LINX® TECHNOLOGIES
WIRELESS MADE SIMPLE®

MDEV-315-HH-KF-MS
MDEV-418-HH-KF-MS
MDEV-433-HH-KF-MS

MS KEYFOB MASTER DEVELOPMENT SYSTEM USER'S GUIDE

ORDERING INFORMATION

PART #	DESCRIPTION
MDEV-***-HH-KF-MS	MS Keyfob Master Development System

*** = 315, 418 (Standard), 433MHz

DESCRIPTION

MS Series encoders and decoders are ideal for remote control and command, security, keyless entry, status monitoring, and a host of similar applications. They allow the status of up to eight buttons or contacts to be securely transferred via a wireless link. The Master Development System is intended to give a designer all the tools necessary to incorporate the Keyfob transmitter, LR Series receiver, and MS Series decoder into a product. This guide will show how to take full advantage of the evaluation board included with the kit. Data guides for all of the Linx parts contained in the kit are included or may be downloaded from the Linx website. The Master Development System serves several important functions:

- Rapid Evaluation - It allows the performance and features of the Keyfob, LR Series, and MS Series to be quickly evaluated.
- Design - It shows how to design with the decoder and how to interface with other components. It also demonstrates the overall system function, making it easy to develop the initial system design.
- Prototype Development - It allows for additional circuitry to be placed directly on the board so that it can act as the first prototype of the product. All of the signals are available on a wire-wrap header for easy connection to external circuitry.

The kit includes 2 Keyfob transmitters**, 2 LR Series receivers*, 2 MS Series decoders*, 1 development board set up for the receiver and decoder, and 1 CW Series antenna. The decoder board is also populated with 1 QS Series USB module for use with the software on the included CD.

**One part is soldered to the board, one extra is for use on your first prototype board.*

***Keyfobs have five buttons, with inserts and keypads for 1-4 button configurations also included.*

Revised 11/11/11

MS SERIES DECODER DEVELOPMENT BOARD

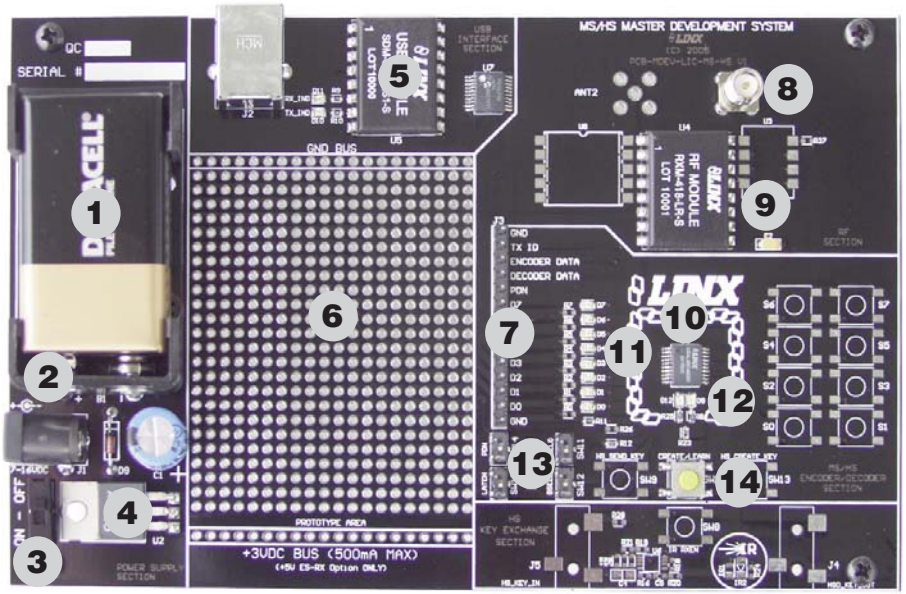


Figure 1: The MS Series Decoder Development Board

1. 9V Battery
2. Power Jack
3. On-Off Switch
4. Voltage Regulator
5. QS Series USB Module
6. Prototype Area
7. Break-out Header
8. RP-SMA Antenna Connector
9. LR Series Receiver
10. MS Series Decoder
11. Data Line LEDs
12. Indicator LEDs
13. Function Switches
14. LEARN Button

USING THE MASTER DEVELOPMENT SYSTEM

Using the Master Development System is straightforward. After unpacking the board, screw the antenna onto the connector, install the supplied 9V battery, and turn on the power switch. The encoder and decoder will have default settings from the factory and will work straight out of the box. To create a new address, follow these easy steps:

1. Press and hold the CREATE_ADDR button on the transmitter to create a new Code Word. This is done by sticking a paper clip through the hole on the back of the case and pressing the button inside. The Code Word will be randomized for as long as the button is held down. Once comfortable that the number is sufficiently random, release the button.
2. Once the button is released, the MODE_IND LED will begin to flash to indicate that it is ready to accept Control Permissions. Press all of the data line buttons that are to be recognized, then press the CREATE_ADDR button again or let it time out after seventeen seconds.
3. Press the LEARN button on the decoder board and the MODE_IND LED will start flashing. Press any of the data line buttons on the transmitter and press the LEARN button again. The encoder's Code Word has now been learned by the decoder and they will operate together.

TROUBLESHOOTING

If the boards fail to work out of the box, then try the following:

- Check the battery to make sure it is not dead.
- Make sure the baud rate switches are set to 9,600bps on the decoder board.
- Make sure that the antenna is connected.
- Check to see if the PDN switch is on, placing the decoder into Power Down Mode. In most cases, the encoder PDN switch should be on.
- Make sure that you set your Control Permissions correctly. If you have not set the encoder to use a particular line, then when you press a button on the encoder board, the MODE_IND LED on the decoder board will light up, but the data line LED will not light up.

If all of these appear to be in order, then you can call 800-736-6677 or e-mail techsupport@linxtechnologies.com for technical support.

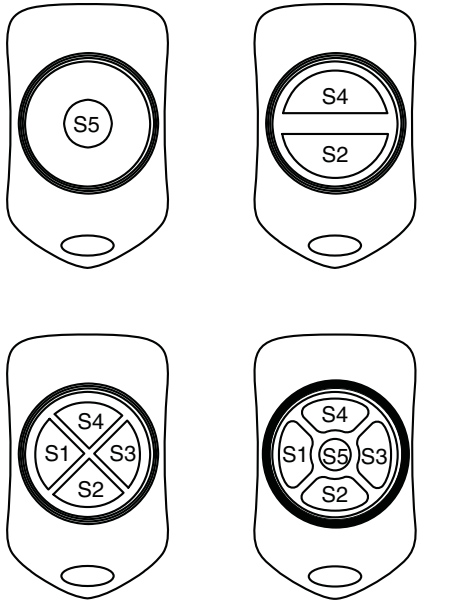
SETTING THE TRANSMITTER ADDRESS

The Keyfobs are all supplied from the factory with a default address and all buttons authorized. The address is changed by using a paper clip or probe to press the CREATE_ADDR button on the board through the hole in the back of the case. When the button is depressed, a LED will light up in the MODE_IND window, indicating that the address is being created. The address will be randomized for as long as the button is held down. When the button is released, the randomized address is saved and the LED will begin flashing to indicate that the Control Permissions may now be set. Press the buttons that the Keyfob user will have the authority to access. Press the CREATE_ADDR button with the paper clip again or wait 17 seconds for it to time out. The address and Control Permissions are now set. The decoder will need to learn the address before it will accept any transmissions. Please see the Typical Applications section of this data guide or the MS Series Decoder Data Guide for details.

Figure 2: CREATE_ADDR Button Access

BUTTON ASSIGNMENTS

The Keyfob is available in five unique button configurations. Those configurations and the corresponding switch numbers are shown in the figure below. The table shows which encoder data line has been assigned to each switch. When a button is pressed, the data line will go high, causing the corresponding data line on the decoder to go high if the addresses match.



Button	Data Line
S1	D0
S2	D1
S3	D2
S4	D3
S5	D4

*Figure 3: OTX-***-HH-KF#-MS Button Assignments*

THE DECODER BOARD

The decoder board included with the evaluation kit uses the LR Series receiver to receive the signal from the Keyfob transmitter and then feeds it into the MS Series decoder. The board is designed to allow full access to the many features of the decoder and to speed development and integration of the LR and MS into a product. The following sections describe the features of this board in detail.

The Prototyping Area

The prototyping area on the decoder board contains a large area of plated through-holes so that external circuitry can be placed on the board. This circuitry can be interfaced with the MS Series decoder through the breakout header to the right of the holes. At the bottom of this area is a row connected to the 3V power supply and at the top is a row connected to ground.

All of the data lines are connected to a wire-wrap header to the right, allowing easy access from the prototyping area. The Decoder Data and TX ID lines are also available on the header as well as the PDN line from the RF module. This allows complete control of the entire system from the prototyping area, giving the designer a great deal of flexibility in using the board.

The Power Supply

The power supply on the decoder board consists of a standard 9V battery and power jack connected to a 3.0V voltage regulator. It can provide approximately 500mA of current to the prototyping area, so if the added circuitry will need more than this, the designer must add an external supply. If the circuit will consistently draw more than 100mA of current, it might be better to use the power jack rather than the battery, as the battery may run down fairly quickly, reducing testing and development time.

The jack accepts a standard 5.5mm plug with the tip ground and the outer shell 7 to 16VDC positive supply. While a reverse voltage protection diode has been included on the board to protect the circuitry in case the voltage on the plug is reversed, it is still a good idea to double-check the polarity.

The RF Area

The figure below shows the RF area of the development board. The board uses the LR Series receiver as shown. Attach the included antenna to the reverse polarity SMA connector before operation.

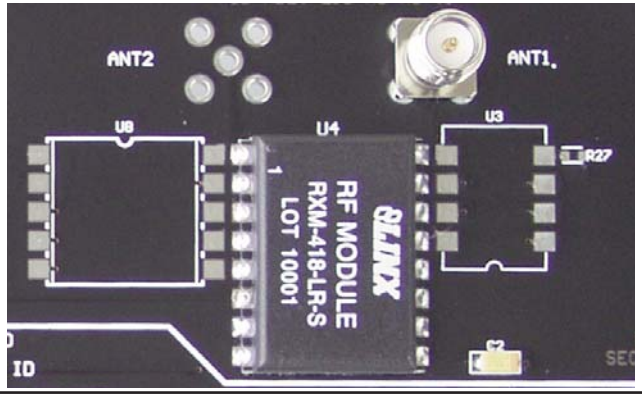


Figure 4: The Decoder Board RF Area

THE DECODER BOARD (CONT.)

The Decoder Area

The figure below shows the decoder area of the development board.

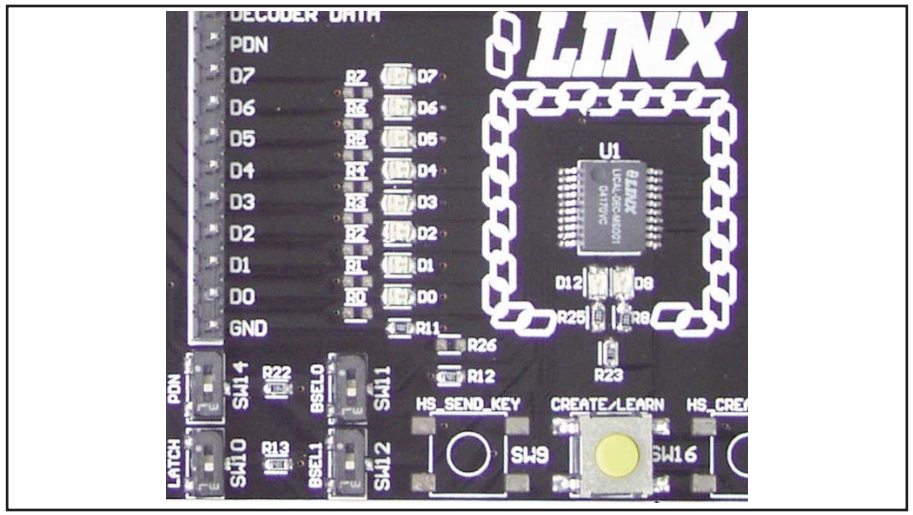


Figure 5: The Decoder Area

The decoder is in the center beneath the Linx logo. To the left are LEDs that are connected to the decoder data lines. These will light up when the decoder receives a signal from the transmitter instructing it to take the data line high. LED D0 corresponds to data line D0 and so forth.

Beneath the decoder are two LEDs. D12 is connected to the MODE_IND line. D8 is connected to the RX_CNTL line and will provide visual feedback by lighting up when the decoder activates the receiver when in RX Control Mode.

Under the LEDs is a button that is connected to the LEARN line. This button is used to learn the Code Word from the encoder as described in the MS Series Decoder Data Guide.

There are four switches to the left of the CREATE / LEARN button. BSEL0 and BSEL1 are used to set the baud rate of the decoder as shown in the chart below. The Keyfob transmitter is set to 9,600bps, so BSEL0 should be on and BSEL1 should be off. If the switch is up, then the line is high (on); if down, then the line is low (off).

**Important* The decoder board must be set to the same baud rate as the transmitter in order for the signal to be received correctly.*

BSEL1	BSEL0	Baud Rate
0	0	2,400
0	1	9,600
1	0	19,200
1	1	28,800

The PDN switch will connect the RX_CNTL line of the encoder to the PDN line of the receiver so that the RX Control Mode can be tested. This mode is described in the MS Series Decoder Data Guide.

The LATCH switch will place the decoder into Latch Mode when on, so that the data lines will go high when a valid signal is received and stay high until a second valid signal is received. If the switch is off, the data lines are momentary.

THE DECODER BOARD (CONT.)

The USB Area

The decoder board has a Linx SDM-USB-QS-S USB module for use with the included development software. This module is powered by the USB bus, so it will not pull any current from the battery. The figure below shows this section.

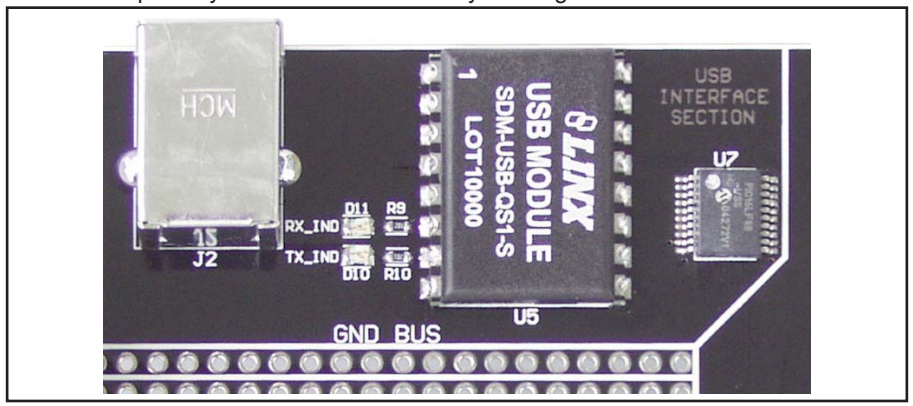


Figure 6: The Decoder Board USB Area

The microcontroller on the right monitors the data lines and generates commands that are sent to the development software on the PC via the QS Series USB module. The RX_IND LED to the left of the module will flash to indicate that data is being received from the PC, and the TX_IND line will flash to indicate that the module is sending data to the PC.

The QS Series USB module provides a simple serial link to a PC via a USB connection. It converts logic-level serial signals to USB-compliant signals and vice versa, so it can be connected to virtually any serial device, including microcontrollers, RS-232 / RS-485 level converters, or Linx RF modules. It is completely self-contained, requiring only a USB type B jack, and includes all necessary firmware and drivers.

INSTALLING THE SOFTWARE AND DRIVERS

The Master Development System uses the QS Series USB module to provide a simple serial interface to a PC via a USB connection. The module requires drivers to be installed on the PC before it can function properly. The QS Series Direct Drivers are included on the CD with the software.

The first time the QS module is plugged into the computer, Windows will display the Found New Hardware Wizard, which will guide you through installing the drivers. Application Note AN-00201 describes the installation of the drivers in detail. The drivers should be installed before running the Development Software.

The MS Master Development Software will automatically start when the CD is inserted and the player in the figure below will appear.

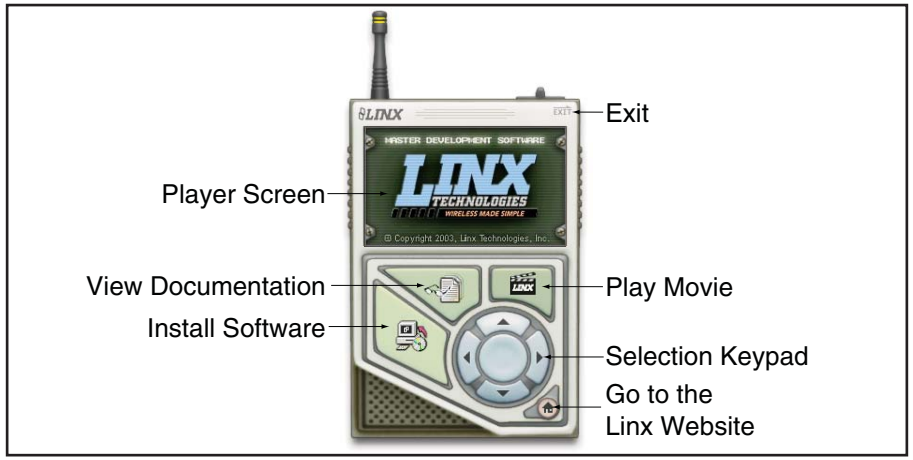


Figure 7: Software Installer

Clicking the Install Software button will start the Installation Wizard, which will guide you through the installation of the development software. The View Documentation button will show a list of the application notes and manuals related to the MS Series. Selecting one of these will open the file in Adobe Acrobat. The Play Movie button will play a short video about Linx on the Player Screen, which can be controlled with the Selection Keypad. Clicking the button on the bottom right of the player will open the Linx Technologies website in the computer's default browser.

The View Documentation list allows for the installation of Adobe Acrobat Reader so that the documents may be viewed. There is also the option of installing Flash, which may be required if the Linx video does not play correctly.

MASTER DEVELOPMENT SOFTWARE

This software is designed to give a complete understanding of how the MS Series encoders and decoders work together, as well as providing an idea of how they can be used in a system.

The Master Development software can be used in one of two modes. The default mode is a software simulation of the system and does not require any hardware. It simulates two handheld transmitters as well as two receiving devices. This is a good way of showing how the MS Series can work in a system by turning on lights and opening doors.

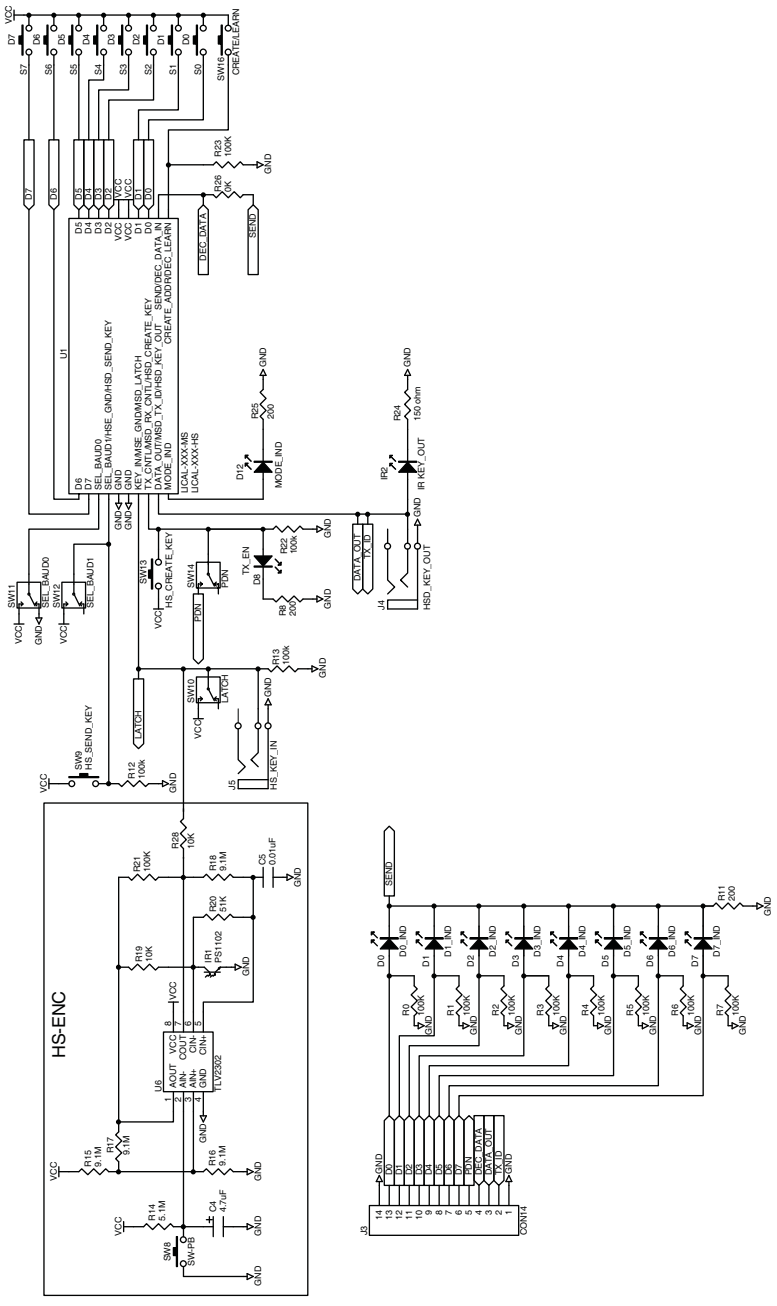
The second mode is for use with the Master Development System. When the decoder board is plugged into a USB port on the PC, the transmitter can be used to activate the features in the software. If you can see the LEDs on the evaluation board turn on, then you will see the LEDs in the program turn on and activate the corresponding data line function.

The figure below is a screen shot of the program set up in Software Operation Mode for simulating the operation of the system.

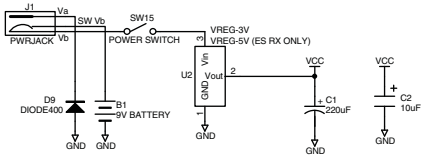
Figure 8: MS Encoder / Decoder DemonstrationSoftware

The transmitters are on the right hand side and the receivers are at the bottom. Complete instructions for using the software can be found by clicking on the Help label at the top right of the window.

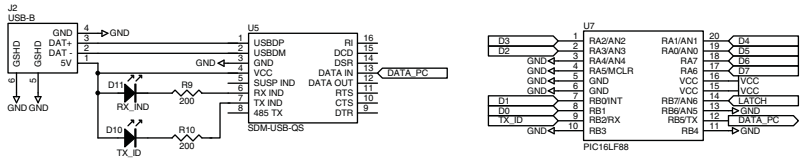
ENCODER / DECODER SECTION



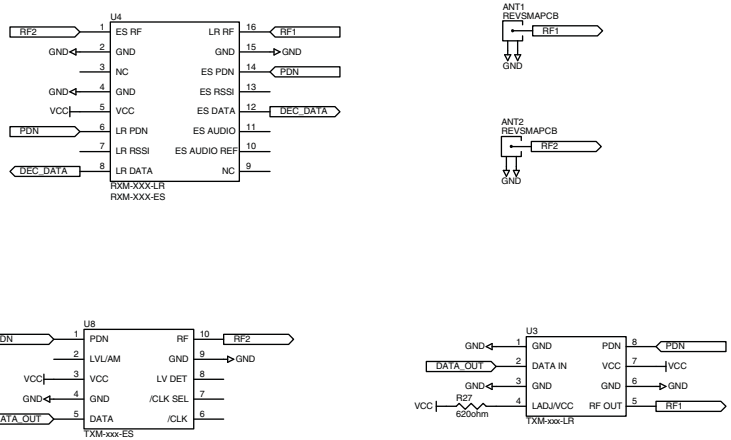
POWER SUPPLY SECTION



USB SECTION



RF SECTION



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