



# LIONEL BASE 3 QUICK START GUIDE

## FCC and RSS Statement

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user authority to operate the equipment.

Notes: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device has been designed to operate with the antennas listed below and having a maximum gain of 3db. The required antenna impedance is 50 ohms. Antennas not included in this list or having a maximum gain greater than 3db are strictly prohibited for use with this device.

### Hengxin Technology Inc. P/N HX-A04-2.4G

To reduce potential radio interference to other users, the antenna type and gain should be chosen so that the equivalent isotropically radiated power (e.i.r.p.) is not more than that required for successful communication.

**This device complies with part 15 of the FCC Rules. 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.**

**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.**

This equipment complies with FCC RF Radiation exposure limits set forth for an uncontrolled environment. This device and its antenna must not be co-located or operating in conjunction with any other antenna or transmitter. This equipment should be installed and operated with a minimum distance of 20mm normally maintained between the radiator and your body.

Cet équipement est conforme aux limites d'exposition aux rayonnements ISSED établies pour un environnement non contrôlé. Cet appareil et son antenne doivent ne pas être colocalisés ou fonctionner en conjonction avec une autre antenne ou émetteur. Cet équipement doit être installé et utilisé avec une distance minimale de 20 mm normalement maintenue entre le radiateur et votre corps.

## ETL Statement

# Lionel Base3 User Guide

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## Introducing the Base3 and Cab3 APP

Necessity is the mother of invention. The ever-growing list of trains offered by Lionel has allowed for user flexibility from the most basic of operating controls in the LionChief category to the legendary advanced features of a Legacy locomotive. This broad range of engine control types has left a ravine when it comes to having a single hand-held controller to operate a model railroad. That is until now. Symbolically modeled after the Hell Gate Bridge in New York City, the new Lionel Base3 bridges the gap between all Lionel control system types. Legacy, TMCC, and LionChief+2.0 engines are now joined by LionChief, LionChief+, and FlyerChief engines (both Bluetooth and RF varieties) in being controlled from a single controller. The Base3 is compatible with the Legacy Cab2 or Cab-1L hardware remotes, or the all-new Cab3 APP for Android or Apple smart devices.

The Base3 and Cab3 APP features many new innovations that allow you to fully connect with your world of Lionel model trains.

This revolutionary command base brings control of all Lionel engine command types to a single controller of your choosing.

Your choice of controller:

- Built-in Wi-Fi for full Base3 functionality with the Cab3 APP
- Compatible with the Cab2 or Cab-1L remotes
- Control 4-digit addressing-compatible locomotives using the Base3 and the Cab3 APP!
- Control Lionel Legacy, TMCC, and LionChief+2.0 engines through the Base3's Legacy radio
- Control Lionel Bluetooth LionChief+, LionChief, and FlyerChief engines through the Base3's Bluetooth radio
- Control Lionel RF LionChief+, LionChief, and FlyerChief engines through the Base3's RF radio
- Layout Control System: 3 PDI ports for expanded LCS use. Built-in circuit monitoring to protect the Base3 from PDI short circuits
- Memory module support
- Included writable module to easily transfer your engine roster from your Base2 to your new Base3
- Reads older Legacy engine orange modules
- Wi-Fi Base3 firmware updates using the Cab3 APP
- Dimensions: 10.3" wide X 5.4" deep X 2.6" tall

## Connecting the Base3 to your Layout

### GET READY TO RUN

Get your engine running by following the instructions in this quick start guide.

- Plug your Base3 into a grounded wall outlet
- Use a wire to connect the Base3's binding post to either the U/Ground/Common terminal of your power transformer, or to one of the outside rails of your track.
- Flip on the power switch on the back of the Base3
- Turn on your CAB hardware remote or Cab3 APP

- Address the TMCC ID of your engine and learn to use the Velocity Throttle, Whistle, Bell, Brake and Direction commands.

## LOCATION

For smaller layouts you can locate the Base3 anywhere on, near, or under the layout.

For a large model railroad layout, the best position for your Base3 is as close to the center of your model railroad as you can get. This gives maximum communication strength to every corner of your layout. Experiment for the most advantageous position of your Base3.

## POWER UP THE TRACK

With your engine on the track and ready to roll, power-up your track to a constant 18VAC. If a circuit breaker trips when you turn on the LIONEL power supply, check the wheels of your locomotive and any cars to make sure they are all securely on the track. Check to make sure the track is free of all metals that may cause a short circuit.

## Cab2 Remote with the Base3

### Setting Base3 & Cab2 channel number

When you are operating in a club environment or a display environment with two or more Railroads in operation in proximity there will be communication problems if both Railroads are using the same channel on their respective Command Bases. You must change one of the Command Bases to a new channel and then match the Cab2 remote you wish to use to that channel.

### TO LEARN THE CHANNEL OF YOUR BASE3:

- Press the “Remote Channel” button on the front of your Base3. Watch the Base3 yellow light bar blinking.
- Observe and note the number of repetitions. That number is the channel of your Base3.

### TO CHANGE THE CHANNEL OF YOUR BASE3:

1. Press the “Remote Channel” button on the front of your Base3 again. Each time you press the button the Base3’s channel will change. The channel can be between 1 and 9.
2. Watch the Base3 yellow light bar blinking
3. Observe and note the number of repetitions. That number is the new channel of your Command Base
4. Repeat to change the channel of your Command Base again.

Your Cab-2 remote must be set to the same channel as your Base3 to operate with it.

## TO MATCH THE CHANNEL OF YOUR CAB2 AND BASE3:

1. Press the CTC button
2. Scroll to channel select
3. Using the Touch-Screen numbers, enter the channel of your Base3 (the same number you located by watching the Base3's yellow light)

The system operates on the same frequencies as many other common wireless devices. If you experience signal quality issues, or lack of range between the Cab2 and Base3, you may need to change channels to resolve the issue.

## BASE COMMUNICATION

Two command base units cannot exist on the same channel. If two bases in proximity are set to the same channel, range and reliability will be compromised.

## RADIO LINK WARNING LIGHT

If you are operating the Cab2 out of range of the Base3, a red Radio Link Warning Light will flash on your remote. If the Radio Link Warning Light triggers at close range, it is a good indication that the channel frequency is experiencing signal quality issues. Try to find the best channel for your environment. A clean channel can extend range greatly and ensure reliability.

## INTERFERENCE FROM CAMERAS

Popular wireless cameras used in the railroad hobby use channel 1-4. Setting the Base3 channel at 5 or above will correct the problem.

## Base3 Wi-Fi Configuration

With the Base3's built-in Wi-Fi, you can operate your model railroad using devices such as smartphones and tablets. Wi-Fi works with the Cab3 App for Android and iOS devices. The Base3 can create its own independent Wi-Fi network or join an existing one. Up to 10 Wi-Fi devices can be connected at once.

### Configuring your Wi-Fi Connection

The illustration below shows the switch and push-button on the Base3 that assists in configuring the Wi-Fi connection.

- A – ACCESS POINT or Join To NETWORK switch
- B – WPS ENABLE push-button
- C – Orange Wi-Fi Connection status indicator
- D – Green Wi-Fi Activity indicator



Note: When using “Join to Network” mode, you may experience control lags due to latency in the network when the network is experiencing heavy traffic.

### ACCESS POINT MODE

When you do not have a Wi-Fi network, or you do not wish to connect your Base3 to your Wi-Fi network, use “ACCESS POINT”. This mode creates an entirely new network with a SSID of “Lionel Base3 – NNNN”. The “NNNN” represents the last 4 digits of the Base3’s Wi-Fi radio MAC address. This is unique to each Base3.

To select “ACCESS POINT” mode:

1. Slide the “ACCESS POINT / JOIN to NETWORK” switch to “ACCESS POINT”.
2. Connect your smart device to your Base3’s Wi-Fi network.
3. Launch the App to control your layout.

### JOIN to NETWORK Mode (WPS)

The Base3 can be added to your home’s Wi-Fi network using most wireless routers.

If your wireless router supports WPS (Wi-Fi Protected Setup), you can easily connect the Base3 to the home network so you can control your trains and have internet access at the same time.

1. Slide the “ACCESS POINT/JOIN To NETWORK” switch to “JOIN To NETWORK” and power the Base3 on.
2. Press and hold the “WPS” button on the Base3 for two seconds and then press the “WPS” button on your wireless router. The devices will automatically negotiate a secure connection.
3. Connect your smart-device to your wireless router network.
4. Open the Cab3 APP and connect to the Base3.

Remember, if your home network is busy, you may experience latency (slower response to commands) when using the Base3 with a wireless router. Also, when connecting the Cab3 APP to the Base3 through a wireless router for the first time, the connection may take a couple of minutes.

### JOIN To NETWORK Mode (no WPS)

- Set B3 to A/P mode.

- Connect computer to Base3
- Start B3SU, confirm connected, go to Wi-Fi Settings
- Press GET
- Enter SSID and PASSWORD of A/P you wish to connect with
- Press SET
- Flip B3 switch to NET mode
- Wait 10 seconds
- In B3SU, go to => Configure, Communications, Search
- Accept Valid Address "OK"
- B3SU will now connect, confirm B3SU operates as expected

## Base3 Lights!

The Base3 includes different LED light features that are used for various reasons.

When you first power up the Base3, the lights on the front panel will alternate in series. We call this the Base3 light show! This lasts for approximately 15 seconds. During this time, the Base3 is performing a systems check to make sure all of its internal components are functioning properly. The Base3 will check its Wi-Fi Radio, Bluetooth Radio, Legacy Radio, and LionChief RF Radio to make sure things are all good. During this time, the Base3 will be unresponsive to commands. Once the light show finishes, you can connect to the Base3 and operate your trains!

Let's go over the functions of each Base3 light during normal operation.

Orange "L" logo: This Lionel "L" logo on the front center of the Base3 is the Wi-Fi connection indicator. This light will be off when no Wi-Fi devices are connected to the Base3. Once a Wi-Fi device is connected, such as a smartphone with the Cab3 App, this light will go solid until the connection is discontinued.

### The light bars

These light bars are a unique method of light transmission, using side-discharge light pipes with LEDs on each end. The inspiration for these light bars comes from the automotive world, where some newer vehicles have continuous wrap-around taillights. Each light bar represents an "activity" which is when data is being sent to or from the Base3, such as when you blow the whistle.

Green: Wi-Fi activity. Any device connected to the Base3 over Wi-Fi, such as the Cab3 App, will use this light when communicating. When you press a button on the App, a command is sent to the Base3, and this green light flashes to indicate that command being sent.

Yellow: Cab2 or Cab-1L activity. When a command is sent from one of these remotes to the Base3, the yellow light will flash.

Blue: Bluetooth activity. This light will flash when the Base3 is sending a command to a Bluetooth-equipped engine.



Red: RF LionChief activity. This light will flash when the Base3 is sending a command to a RF LionChief engine.

Blue “LIONEL” breath lights: these lights may be familiar to those with a Base2. These are called the breath lights. They are used to indicate that the Base3 has power. The lights slowly fade in and out. There is one of these lights at each end of the Base3.

## Programming Bluetooth Engines into the Base3

One of the key features of the Base3 is the ability to operate Lionel Bluetooth engines using a Cab2, Cab-1L, or the Cab3 App. Compatible Bluetooth engines include LionChief, LionChief Plus, FlyerChief, and even Bluetooth-equipped HO! Bluetooth-equipped engines that also have a TMCC radio, including Legacy and LionChief Plus 2.0, will be controlled by the Base3 using their TMCC radios and not Bluetooth.

Bluetooth engines are programmed in as TMCC IDs and are remembered by the Base3 until that channel is cleared or another engine overrides it. Base3’s version 1.0 Bluetooth firmware can operate up to 8 engines at one time. These are reserved as TMCC IDs 10 through 17.

Setting up a Bluetooth engine with the Base3 is like programming a Legacy or TMCC engine. Since Bluetooth engines do not have a RUN/PGM switch on them, that switch is on the front of the Base3.

### To Program a Bluetooth Engine into the Base3:

Make sure the Base3 is powered on and you have a connected Cab controller.

1. Place the Bluetooth engine on the track, and power it up. The engine should start chirping (or headlight flashing), indicating it is ready to be paired with.
2. On the front of the Base3, flip the Bluetooth RUN/PGM switch to PGM.
3. On the Cab controller, press ENG and the TMCC ID you wish to use (10 through 17). Then press SET. The Bluetooth engine should stop chirping, indicating connection with the Base3.
4. Slide the Bluetooth RUN/PGM switch back to RUN.
5. If using a Cab2 or the Cab3 App, make sure the engine CONTROL type is set to TMCC or LionChief. Bluetooth engines will not respond to commands if the type is set to Legacy.

You can now operate your Bluetooth engine with your cab controller. Basic commands will operate the engine, such as the throttle, bell, whistle, and basic CrewTalk. You can even toggle the smoke units on and off if the engines are so equipped.

### Bluetooth Engine Information

When you program a Bluetooth engine into the Cab2 or the Cab3 App, the engine’s road name and road number will automatically populate. The two-way Bluetooth communication between the engine and the Base3 means the Base3 can read which engine it is operating and sends that info to the cab controller.

## Programmed Bluetooth Engines

When you first power up your layout, the Base3 will look for any Bluetooth engines that are programmed into its database on TMCC IDs 10 through 17. If it finds any, it will connect to them automatically without you having to manually address them. This is done to prevent the engines from constantly making the chirping sound that indicates the engine is ready to be paired to.

Any Bluetooth engine that has not already been programmed into the Base3 will make the chirping sound.

**IMPORTANT: WHEN THE BASE3 IS POWERED UP, ANY BLUETOOTH ENGINE THAT HAS BEEN PROGRAMMED INTO THE BASE3 WILL BE UNAVAILABLE TO OTHER BLUETOOTH CONTROLLERS SUCH AS THE UNIVERSAL REMOTE OR THE BLUETOOTH TAB OF THE CAB3 APP. TO USE THOSE CONTROLLERS, YOU MUST EITHER REMOVE THE BLUETOOTH ENGINE FROM THE BASE3 OR POWER DOWN THE BASE3.**

## Clearing a Bluetooth Engine from the Base3 Database

If you want to remove a saved Bluetooth engine from the Base3 database:

1. Slide the Base3 Bluetooth RUN/PGM switch to PGM.
2. Using the cab controller of choice, press ENG, the TMCC ID you wish to clear (10 through 17). Then hit SET.
3. Slide the Bluetooth RUN/PGM switch back to RUN.
4. Any Bluetooth engine saved to that TMCC ID is now removed.

A Bluetooth engine will also be removed from the Base3 database anytime a new engine is programmed into that TMCC ID number. This includes a different Bluetooth engine, a RF engine, or a Legacy/TMCC engine.

## How to tell if an engine is Bluetooth

There are two ways to tell if a Lionel engine that is not equipped with TMCC is Bluetooth-compatible:

1. When the locomotive powers-up, it will play a “chirping” sound. Earlier RF LionChief engines play a more defined “beeping” sound.
2. Look under the engine or tender for the Bluetooth logo. If there is no logo present, the engine may be RF. The sample Hogwarts engine shown below shows the blue BLE icon.

## Programming RF LionChief Engines into the Base3

The Base3 includes the ability to operate Lionel RF LionChief engines using a Cab-1L, Cab2, or the Cab3 App. Compatible RF engines include LionChief, LionChief Plus, and FlyerChief. These engines were produced when LionChief was first introduced in 2014 until being replaced by Bluetooth in 2017.

RF engines are programmed with TMCC IDs, and are remembered by the Base3 until that channel is cleared or another engine is programmed in. RF engines can be programmed using TMCC IDs 2 through 9.

Setting up a RF engine with the Base3 is like programming a Legacy or TMCC engine. Since RF engines do not have a RUN/PGM switch on them, that switch is on the front of the Base3.

### TO PROGRAM A RF ENGINE INTO THE BASE3:

1. Power on the Base3 and have a connected Cab controller.
2. Place the RF engine on the track and power it up. The engine should start beeping (or headlight flashing), indicating it is ready to be paired with. (Some early RF LionChief engines play background sounds always, whether a controller is connected or not)
3. On the front of the Base3, flip the RF RUN/PGM switch to PGM.
4. On the Cab controller, press ENG and the TMCC ID you wish to use (2 through 9). Press SET. It may take a moment for the Base3 and the RF engine to fully connect. The RF engine will stop beeping, indicating connection with the Base3.
5. Slide the RF RUN/PGM switch back to RUN.
6. If using a Cab2 or the Cab3 App, make sure the engine CONTROL type is set to TMCC or LionChief. RF engines will not respond to commands if the type is set to Legacy.

You can now operate your RF engine with your cab controller. Basic commands will operate the engine, such as the throttle, bell, whistle, and basic CrewTalk. Some RF engines also have volume control.

### RF ENGINE INFORMATION

When you program a RF engine into the Cab2 or the Cab3 App, the engine's road name and road number will automatically populate. The two-way RF communication between the engine and the Base3 means the Base3 can read which engine it is operating and sends that info to the cab controller.

### PROGRAMMED RF ENGINES

When you first power up your layout, the Base3 will look for any RF engines that are already programmed into its database on TMCC IDs 2 through 9. If it finds any, it will connect to them automatically without you having to manually address them. This is done to prevent the engines from constantly making the beeping sound that indicates the engine is ready to be paired to.

Any RF engine that has not already been programmed into the Base3 will make the beeping sound.

### CLEARING A RF ENGINE FROM THE BASE3 DATABASE

If you want to remove a saved RF engine from the Base3 database:

1. Make sure the engine is powered down or removed from the track.
2. Slide the Base3 RF RUN/PGM switch to PGM.
3. Using the cab controller of choice, press ENG, the TMCC ID you wish to clear (2 through 9). Hit SET.
4. Slide the RF RUN/PGM switch back to RUN.

Any RF engine saved to that TMCC ID is now removed.

A RF engine will also be removed from the Base3 database anytime a new engine is programmed into that TMCC ID number. This includes a different RF engine, a Bluetooth engine, or a Legacy/TMCC engine.

## LCS with the Base3

Lionel's Layout Control System, or LCS, allows full layout control of things like operating accessories, switches, track power blocks, and more. The Base3 expands the usability of LCS by including three PDI connector ports. Each PDI port operates independently, and they all communicate to the Base3's main processor, so having a single daisy chain with all LCS modules is no longer needed.

### CONNECTING BASE3 TO LCS MODULES

With the Base3, the LCS DB9 Cable with Power Supply is no longer needed. Instead, LCS modules are connected to the Base3 by using a PDI cable. PDI cables are available in 1' (6-81500), 3' (6-81501), 10' (6-81502) and 20' (6-81503) lengths.

### BASE3 PDI POWER

The Base3 provides 12V DC PDI power to each LCS module. The green LED above each PDI port on the Base3 indicates that the PDI power is on for that port.

Each port is rated to operate up to 10 LCS modules. That means the Base3 can handle 30 modules total. If your layout requires more than this, you may need to add an additional power supply tapped into the PDI line using a PDI cs-691JOINB00-p board. These are available on the Lionel Support page.

In the unlikely event that a short occurs on one of the PDI lines that is connected, the Base3 will turn off power to that PDI output to protect both itself and the modules that are connected. The Base3 will monitor the status of that line and once the short is fixed or removed, power to that PDI port will resume. When a short occurs, the Base3's "LIONEL" lights on the sides will blink to indicate a fault.

## Using Memory Modules with the Base3

The Base3 supports use of Legacy Memory Modules (MEM) originally used with the Base2 and Cab2. These modules perform various functions with the Base3:

- Included black writable memory module can transfer your Base2's engine database to your Base3.
- Included black memory module can backup and/or restore the Base3's database.
- Included black memory module can be used to update a Cab2 remote's firmware
- Upload older Legacy engine information with orange memory modules to the Base3's database.
- Create engine-specific memory modules using the B3SU

### BLACK WRITABLE MEMORY MODULE

The Base3 includes one black rewritable memory module. The information saved to this module can be rewritten so that the module can be reused over and over again.

The black module is used for a few different tasks:

- Transfer your existing Legacy Base2's engine database to your new Base3
- Backup and/or restore your Base3's database
- Update your Cab2 remote's firmware

Updating Cab2 firmware using black memory module

1. Download the latest Cab2 firmware from the Lionel Support Site.
2. Plug the black memory module into the Base3
3. The firmware can be installed into the black memory module using one of two ways:
  - a. Using the Cab3 APP.
  - b. Using the B3SU (Base3 System Utility).
4. After the firmware has been downloaded to the black memory module via the previous step, unplug it from the Base3.
5. Turn off the Cab2 remote and plug in the black memory module.
6. Press and hold the SET and CTC buttons. Wait 10-15 seconds and your screen will display the main page. The remote firmware is now updated.

## ORANGE MEMORY MODULE FOR OLDER LEGACY ENGINES

Your Legacy engines perform best when all its options are loaded into the Base3 database. Older Legacy locomotives included an orange memory module, which is one way to load these settings.

Orange Memory Module Procedure using Cab2

1. Address a LIONEL LEGACY Control System equipped engine with its TMCC ID#
2. Press INFO
3. Select LOAD with the soft keys
4. Insert your Orange module into your remote
5. Follow the on-screen prompts to load the engine info

Information about your engine will be downloaded into the Base3 database and associated with the ID# you entered in step 1. This information will now be used by all remotes connected to the Base3.