






LM-3(S)-21 **RailPro™** Locomotive Module

INSTRUCTION MANUAL

Thank you for purchasing this RailPro locomotive Module by Ring Engineering. Please read all warnings and instructions before installation and use. For the latest information from Ring Engineering, please visit us on the web at www.RingEngineering.com.

INSTALLATION INSTRUCTIONS CAN BE FOUND ON PAGE 2 OF THIS SHEET.

-  **WARNING:** This product contains small parts and is not recommended for persons under fourteen (14) years of age.
-  **WARNING:** This product can expose you to chemicals including lead, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.
-  **WARNING:** If this module is wired incorrectly, or the maximum allowed voltage is exceeded, it is possible that enough heat can be generated to ignite flammable material, causing a fire. The use of improper resistors for LED lights is one possible source for this danger.
-  **WARNING:** Maximum voltage is 18 Volts. Only power your LM-3 module with a Ring Engineering Inc. RailPro Power Supply designed for the LM-3 or a DCC power supply that only has the signal that is described in NMRA DCC standards S-9.1 and S-9.2.
-  **WARNING:** Do not remove enclosure.

Description

The LM-3(S)-21 is a module that you can install into a model train locomotive so the locomotive can be controlled and setup by a Ring Engineering RailPro Controller, such as the HC-3 Handheld Controller with a Color Touch Screen! After the LM-3(S)-21 is installed in a locomotive, you will be able to control the locomotive speed, direction, up to 12 light outputs and sounds! The LM-3(S)-21 has "Direct Radio"+NET (RF transceiver) built inside. The built in RF module allows commands and data to be sent and received to and from the module. You can install a picture of the locomotive that you will install the LM-3(S)-21 into, so you can detect and load the picture into a RailPro Controller such as the HC-3. Then you will be able to touch the screen of the HC-3 to take control of this LM-3(S)-21 or other locomotive modules!

The LM-3(S)-21 is electrically compatible with the DCC plug found in many locomotives to promote easy installation.

IMPORTANT: Your handheld controller must have a new enough program revision to properly setup and use the LM-3S-21.
HC-3 Revision 1.09 or higher.
HC-2(b) Revision 2.53 or higher.
HC Simulator Revision 2.32 or higher.

Limited Warranty

Our products come with a One Year Limited Warranty when you purchase our products from an authorized reseller. [Authorized Reseller List](http://www.ringengineering.com/HobbyShopList.htm)
<https://www.ringengineering.com/HobbyShopList.htm>

We suggest you contact Support@RingEngineering.com first to determine whether the item is indeed defective before returning.

The complete Warranty is as follows:

Ring Engineering, Inc. (Ring Engineering) warrants that for a period of One Year from the date of purchase, this product will be free from defects in material and workmanship. Ring Engineering, at its option, will repair or replace this product or any component of the product found to be defective during the warranty period. Replacement will be made with new or remanufactured product or component. If the product is no longer available, replacement may be made with a similar product of equal or greater value. This is your exclusive warranty.

This warranty is valid for the original retail purchaser from the date of initial retail purchase and is not transferable. Ring Engineering dealers, distributors, or retail stores selling Ring Engineering products do not have the right to alter, modify, or in any way change the terms and conditions of this warranty.

The warranty does not cover normal wear of parts or damage resulting from negligent misuse of the product. Further, the warranty does not cover Acts of God, such as fire, flood, hurricanes, and tornadoes.

Ring Engineering shall not be liable for any incidental or consequential damages caused by the breach of any express or implied warranty or condition. Except to the extent prohibited by applicable law, any implied warranty of merchantability or fitness for a particular purpose is limited in duration to the duration of the above warranty. Ring Engineering disclaims all other warranties or conditions, express or implied statutory or otherwise. Some states or jurisdictions do not allow the exclusion or limitation of incidental or consequential damages or limitation on how long an implied warranty lasts, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights that vary from state to state.

Our warranty is void if the instructions are not followed or our products are modified in anyway not specified in the instructions.

How to Obtain Warranty Service
Submit a request online for a Return Merchandise Authorization (RMA) number at <https://www.ringengineering.com/TechnicalSupport.htm>.

Please allow one business day to receive a return number. You will receive instructions by email on how to return the product.

If your Ring Engineering product is not covered by warranty, or has been damaged, an estimate of repair costs or replacement costs will be provided to you for approval prior to servicing or replacement.

Ring Engineering's warranty is void if a product is modified in any way or if the product is not used as intended or used as described in the product user manual or instruction sheet.

If your product is covered by our warranty, Ring Engineering will pay for return shipping to US destinations. If your product is not covered under our warranty, you will be responsible for return shipping and handling cost.

Software products do not come with a Warranty.

FCC Statement

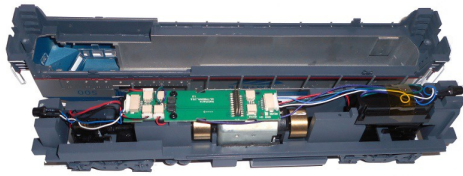
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio 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.

IMPORTANT: There is no entity that enforces the locomotive manufacturers to comply to the same pin out and electrical specifications on the 21 pin connector so no company can guaranty that their product will be completely compatible with all locomotives. We have tested our module in many popular 21 pin locomotives and found that they work well when installed per these directions but we can not guaranty your results. You need to determine for yourself if our product will be compatible with your locomotive. Damage to our module from your locomotive is not covered under our warranty. Installing a RailPro module in your locomotive is done at your own risk. Ring Engineering will not be responsible for any incidental or consequential damages to your equipment or property.

Installation Instructions

Step 1



Remove the locomotive shell.

Check the manufactures directions to learn how to remove the shell.

Choose a locomotive that is DCC Ready (Not with DCC and Sound Installed). DCC Ready cost much less than a locomotive with DCC and Sound.

See below for Proper Alignment of missing pin location.



WARNING: Be sure the power is off when you plug in the module or wiring your installation to prevent damaging it.

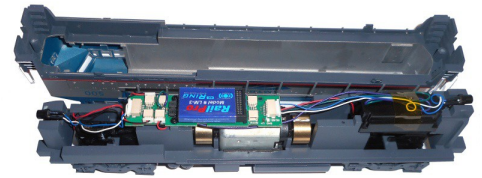
Step 2



Install a Speaker.
(LM-3S-21 only not LM-3-21)

Note: Some DCC Ready Locomotives come with speakers installed.

Step 3



Plug the module into the 21 pin connector.

WARNING: If you plug in the module upside down or backward you will damage it. This type of damage is NOT covered under the warranty. See below for correct orientation.

Step 4

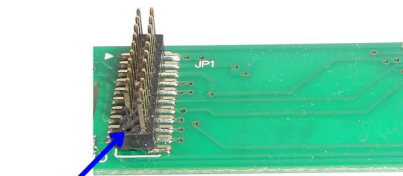
Reinstall the locomotive shell.



Step 5

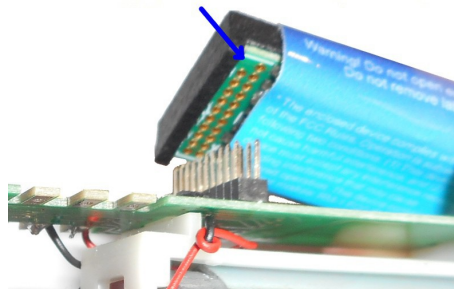
Use your RailPro controller, such as the HC-3, to control and setup the features of the locomotive.

IMPORTANT: You must set the Motor Full Load Current before operating your locomotive. See the Handheld Controller User Manual for instructions.



IMPORTANT: Missing Pin Location Must Line Up.
WARNING: Plugging the module in incorrectly will damage it!

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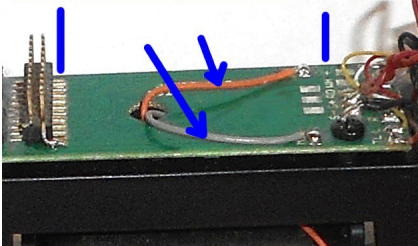


21 Pin Connector Diagram

Input / Out 12	1	22	Track 2
Out 9 (Aux 7)	2	21	Track 1
Out 8 (Aux 6)	3	20	Common
Out 6 (Aux 4)	4	19	Motor +
Out 10	5	18	Motor -
Out 11	6	17	Out 7 (Aux 5)
Out 2 (Bck Light)	7	16	V+
Out 1 (Frt Light)	8	15	Out 3 (Aux 1)
Speaker 1	9	14	Out 4 (Aux 2)
Speaker 2	10	13	Out 5 (Aux 3)
Missing Pin	11	12	+5V

Below are things to check to be sure you have a proper Installation.

If your locomotive has wires in this area relocate them before installing the RailPro 21 pin module.



IMPORTANT:

1. When finished, be sure the wiring is not rubbing on the motor weights or axles!
2. Speaker should be rated for at least 1 watt of power handling and 4 to 16 ohms. Speaker should be baffled to achieve better sound quality.

In an Atlas* brand locomotive we tested we needed to remove a capacitor that was across the motor connections before the RailPro module could radio consist properly.

*Atlas Model Railroad Company, Inc. is not affiliated with Ring Engineering Inc.



Outputs 1 - 4 are full power outputs. Outputs 5 - 12 are logic level outputs. It is typical that manufacturer main boards support 8 outputs. You need to purchase a Ring Engineering Main Board to use all 12 outputs.

IMPORTANT: If you connect low voltage bulbs or LED's you should be sure the proper dropping resistors are inline with each light output. Dropping resistors are typically on most all 21 pin main boards but you should be sure that is the case in your installation before applying power.

IMPORTANT: If you choose to add power backup module only use RailPro Power Backup Module PBM-2. Regular Super Capacitors can damage the LM-3S-21 and will not be covered by our warranty. Connect PBM positive to pin 16 (V+) and PBM negative to pin 20 (Common). These connections should be made on the proper locations on the Main board.