

# **BUILDING AN OPERATIONAL RAILROAD CROSSING**

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- **ROADWAYS FREQUENTLY CROSS RAILROAD TRACKS AT GRADE, AND REQUIRE WARNING DEVICES TO ALERT MOTORISTS AND PEDESTRIANS TO APPROACHING TRAINS**
- **PRIOR TO THE FIRST QUARTER OF THE 20TH CENTURY, ROADWAY CROSSINGS WERE PROTECTED BY FLAGMEN STATIONED AT THE CROSSING**
- **AFTER THE FIRST QUARTER OF THE 20TH CENTURY, AUTOMATIC CROSSING GATES BEGAN TO BE INSTALLED**

- **DEPENDING UPON THE AMOUNT OF RAILROAD TRAFFIC AT A ROADWAY CROSSING, A CROSSING CAN HAVE:**
  - **A SIMPLE CROSSBUCK WARNING**
  - **A CROSSBUCK WITH FLASHING LIGHTS AND A BELL**
  - **A CROSSBUCK WITH FLASHING LIGHTS AND A BELL AND GATES THAT AUTOMATICALLY LOWER ACROSS THE ROADWAY BEFORE THE TRAIN ARRIVES**

- **THE OBJECTIVE OF THIS CLINIC IS TO SHOW HOW INSTALLING AUTOMATIC, OPERATING CROSSBUCKS AND CROSSING GATES ON A LAYOUT IS NOT THAT DIFFICULT**
- **THERE ARE MANY GRADE CROSSING COMPONENTS AVAILABLE ON THE MARKET**
- **THIS CLINIC DOES NOT NECESSARILY IDENTIFY EVERYTHING THAT IS AVAILABLE**
- **AS WITH ANY ASPECT OF YOUR LAYOUT, IT IS RECOMMENDED THAT YOU SEARCH AND SEE WHAT IS AVAILABLE THAT BEST SUITS YOUR PARTICULAR NEEDS AND BUDGET**



**TYPICAL MODERN  
CROSSBUCK,  
FLASHER, AND GATE AT  
A GRADE CROSSING IN  
BUCKEYSTOWN, MD**





# Four Elements of a Grade Crossing

- **CROSSBUCK FLASHERS**
- **CROSSING GATES**
- **CROSSING BELL**
- **DETECTION AND ACTIVATION CIRCUIT**

# **TWO OPTIONS**

- **PURCHASE AN INTEGRAL SYSTEM**
- **BUY SEPARATE COMPONENTS AND COMBINE THEM**

# **INTEGRAL SYSTEMS**

- **THE EASIEST WAY TO INSTALL AN OPERATIONAL GRADE CROSSING IS WITH AN INTEGRAL SYSTEM THAT CONTAINS ALL THE COMPONENTS (DETECTORS, FLASHING CROSSBUCKS, BELL, GATES)**
- **SEVERAL COMPANIES ADVERTISE INTEGRAL SYSTEMS**
  - **TYCO, LIFE-LIKE, BACHMANN**
  - **Z-STUFF FOR TRAINS**
  - **WALTHERS**
  - **MODEL TRAIN TECHNOLOGY**





**THIS IS THE SIMPLEST, LEAST EXPENSIVE,  
AND LEAST REALISTIC SYSTEM**



- **Z-STUFF FOR TRAINS  
MAKES AN INTEGRAL  
GRADE CROSSING SYSTEM**
- **OPERATIONAL CROSSBUCK  
FLASHERS AND DETECTORS**
- **AVAILABILITY OF  
COMBINATION CROSSBUCK  
FLASHERS WITH  
OPERATING GATES  
UNCERTAIN**



# **WALTHERS GRADE CROSSING CONTROLLER**

- **CAN ONLY BE USED  
WITH DC-POWERED  
LAYOUTS**
- **CANNOT BE USED WITH  
DCC**
- **USES OPTICAL SENSORS**
- **CONNECTS TO  
CORNERSTONE GRADE  
CROSSING FLASHERS**





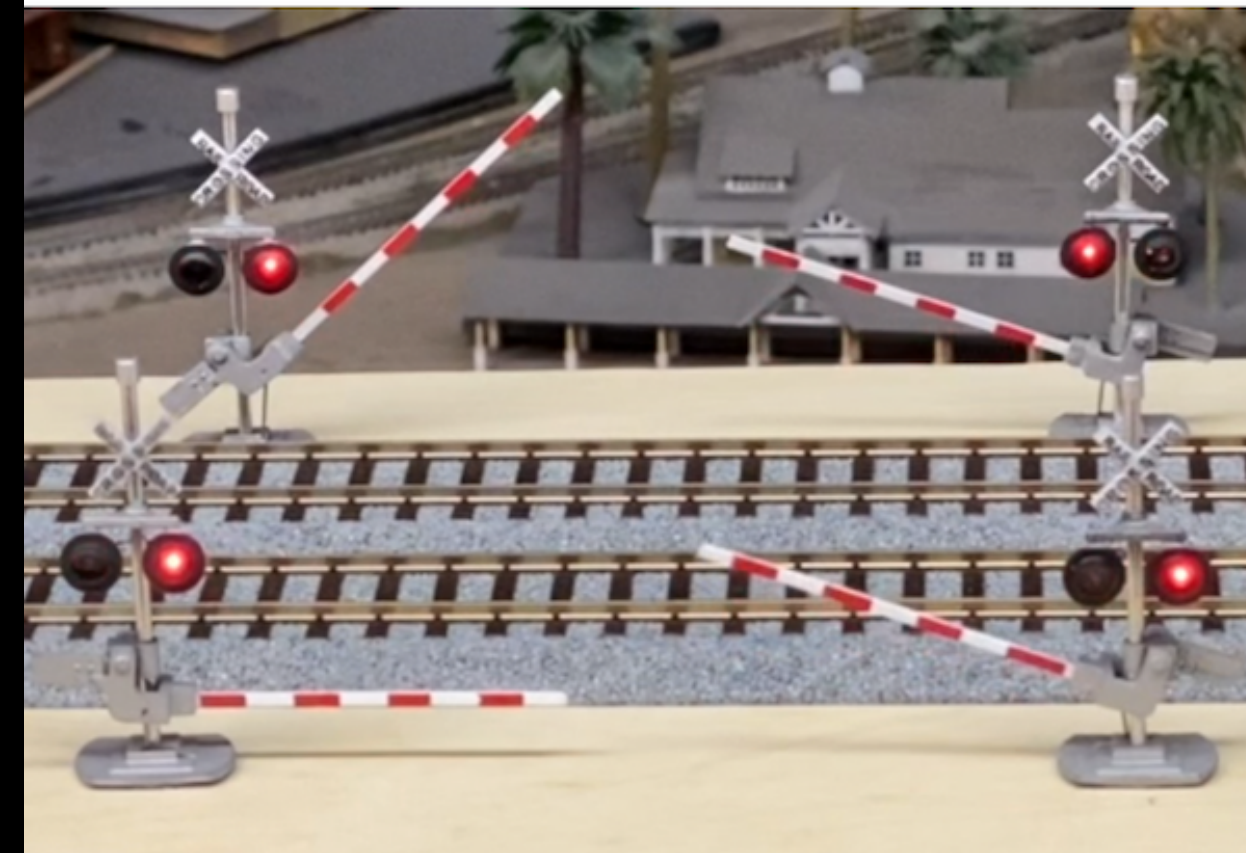
# MODEL TRAIN TECHNOLOGY RECENTLY INTRODUCED MOTORIZED CROSSING GATES THAT APPEAR RELATIVELY EASY TO INSTALL



**Model Train™**  
TECHNOLOGY

***MOTORIZED CROSSING GATES!***

N, HO AND G SCALE



***EASY TO INSTALL AND OPERATE***

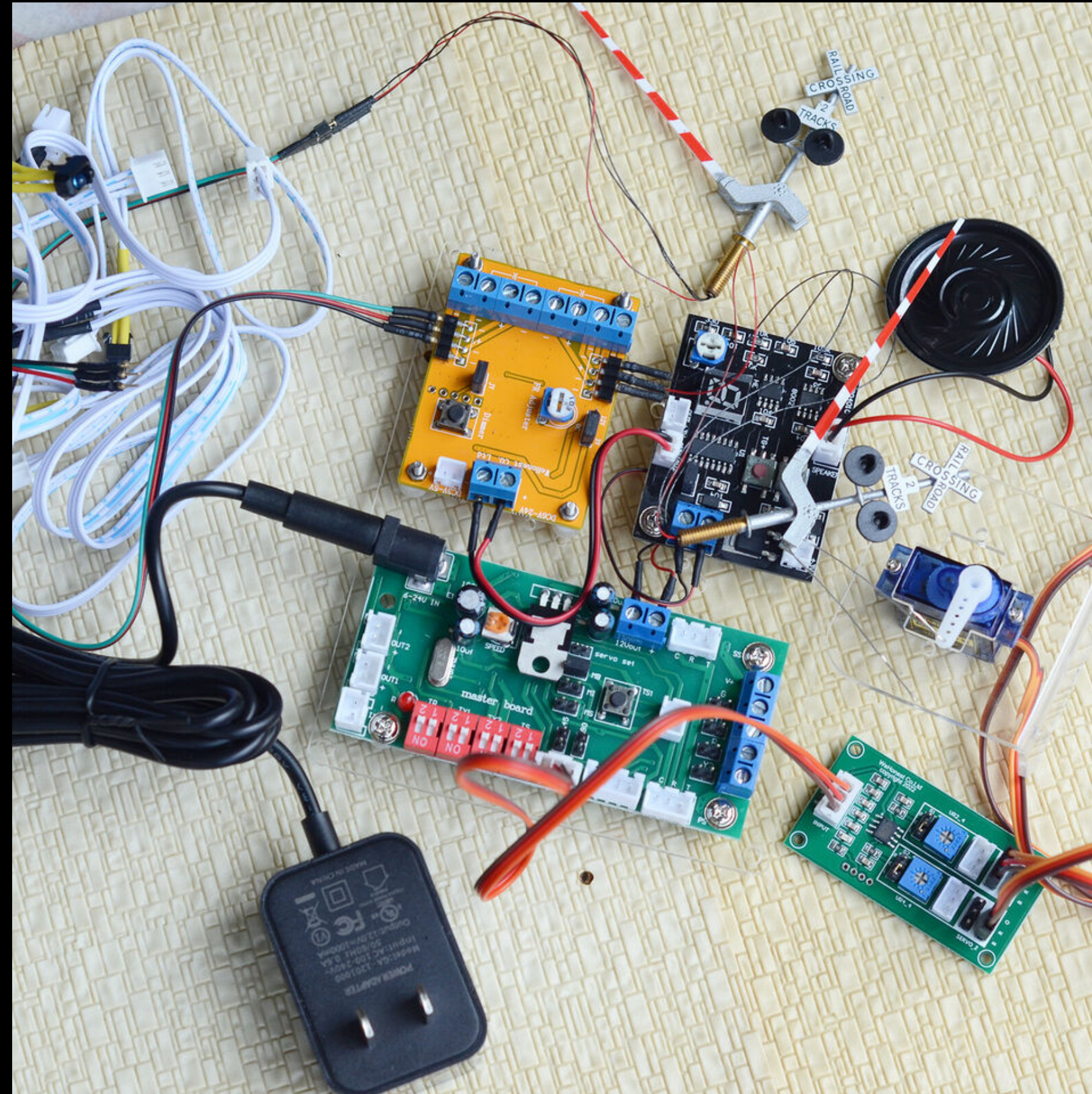
- SIMPLE DROP-IN GATE MECHANISM
- STEPPER MOTOR FOR PRECISE SMOOTH CONTROL
- TRIGGER WITH ANY OF OUR ***PRECISION DETECTORS***
- DELAY TIMING OPTIONS
- PAIR WITH OUR BELL OR SOUND MODULE

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**INTEGRAL SYSTEM WITH DETECTORS, SERVO MOTORS,  
ACTIVATION CIRCUITS AND CROSSING GATES AND FLASHERS  
AVAILABLE FOR \$100 (STILL AVAILABLE ON EBAY AS OF 5/13/26)**



# **CONSTRUCTING AN OPERATIONAL GRADE CROSSING FROM SEPARATE COMPONENTS**

## **1.) CROSSBUCK FLASHERS**

- **MOST GRADE CROSSINGS HAVE THE GATES AND CROSSBUCK FLASHERS CONSTRUCTED AS AN INTEGRAL UNIT**
- **HOWEVER, GATES CAN BE SEPARATE FROM CROSSBUCK FLASHERS**
- **SEVERAL MANUFACTURERS INCLUDE A FLASHER CIRCUIT WITH THEIR CROSSBUCKS**
- **APPLY VOLTAGE (USUALLY 12VDC) TO THE CIRCUIT AND THE CROSSBUCK FLASHERS WILL FLASH**
- **HOWEVER, UNLESS YOU CONNECT THEM TO A TRAIN DETECTION CIRCUIT THAT WILL AUTOMATICALLY ACTIVE THEM, THEY CAN ONLY BE ACTIVATED MANUALLY.**

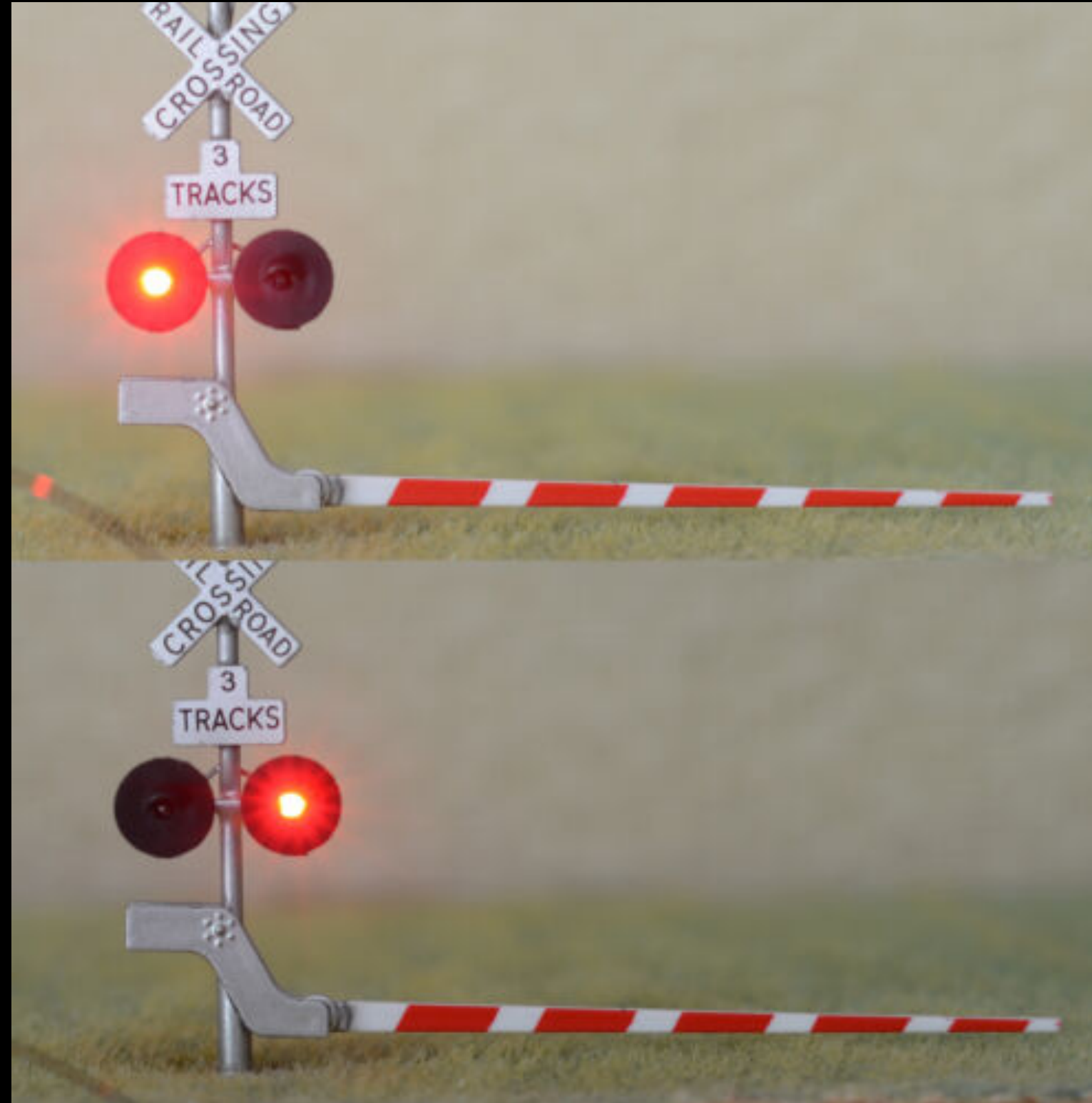
- **TYPICAL  
INEXPENSIVE  
(\$11.99) CROSSING  
FLASHER WITH  
FLASHER CIRCUIT  
FOUND ON EBAY**





## **2.) CROSSING GATES**

- **SEVERAL CROSSING GATES WITH FLASHERS ARE AVAILABLE ON EBAY**
- **NJ INTERNATIONAL MAKES A REALISTIC COMBINATION OPERATING CROSSBUCK AND GATE**
- **AVAILABILITY IS UNCERTAIN BUT IT APPEARS THEY ARE STILL BEING MANUFACTURED**
- **TOMAR ALSO MAKES AN OPERATIONAL CROSSBUCK WITH CROSSING GATE**
- **AVAILABILITY IS ALSO UNCERTAIN**



**TWO CROSSING GATES AVAILABLE  
ON EBAY FOR \$20**



- **NJ INTERNATIONAL CROSSING GATE**
- **GATE ARM IS ACTIVATED BY ROD CONNECTED NEAR THE PIVOT THAT EXTENDS TO BELOW THE LAYOUT**





- **ANOTHER NJ  
INTERNATIONAL  
COMBINATION  
CROSSBUCK AND  
CROSSING GATE**





- **NJ INTERNATIONAL  
CROSSING GATES  
BEING USED WITH  
SEPARATE BERKSHIRE  
JUNCTION  
CROSSBUCK  
FLASHERS**



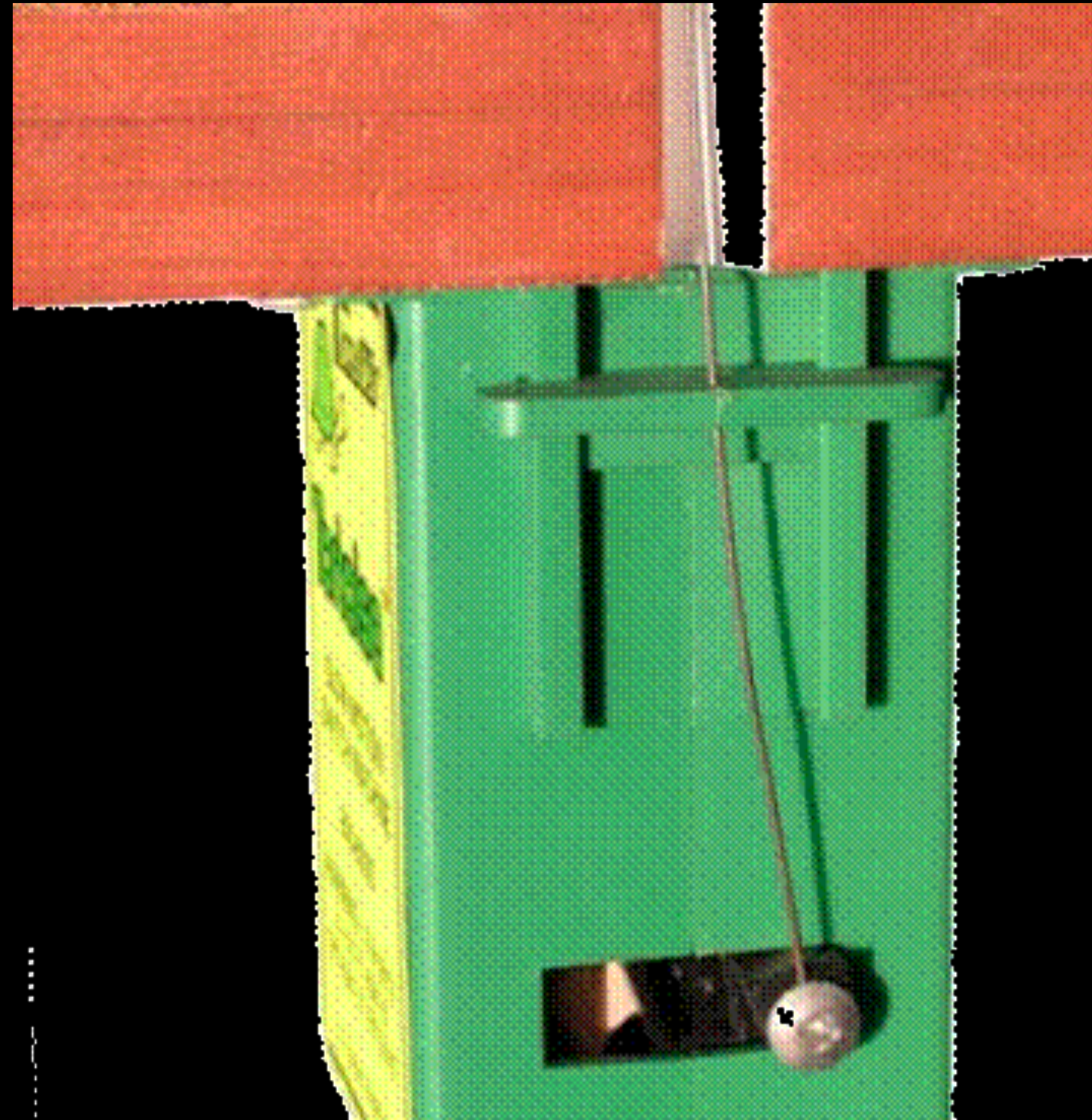


# OPERATING THE GATES

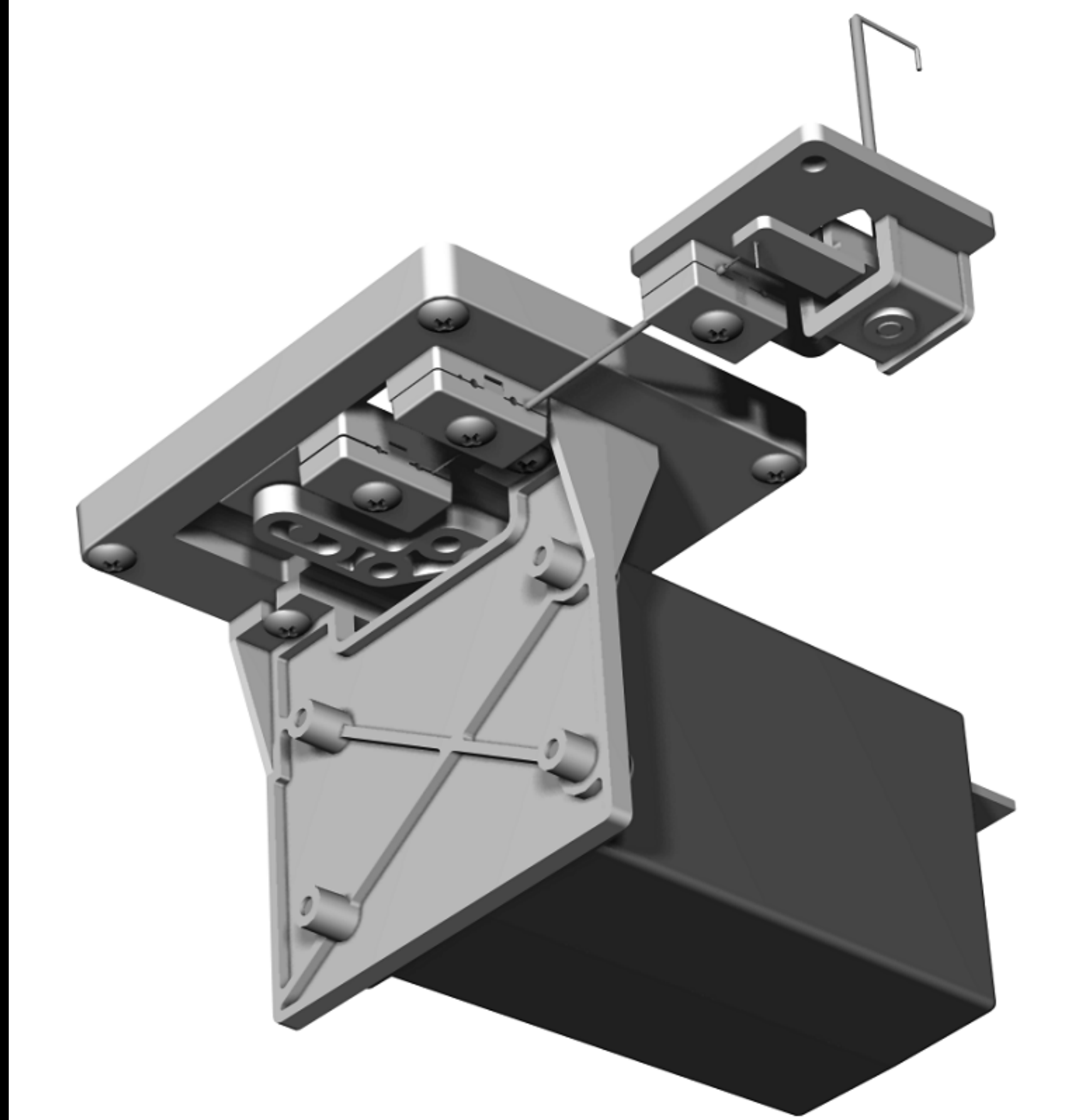
- **TO REALISTICALLY RAISE AND LOWER A CROSSING GATE, A MOTORIZED TURNOUT CONTROLLER OR SERVO MOTOR IS BEST**
- **MOVES IN BOTH DIRECTIONS**
- **MOTION IS REALISTICALLY SLOW**
- **MOTION NEEDS TO BE VERTICALLY UP AND DOWN**
- **TORTOISE SWITCH MACHINES ARE WELL-SUITED FOR DRIVING A CROSSING GATE**
- **NEED TO ADD A REMOTE TORTOISE MOUNT SO SWITCH MACHINE MOTION IS VERTICALLY UP AND DOWN**



# CIRCUITRON TORTOISE SWITCH MACHINE



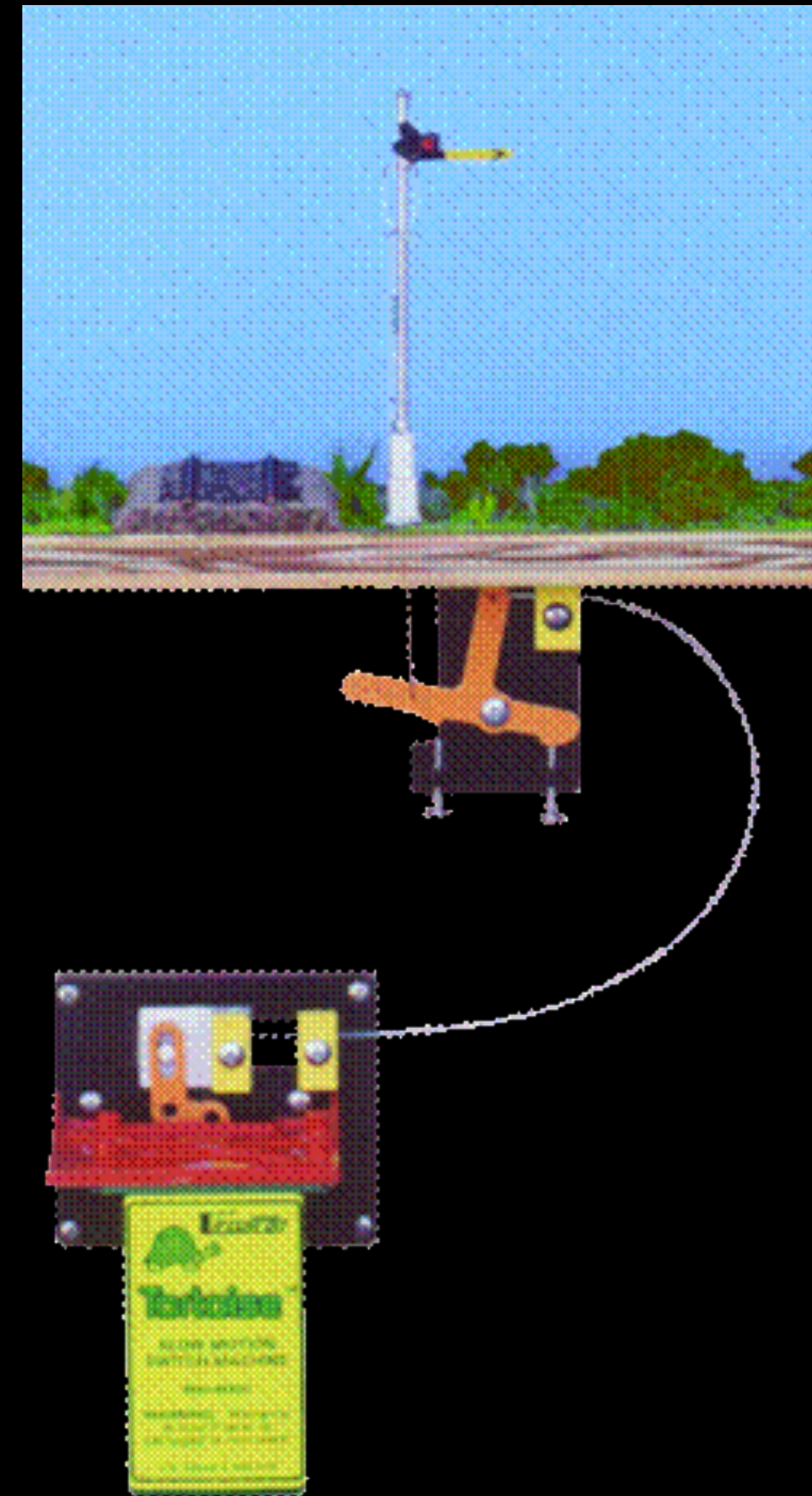
**TORTOISE  
SWITCH  
MACHINE  
ATTACHED TO A  
REMOTE  
TORTOISE  
MOUNT**





# TORTOISE SWITCH MACHINE WITH REMOTE SIGNAL ACTIVATOR

- REMOTE SIGNAL ACTIVATOR IS INTENDED FOR USE WITH SEMAPHORES AND CROSSING GATES
- ALLOWS FOR MORE CONTROL OVER THE LENGTH OF VERTICAL THROW
- MAY NOT BE NECESSARY FOR CROSSING GATES





## **MOUNTING THE TORTOISE MACHINE**

- **USING 3/4" PINE, I  
MADE AN L-SHAPED  
MOUNT FOR THE  
TORTOISE MACHINE**

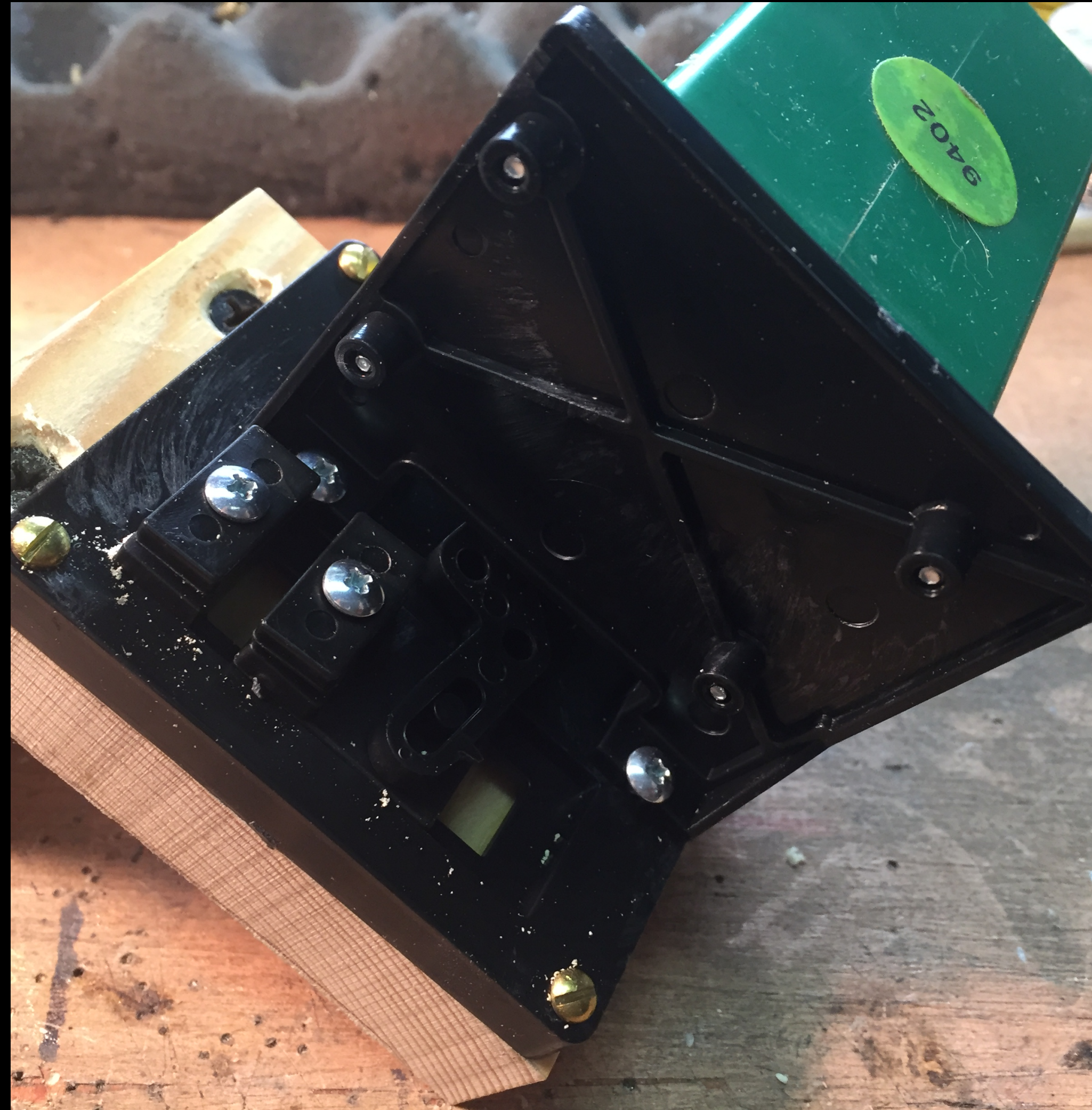




- **BEFORE INSTALLING THE TORTOISE MACHINE ON THE MOUNTING BLOCK, MEASURE THE DISTANCE THE CROSSING GATE ACTUATOR ROD HAS TO TRAVEL IN ORDER TO MOVE THE CROSSING GATE FROM THE UP TO THE DOWN POSITION**
- **ADJUST THE PIVOT ARM ON THE TORTOISE MACHINE SO THE THROW DISTANCE OF THE TORTOISE MACHINE IS THE SAME**
- **THIS WILL USUALLY MEAN POSITIONING THE TORTOISE PIVOT ARM FOR THE SHORTEST THROW POSSIBLE**



**TORTOISE MACHINE  
WITH REMOTE MOUNT  
ATTACHED TO THE L-  
SHAPED MOUNT**



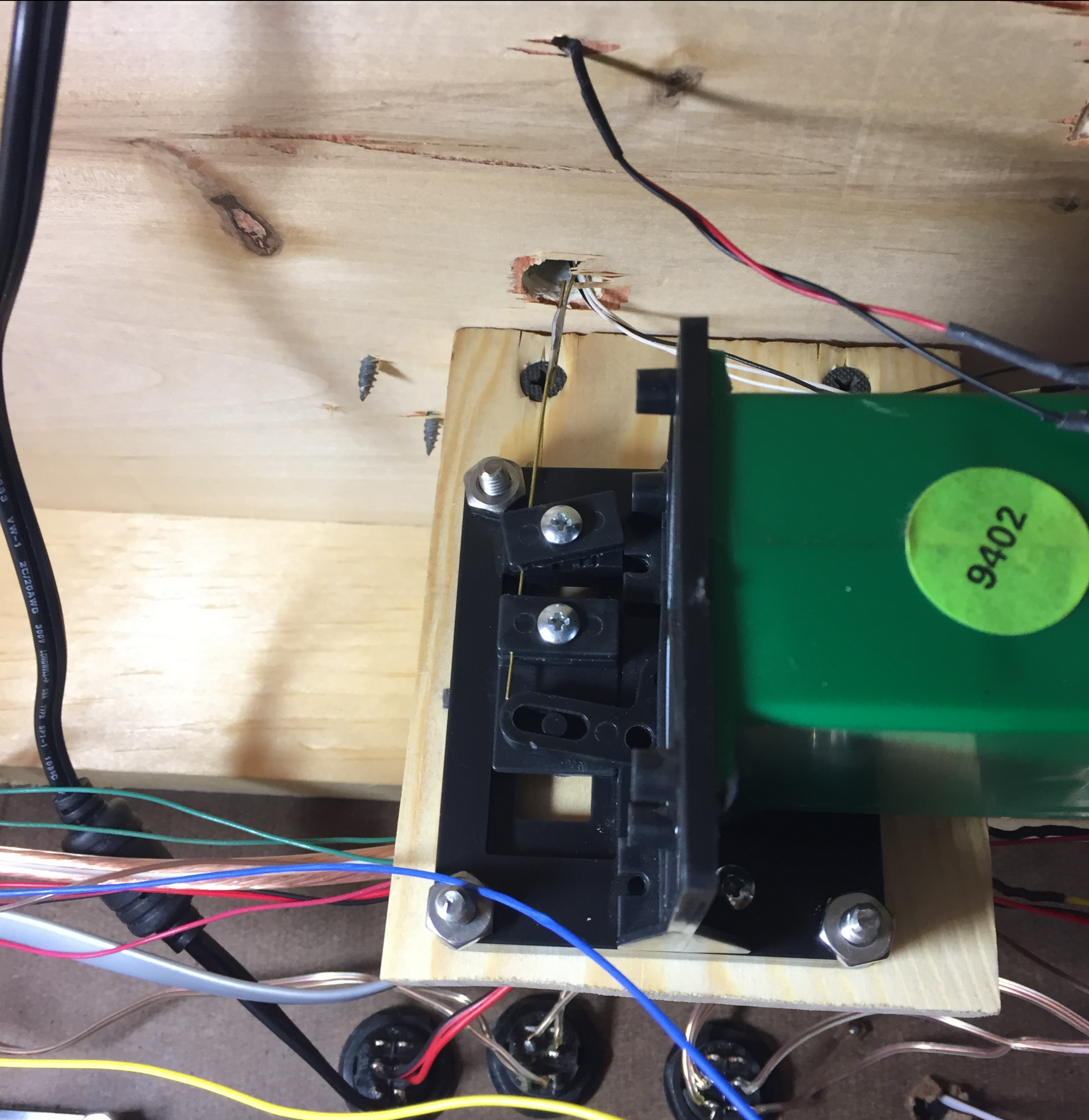


- **MOUNT THE CROSSING GATE ON THE LAYOUT AND DRILL A HOLE SO THE ACTUATOR ROD AND CROSSBUCK FLASHER WIRES PASS THROUGH TO THE UNDERSIDE OF THE LAYOUT**
- **FASTEN THE MOUNTING BLOCK WITH THE TORTOISE MACHINE TO THE UNDERSIDE OF THE LAYOUT SO THE ACTUATOR ROD IS ALIGNED WITH THE TORTOISE MACHINE ROD GUIDE AND ROD CLAMP**



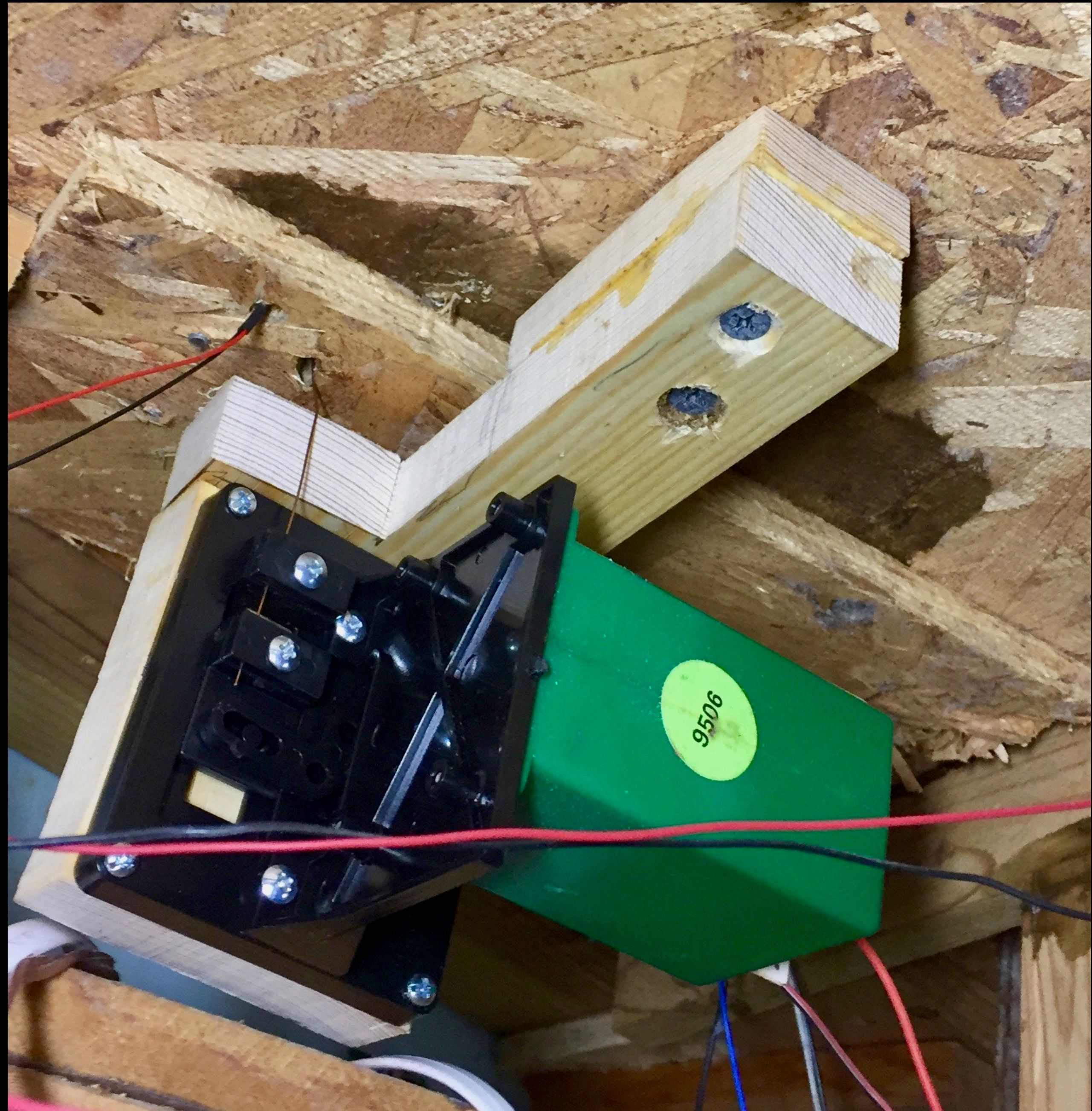


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- **YOU MAY HAVE TO MODIFY YOUR TORTOISE MACHINE MOUNT TO CIRCUMVENT ANY UNDER-THE-BENCHWORK OBSTACLES!**





**GATES UP**





**AND GATES DOWN**





## **DETECTION SYSTEMS TO ACTIVATE THE CROSSBUCK FLASHERS, CROSSING GATES, AND BELL**

- **SO FAR , WE HAVE BRIEFLY DISCUSSED:**
  - **AVAILABILITY OF COMPLETE SYSTEMS**
  - **CROSSBUCK FLASHERS**
  - **CROSSING GATES**
  - **CROSSING GATE DRIVES**
- **NEXT WE WILL DISCUSS DETECTION AND  
ACTIVATION SYSTEMS**



# **DETECTION AND ACTIVATION SYSTEMS**

- **SEVERAL COMPANIES MAKE ELECTRONIC SYSTEMS THAT WILL AUTOMATICALLY ACTIVATE CROSSBUCK FLASHERS, CROSSING GATES, AND CROSSING BELLS WHEN A TRAIN APPROACHES A GRADE CROSSING**
- **BASICALLY THREE WAYS TO DETECT WHEN A TRAIN APPROACHES A GRADE CROSSING:**
  - **PHOTOCELL**
  - **INFRARED EMITTER AND DETECTOR**
  - **CURRENT DETECTOR**



# PHOTOCELL

- **PHOTOCELLS USUALLY MOUNT BETWEEN THE RAILS AND ARE EMBEDDED IN THE TIES**
- **A PHOTOCELL IS A RESISTOR THAT CHANGES RESISTANCE DEPENDING UPON THE AMOUNT OF LIGHT INCIDENT UPON IT**
- **THE ENERGY OF THE PHOTONS (LIGHT) HITTING THE PHOTOCELL FREES ELECTRONS TO FLOW THROUGH THE PHOTOCELL MATERIAL, DECREASING ITS RESISTANCE**
- **ELECTRONIC CIRCUITS DETECT THIS DECREASED RESISTANCE TO TRIGGER CIRCUITS THAT ACTIVATE FLASHERS, GATE MOTORS, ETC.**
- **PHOTOCELL-ACTIVATED CIRCUITS REQUIRE ROOM LIGHTING**
- **CANNOT BE USED IN A DARKENED ROOM**



# CURRENT DETECTION

- TRAIN IS DETECTED WHEN A FLOW OF ELECTRIC CURRENT ACROSS THE RAILS IS DETECTED
- DETECTED CURRENT FLOW IS USED TO ACTIVATE CIRCUIT TO OPERATE FLASHERS, GATES, ETC.
- REQUIRES SECTION(S) OF TRACK IN VICINITY OF GRADE CROSSING TO BE ISOLATED
- ALSO REQUIRES METAL WHEELS WITH RESISTORS ON ROLLING STOCK TO BE DETECTED
- CAN BE USED IN A DARKENED ROOM



# **INFRARED EMITTER AND DETECTORS**

- **INFRARED LIGHT IS LIGHT THAT IS ABOVE THE VISIBLE SPECTRUM**
- **WE USE INFRARED LIGHT EVERYDAY (E.G., TV REMOTES)**
- **DEPENDING UPON THE PLACEMENT OF THE EMITTER AND DETECTOR, A TRAIN CAN BE DETECTED IF EITHER THE INFRARED BEAM BETWEEN THE EMITTER AND DETECTOR IS BROKEN OR COMPLETED**
- **CAN BE USED IN A DARKENED ROOM**



- **INFRARED EMITTER AND DETECTOR IN ACROSS-THE-TRACK CONFIGURATION**
- **WHEN TRAIN PASSES BETWEEN EMITTER AND DETECTOR, IT BLOCKS THE INFRARED BEAM AND THE DETECTOR STOPS DETECTING THE EMITTER BEAM**

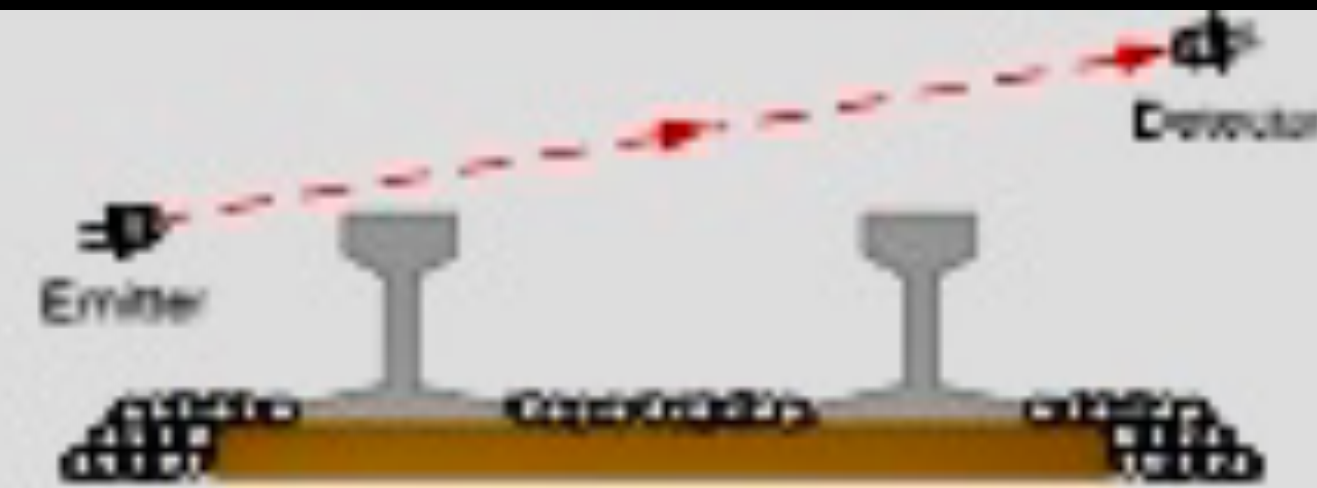


Figure 9a

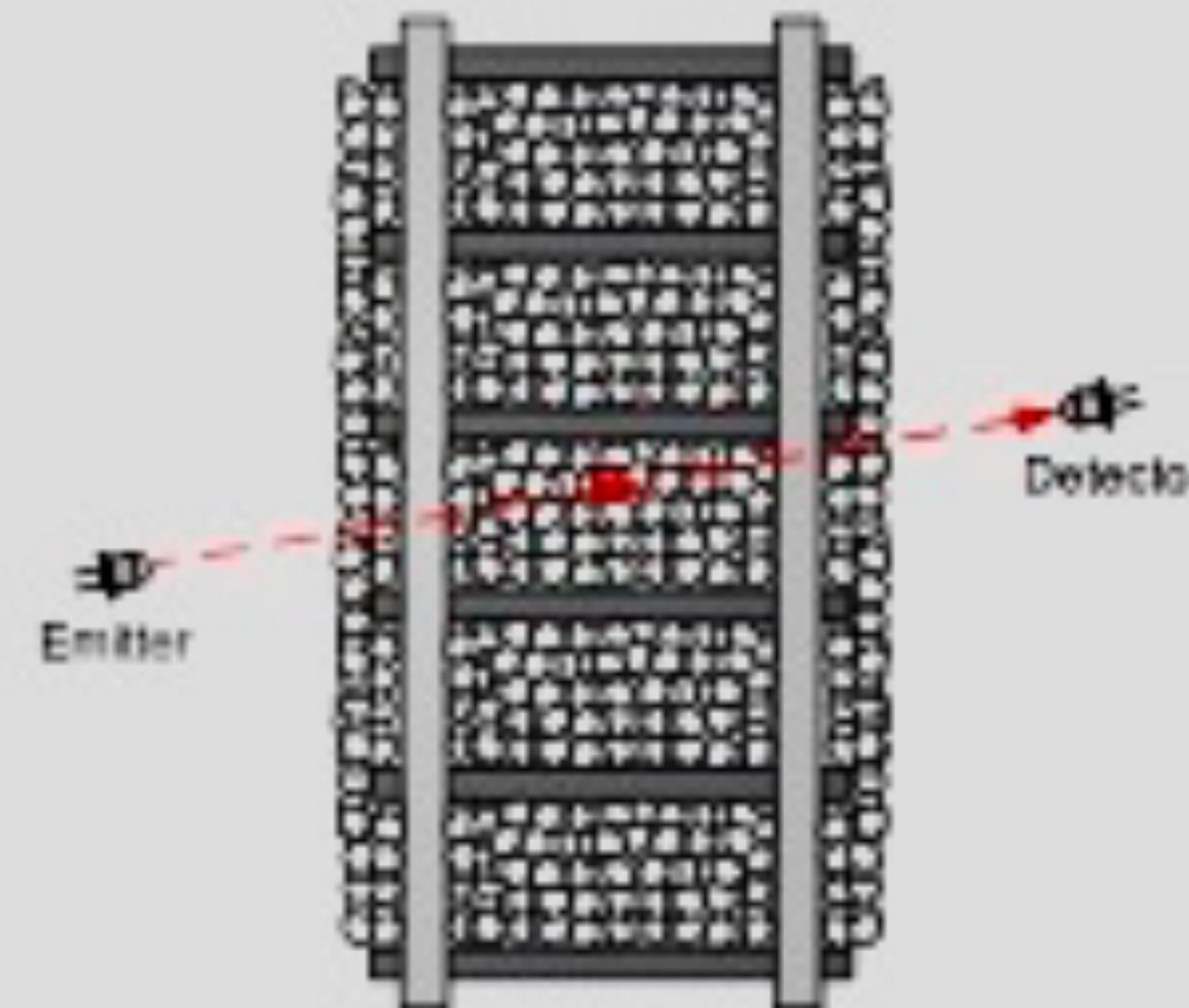


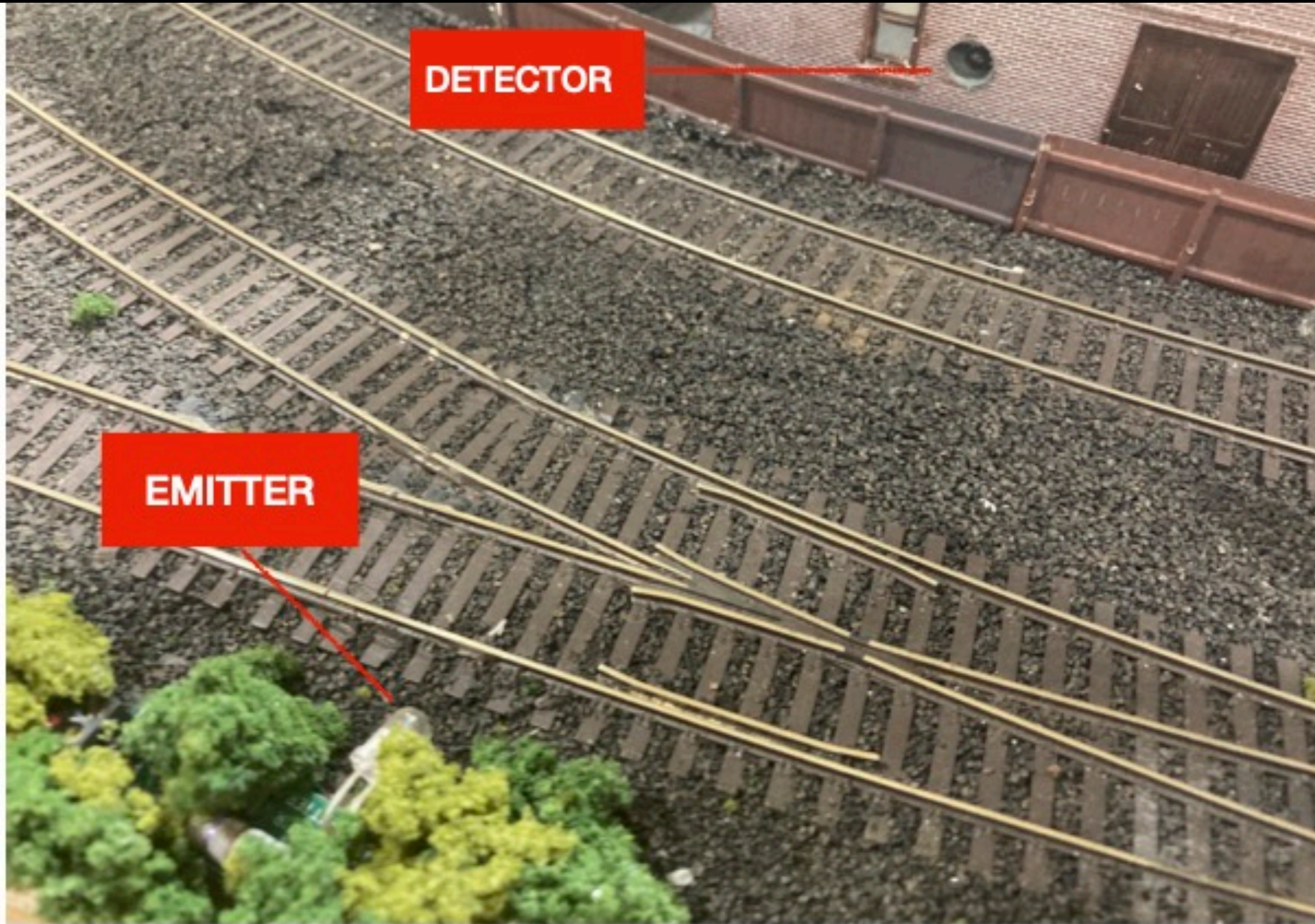
Figure 9b



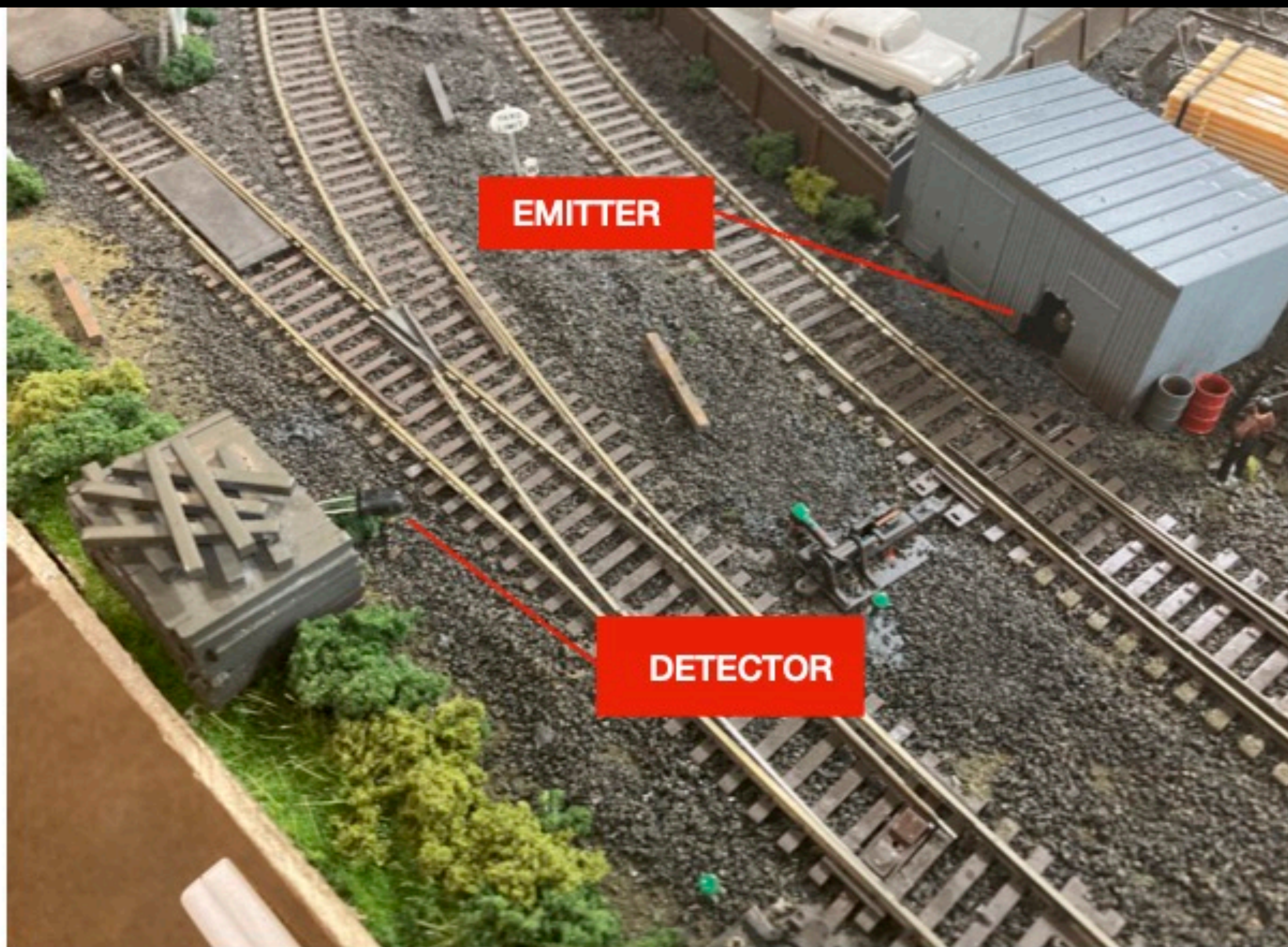
# **THE TRICK IS TO DISGUISE THE EMITTER AND DETECTOR**

- **HIDE THEM IN FOLIAGE**
- **HIDE THEM IN TRACKSIDE STRUCTURES**

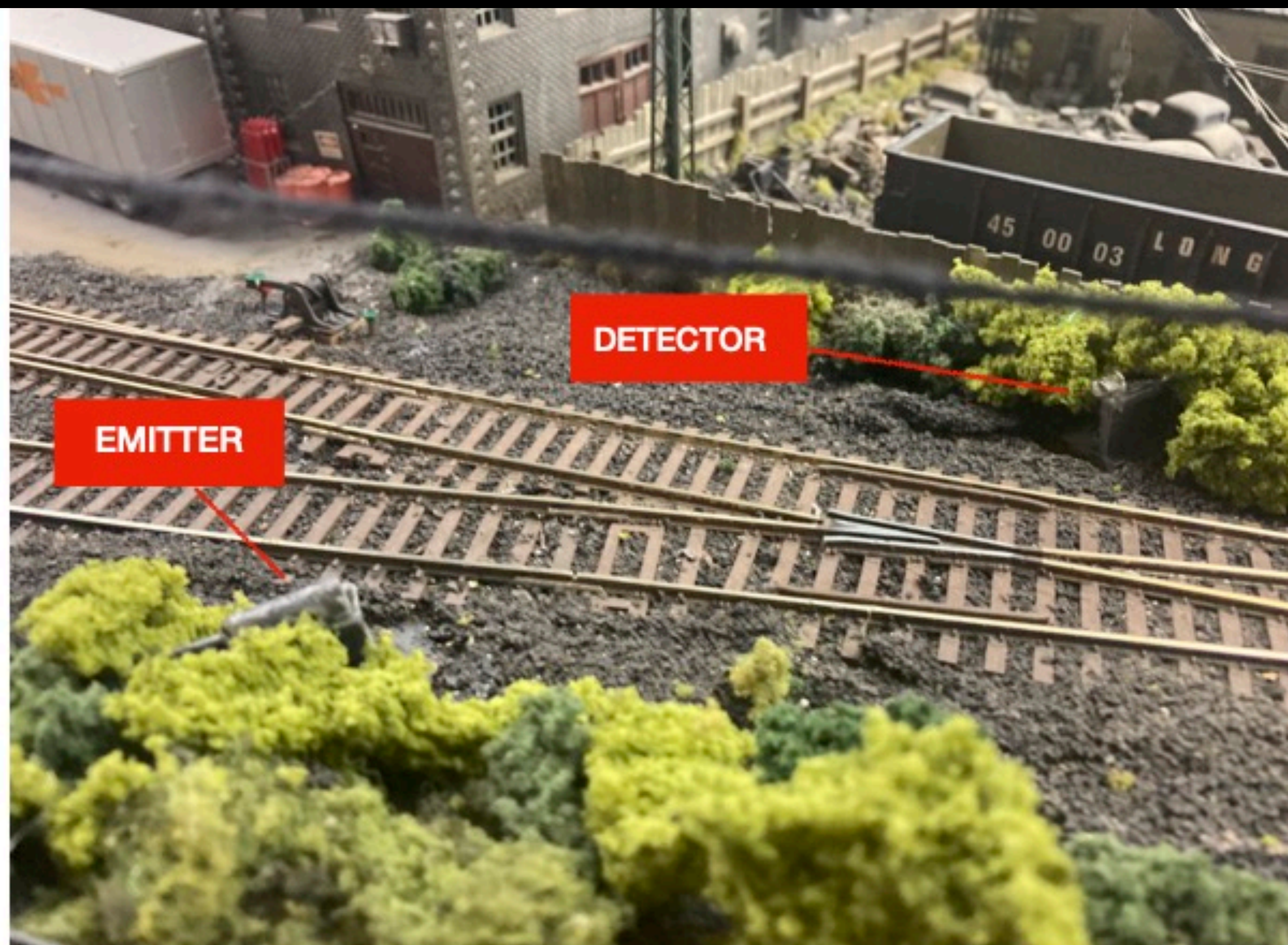


















- **INFRARED EMITTER AND DETECTOR IN BETWEEN-THE-RAILS CONFIGURATION**
- **WHEN TRAIN PASSES OVER THE EMITTER, INFRARED BEAM IS REFLECTED OFF OF BOTTOM OF ENGINE OR CAR TO THE DETECTOR**
- **NO NEED TO HIDE EMITTER AND DETECTOR**

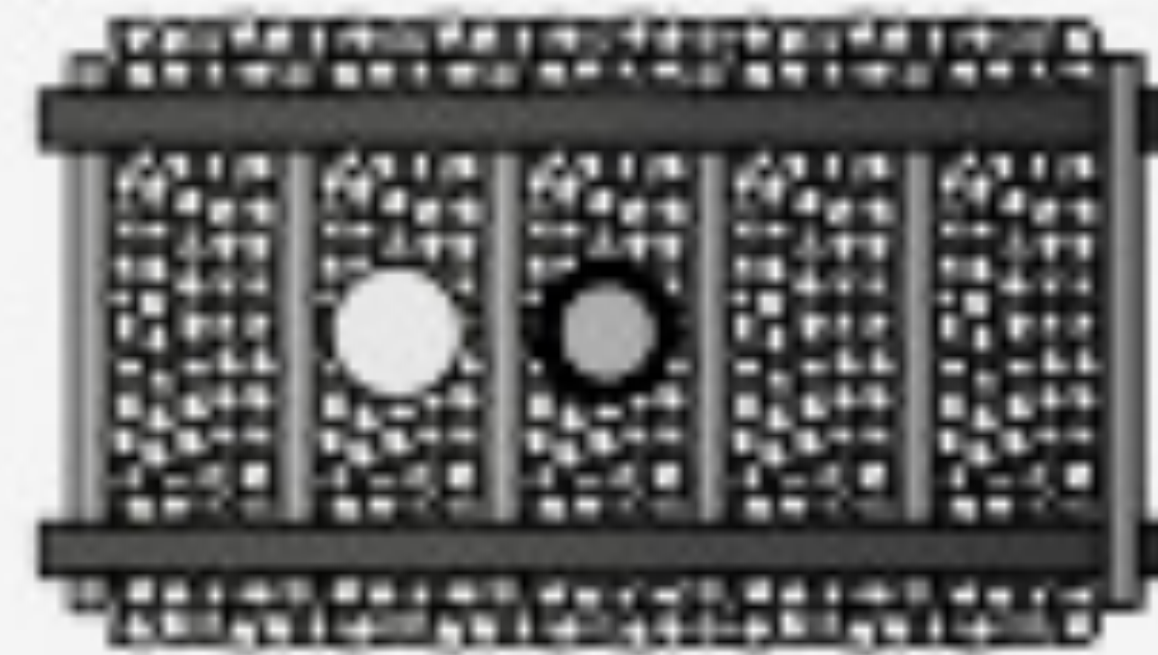


Figure 8a





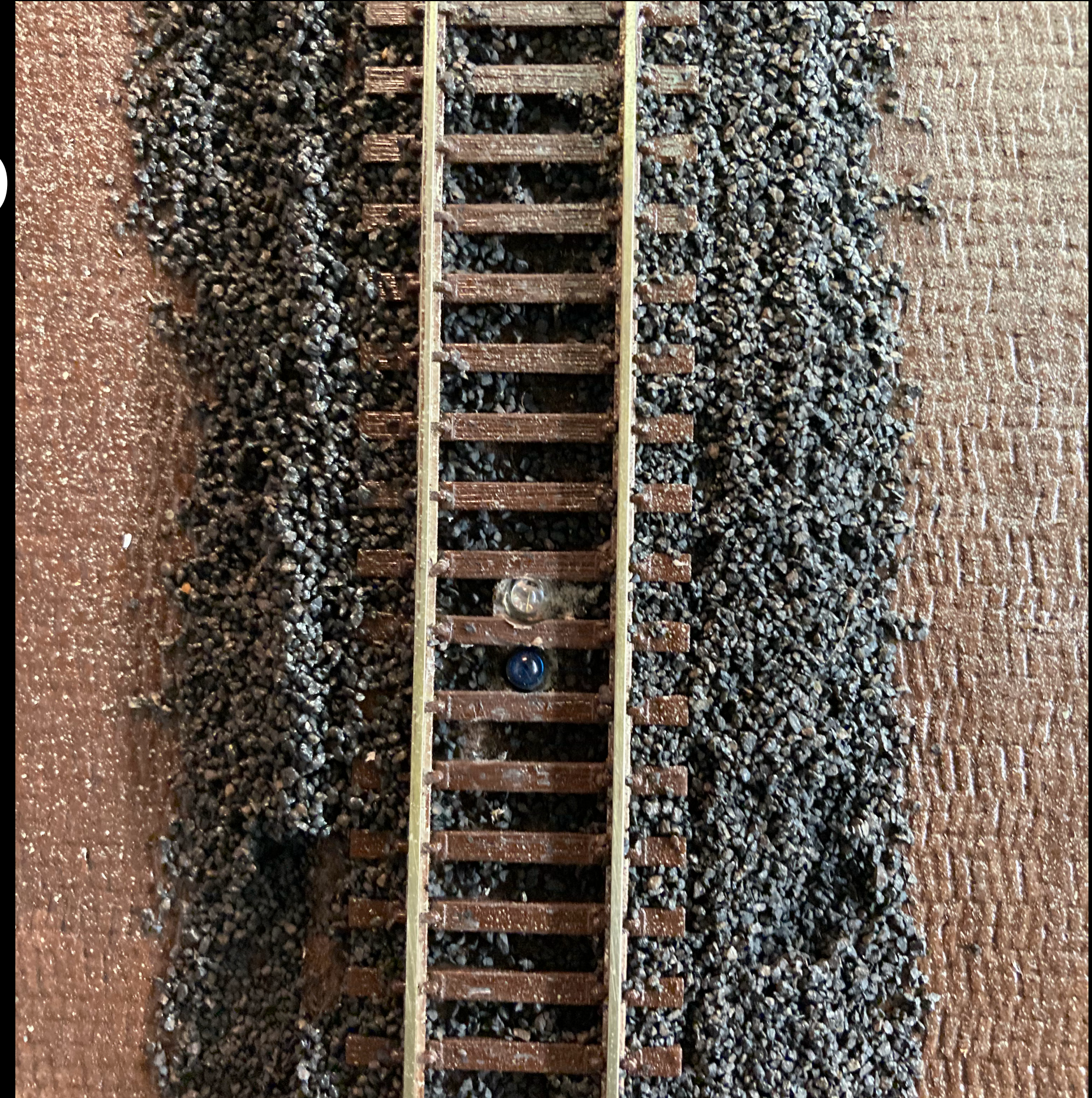
**HOLES DRILLED IN  
TRACK FOR  
MOUNTING  
INFRARED EMITTER  
AND DETECTOR  
BETWEEN THE RAILS**





# INFRARED EMITTER AND DETECTOR MOUNTED BETWEEN THE RAILS

- **EMITTER IS AT TOP, DETECTOR IS AT THE BOTTOM**





# **WHO MAKES DETECTION SYSTEMS THAT WILL OPERATE FLASHERS, GATES, AND BELLS?**

- **CIRCUITRON**
- **Z-STUFF FOR TRAINS**
- **ARDUINO CIRCUITS**
- **LOGIC RAIL TECHNOLOGIES**
- **THERE ARE OTHERS (LOOK ON  
EBAY)**



# CIRCUITRON

- **MANUFACTURES VARIETY OF DETECTION CIRCUITS TO OPERATE JUST CROSSBUCK FLASHERS AS WELL AS FLASHERS,GATES AND BELL**
- **DT-1, 2, & 3 CIRCUITS WORK ON DC ONLY (WILL NOT WORK ON DCC)**
- **DF-2 USES OPTICAL SENSORS AND OPERATES FLASHERS, GATES AND BELL**
- **DF-3 USES CURRENT DETECTION AND OPERATES FLASHERS, GATES AND BELL**
- **REQUIRES 3 ISOLATED TRACK SECTIONS AND ROLLING STOCK MUST USE METAL WHEELSETS WITH RESISTORS TO BE DETECTED**
- **AVAILABILITY QUESTIONABLE**



# **Z-STUFF FOR TRAINS**

- **DZ-1010HOs NOT LISTED ON WEB PAGE PRODUCT LIST**
- **ASSUME IT OPERATES SIMILAR TO S AND O GAUGE CROSSING GATES (OPTICAL DETECTORS)**
- **APPEARS TO MOUNT ON A PLATFORM (NOT PROTOTYPIC)**
- **CIRCUIT BOARD EXTENDS BELOW LAYOUT**



# ARDUINO CIRCUITS

- **ARDUINO IS COMPANY THAT MAKES MICROPROCESSORS YOU CAN PROGRAM**
- **TAKES INPUTS, E.G., FROM PHOTOCCELL OR INFRARED SENSOR**
- **OUTPUTS ARE SIGNALS TO OPERATE FLASHERS, GATES**

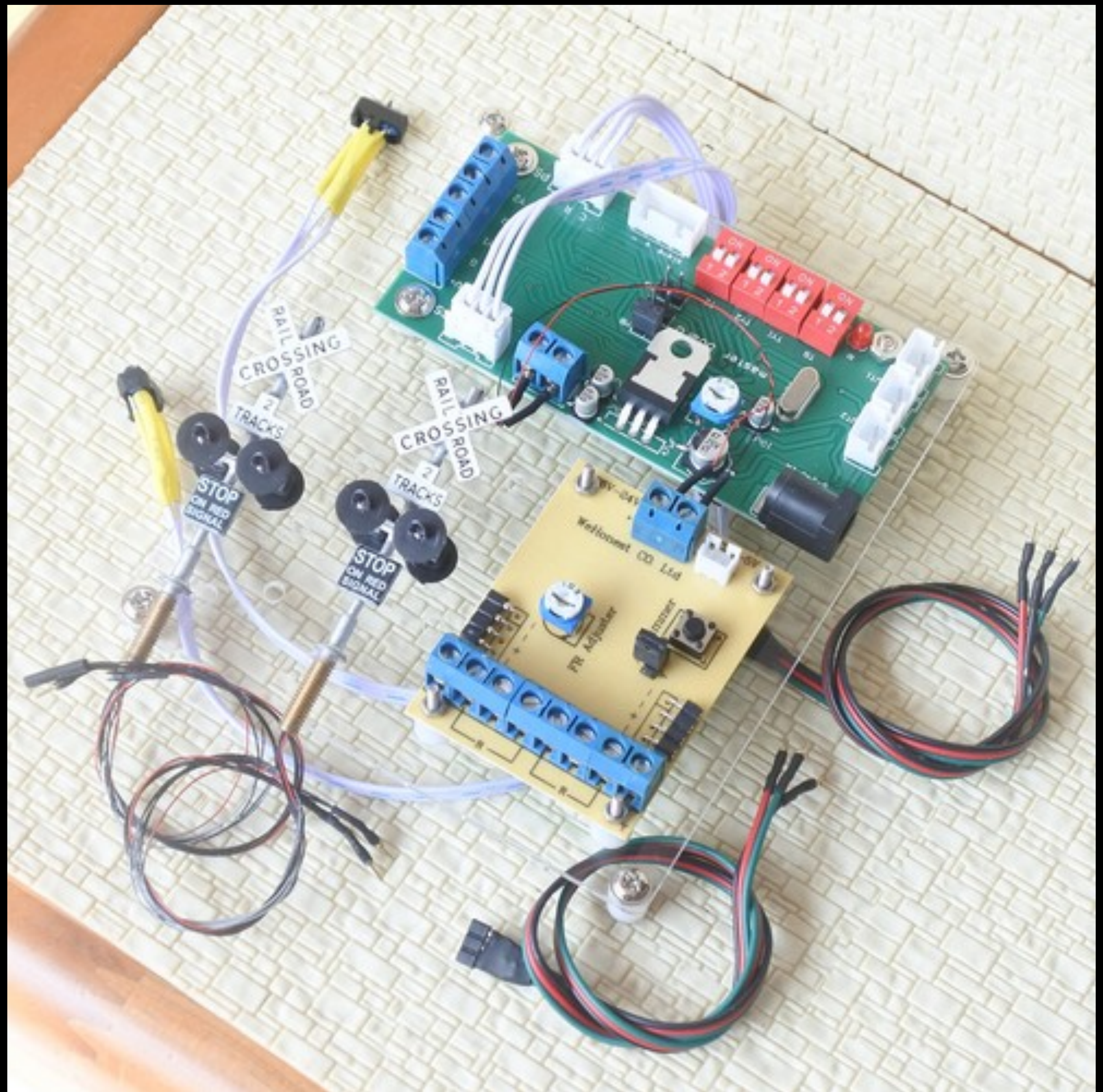


- **UTILIZES ARDUINO PROGRAMMING LANGUAGE AND SOFTWARE**
- **YOU PROGRAM THE MICROPROCESSOR ON YOUR HOME COMPUTER**
- **ONCE IT IS PROGRAMMED, YOU CAN DISCONNECT IT AND MOUNT IT ON YOUR LAYOUT AND CONNECT COMPONENTS TO IT**



**FOUND ON EBAY  
FOR ~\$40**

**EMITTERS AND  
DETECTORS WILL ONLY  
OPERATE CROSSBUCK  
FLASHERS**





# NOTE!

- Most emitter and detector circuits (photo cell and infrared) will only activate a crossing gate or cross buck if the light beam is broken.
- If you place an emitter/detector pair, say 5-6 car lengths upstream and downstream of the crossing, if you have a train shorter than 10-12 cars, the cross bucks will stop flashing and the gates will go up once the light beam of a detector/emitter pair is unbroken when the last car passes.
- This can be partially rectified by adding a second emitter/detector pair on each side of the crossing
- Also, when using an infrared emitter/detector pair, position them at an angle across the tracks. That way, the light beam will not be broken by the gap between cars as they pass



# LOGIC RAIL TECHNOLOGIES

- CIRCUIT IS CALLED **GRADE CROSSING PRO/2 (GCP/2)**
- UTILIZES PHOTOCELLS, CURRENT DETECTION, INFRARED SENSORS PROVIDED WITH THE GCP/2 OR INFRARED SENSORS FROM ANOTHER VENDOR (E.G., IOWA SCALED ENGINEERING'S TRAINSPOTTER)
- INFRARED EMITTERS AND DETECTORS CAN BE MOUNTED BETWEEN THE RAILS OR ACROSS THE RAILS
- DETECTS TRAIN AND ACTIVATES FLASHERS, GATE MOTORS, AND CROSSING BELL



- **SAME CIRCUIT BOARD IS USED FOR ALL 4 DETECTOR TYPES (SWITCHES ON CIRCUIT BOARD USED TO CONFIGURE BOARD TO DETECTOR TYPE)**
- **HAS AN OUTPUT FOR AN “END-OF-GATE” LED THAT DOESN’T FLASH**
- **PROVIDES REALISTIC “FADING” OF CROSSBUCK FLASHER LAMPS WHEN FLASHING (CALLED TRUE LAMP2)**
- **LATEST GCP/2 HAS GATE MOTOR OUTPUTS THAT WILL DRIVE TORTOISE SWITCH MOTORS AND SEPARATE ONES FOR SERVO MOTORS**



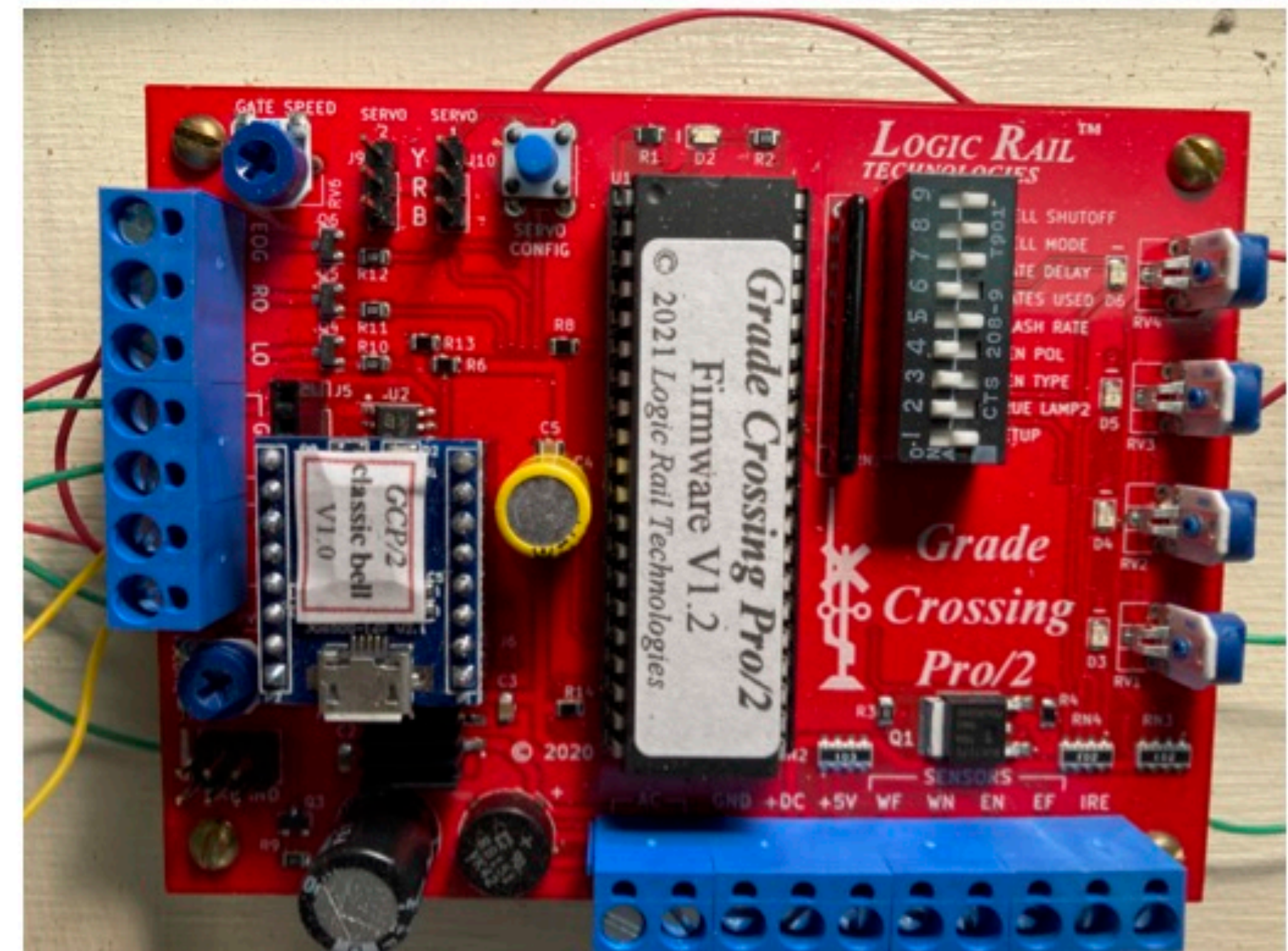
# CROSSING BELL

- **LOGIC RAIL TECHNOLOGIES HAS 3 DIFFERENT BELL TONES**
  - **CLASSIC MECHANICAL BELL**
  - **MODERN ELECTRONIC BELL**
  - **“FAST” CLASSIC MECHANICAL BELL**
- **BELL CAN RING CONTINUOUSLY OR ONLY WHEN GATES ARE MOVING**

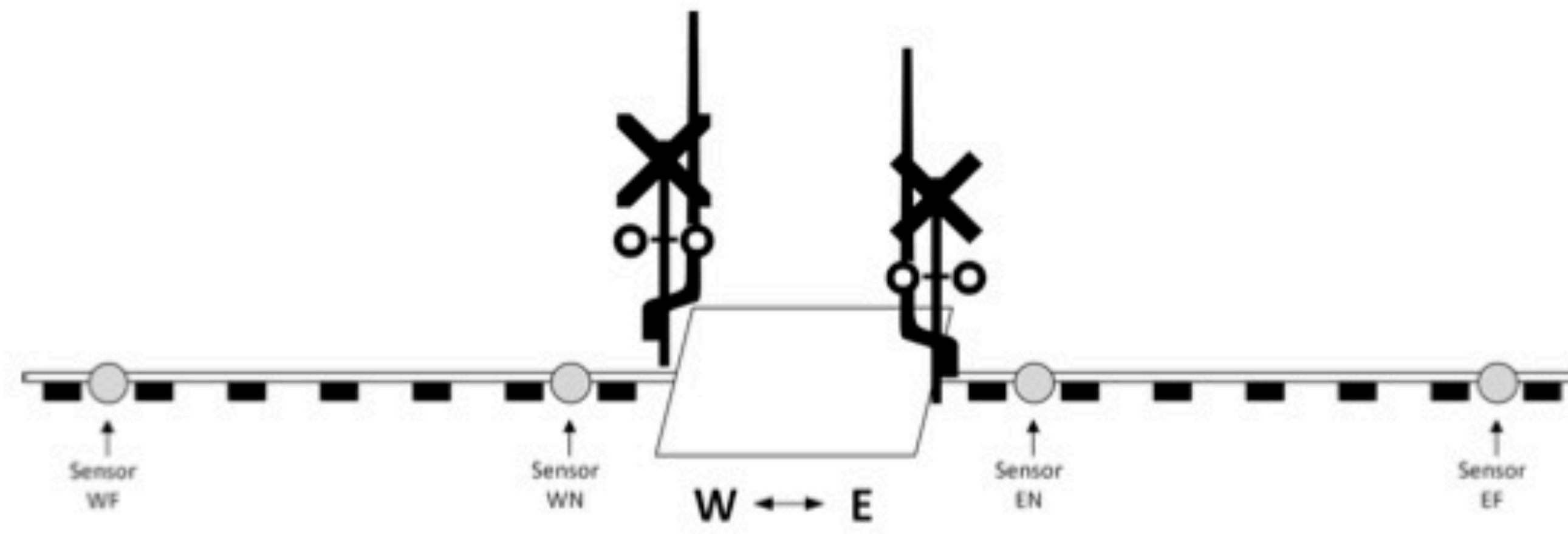


# GRADE CROSSING PRO/2 CIRCUIT BOARD

NOTE THAT BELL  
CIRCUIT PLUGS  
DIRECTLY INTO  
THE GCP/2









# HOW IT WORKS

- **EASTBOUND TRAIN (LEFT TO RIGHT) ACTIVATES FLASHERS (AND BELL ) WHEN TRAIN PASSES WF**
- **AFTER SHORT DELAY, GATE MOTORS ARE ACTIVATED AND GATES LOWER**
- **SIGNALS CONTINUE TO FLASH, BELL RINGS, AND GATES REMAIN LOWERED EVEN IF TRAIN CLEARS WF AS LONG AS TRAIN PASSES OVER WN SENSOR WITHIN 35 SECONDS**
- **TRAIN THEN PASSES EN SENSOR**
- **TWO SECONDS AFTER LAST CAR CLEARS EN SENSOR, GATES WILL RAISE**
- **THREE SECONDS LATER THE FLASHERS AND BELL STOP**

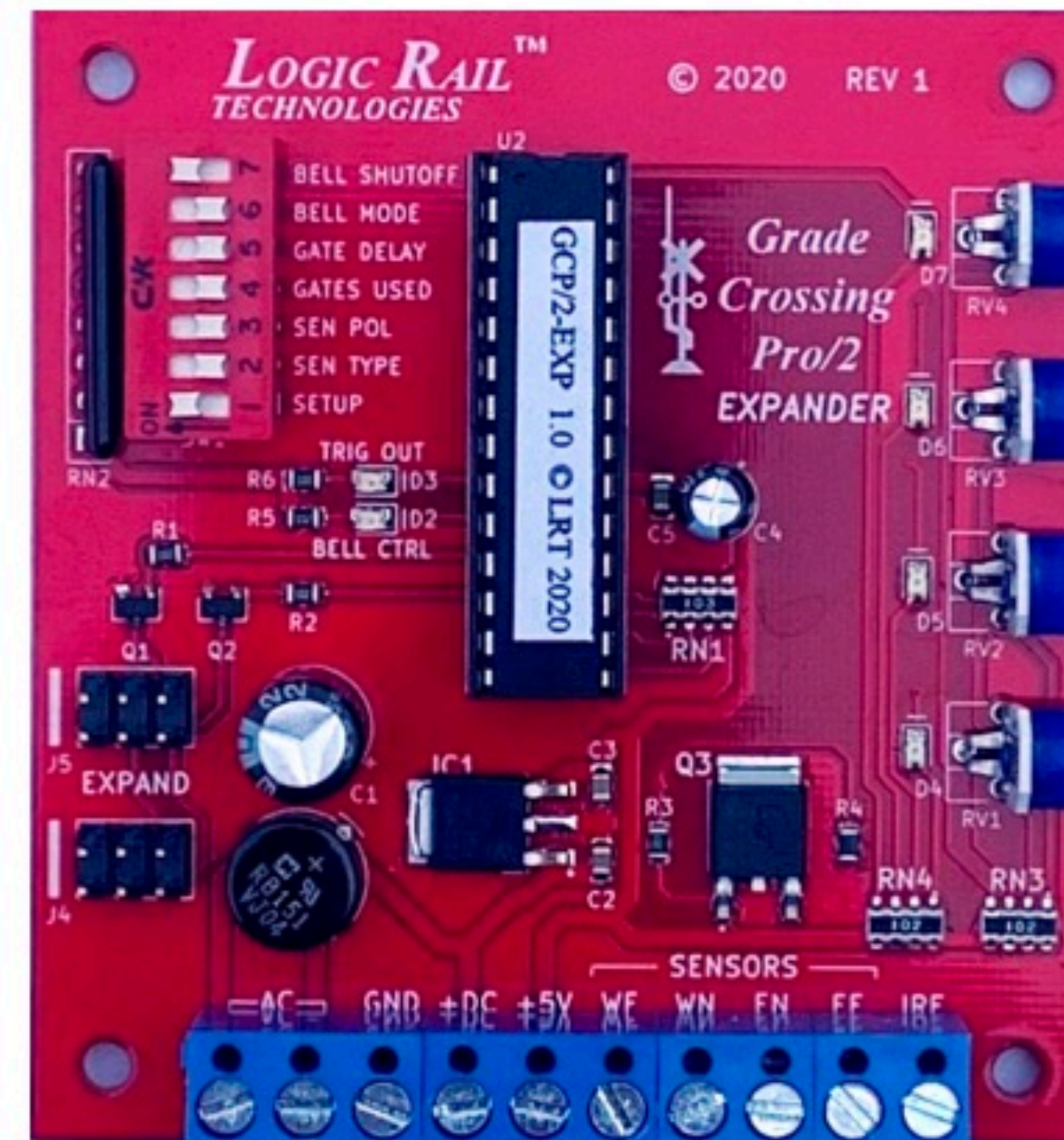


- **IF TRAIN PASSES WF BUT DOES NOT REACH WN WITHIN 35 SECONDS, ASSUMPTION IS THAT TRAIN HAS REVERSED**
- **FLASHERS AND BELL WILL STOP AND GATES WILL RAISE**
- **SYSTEM BEHAVES THE SAME FOR A WESTBOUND TRAIN**



## WHAT IF I HAVE A MULTIPLE TRACK GRADE CROSSING?

- LOGIC RAIL TECHNOLOGIES MAKES A GCP/2 EXPANDER
- SENSORS IN ADDITIONAL TRACK CONNECT TO THE EXPANDER BOARD
- EXPANDER BOARD CONNECTS TO MAIN BOARD (GCP/2)
- ONE EXPANDER BOARD NEEDED FOR EACH ADDITIONAL TRACK





- **NOTE: IF YOU MOUNT THE EMITTERS AND DETECTORS ACROSS MULTIPLE TRACKS (RATHER THAN EMBED THEM BETWEEN THE TIES), A SINGLE GPC/2 WILL WORK AS LONG AS TWO TRAINS DO NOT ACTIVATE THE EMITTER/DETECTORS AT THE SAME TIME**
- **SYSTEM WILL NOT FUNCTION PROTOTYPICALLY IF TWO OR MORE TRAINS ACTIVATE EMITTER/DETECTORS**

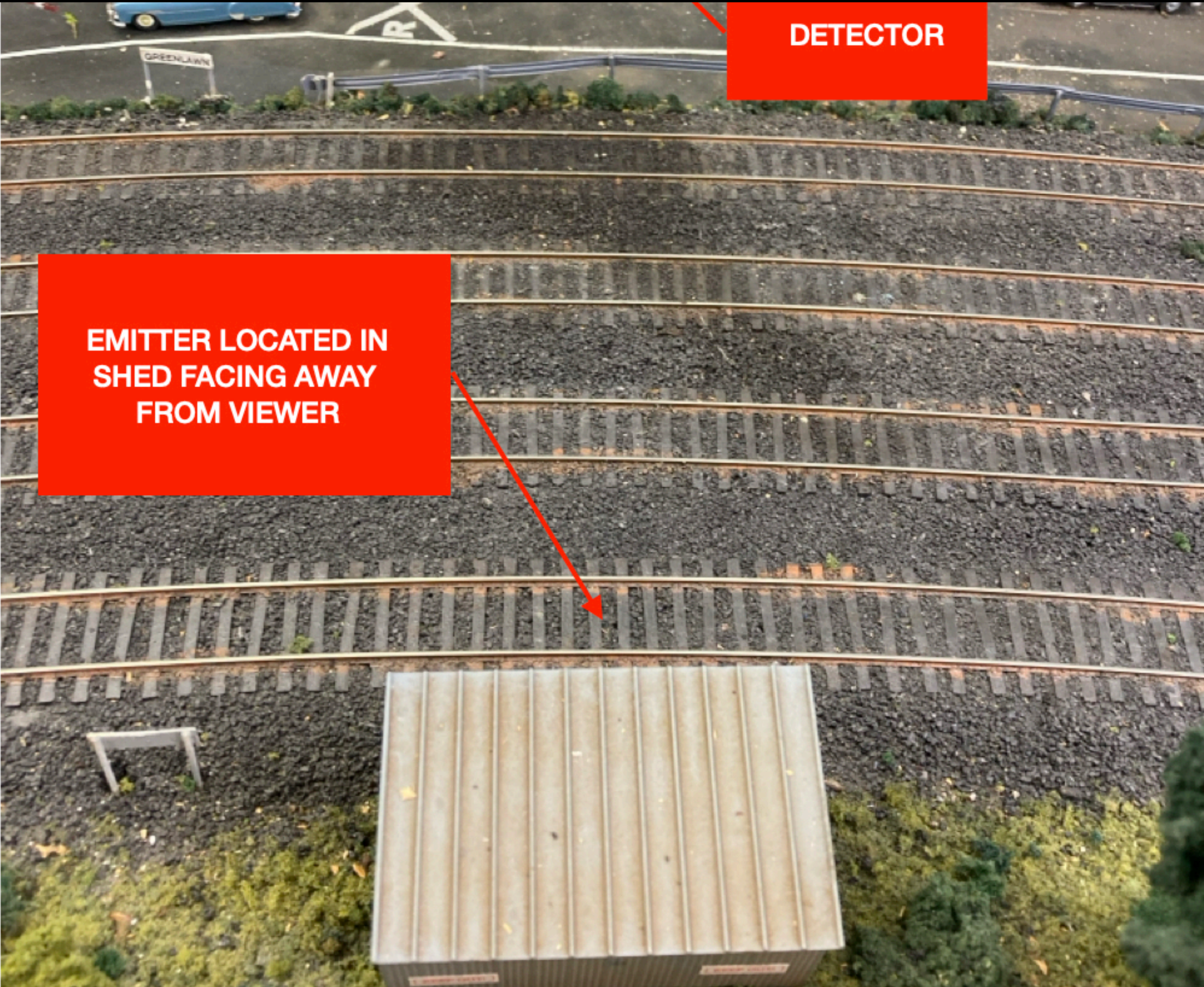




DETECTORS

EMMITERS HIDDEN BEHIND SHEDS



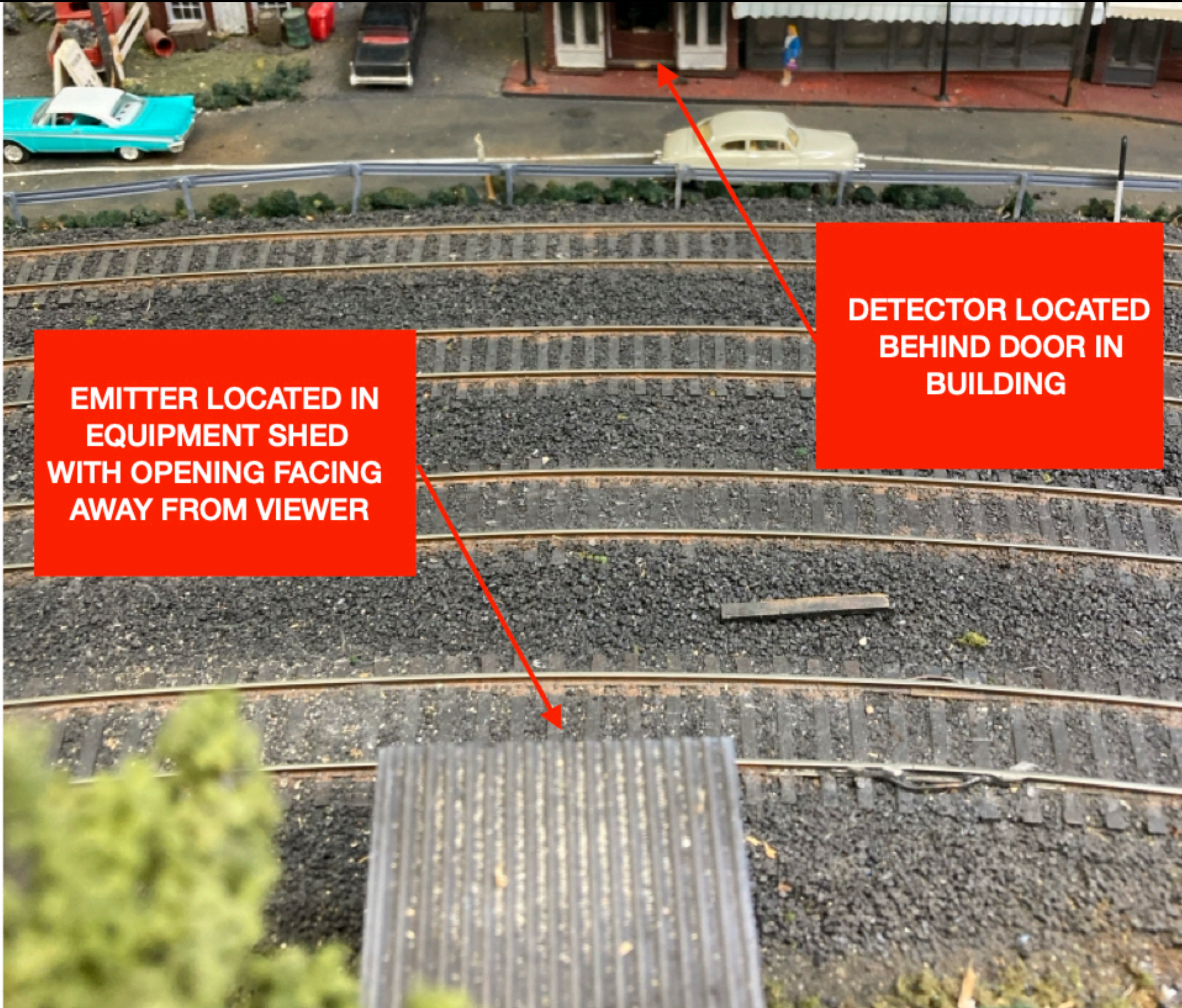


DETECTOR

An aerial photograph of a railway track. At the top, a road with a blue car and a 'GREENLAWN' street sign is visible. The track consists of several parallel rails on a bed of gravel. A red box labeled 'DETECTOR' is positioned on the top track. A red arrow points from this box to a red box labeled 'EMITTER LOCATED IN SHED FACING AWAY FROM VIEWER' which is positioned on a track further down. Below the tracks, there is a corrugated metal roof of a shed and some greenery.

EMITTER LOCATED IN  
SHED FACING AWAY  
FROM VIEWER





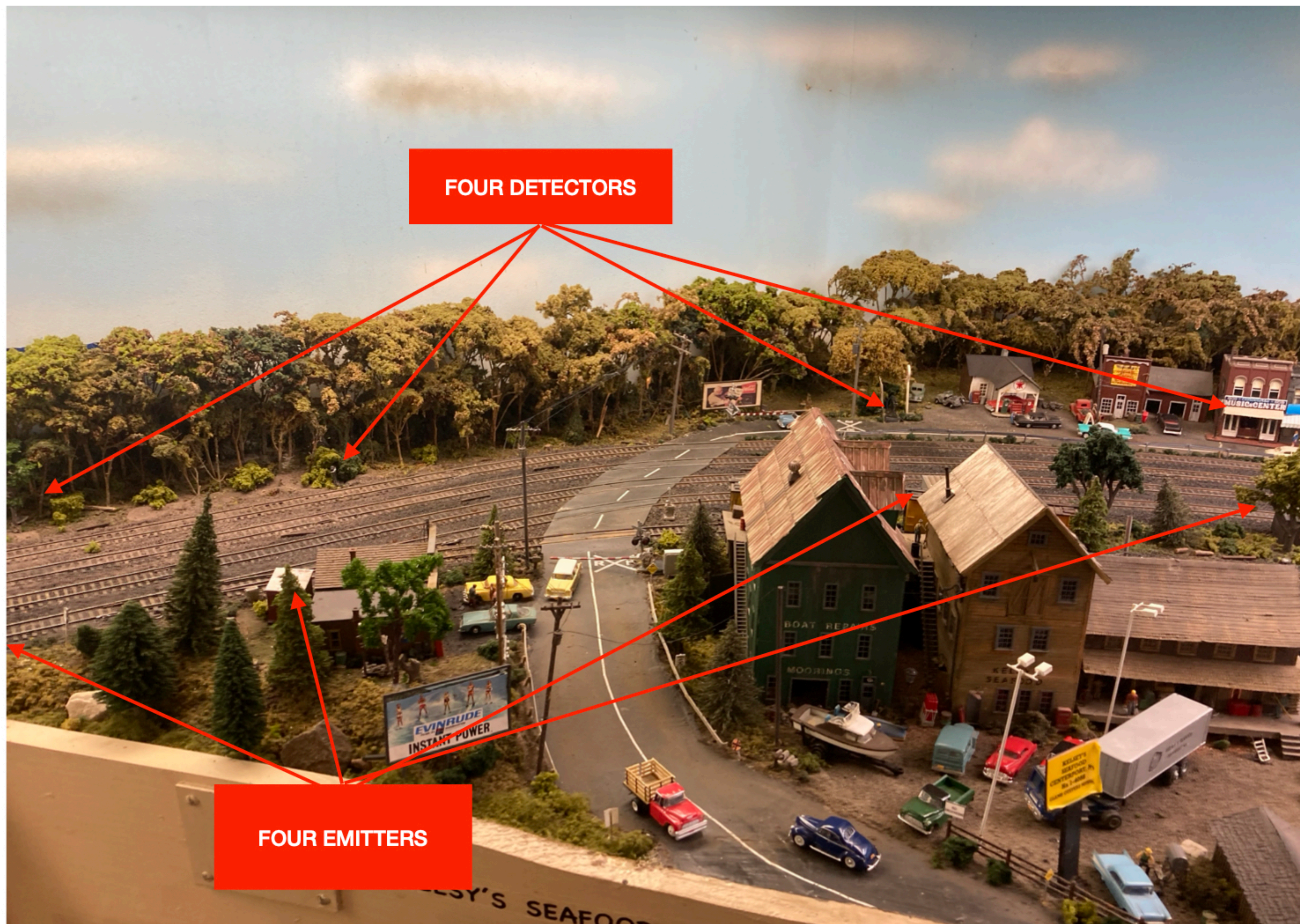
**EMITTER LOCATED IN  
EQUIPMENT SHED  
WITH OPENING FACING  
AWAY FROM VIEWER**

**DETECTOR LOCATED  
BEHIND DOOR IN  
BUILDING**



FOUR DETECTORS

FOUR EMITTERS



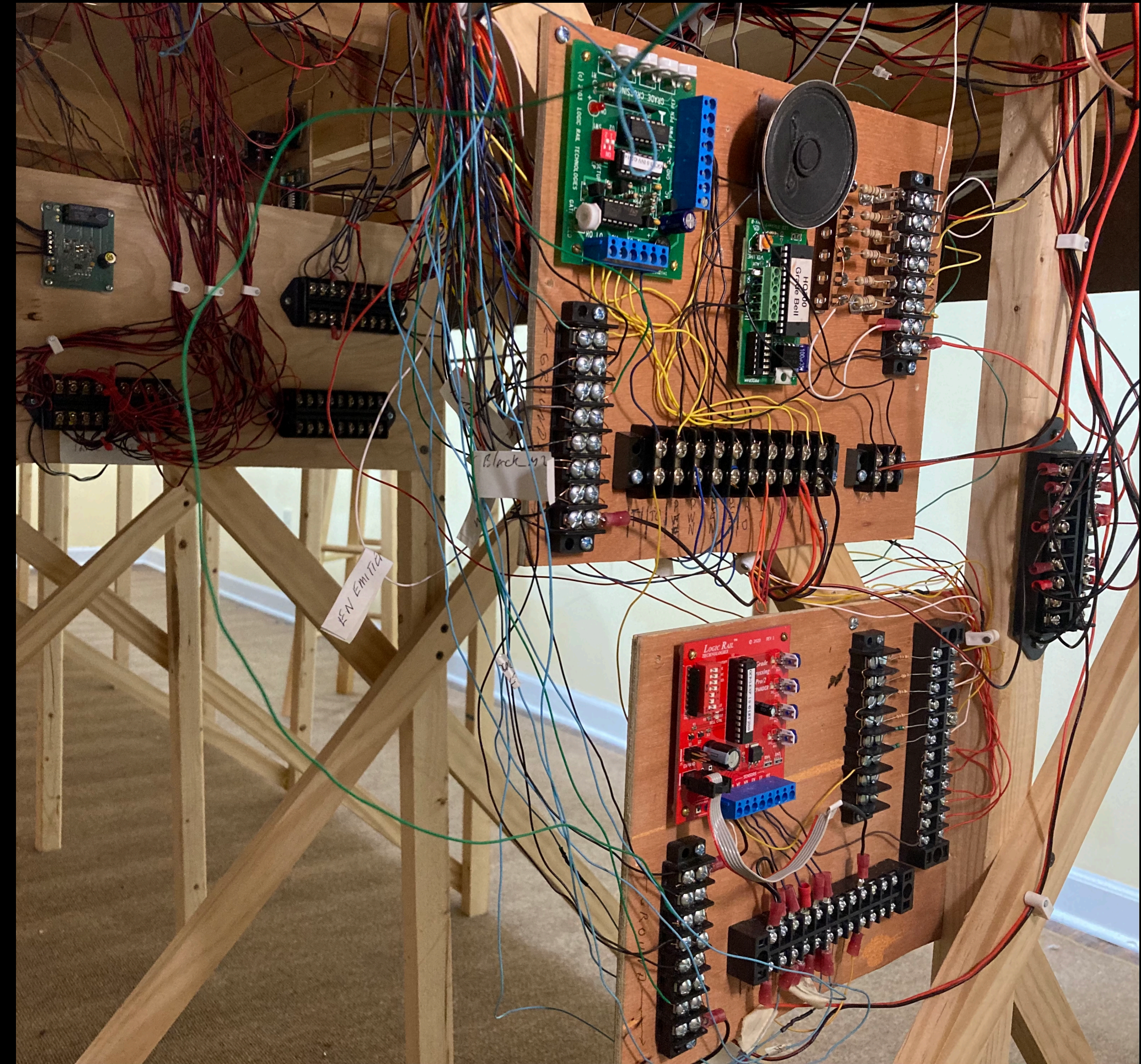


## **SO HOW HARD IS IT TO HOOK ALL THIS STUFF UP?**

- **INSTRUCTIONS FOR GCP/2 ARE VERY CLEAR AND NOT COMPLICATED**
- **BEST TO MOUNT CIRCUIT BOARDS ON A PIECE OF PLYWOOD AND CONNECT CIRCUIT BOARD TERMINALS TO TERMINAL BLOCKS ALSO MOUNTED ON THE PLYWOOD BOARD**
- **THIS IS BECAUSE SEVERAL OF THE CIRCUIT BOARD TERMINALS WILL REQUIRE MULTIPLE WIRES CONNECTING TO THEM**
- **ALSO, CONNECTING WIRES TO LARGER TERMINAL BLOCKS IS EASIER THAN CONNECTING THEM TO THE CIRCUIT BOARD**



- **INSTALLATION OF A GCP (OLDER VERSION OF THE GCP/2) WITH BELL CIRCUIT (TOP) FOR A TWO-TRACK GRADE CROSSING**
- **GCP/2 EXPANDER CIRCUIT BEING USED FOR SECOND TRACK (BELOW)**





- **LOTS OF WIRES, BUT REMEMBER, EACH CIRCUIT BOARD HAS 4 EMITTERS AND 4 DETECTORS**
- **32 SENSOR WIRES GOING TO 2 CIRCUIT BOARDS (16 SENSOR WIRES PER TRACK)**
- **3 WIRES GO TO EACH CROSSBUCK FLASHER**
- **4 WIRES GO TO 2 SWITCH MACHINES**
- **2 WIRES GO TO THE SPEAKER**
- **2 WIRES FOR POWER SUPPLY TO CIRCUIT BOARDS**



- **CIRCUITRON** DF-2 CIRCUIT BOARD - NO PRICE AVAILABLE IN CATALOG (LISTED AS TBD BUT PROBABLY >\$50)
- Z-STUFF FOR TRAINS - 2 FLASHERS AND GATES = \$152.00
- **ARDUINO** -STARTER KIT IS ABOUT \$35
- **MODEL TRAIN TECHNOLOGIES** - COMPLETE SYSTEM IS ABOUT \$380
- **LOGIC RAIL TECHNOLOGIES**
  - GCP/2 (WITH PHOTOCELL DETECTORS) = \$47.95
  - GCP/2 WITH INFRARED DETECTORS) = \$59.95
  - GCP/2 FOR EXTERNAL DETECTORS =\$39.95



- **GCP/2 EXPANDER FOR ADDITIONAL TRACKS**
  - **INFRARED SENSORS - \$49.95**
  - **PHOTOCELL SENSORS -\$37.95**
  - **EXTERNAL SENSORS - \$29.95**
- **CROSSING BELL CIRCUIT (3 BELL SOUNDS AVAILABLE) =\$19.95**
- **2" 8 OHM SPEAKER (FOR CROSSING BELL) =\$6.00**



# **LET'S TAKE A LOOK AT AN OPERATIONAL GRADE CROSSING IN HO SCALE THAT USES:**

- **NJ INTERNATIONAL COMBINATION  
CROSSBUCK FLASHERS AND CROSSING  
GATES**
- **2 CIRCUITRON TORTOISE SWITCH MACHINES**
- **LOGIC RAIL TECHNOLOGIES GCP/2 WITH  
INFRARED SENSORS**



## **COST FOR A SINGLE TRACK GRADE CROSSING USING LOGIC RAIL TECHNOLOGIES INFRARED SENSORS AND ACTIVATION CIRCUIT**

- **GATES AND FLASHER** ~ \$60
- **GCP/2 INFRARED CIRCUIT** ~\$60
- **2 TORTOISE SWITCH MACHINES** ~\$30
- **CROSSING BELL** ~\$20
- **SPEAKER** ~\$6
- **TOTAL** ~\$176
- **NOTE: THIS DOES NOT INCLUDE COSTS OF WIRE, 12VDC POWER SUPPLY, TERMINAL BLOCKS, AND OTHER MISCELLANEOUS COMPONENTS.**







# WHERE CAN I GET MORE INFORMATION?

- NJ INTERNATIONAL - <https://www.njinternational.com>
- CIRCUITRON - <http://www.circuitron.com>
- Z-STUFF FOR TRAINS - <https://www.z-stuff.net>
- ARDUINO - <https://www.arduino.cc>
- LOGIC RAIL TECHNOLOGIES - <https://www.logicrailtech.com>
- MODEL TRAIN TECHNOLOGY - [www.modeltraintechology.com](http://www.modeltraintechology.com)



# CONCLUSION

- **Automatically activated operational cross buck flashers, crossing gates, and crossing bells can add additional realism to your layout**
- **One integral system is currently available (Model Train Technologies)**
- **Constructing an operational system from separate components is not difficult**
- **Research all available products regarding their capabilities before deciding on a system.**
- **I have found that Logic Rail Technologies detection and activation circuits offers the most realistic operation for the price**



# THANK YOU FOR YOUR ATTENTION

- THIS CLINIC WILL BE POSTED ON THE POTOMAC DIVISION WEB SITE <https://potomac-nmra.org>
- ANY QUESTIONS?
  - I CAN BE REACHED AT [bwsheron@mac.com](mailto:bwsheron@mac.com)