M1/EZ8 Data bus power and local power supply) to be commonly connected. See wiring diagram.

   - Dallas iButton Reader - This device reads data from a special memory chip called an iButton. It is housed in a virtually indestructable stainless steel "coin like" container approximately the size of a dime. There are only two (2) wires required from this reader. Connect the Black wire to the M1KAM terminal marked **READER NEG**. Connect the White wire to the terminal marked **READER iButton**.

   * Some readers have LED indicators for features like status, armed, ready, etc. It may be possible to connect and utilize these with the M1KAM. See step 8 and the wiring diagram or contact ELK Technical Support for details.

6. Install a Normally Closed (N/C) alarm contact on the door. Connect this to the M1KAM using a two conductor wire. One wire connects to the terminal marked **IN2DOOR**, the other connects to one of the terminals marked **NEG**. Install a 2,200 Ohm end of line (EOL) resistor (provided) in series with the switch. There are two (2) NEG terminals on the M1KAM. See wiring diagram on opposite page.

   Important point to remember:
   1) The Zone number (ID) associated with the **IN2 DOOR** (door status) input on the M1KAM is based on the Data Bus Address of the M1KAM. See Table 1 under "Setting the Data Bus Address" for more details. From the control panel programming this same input ID can be defined as a Burglar alarm zone, allowing the door switch to be used for both the alarm and the Access Module.

7. Install a Request to Exit (RTE) sensor or switch. This is generally required by law to allow free exit from the building. The output from an RTE device is typcially the same as a two wire N/C door switch. One wire connects to the terminal marked **IN1 RTE**, the other connects to one of the two terminals marked **NEG**. Install a 2,200 Ohm end of line (EOL) resistor (provided) in series with the switch. There are two (2) NEG terminals on the M1KAM. See wiring diagram on opposite page.

8. There are three (3) additional Outputs on the M1KAM. **OUT1 ALARM** is designed to allow a local alarm if the door is held open too long. **OUT2 READY** is a remote Ready To Arm indication of the Area or partition which the M1KAM is assigned. **OUT3 ARM** is a remote Armed indication of the Area or partition which the M1KAM is assigned. Each of these outputs is low current switched negative (pull to ground). "OUT1ALARM output is switched negative, maximum current of 50mA. OUT2READY and OUT3ARM outputs are switched negative, maximum current of 10mA." See wiring diagram on opposite page.   DO NOT EXCEED the maximum drive current of any output.

9. Turn on the power to the control along with the local power source for the locking device and reader. Proceed to the section titled "Setting the Data Bus Address and Enrolling Data Bus Modules".

ELK-M1KAM
Single Door Access Module

DOOR TIME

ADDRESS
1 2 4 8

S2 S1

Switch 2 shown in the UP position, all others are down. This selects Address 2.

Address 2 sets the M1KAM Zone Input (**IN1RTE**) to Zone 194 and the Output (**Relay**) to Output 194 as it relates to M1 and M1EZ8 Control programming.

Each M1KAM MUST be set to a unique address from any other Keypad or M1KAM connected on the same data bus. See Table 1 under "Setting the Data Bus Address" for more details.

4-pin "plug-on" Data Bus Connector. Can be used as a temporarily data bus connection . Fits a ELK-WO18 ribbon cable.

SPDT
Relay

M1   Data Bus   IN1   IN2   Relay   Out1 Out2 Out3   Wiegand   Reader
+12V   A   B   Neg   Rte   Dr   N/O   Com   N/C   Alrm   Rdy   Arm   D0   D1   Neg   iButton

M1/EZ8
Keypad Data
Bus

White (D1)

Black (-)

1,000 Ohm
Current Limiting
Resistors

Dallas iButton
"1-Wire" Reader
ELK Part # ELK-MA110

iButton Keys are
ELK Part # ELK-MA101

Door Switch - N/C Normally Closed with 2,200 Ohm EOL Resistor

+
Local Power
Source for Door
Strike (Lock)
Typically 12Vdc.

−

DO NOT attempt to power an electric locking device (door strike, mag lock, etc.) from the +12VDC of the M1/ EZ8 Data Bus.

RTE
(request to exit) N/C
Normally Closed with
2,200 Ohm EOL
resistor

Door
Strike

+
−

Diode MUST be placed across + and - to stop voltage kickback.

Black (-)
Red (+)
Green (D0)
White (D1)

26 bit Wiegand Proximity Reader
ELK Part # ELK-106055 or equivalent

This illustrates a Door Strike locking device. Depending upon whether the strike is a "Fail Secure" or "Fail Safe" design the wiring connections may differ from this diagram. As shown on the diagram, one wire from the power source connects through the COM and N/O terminals on its way to the strike. Voltage does not flow to the strike until the Relay becomes energized. This is typical of a "non-continuous duty" strike. This would also be considered a "Fail Secure" strike in that the door remains locked until it receives power from the power source to then unlock.

Hookup Diagram for ELK-M1KAM Single Door Access Module

Setting the Data Bus Address and Enrolling Device(s) into the System

All devices that operate on the RS-485 4-wire data bus must have a unique address setting from 1 to 16 within their device TYPE. Keypads and Access Modules are device TYPE 1, input (zone) expanders TYPE 2, output expanders TYPE 3, etc. The purpose of device types is so that the address numbers can be re-used in each different device type. <u>It is OK to have a Keypad, a Zone Expander, and a Output Expander all set to address 2 and on the same data bus since each device is a different device type.</u> **It is NOT OK to have duplications of addresses within the same device type. I.E. Multiple keypads on the same control cannot be set to 'like' addresses.**

Setting the Data Bus Address of the M1KAM Access Module: The address setting is very important because it establishes the Zone ID of the Door Status Input AND the Output ID of the on-board relay that is used to operate the locking device. Refer to Table 1 below. Since the Access Module is the same device "type" as a Keypad, its bus address must be unique among any of the possible 16 keypad addresses. If more than 1 Keypad or Access Module is installed, each one MUST be set to a unique address (2, 3, etc). The maximum number of keypad addresses is 16. **Duplicate addresses MUST NOT EXIST. I.E. Multiple keypads and/or Access Modules must each have a unique address.**

1. There are 4 white switches located in the top right hand corner of the M1KAM board. Each switch has a position of OFF or ON (binary value 0 or 1) and a decimal equivalent value of (1, 2, 4, or 8). The total decimal value of the "ON" switches equates to the data bus address.
2. Proceed to the <u>ENROLLING process to make the Access Module operational.</u>

Data Bus Address	Switch Settings				Input ID (Zone)	Output ID (Relay)
	S1	S2	S3	S4		
1	ON	Off	Off	Off	193	193
2	Off	ON	Off	Off	194	194
3	ON	ON	Off	Off	195	195
4	Off	Off	ON	Off	196	196
5	ON	Off	ON	Off	197	197
6	Off	ON	ON	Off	198	198
7	ON	ON	ON	Off	199	199
8	Off	Off	Off	ON	200	200
9	ON	Off	Off	ON	201	201
10	Off	ON	Off	ON	202	202
11	ON	ON	Off	ON	203	203
12	Off	Off	ON	ON	204	204
13	ON	Off	ON	ON	205	205
14	Off	ON	ON	ON	206	206
15	ON	ON	ON	ON	207	207
16	Off	Off	Off	Off	208	208

The Zone Input and Relay Output ID is determined by the Data Bus Address setting.

Table 1: Data Bus Address Switches

Jumper Settings for RTE (Request to Exit) & DHO (Door Held Open) Times

These two jumpers select the time values assigned to Request to Exit (RTE) and Door Hold Open (DHO) functionality.

00 > RTE Time = 10 Seconds
     DHO Time = 20 Seconds

10 > RTE Time = 20 Seconds
     DHO Time = 40 Seconds

01 > RTE Time = 30 Seconds
     DHO Time = 60 Seconds

11 > RTE Time = 45 Seconds
     DHO Time = 90 Seconds

Other Jumper Settings

NOTE: Jumper JP1 located in the middle left side of the board is used to engage a 120 Ohm resistor for terminating the M1 Data Bus. Please see Data bus wiring instructions before using this jumper.

Enrolling the M1KAM with the control: Once the address is set and the M1KAM powered up it will be necessary to manually ENROLL the new device so that the M1 Control knows it is present. This is accomplished either from keypad programming "Menu 1 - Bus Module Enrollement" or from the ElkRP Remote Programming Software. Proceed to the ENROLLING process to enroll the device and make it operational.

(This step requires an LCD Keypad or the ElkRP software)

1. Press the <u>ELK</u> key, then press <u>9</u> (or scroll up) to display <u>9 - Installation Programming.</u> Press the <u>RIGHT</u> arrow key to select this menu. The Installer Program Code (PIN) must be entered to access this menu.
2. Enter the Installer Program Code. (See M1 Manual for the default Code)
3. The first Installer Programming menu displayed will be "Bus Module Enrollment"
4. Press the RIGHT arrow key to select this menu. "Enrolling Bus Modules" will display
5. The M1 will transmit an enrollment message to all data bus devices, following by a display showing the total Bus Modules that are enrolled. To view the enrolled devices and/or remove a device press the RIGHT arrow key to select Edit mode.
6. Press the * or Exit keys to exit Installer Programming.

```
Auth. Required
Enter Valid Pin
```

```
01-Bus Module
Enrollment
```

```
XX Bus Modules
Enrolled, Edit▶
```

Jumper Settings for RTE and DHO Time Values

The M1KAM has four possible jumper settings that adjusts the amount of time on the Request To Exit (RTE) and Door Held Open (DHO) features. The time values for RTE and DHO are adjusted together. See Table 1 for the time adjustments.

Request To Exit (RTE) refers to the amount of time that the Door Lock will remain Unlocked by the action of the RTE device.

Door Held Open (DHO) refers to the amount of "Delay" time the door status may remain open before the **Out1 Alrm** output becomes active. The timer starts upon a valid access, when a RTE occurs, and/or when the **IN2DR** input (door status) is tripped. The **Out1 Alrm** can be connected to activate a relay or a low current sounder device as a local alert. The output stays on until the door is physically restored to a closed/secure state.

Programming the Control Panel "Keypad" Options

There are only two (2) attributes under the Keypad programming menu which have any effect or functionality with the M1KAM.

1) NAME: The NAME field allows a 16 digit description for the location of purpose of each M1KAM. i.e., employee entry
2) AREA: This is an important field as it defines to which area (partition) the M1KAM belongs. The default setting is area 1.

<u>IMPORTANT</u>   The ELK-M1KAM installs in place of a regular M1 Keypad. Although each Keypad has multiple programming attributes, only the 2 listed above have any purpose with the M1KAM. All the others can remain blank or as-is.

Adding Access Credentials (Cards or Fobs) see special note on Dallas iButtons
There are two (2) different procedures for adding access credentials (Cards or Fobs) to an M1 or M1EZ8 control.

A) Attach a traditional M1 Keypad with a built-in or attached reader to the M1 or M1EZ8. This will allow you to learn (enroll) an access credential (cards and fobs only) directly into any user code slot. Once the credential is stored in the control it automatically becomes available for use by any M1KAM Access Module connected to this control.
    NOTE: It is NOT POSSIBLE to learn (enroll) an access credential directly using only an M1KAM.

B) If you already know or can determine the special code unique to each access credential then it is possible to enter that code into the control using the ElkRP Programming Software.
    NOTE: This is the only method by which a Dallas iButton can be added to the M1 or M1EZ8 control. See next page.

Using an M1 Keypad with an attached Prox Reader to add access credentials:
1. Make sure the keypad is attached, enrolled, and fully operation on the M1 or M1EZ8 control. The keypad MUST have either an internal or external reader attached to it.
2. From the Keypad press the <u>ELK</u> key followed by the <u>6 key</u> (or scroll up) to display <u>6 - Change User Codes.</u>
3. Press the <u>RIGHT</u> arrow key to select the Change User Code menu.
4. When prompted, enter a valid Authorization Code (MUST be a "Master" user code) to gain access to this menu.
5. The next display will show 001 (User Code 1). Press the UP or DOWN arrow keys to scroll to the User Code which you wish to use, OR use the number keys to enter three (3) digits and jump directly to any desired User Code. Once the display shows the correct User Code number simply press the RIGHT arrow <u>CHG</u> key to make changes to this User.
6. The display will show any existing code digits that might be programmed for this user. It will also show the user name.
7. Momentarily present the credential (card or fob) to the reader that's attached to the Keypad.
8. The Keypad should beep 3 times if the access credential is accepted. If the credential is rejected the Keypad will produce a low error tone and display <u>Code Not Authorized, Redo</u>.   The most common causes for rejection are: A.The credential has already been enrolled (duplicate codes are not allowed) <u>or</u> B.The facility code in the credential is not the same brand or is not compatible with the reader. Some manufacturers credentials are not readable by other brands of readers.
9. After the credential has been learned (enrolled) it is important to remember that its capabilities MUST be selected in the User Code Options Menu, Menu 02 from the Installer Level Programming. These options include: what area(s) or partition(s) for which the code shall be valid, whether it can Arm, Disarm, trip the Access function, etc.
10. The credential should now be usable with any attached M1KAM (or Keypad w/reader) as long as the area (partition) settings match and the credential is valid for the features you are trying to perform.


Using ElkRP Downloading Software to add access credentials:
    The ElkRP Downloading Software makes it very simple to add, change, or delete access credentials (a.k.a. user codes) both locally and remotely. For an existing user code simply double click and make any changes on the screen. To add a new code select Add / New User. The following steps explain the process for adding or changing a user code).

1. The ElkRP User Code screen contains a code field for entering the actual code digits. To the upper left of this code field is a check box labeled: "This user has an access key......". This box MUST be checked to add a access credential. Access credentials have a longer code string of alphanumeric characters. Some credentials have the code string printed on the outside while others do not. Even if a code is printed on the credential it may be encrypted so that the actual digits are not disclosed. In that event a separate software program may be required to decript the digits so that they are usable by the ElkRP program. Refer to the Elk Website http://www.elkproducts.com/products/m1/m1documentation.htm for a decode program titled: M1 Prox Code Calculator.

2. Once the code string is known it's just a matter of typing the string into the ElkRP code field. Don't forget to check the box identifying this as an access credential.
3. Once the code field has been entered it is important to select the User Code Options. These options include: what area(s) or partition(s) for which the code shall be valid, whether it can Arm, Disarm, trip the Access function, etc.
4. When everything is completed as needed be sure to connect to the control and SEND this user code data.
5. The credential should now be usable with any attached M1KAM (or Keypad w/reader) as long as the area (partition) settings and options are correct for the features that you are trying to perform.

Dallas iButtons

With a M1KAM Access Module it is possible to connect a Dallas iButton reader to an M1 or M1EZ8 Control. NOTE: Dallas iButton readers CANNOT BE CONNECTED OR INTERFACED to regular M1 Keypads. Accordingly, the only method by which a Dallas iButton credential may be added is to manually type in the code string using the ElkRP Downloading Software. Fortunately, the code string for a Dallas iButton is printed on the front of the iButton itself. The code string consists of twelve (12) digits that must be entered.
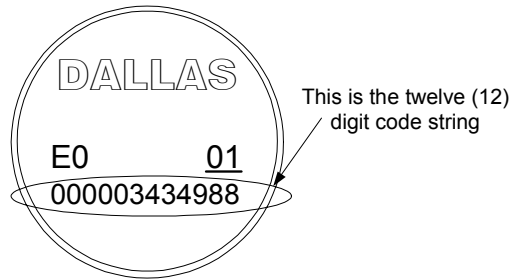
Programming an Access Event from the ElkRP Rules Engine

When an access credential (card, fob, iButton) is read by a reader attached to a Keypad or M1KAM the Control immediately scans each of it's programmed User Codes looking for a match to the code string. If a match is found the control will produce an appropriate action based on the authorization options for that particular User Code. For example:

If the ARM option is enabled for that User Code the control will attempt to arm the area (partition).

If the DISARM option is enabled for that User Code the control will disarm the area (partition).

If the ACCESS option is enabled for that User Code the control will log an Access event and then scan for any Rules that may contain an Access event. IMPORTANT: No outputs or action will take place beyond the logging UNLESS a Whenever/And/Then rule has been written to tell the control what it is supposed to do. See the paragraph below concerning Whenever/And/Then Rules.

> *NOTE:* **It is possible for an access credential to Disarm the Control and unlock (Access) the door at the same time provided the User Options for DISARM and ACCESS are both enabled.**

Whenever/And/Then Rules

As mentioned above, an ACCESS event flag does not actually do anything (other than log) unless there has been a Whenever/And/Then Rule written to tell the control what it is suppose to do. Rules are written using the ElkRP Programming Software. An Access event can be used to create virtually any desired reaction. i.e., turn on an output, a light, close/open a relay, etc. The following is an example of a rule designed to turn an output ON for 10 seconds whenever a valid credential (card, fob, iButton) is presented and verified by the control. The output might be wired to a door locking device which could unlock the door for 10 seconds.

<div align="center">

WHENEVER ACCESS 'Keypad Name' (KP 2) IS TRIGGERED
THEN TURN Output 194 ON FOR 10 SECS

</div>

> **NOTE: ElkRP will always use the reference of "KP" (for Keypad) followed by an address number (2 in this case) even if the actual device at this address happens to be an M1KAM Access Module. The actual Keypad Name can be custom programmed to a more descriptive identity such as "Employee Entry" to help keep things organized.**