Instructions and Proper Use

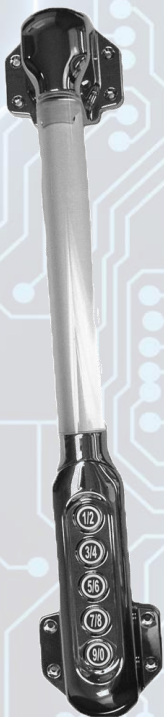# UM 36

Newmar Passive Entry/Push to Start System

500-1350 e-*ASK* PKE System

41337-01 PKE Controller, 41522-02 XMTR, CHROME, PKE

38148-01/02 MH Entrance Door Handle with Capacitive Sense (Optional)

TriMark
DOOR SYSTEMS
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If you have a question regarding the Passive Keyless Entry System, please contact Spartan RV Customer Service at the following contacts before contacting TriMark Corporation:

Spartan/Shyft Recreational Vehicle Owner Support: rvcustomerservice@spartanvchassis.com
800.543.4277

Table of Contents

Tri*Mark* makes every attempt to assure that information contained in the User Manual is correct and accurate; however, changes in design, dimension and specifications may occur at any time and without notice. Please verify the revision level of this manual (see cover page) by referring to Tri*Mark*'s website under Product Code 500-1350.

Note: Product photos and illustrations may vary from your specific part numbers.

Introduction

This manual provides the necessary information for the proper installation and use of Tri*Mark*'s **e-ASK** system. The **e-ASK** system comes with the following components:

- **e-FOB:** Keyless entry RF fob transmitter with passive entry and passive keyless start capability.
- **e-Controller:** The input/output processor with low frequency (LF) and Radiofrequency (RF) transceiver capabilities.
- **Antennas:** LF interior antenna for **e-*FOB*** detection. LF door antenna for exterior detection.
- **e-GRAB Lighted Grab Handle with Keypad:** A five button chrome handle. It allows for locking and unlocking functions via a CAN network.
- **MH Entrance Handle:** Motor Home entrance handle with capacitive touch sense (optional).

This new generation of Tri*Mark*'s **e-ASK** not only maintains its previous advantages for controlling door and accessory control, it also adds to the user experience by leaving the fob in your pocket or purse without having to press buttons. We've incorporated remote keyless entry, passive entry, immobilization, and keyless start into a single package.

The fobs have typical lock/unlock buttons that can be used up to 50 meters depending on architecture and location. For security reasons, RF signals are encrypted using randomly generated numbers. This is what allows the system to start by pressing a button. The system uses the LF/RF messaging to ensure an authorized fob is within range inside the vehicle, or if so optioned that an authorized fob is close to the entrance door for true passive entry.

General Component Overview

e-FOB

41522-02

- Stylish 4-button PKE fob, FCC/IC/CE/UKCA compliant.
- LF transceiver that can reach 1.5 meters through open air.
- RF transceiver that can reach 50 meters through open air.
- Control main door lock and unlock, plus cargo door lock and unlock.
- Provides ping response for passive entry and passive start without pressing buttons.
- High security using random number generators and proprietary encryption algorithm between the fob and controller to prevent attacks/hacking.

e-Controller

- Enables distributed functionality, such as multiple door control and ignition immobilization via vehicle multiplex communication plus passive entry.
- CAN network functionality with error handling.
- Fault displaying LEDs.
- LF transceiver (FCC/IC/CE/UKCA compliant).
- RF transceiver (FCC/IC/CE/UKCA compliant).
- Selectable visual/audible controls.

41337-01

(Optional) Entrance Door Handle with Capacitive Sense

- Enables passive entry while leaving e-FOB in your pocket or purse.
- Integrated capacitive sensor automatically detects a hand and triggers a fob search and unlocks.
- Can be unlocked with e-FOB unlock button or keypad with security code.
- Deadbolt with traditional mechanical key for added security.
- If your motorhome has the standard handle, passive entry is disabled.

38146-01

e-GRAB Lighted Grab Handle with Keypad

- Entry assist handle incorporates Tri*Mark*'s e-*ASK* keypad into a stylish combo for RV coaches, motor homes and travel trailers.
- Lighted rod and backlit keypad for greater visibility.
- Button presses with tactile, visual, and audio feedback.
- Communicates with the Tri*Mark* e-Controller via CAN network.
- Error/fault feedback via beeps and lighting.
- Water and dust are resilient to outdoor environments.

36444-03

LF Antennas

- Fob detecting internal antenna (inside dash) for push to start, exterior (in entrance door) for and passive entry functions.
- Potted construction ensures environmental protection and durability performance—can be used in exterior or interior locations.

36159-01

Chapter 1: Standard Operating Procedures

Passive Entry - Optional

Inserting your hand behind the paddle of the main entrance door handle automatically initiates an exterior fob search via an antenna inside of the door. If the fob is in range (3.5 to 4 feet of the bottom of the door), it responds with a single LED blink. If the fob is authorized the handle unlocks.

Push to Start

Pressing the engine start button causes one of the non-TriMark controllers to activate the e-Controller's Authorization Request input (J11P2 active) to begin the process of detecting a fob in range. The e-Controller initiates a fob search via the antenna behind the dash. If the fob is in range (5) feet from the antenna), it responds with a single LED blink. If the fob is authorized, the e-Controller activates its Authorization Response output (J11P4) to another non-TriMark controller that starts the engine.

Running

Once running, the fob is not required to keep the vehicle running. **Note:** You can drive away without your fob in the vehicle. You will not be able to start the vehicle again without the fob.

Shutdown

With your vehicle in park, a short press of the start/stop button turns off the vehicle.

Locking (typical)
Press and hold the 1 button on the keypad or press the lock button on the fob.

Unlocking Entrance (typical)
Type in the five-digit entry code followed by the 1 button on the keypad or press the unlock button on the fob.

Note: Programming new codes into your keypad can be found in Chapter 3: **Keypad Operation and Features (36444-03)** under Teaching Keypad New Authority / Entry Codes.

Alarm Functionality
Arming the Alarm
Performing a "lock all" with the keypad or the fob lock button attempts to set the alarm.

The word "attempt" is used above because several conditions can block the alarm from being armed:
- Parking brake not set (in gear).
- Pressing the button to start the vehicle.
- Any security inputs are in the active state.
- Any door ajar inputs are in the active state.

Feedback
- If you activate the alarm from keypad, the system sends a single pulse to the headlights.
- If you activate the alarm from the fob, the system sends a single pulse to the headlights and horn/siren.
- If you fail to activate the alarm the siren chirps 3 times.

Disarming the Alarm
The alarm system will immediately be disarmed if one of the following things occurs:
- You start the engine.
- Any door is unlocked.
- The Parking Brake is released.

Cancelling the Alarm
Any of these conditions will cancel an active alarm:
- The vehicle is put into gear.
- The engine is started.
- An unlock command of any door main entry or cargo.
- The alarm timer expires (60 seconds).

Tripping the Alarm
After arming the alarm, if the security input (J1P13) or any of the door ajar inputs (J1P23, J1P3) are tripped, the alarm activates. When active, the siren sounds and the headlights flash for one minute.

Auto Locking

Parking Brake		Description
Engaged	Active	The parking brake is active and the vehicle cannot move. The vehicle is considered "not in use".
Disengaged	Float	The vehicle can move if no other brakes are applied. The vehicle is considered "in use". This is usually caused by putting the vehicle into gear.

Auto Lock / Unlock
The parking brake is monitored for the auto locking feature:
- Whenever the vehicle parking brake is engaged, a timer is started. Seven seconds later a lock all sequence is done.
- Whenever the vehicle parking brake is disengaged, the entrance door is unlocked.

Chapter 2: e-FOB Operation and Features (41522-02)

e-FOB Functionality   Lock All   Unlock Entry

Lock Cargo   Unlock Cargo

Button	Function
Lock All	Locks all doors
Unlock Entry	Unlocks entry door
Lock Cargo	Locks the cargo doors in the order of section A, B, C, D
Unlock Cargo	Unlocks the cargo doors in the order of section A, B, C, D

Pressing a button on the fob should cause the LED to flash once per second. The LED also flashes anytime it is located by an antenna that is searching for a fob. This happens when you start your vehicle and the fob search near the driver's seat is initiated, or when you insert your hand into the optional entrance door handle.

The fob is powered by a standard CR2032 3V battery.

Note: Typical use has 2 years without replacing the batteries. May be subject to variation from OEM as the time the fobs were manufactured is not the day the coach was sold. Wireless phone chargers can have a significant impact on battery life. Fobs sometimes cannot achieve deep sleep mode if near a wireless charger (2-4 feet depending on the charger). The 125 kHz noise put out by these chargers can also prevent the system from detecting a fob.

Pairing Fobs

You will need to have access to the module connectors or a OEM switch to pair fobs. To understand pin names and functions please reference Chapter 4: **Module Operation and Features (41337-01)**. There may be a push button attached to J13P2, if it is not supplied, short J13P2 (learn pin) to J11P1 (12Volt pin) when it say's "push button".

Note: Programming new fobs unlearn any programmed fobs previously stored. You may learn up to 20 fobs. Make sure you have all the fobs that you wish to program before starting this process.

1. Press the push button 3 times within 5 seconds (more than 3 is acceptable)
    a. The e-Controller locks, then unlocks the entry door as an audible indication that Fob Learn Mode is running.
    b. Two LEDs (red and green) located near the DIP switches inside the e-Controller remain on flashing in tandem, as long as the controller is in learn mode.
2. Press and release a button (any button) on each fob. Only 1 button per fob is necessary.
3. The e-Controller locks then unlocks the entry door as an audible indication as each fob is added.
4. Wait 10 seconds after the last desired fob is added.
5. Entry door unlocks the red and green LEDs stop flashing and you exit Fob Learn Mode.

e-ASK Fob Guidlines

The e-ASK fob is designed to use commonly available CR2032 batteries. Estimated normal use should have an expected life of 2 years for the fob battery. Variances across commercial battery manufacturers and operating environment conditions may result in deviations from the expected battery life. The following guidelines should be followed to optimize fob battery life and system performance.

The e-ASK fobs are designed to operate in a low power or "sleep" mode. The fob electronics "wake up" upon detection of a button press or LF signal from the e-Controller. The fob returns to "sleep" mode once the event that woke it up is completed.

When a fob is in proximity, 2-3 inches, from other vehicle control units, cell phones or inductive cell phone charger pads, electrical signals from these devices can prevent the fob from returning to "sleep" mode and can reduce battery life. Additionally, when near these other electrical devices, their emitted electrical signals can saturate the fob's internal receiving antennas and prevent the fob from receiving proper LF signals.

It is recommended for optimal fob performance and battery life that a distance of at least 5-6 inches minimum be maintained between fobs and other such mentioned electronic devices.

Due to the chemical process inherent in batteries, the performance of the e-FOB may be degraded at extreme temperatures. Operating temperature ranges vary across batteries from different manufactures. For commercially available CR2032 batteries the typical operating temperatures ranges from –0C to +60C.

At cold temperatures, the battery's chemical process is slowed down and can result in reduced fob range performance or an inoperative fob. When the battery is returned to warmer temperatures, normal performance will return. Extreme cold temperatures, below –20C, can cause a battery to-

e-ASK Fob Guidelines continued

freeze and fail due to expansion of internal plastic components. Simply replacing the battery allows the fob to function normally.

At extreme hot temperatures, the battery's chemical process is accelerated. This may result in a reduced life expectancy of the battery. Normal fob range performance can be expected at higher temperatures if manufacturer limits are not exceeded.

Chapter 3: Keypad Operation and Features

36444-03

The keypad can store one authority code and four entry codes.

- The authority code is used to create entry codes.
- The entry codes are used to unlock the vehicle.

This allows for the owner to have one code and make separate codes for someone else.

Default Entry Code

Digit 1	Digit 2	Digit 3	Digit 4	Digit 5
Button 1	Button 2	Button 3	Button 4	Button 4

Default Authority Code

Digit 1	Digit 2	Digit 3	Digit 4	Digit 5
Button 4	Button 4	Button 4	Button 4	Button 4

It is strongly recommended that you change all default codes to codes that you choose. Default codes are commonly known.

Note: If a code has been changed and you don't know what it is, please go to the **Teaching Keypad New Authority / Entry Codes** section.

Standard Operation
Note: The dome light turns on for 30 seconds upon any button press.

Lock All Doors
Press and hold the1 button for 2 seconds to lock entrance doors and all bay/cargo doors.

Unlock the Entrance Door
Enter a valid 5-digit Entry Code (double beep from keypad) followed by button 1.

Unlock All Doors
Enter a valid 5-digit Entry Code (double beep from keypad) followed by button 2.

Unlock Bay/Cargo Doors
Enter a valid 5-digit Entry Code (double beep from keypad) followed by button 3.

Teaching Keypad New Authority / Entry Codes

All codes are exactly 5 digits. You may reuse numbers. Changing the Authority Code erases all Entry Codes. It is highly recommended that you change your Authority Code from the default authority code.

Preparation for Programming the Authority Code

Note: There is a video of how to do this (it will not play on Apple tablets).
https://www.trimarkcorp.com/en/media/Videos/eask/All%20Keypads/index.htmlfg

The keypad is plugged into the coach's wiring harness with a four-pin connector. You need to unscrew the keypad housing and pull it away from the coach to expose this connector. The yellow wire that is tucked into the sheathing is the wire that initiates Authority Code programming mode.
(The OEM may have extended this wire to a button on the steering column this is dependent on your individual coach wiring)

Programming the Authority Code

1. With the keypad still plugged in, short the yellow wire to the black wire (GND) momentarily. This causes the keypad to beep for three seconds.
2. Enter the desired 5-digit Authority code, the keypad will beep twice per button press.
3. Enter the 5-digit Authority Code again. The keypad will beep twice per button press.
   a. If the Authority code is entered twice correctly the keypad will beep 4 times.
   b. If the Authority code is entered incorrectly or mistakes are made the keypad will beep one long, one second beep will sound, and the code will NOT be changed.
4. After programming the system immediately exits Authority Code learn mode.
5. Test the code by unlocking the entrance door.
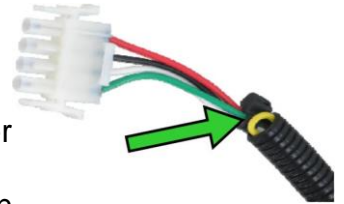
Note: We recommend changing the Entry Code when an RV is acquired. The system automatically clears all Entry Codes and stores an Entry Code the same as your Authority Code in location button 1 any time the Authority Code is changed.

Programming Entry Codes

All codes are exactly 5 digits. You may reuse numbers. Have a number chosen.

1. Press and hold button 3, for 5 seconds. The keypad beeps again and begins flashing when it is held long enough.
2. Enter the 5-digit Authority Code.
3. If you enter the correct Authority code, you will hear a constant beep - continue to step 3.
   a. If you enter the incorrect Authority code, you will hear a 1 second beep. Please double check the authority code.
4. Choose a location to store this code by pressing a location button once.

   Button 1 = Location 1   Button 2 = Location 2
   Button 3 = Location 3   Button 4 = Location 4
   (Constant beep will end when a location selected)
5. Enter the desired 5-digit Entry Code. The keypad will beep twice per button press.
6. Enter the desired 5-digit Entry Code again. The keypad will beep twice per button press.
   a. if the Entry Code is entered twice correctly the keypad will beep 4 times.
   b. If the Entry code is entered incorrectly or mistakes are made the keypad will beep one long, one second beep will sound and the code will NOT be changed
7. Test by unlocking the entry door.

Note: You may store up to 4 codes in the system. You may write over a location by simply programming an entry code over that location.

Keypad Wiring

Wire Color	Wire Function
Red	12 Volt battery power
Black	Ground
White	CAN High (communication line)
Green	CAN Low (communication line)

Chapter 4: Module Operation and Features (41337-01)
Module Connectors and Functions

If you look at the Tri*Mark* e-Controller with the label pointed up, the numbering system is bottom right to top left (opposite of how you read). (See diagram below)
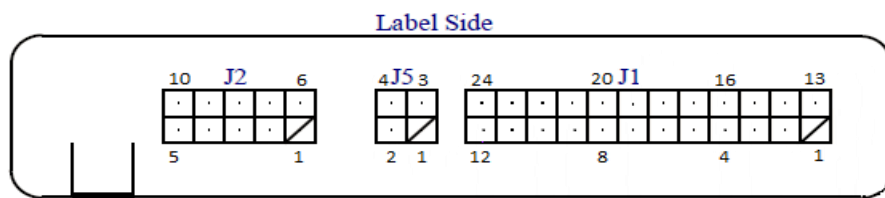
For all inputs:
- (-) indicates that the input normally floats (no predetermined voltage to input) unless a ground signal is placed to activate the pin.
- (+) indicates that the input normally floats (no predetermined voltage to input) unless a 12V signal is placed to activate the pin.
- (+/-) indicates that the input normally floats (no predetermined voltage to input), and the voltage is the opposite of J2P7 to activate (selectable).

For all outputs:
- (-) indicates upon activation a 500mA maximum ground will be activated.
- (Relay 20A) a momentary pulse to (vehicle power +12V) to lock/unlock doors, etc. The normal state of these pins is ground.
- (Relay 20A) Bank D has multiple pins to allow higher currents through these connectors. The four pins to allow this higher current are J1P5, J1P6, J1P17, and J1P18 described on the next page.

Note: Most fuses are based on wire gauges. Fuses should be gauged accordingly.

All signal wires must use twisted pair wires per industry standards:
- Follow CAN/RV-C protocol (see acronyms)
- LF antenna wires also need to be twisted pairs

Connector Locations

J1 J5 J2

J13

J11

J4 J3

LED Location

Status LED's
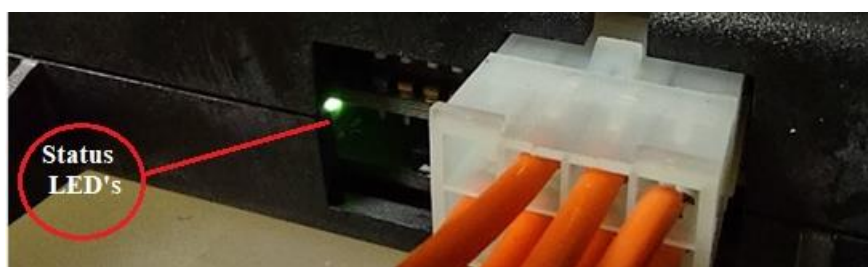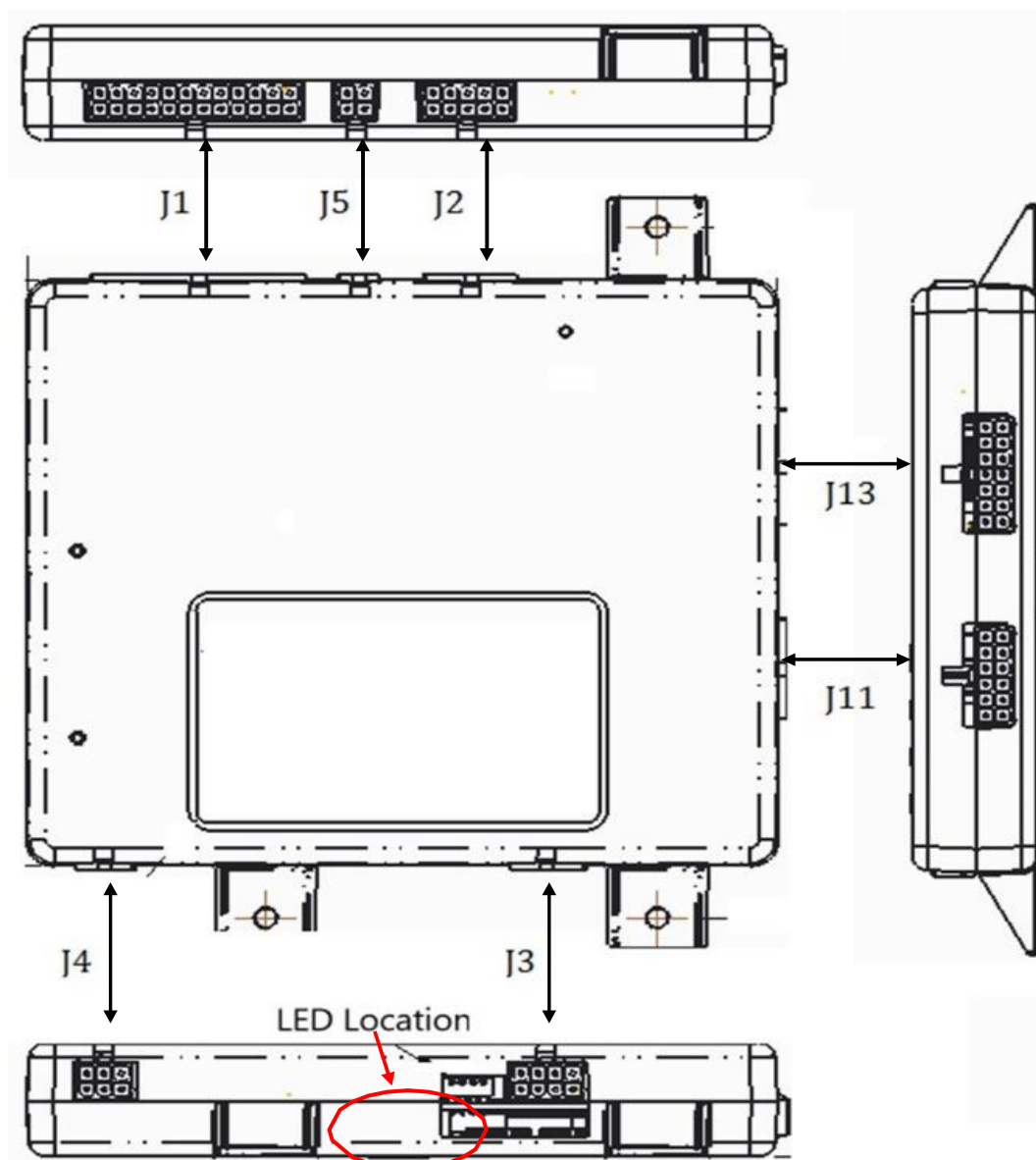
J1—Main Chassis Connector 24-Pin

Pin	Input/Output	Function
J1P1	Input (-)	Bank C-D Unlock: Ground this input to unlock cargo Banks C and D
J1P2	Input (-)	Bank A-B Unlock: Ground this input to unlock cargo Banks A and B
J1P3	Input (-)	Cargo Door Ajar: Ground this input to indicate any of the cargo doors are ajar
J1P4 & J1P16	Input	Vehicle Ground
J1P5 & J1P17	Output (+)	Bank D Lock: +Vin 20A max relay output
J1P6 & J1P18	Output (+)	Bank D Unlock: +Vin 20A max relay output
J1P7 & J1P19	Input	Vehicle Battery—Powers relays
J1P8	Output (+)	Entry Door Unlock: +Vin 20A max relay output
J1P9	Input (-)	Unlock Entry: Ground this input to unlock the entry door
J1P10	Input (-)	Unlock All: Ground this input to unlock the entry door and all cargo doors in Banks A-D
J1P11	Input (-)	Lock All: Ground this input to lock the entry door and all cargo doors in Banks A-D
J1P12	Input (-)	Lock Entry: Ground this input to lock the entry door
J1P13	Input (-)	Security: Ground this input to indicate a break in and activate
J1P14		(Unused Pin)
J1P15		(Unused Pin)
J1P20		(Unused Pin)
J1P21	Output (+)	Entry Door Lock: +Vin 20A max relay output
J1P22		(Unused Pin)
J1P23	Input (-)	Entry Door Ajar: Ground this input to indicate any of the entry doors are ajar
J1P24	Output (+)	Dome Light: +Vin 20A max relay output

Note: Grounding J1P1 and J1P2 together will unlock banks A-D in order.

J2—Parking Brake 10-Pin

Pin	Input/ Output	Function
J2P1	Input (+)	Vehicle Battery—Powers relays
J2P2		(Unused Pin)
J2P3		(Unused Pin)
J2P4	Input (+-)	Parking Brake Sensor: Active with the opposite voltage of J2P7. J2P7 is the return path (electrically) to activate input
J2P5		(Unused Pin)
J2P6	Input (-)	Vehicle Ground
J2P7	Input (+-)	Acts as the electrical return path of J2P4 and J2P8
J2P8	Input (+-)	Lock Cargos Switch: Active with the opposite voltage of J2P7. J2P7 is the return path (electrically to activate input
J2P9		(Unused Pin)
J2P10		Vehicle Ground

J3—External Relay Drivers 8-Pin

Pin	Input/ Output	Function
J3P1	Output (+)	12V Regulated Power. 12V reference voltage for external relays.
J3P2	Output (-)	Horn for external relay (-500 mA)
J3P3	Output (-)	Headlight for external relay (-500 mA)
J3P4	Output (-)	Doorbell for external relay (-500 mA)
J3P5	Output (-)	(Not Assigned) (-500 mA)
J3P6	Output (-)	Door Ajar for external relay (-500 mA)
J3P7	Output (-)	Siren for external relay (-500 mA)
J3P8		(Unused Pin)

J4—Relay Outputs 6-Pin

Pin	Input/ Output	Function
J4P1	Output (+)	Bank C Lock 20A relay
J4P2	Output (+)	Bank B Lock 20A relay
J4P3	Output (+)	Bank A Unlock 20A relay
J4P4	Output (+)	Bank B Unlock 20A relay
J4P5	Output (+)	Bank C Unlock 20A relay
J4P6	Output (+)	Bank A Lock 20A relay

J5—Relay Outputs 4-Pin

Pin	Input/Output	Function
J5P1	Output (-)	Keypad Ground
J5P2		(Unused Pin)
J5P3	Output (+)	Keypad Power: 12V
J5P4		(Unused Pin)

J11—Push to Start PKE 12-Pin

Pin	Input/Output	Function
J11P1	Input (+)	Vehicle Battery: Powers all ICs and relays on J11 connector.
J11P2	Input (+)	AUTH_REQ: Input to request PKS system to locate fob near interior LF antenna.
J11P3	Output (-)	Low fob battery indicator
J11P4	Output (-)	AUTH_RESP: While AUTH_REQ is active, the E-Controller activates this output if an authorized fob is in range.
J11P5	Input (+)	Door Handle—Proximity Sense Input from capacitive sense handle to request PKE system to locate fob near the door handle.
J11P6	Antenna	LF Antenna 1—Interior Area 1 Used to sense fobs inside the vehicle cab.
J11P7	Output (+)	(Not Assigned) Relay 20 A
J11P8	Output (+)	(Not Assigned) Relay 20 A
J11P9	Signals	CAN Low: Connection to vehicle's CAN bus.
J11P10	Signals	CAN High: Connection to vehicle's CAN bus.
J11P11	Input (-)	Vehicle Ground
J11P12	Antenna	LF Antenna 1—Return: Used to sense fobs inside the vehicle cab.

J13—Entry Door PKE 14-Pin

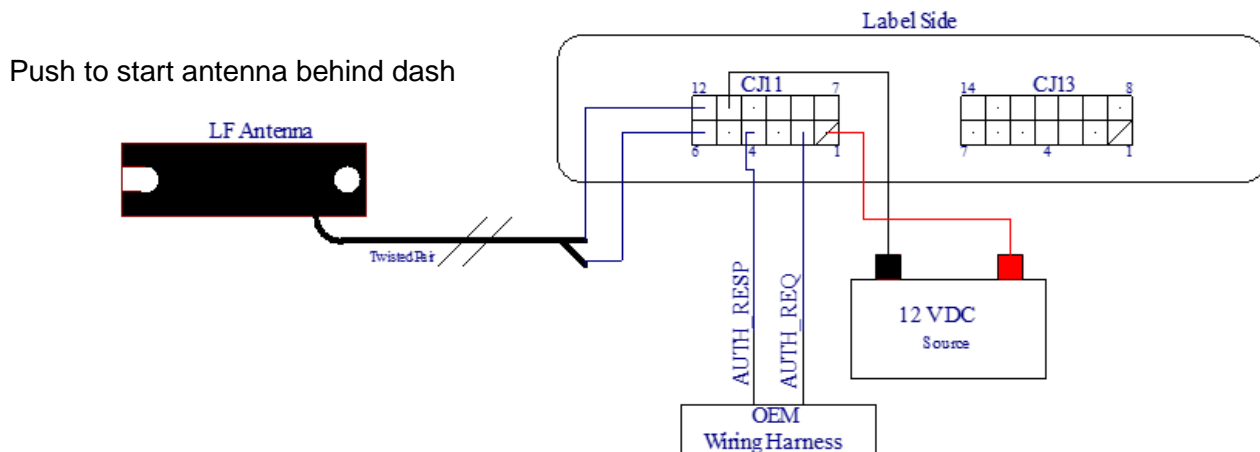| Pin	Input/Output	Function
J13P1		(Not Assigned)
J13P2	Input (+)	Fob Learn Mode Request: Using this input to program fobs.
J13P3		(Not Assigned)
J13P4		(Not Assigned)
J13P5	Antenna	LF Antenna 2—Exterior: Used to sense fobs exterior to the vehicle cab near the door handle.
J13P6		(Unused Pin)
J13P7		(Unused Pin)
J13P8	Output (+)	Door Handle Power: 12V regulated power output for the door handle.
J13P9		(Unused Pin)
J13P10	Input	Vehicle Ground
J13P11		(Not Assigned)
J13P12	Antenna	LF Antenna 2—Return: Used to sense fobs exterior to the vehicle cab near the door handle.
J13P13	Input (-)	Vehicle Ground
J13P14	Antenna	RF Antenna: Attached to a wire 107.5cm +/- 1cm long for HF communication. Se

DIP Switch Settings

The DIP switches are there to enable/disable any visual/audio functions this controller provides. DIP switches are located next to the J3 connector.

DIP Switch	Function	On	Off
1	Unassigned		
2	Siren (J3P7)	Enable	Disable
3	Headlights (3P3)	Enable	Disable
4	Horn (J3P2)	Enable	Disable

Appendix A: Wiring Diagrams

Push to Start

Push to start antenna behind dash

LF Antenna

Label Side

CJ11   CJ13

Twisted Pair

AUTH RESP   AUTH REQ

12 VDC
Source

OEM
Wiring Harness

Entry Door (Standard)

Label Side   Label Side

J2   J5   J1   J11   J13

HF Antenna Wire

Lock Actuator

12 VDC
Source

Passive Entry (Optional)

Label Side

Label Side

CJ2 CJ3 CJ1

CJ11 CJ13

Passive entry antenna inside of door
LF Antenna

Lock Actuator

Twisted Pair

DTM plug

1
2
3
4
5

Capacitive Sense Handle

GND

Passive entry antenna inside of door
(Optional)

Bay/Compartment Door

Label Side

Label Side

J2 J5 J1 J4 J3

Lock Actuator
Bank D

Lock Actuator
Bank A

Lock Actuator
Bank B

Lock Actuator
Bank C

Label Side

J11 J13

12 VDC
Source

Keypad

Label Side

CJ2   CJ5   CJ1

120 Ohms   120 Ohms

Label Side

CJ11   CJ13

12 V DC
Source

Authority code reset
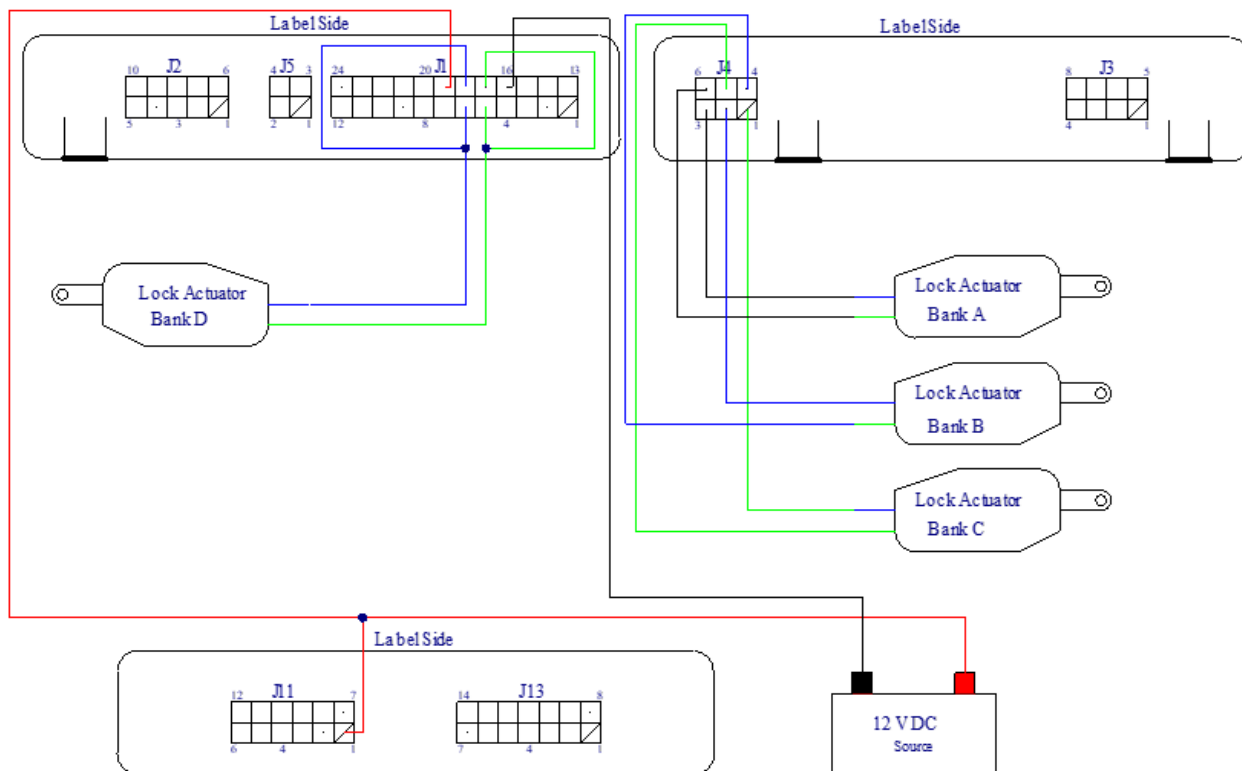
GND
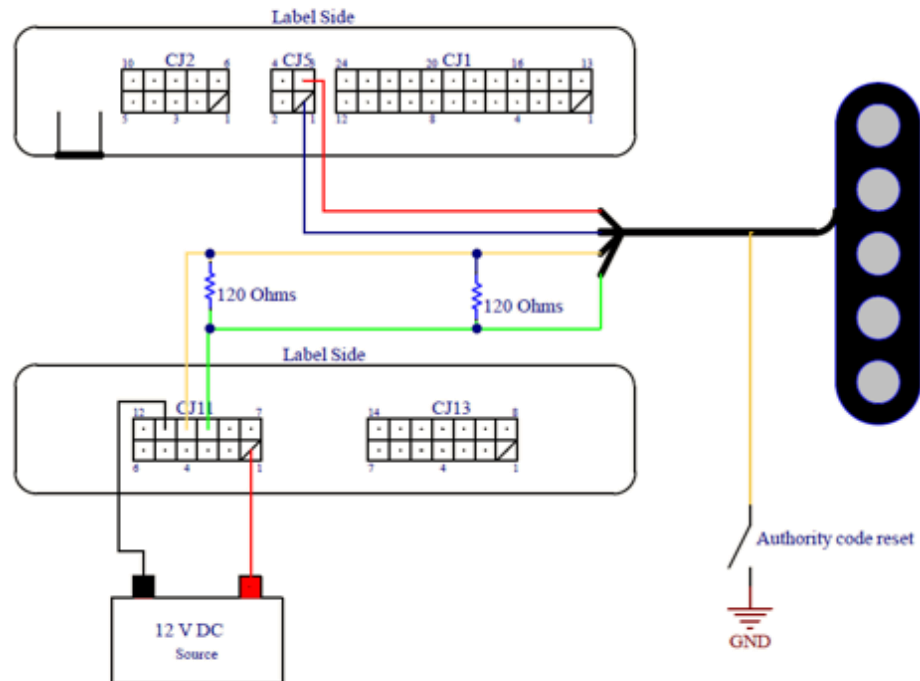
SW1 = Door Ajar
SW2 = Lock Compartments Switch
SW3 = Parking Brake Sensor
SW4 = Entry Door Ajar
SW5 = Lock Entry
SW6 = Lock All
SW7 = Unlock All
SW8 = Unlock Entry
SW9 = Compartment Door Ajar
SW10= Bank A-B Unlock
SW11= Bank C-D Unlock
SW12= Security

Accessories (Inputs)

Label Side   Label Side

J11   J13   J7   J5   J1

12 V DC
Source

SW1   SW2   SW3   SW4   SW5   SW6   SW7   SW8   SW9   SW10   SW11   SW12
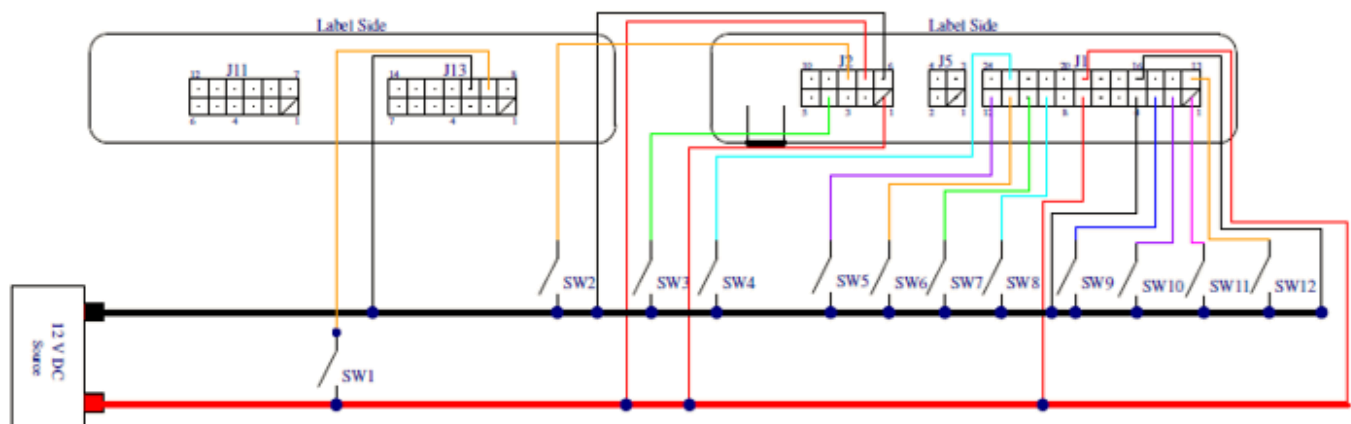
Appendix B: Installing e-*ASK* Components

This system uses low-voltage circuitry and wireless communication. To protect these components and to ensure the device operates as expected, these application notes must be followed.

RF Antenna Guidelines
Typical RF antenna implementation consists of a single wire from the control module. To ensure optimal reception the RF antenna wire should be designed to the following specifications:

Wire Length: 107.5cm +/- 1cm
Wire Type: 22AWG, Braided tinned

The tip of the antenna wire should also be covered with heat shrink tube or plastic dip to prevent the possibility of bare wire contacting vehicle chassis locations and grounding the antenna.

The RF antenna should be placed in an interior location that does not shield RF signals. You may need to try multiple locations to optimize reception. The antennae must be left fully extended and exposed.
Minimize shielding from metal enclosures or chassis body panels that could act as a ground plane.

Looping the antenna, wrapping the antenna around a metallic object, or grouping the antenna wire in with another wire harness may affect the operating range of the remote key fobs. Routing of the antenna wire near wires with large or rapid voltage fluctuations may also have a detrimental effect on fob communication. If the antenna wire must be routed with other wires due to vehicle design constraints, care should be taken in harness manufacturing to ensure the antenna wire is routed on the outside of the wire harness bundle and away from wires that have large or rapid voltage fluctuations.

Controller Mounting
The module-Controller contains several internal mechanical relays. If a relay is exposed to excessive G-force loads (greater than 30 G), it could toggle unexpectedly. It is important that the control module be mounted in a suitable location to prevent exposure to excessive G-force loads. Examples of poor mounting locations include on or inside doors, near chassis suspension features, or near internal-combustion engines.

LF Antenna Guidelines
TriMark e-ASK LF antennas are designed to be spaced off any metallic surfaces. Mounting the antenna to a metal surface without space will result in the antenna's transmitted signal to be absorbed and fob detection range will be reduced to a few inches. The suggested distance from the metal surface is 3/8" or farther. The LF antenna communication can also be disrupted by other electrical devices like, inductive charging pads and high discharge LED screens.

e-Controller: 41337-01
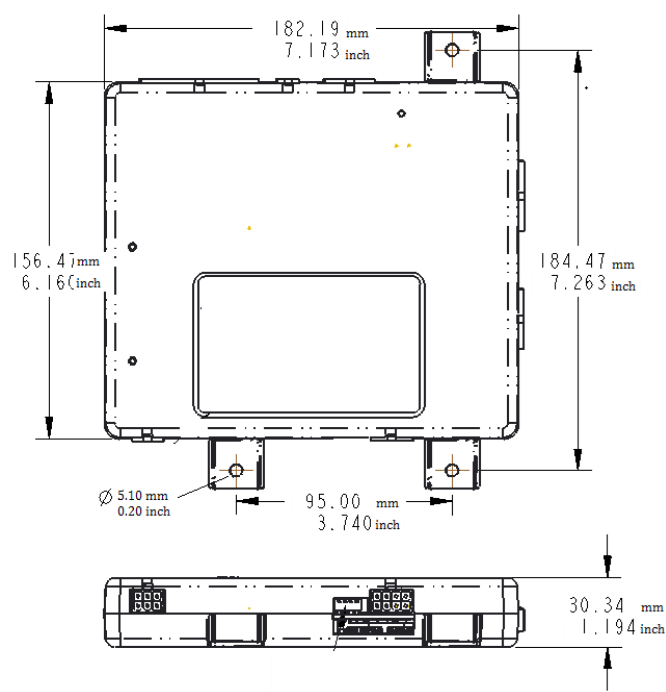
LF Antenna: 36159-01
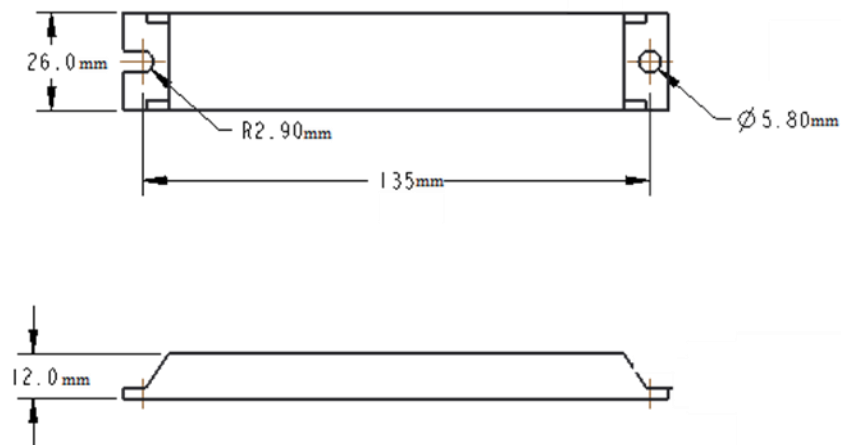
Chrome Keypad: 36444-03

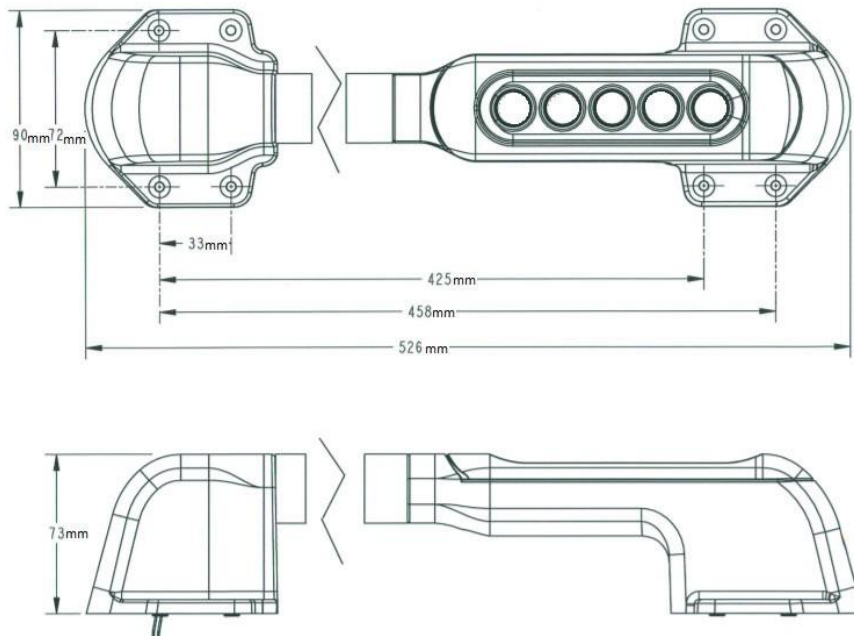# Appendix C: Acronyms

PKE: Passive Keyless Entry. The ability to unlock the door by placing your hand in the door handle.
RKE: Remote Keyless Entry. The ability to lock/unlock the door by a button press on the fob   .
PKS: Passive Keyless Start: The ability to start/stop the vehicle with a button press.
Fob: The remote that allows PKE/RKE/PKS to work properly.
RF/LF: Radio Frequency/Low Frequency. The frequency band that the module and fob communicate on.
CAN: Controller Area Network: This is a computer BUS system that is a highly accurate low data rate system that has been adapted by most vehicles throughout the word.
RV-C: This is the protocol/message structure used by the CAN network. This sets priorities, authentications, and configurations of the messages.
OEM: Original Equipment Manufacturer.

Appendix D: Error Codes

There are red and green LEDs located to the left of the programming port. This is visually shown in the Module Connectors and Functions under Connector Locations. The purpose of these LEDs is to indicate the mode the system is in.

Green LED	Red LED	Software Mode	Software Mode / Current State
On	Off	Customer Mode	Normal operation, full power state
Off	Off	NA	No Power
Fast blink	Off	Customer Mode	Initial power state at power on, waiting on super caps to fully charge
Off	Slow blink for X cycles then pause	Customer Mode	Run-time error detected, see table below
Fast blink	Fast blink	Fob Learn Mode	Waiting for fob input to add fobs to the Authorized Fobs List

Fault	Meaning	Run-Time Error Blinks
CAN Bus Communication Error	No CAN traffic for 10 seconds	1
CAN Voltage Out of Range, High	A CAN line is above 5 VDC	2
CAN Address Conflict	Two devices on bus claiming the same address	3
EEPROM Read/Write Error	Unable to read or write to EEPROM	4
LF Module Communication Error	Unable to communicate with LF PCB	5
I/O Expander Communication Error	Unable to communicate with I/O Expander PCB	6

Appendix E: Troubleshooting

**Note:** A **complete power cycle** requires that power is removed for **2 minutes**!!!

Keypad is not functioning	
No audible beep when button is pressed	Check for power and good ground connection.
Keypad beeps one long and two shorter beeps	This is a CAN error and is usually due to wiring harness issues. Please refer to Appendix E: CAN Requirements for harness requirements. The keypad doesn't think it can communicate to the e-Controller so it is nonfunctional until the CAN issue is resolved. This includes programming.
	Make sure module & keypad has power. There are two LEDs; one red and one green. They are located inside the module. One or the other should be blinking or on. Connector Locations section identified the location.
	Replace keypad.
I put the 5-digit code in, and it doesn't do a double beep	Reprogram entry code.
Pressing the Start button won't start the vehicle	
The start button blinks three times, and nothing happens	Make sure that pressing a button on the fob makes the LED blink. If no replace battery.
	Make sure the fob LED blinks when you press the start button, and the fob is in range of the antenna (steering column).
	Replace fob battery. The LED can blink and still not have the power to send messages.
	Check fuses. Does the e-Controller have power?
	Check the J13P14 wire. This is an antenna and should be laid out as described in Appendix B: Installing e-*ASK* Components.
The start button blinks five times, and nothing happens	Re-sync fobs.
	Check power to J11 connector.
	Cycle Power to the e-Controller leaving power off for 2 minutes.
	Check wiring harness for the LF antenna attached to the J11 connector (these antennas are b-directional), Open circuit, shorted to ground, etc.
	Check wiring harness J11P4 and J11P2 (communication lines between the module and vehicle computer) for continuity.

Will not lock or unlock	
Pressing Lock or Unlock will not operate a specific door by keypad or fob	Clean door contacts. Power is supplied to the actuator through spring loaded metal conductors. Make sure they are clean.
	Check actuator (replace if needed). These actuators are 12V bi-directional. You should be able to activate them with 12VDC one way to lock and the other to unlock.
	Check voltage at door contact, the controller sends a .5 second pulse one direction for lock, and the other for unlock. Most voltmeters average over .75 seconds so you may not see the 12VDC, but you should see your voltmeter show a voltage above 9 volts.
	Check harness for continuity.
Lock and unlock will not unlock any doors by keypad or fob	If you can hear the internal relays click, check power to either the J1 connector or the J2 connector. The power to the relays is separate from the power to the electronics. The J11 connector powers the electronics and the relay coils (the clicking sound). J1 and J2 connectors are on the same power source. Powering one, powers them both. For relays to give power one or both will need power given to it.
	Nothing is happening. Check the fuses. Check system LEDs. For locations of LED please go to section Connector Locations. Check power to the J11 connector.
Lock and unlock work with the keypad, but not with fobs	Change fob battery.
	Re-sync fob(s).
The fob works but it is intermittent or has bad range	
Sometimes the fob works and sometimes it doesn't	Arrange the RKE antenna as discussed in the RF Antenna Guidelines.
	Cycle power to the system off (2 minutes min), then on again.
One fob is not syncing	When you sync fobs, all fobs need to be sync'd at the same time. With any sync, it erases previously sync'd fobs.
The light & horn stopped providing lock or unlock confirmations	Check DIP switch settings to see if it's turned off.
	Check external relays triggered by e-Controller.
	Check wiring continuity. See Accessories in wiring diagrams.

Appendix F: CAN Requirements

- There must be at least two CAN systems on the CANH and CANL.
- Terminating resistors are needed at each end of the CAN network (total of two).
- With everything unplugged, the harness must be 60 ohms between CANH and CANL.
- Highly recommended that CANH and CANL wires are twisted together.

CANH: CAN High line
CANL: CAN Low line
R_T: Terminating Resistor (120 ohms)
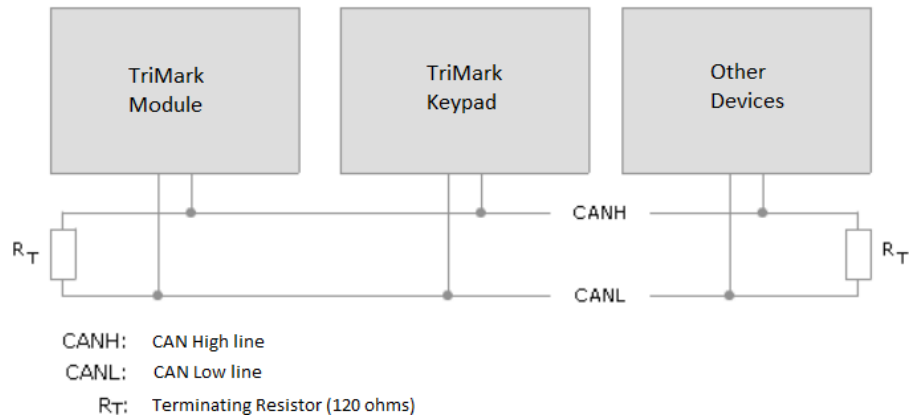
Appendix G: Warranty

Tri*Mark* warrants that the products manufactured and sold shall be in accordance with specifications and free from defects in materials and workmanship for a period up to 18 (eighteen) months following the date of delivery to Tri*Mark*'s customer or 12 (twelve) months from the original O.E.M. sale (in-service) date. Where Tri*Mark* does not have design control regarding customer supplied products, materials or specifications, the warranty is limited to non-conforming product.

This warranty is expressly limited to persons who purchase Tri*Mark*'s products for the purpose of resale or use in the ordinary course of the buyer's business. This warranty does not cover any product that if Tri*Mark* Corporation determines (in its sole discretion) that a product's failure or malfunction is due to one or more of the following conditions, such failure or malfunction is EXCLUDED from the warranty provided hereunder: (1) used in a manner that exceeds published engineering specifications; (2) has been abused, misused, disassembled/opened, altered/modified, or improperly installed; (3) is used in an application not previously approved by Tri*Mark*; (4) is used in a manner inconsistent with any instructions and good industry practices regarding its use; (5) wear or deterioration due to environmental conditions; (6) unusual mechanical, physical or electrical stress or (7) is destroyed/damaged by fire, lightning or an act of God. In addition to the above, Tri*Mark* will not warrant any electrical/electronic products with (8) burned or broken traces on the printed circuit board; (9) burned or damaged components; (10) dirt or water residue on the printed circuit board or inside the case; (11) motor failure due to thermal failure; (12) or dead batteries.

This warranty is exclusive, and Tri*Mark* makes no other warranty of any kind whatsoever, expressed, or implied, with respect to the products manufactured and sold by it, whether as to merchantability, fitness for a particular purpose or any other matter. Without prior written authorization from the Board of Directors, no agent, employee, or representative of Tri*Mark* has any authority to bind Tri*Mark* to any affirmation, representation or warranty concerning Tri*Mark* products or parts, except as stated herein.

If any product supplied by Tri*Mark* is found to be defective by Tri*Mark* in its sole discretion, Tri*Mark* reserves the right to replace, rework, repair, or give credit for defective product. Upon confirmation of the defective condition of the subject part either with return of subject part and/or proper documentation, Tri*Mark* will replace such defective product exclusive of any labor, shipping, transportation, or delivery cost associated with the replacement. Tri*Mark* will not be responsible for the cost of removal of a defective product. This remedy shall be the exclusive remedy available for any defects in the products manufactured and sold by Tri*Mark* or for damages resulting from any other cause whatsoever, including without limitation, Tri*Mark*'s negligence. The purpose of this exclusive remedy shall be to provide the buyer with replacement of products or parts sold by Tri*Mark* found to be defective in materials or workmanship or negligently manufactured. This exclusive remedy shall not be deemed to have failed in its essential purpose so long as Tri*Mark* is willing and able to replace said defective products or parts in the prescribed manner.

WITHOUT LIMITING THE FOREGOING, TRIMARK SHALL NOT BE LIABLE FOR CONSEQUENTIAL OR INDIRECT DAMAGES, ECONOMIC LOSSES, LOSS OF USE, LOST PROFITS, DOWN TIME, OR DAMAGES DUE TO DELAY, WHETHER BY REASON OF BREACH OF WARRANTY, BREACH OF CONTRACT, NEGLIGENCE, STRICT LIABILITY OR OTHERWISE.

This product has been manufactured with methods to ensure high quality and to meet the high expectations of our customers. Tri*Mark* warrants this product to be free from workmanship defects and will remedy issues per Tri*Mark*'s warranty policy.

Remote transmitter fobs, batteries, and other equipment subject to normal wear and deterioration may need to be replaced periodically by dealer and/or end user and are not covered by this warranty. Tri*Mark* will not be liable for indirect, special, incidental, or consequential damages.

Appendix H: Regulatory Information

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

Le manuel d'utilisation des appareils radio exempts de licence doit contenir l'énoncé qui suit, ou l'équivalent, à un endroit bien en vue et/ou sur les appareils :

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful

interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Changes or modifications (moving the LF antenna for example) not expressly approved by the manufacture could avoid the user's authority to operate the equipment.

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Appendix I: RF Exposure Statement

The device shall be used in such a manner that the potential for human contact normal operation is minimized. This equipment complies with RSS-102 radiation exposure limits. This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body. This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

Le dispositif doit être utilisé de manière à minimiser le potentiel de fonctionnement normal par contact humain. Cet équipement est conforme aux limites d'exposition au rayonnement RSS-102. Cet équipement doit être installé et utilisé avec une distance minimale de 20 cm entre le radiateur et votre corps. Cet appareil et son (ses) antenne (s) ne doivent pas être co-localisés ou utilisés conjointement avec une autre antenne ou un autre émetteur

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Appendix J: Notes

If you have a question regarding the Passive Keyless Entry System, please contact Spartan/Shyft RV Customer Service at the following contacts before contacting TriMark Corporation:

Spartan/Shyft Recreational Vehicle Owner Support:

rvcustomerservice@spartanvchassis.com
800.543.4277