



# TrainTraxx.com

HiveID RFID/NFC Solutions for Model Railroaders

Presented by

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&  
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# Using RFID for Model Railroad Operations

- ❖ What is RFID?
- ❖ How does RFID Work?
- ❖ RFID Frequencies and Type of Tags
- ❖ Getting Started with TrainTraxx
- ❖ JMRI Integration
- ❖ Q & A



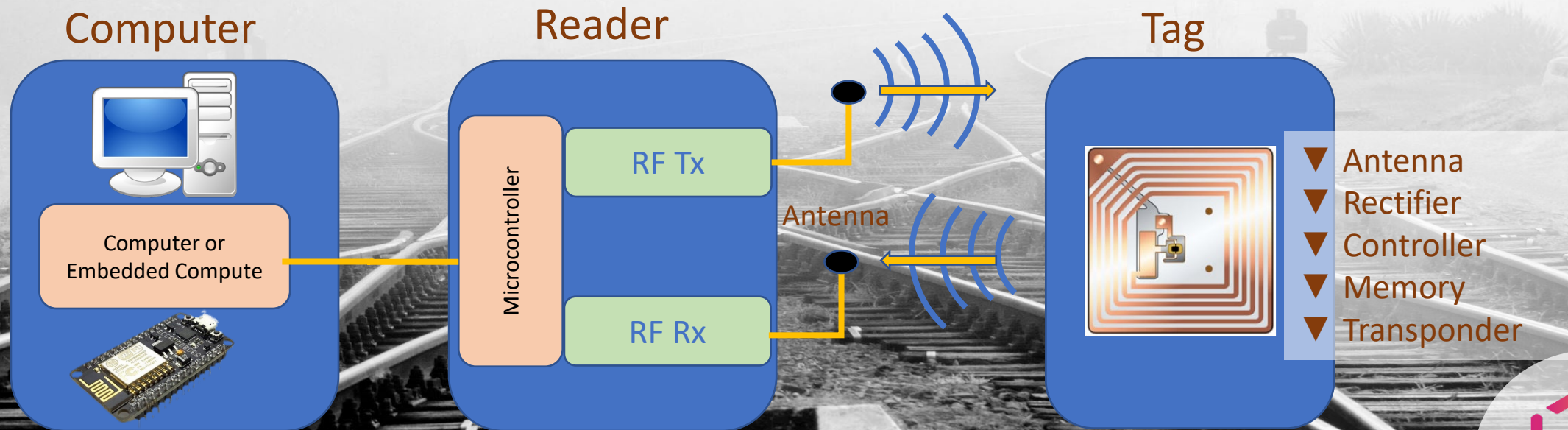
# What is RFID?

- Radio Frequency Identification (RFID) is a technology that uses radio waves to transmit for detection and identification
- There are many applications of RFID technology:
  - Physical Security and Access Management
  - Inventory Management
  - Location Identification
  - Tracking – vehicles, pets, and people
  - Retail Merchandizing and Payment
  - Scale 1:1 railcars – Railroad Industry
- RFID uses 3 primary components:
  1. RFID Tag
  2. RFID Reader
  3. Computer



# How Does RFID Work?

- RFID technology depends on radio waves propagating from the reader to a tag and back.
- RFID is created as the radio waves of the reader stimulates and energizes the tag which is attached to a device that is in range of the incoming waves.
- When the RF field passes through an antenna coil of the tag, there is an AC voltage generated across the coil. This voltage is rectified to supply power to the tag.
- The information stored in the tag is transmitted back to the reader and computer



# RFID Frequencies and Type of Tags

	LF	HF	UHF	VUHF
Frequency Range	125 – 134 KHz	13.56 MHz	850 - 930 MHz	2.45 – 5.8 GHz
Distance	< 1 ft.	1-3 ft.	2-25 ft.	5-90 ft.
Standards	ISO 11784 ISO 11785 ISO 14224	ISO 14443 ISO 15693 ISO 18000-3	ISO 18000-6 EPC Gen2	ISO 18000-4 IEEE 802.11 IEEE 802.15.4

**NOTE:** Distance is based on the size of the reader and tags.

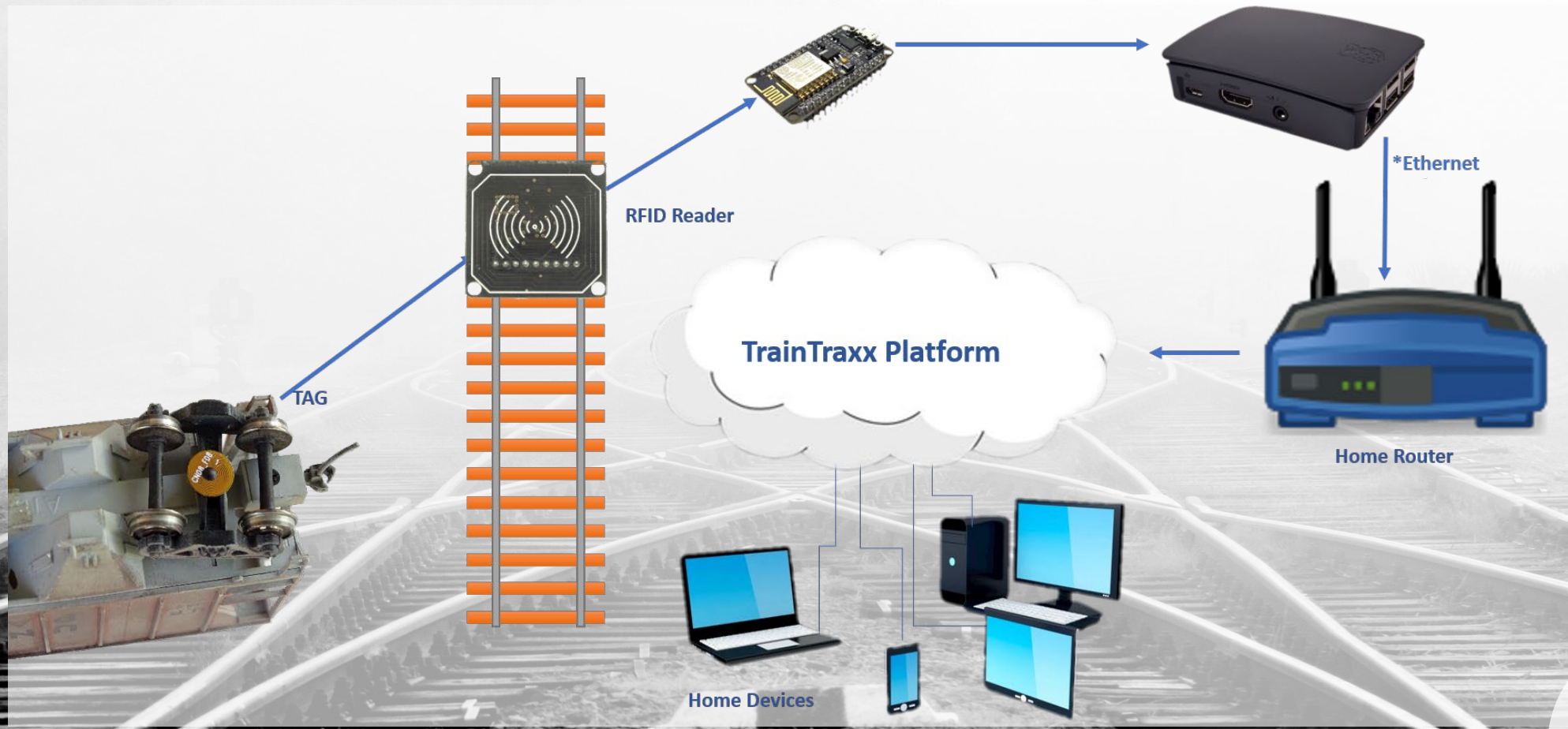


# Getting Started with TrainTraxx

Getting started with TrainTraxx



# TrainTraxx Platform Overview



# Things to Know

- TrainTraxx tags come in an 8mm and 25 mm sizes.

Scales:	N	HO	S	O	G
8mm	✓	✓	✓	✗	✗
25mm	✗	✓	✓	✓	✓

- All RFID tags are put in the TrainTraxx database, allowing for easy association with railcars and locomotives.
- The Readers can come in various form factors depending upon the scale.
- The WiFi Modules and Raspberry Pi's have SW pre-configured; no end user configuration is required.
- TrainTraxx application is part of a hosted environment that can be accessed from any location from any internet enabled device; automatic updates with no user intervention. JMRI is a one button update.
- Once customer purchases TrainTraxx hardware, a Username and Password is sent to gain access to the operational SW. The user will sign in from the TrainTraxx website.



# Installing the Gateway

- Connect Raspberry Pi to your existing home router as shown in the picture.
- It is important that the Raspberry Pi is operational before powering up the readers

**NOTE:** Raspberry Pi has been pre-configured with the WiFi/Reader modules.



# Ways to Scan Tags with TrainTraxx



## Computer

The RF reader and WiFi module are shipped connected by a 7 wire interface cable.

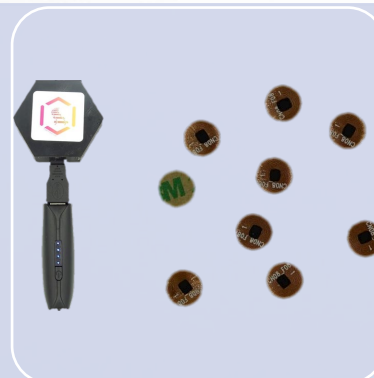
Adding a USB to Micro-USB cable, to the WiFi module and connecting it to the computer, allows TrainTraxx member to view & assign real-time the tag to the railcar or locomotive.



## Battery

This example shows the WiFi module and reader using battery for power.

The battery is an option if you do not want to connect to a computer.



## Wand

The wand is used to scan individual tags using an integrated WiFi module and RF reader.

Using an attachable battery as the power source, tag scanning can be very quick and easy.



## Layout

When the WiFi module along with the reader are installed on the layout and as the tag is placed on the railcar or locomotive, it can be used for tag-railcar association.



# Using 8 & 25mm Tags



Un-peel the protective paper from the tag and place the tag on the Car/Locomotive over the trucks screw cylinder or the lowest point of the car/engine body.



- When the WiFi module along with the reader are installed on the layout and as the tag is placed on the railcar or locomotive, it can be used for tag-railcar association.



# Web View – Activity

TrainTraxx

Views











Tools

Auto Refresh

Refresh

Off

On

Inventory Image	C...	Inventory Item	Car Type	Activity Time	Location Image	C...	Location Name
		<div>filter column...</div>		<div>filter column...</div>			<div>filter column...</div>
<div><div></div><div></div></div>		<div><div></div>ILLINOIS CENTRAL GULF_416113</div>	Box Car	2019-05-09 02:15:17			<div><div></div>Lee's Warehouse</div>
<div><div></div><div></div></div>		<div><div></div>BURLINGTON NORTHERN_161234</div>	Box Car	2019-05-09 02:15:03			<div><div></div>Lee's Warehouse</div>
<div><div></div><div></div></div>		<div><div></div>CSX_976072</div>	Box Car	2019-05-09 02:14:46			<div><div></div>Dawson's Freight Car Dock</div>
<div><div></div><div></div></div>		<div><div></div>CHESSIE SYSTEM_23769</div>	Box Car	2019-05-09 02:14:20			<div><div></div>Dawson's Freight Car Dock</div>
<div><div></div><div></div></div>		<div><div></div>Union Pacific_909238</div>	Flat Car	2019-05-09 02:14:08			<div><div></div>Dawson's Flatcar Depot</div>

First


Prev



1




Next

Last

# Web View – Inventory



















 TrainTraxx Views Tools

Refresh Add Record  
 

 ?  


Global Views

- ☐ Activity (Default)
- ☐ Gateway
- ☒ Inventory
- ☐ Locations
- ☐ Node
- ☐ Tags
- ☒ Customize

Image	Inventory	Road Name	Road Number	Car Type
	  BURLINGTON NORTHERN_161234	BN	161234	Box Car
	  CHESSIE SYSTEM_23769	C&O	23769	Box Car
	  CSX_976072	CSX	976072	Box Car
	  Hopper			
	  ILLINOIS CENTRAL GULF_416113	ILLINOIS CENTRAL GULF	416113	Box Car
	  Union Pacific_909238	Union Pacific	909238	Flat Car



First Prev 1 Next Last







 TrainTraxx

Views Tools

Refresh Add Record

Global Views

☐ Activity (Default)

☐ Gateway

☐ Inventory

☒ Locations

☐ Node

☐ Tags












 Customize





	Image	Location Name
		 Dawson's Flatcar Depot
		 Dawson's Freight Car Dock
		 Lee's Warehouse

First Prev 1 Next Last

# Web View – Tags

 TrainTraxx Views Tools

Refresh

Global Views

☐ Activity (Default)

☐ Gateway
















☐ Inventory

☐ Locations

☐ Node

☒ Tags

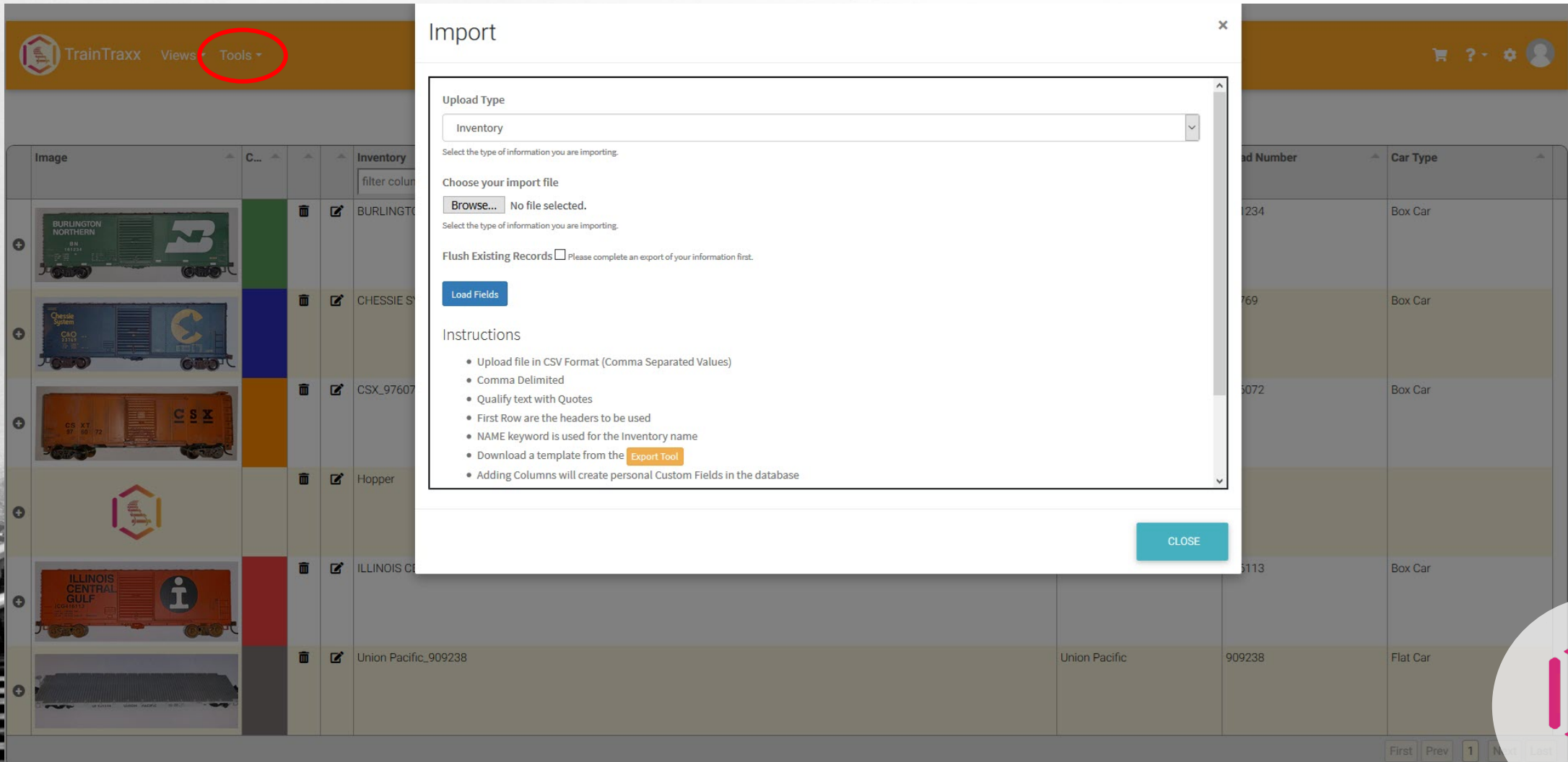
☒ Customize

Tag	Inventory Item	Start Date	End Date	Tag UID	Tag Data	Tag PICCType	Tag Key
filter column...	column...	filter column...	filter column...	filter column...			
+ CAR: (ID: 1837)		2019-01-15 13:19:58	2999-01-01 01:00:00	61 13 92 b9	61 13 92 b9 59 08 04 00 02 dd aa...	MIFARE 1KB	ff ff ff ff ff
+ CAR: (ID: 1838)		2019-01-15 13:20:06	2999-01-01 01:00:00	51 e9 92 b9	51 e9 92 b9 93 08 04 00 02 ac 88 ...	MIFARE 1KB	ff ff ff ff ff
+ CAR: (ID: 1839)		2019-01-15 13:20:08	2999-01-01 01:00:00	11 c6 90 b9	11 c6 90 b9 fe 08 04 00 02 d3 21 ...	MIFARE 1KB	ff ff ff ff ff
+ CAR: (ID: 1840)		2019-01-15 13:20:11	2999-01-01 01:00:00	b1 b4 90 b9	b1 b4 90 b9 2c 08 04 00 02 68 03...	MIFARE 1KB	ff ff ff ff ff
+ CAR: (ID: 1841)		2019-01-15 13:20:14	2999-01-01 01:00:00	d1 c7 92 b9	d1 c7 92 b9 3d 08 04 00 02 35 04...	MIFARE 1KB	ff ff ff ff ff
+ CAR: (ID: 1842)		2019-01-15 13:20:16	2999-01-01 01:00:00	01 dd 92 b9	01 dd 92 b9 f7 08 04 00 02 34 2a ...	MIFARE 1KB	ff ff ff ff ff
+ CAR: (ID: 1843)		2019-01-15 13:20:18	2999-01-01 01:00:00	31 e1 92 b9	31 e1 92 b9 fb 08 04 00 02 7d 09 ...	MIFARE 1KB	ff ff ff ff ff
+ CAR: (ID: 1844)		2019-01-15 13:20:20	2999-01-01 01:00:00	21 dd 90 b9	21 dd 90 b9 d5 08 04 00 02 ae 92...	MIFARE 1KB	ff ff ff ff ff
+ CAR: (ID: 1845)		2019-01-15 13:20:22	2999-01-01 01:00:00	11 be 90 b9	11 be 90 b9 86 08 04 00 02 49 02...	MIFARE 1KB	ff ff ff ff ff
+ CAR: (ID: 1846)		2019-01-15 13:20:25	2999-01-01 01:00:00	d1 13 91 b9	d1 13 91 b9 ea 08 04 00 02 e5 be ...	MIFARE 1KB	ff ff ff ff ff
+ CAR: (ID: 1847)	 CHESSIE SYSTEM_23769	2019-01-15 13:20:28	2999-01-01 01:00:00	81 d9 92 b9	81 d9 92 b9 73 08 04 00 02 cb c5...	MIFARE 1KB	ff ff ff ff ff
+ CAR: (ID: 1848)	 Union Pacific_909238	2019-01-15 13:20:30	2999-01-01 01:00:00	a1 6f 92 b9	a1 6f 92 b9 e5 08 04 00 02 02 58 ...	MIFARE 1KB	ff ff ff ff ff
+ CAR: (ID: 1849)		2019-01-15 13:20:33	2999-01-01 01:00:00	61 c4 92 b9	61 c4 92 b9 8e 08 04 00 02 39 e2 ...	MIFARE 1KB	ff ff ff ff ff
+ CAR: (ID: 1850)	 CSX_976072	2019-01-15 13:20:35	2999-01-01 01:00:00	41 54 90 b9	41 54 90 b9 3c 08 04 00 02 e1 45...	MIFARE 1KB	ff ff ff ff ff
+ CAR: (ID: 1851)		2019-01-15 13:20:37	2999-01-01 01:00:00	01 0c 92 b9	01 0c 92 b9 26 08 04 00 02 98 b0...	MIFARE 1KB	ff ff ff ff ff
+ CAR: (ID: 1852)		2019-01-15 13:20:39	2999-01-01 01:00:00	61 ed 92 b9	61 ed 92 b9 a7 08 04 00 02 62 ee ...	MIFARE 1KB	ff ff ff ff ff
+ CAR: (ID: 1853)		2019-01-15 13:20:41	2999-01-01 01:00:00	e1 07 91 b9	e1 07 91 b9 ce 08 04 00 02 9f 42 ...	MIFARE 1KB	ff ff ff ff ff
+ CAR: (ID: 1854)	 BURLINGTON NORTHERN_161234	2019-01-15 13:20:43	2999-01-01 01:00:00	91 6f 92 b9	91 6f 92 b9 d5 08 04 00 02 db ad ...	MIFARE 1KB	ff ff ff ff ff
+ CAR: (ID: 1855)	 ILLINOIS CENTRAL GULF_416113	2019-01-15 13:20:56	2999-01-01 01:00:00	11 20 93 b9	11 20 93 b9 1b 08 04 00 02 bd 22...	MIFARE 1KB	ff ff ff ff ff
+ CAR: (ID: 1856)		2019-01-15 13:20:59	2999-01-01 01:00:00	d1 b4 90 b9	d1 b4 90 b9 4c 08 04 00 02 c1 8e ...	MIFARE 1KB	ff ff ff ff ff
+ CAR: (ID: 1857)		2019-01-15 13:21:24	2999-01-01 01:00:00	f0 aa f3 d4	f0 aa f3 d4 7d 08 04 00 01 f1 97 7...	MIFARE 1KB	ff ff ff ff ff
+ CAR: (ID: 1858)		2019-01-15 13:21:26	2999-01-01 01:00:00	d0 a2 f3 d4	d0 a2 f3 d4 55 08 04 00 01 ef af e...	MIFARE 1KB	ff ff ff ff ff
+ CAR: (ID: 1859)		2019-01-15 13:21:33	2999-01-01 01:00:00	40 9b f3 d4	40 9b f3 d4 fc 08 04 00 01 d8 34 ...	MIFARE 1KB	ff ff ff ff ff
+ CAR: (ID: 1860)		2019-01-15 13:21:35	2999-01-01 01:00:00	80 95 f3 d4	80 95 f3 d4 32 08 04 00 01 68 0e ...	MIFARE 1KB	ff ff ff ff ff
+ CAR: (ID: 1861)		2019-01-15 13:21:37	2999-01-01 01:00:00	20 8e f3 d4	20 8e f3 d4 89 08 04 00 01 a4 15 ...	MIFARE 1KB	ff ff ff ff ff

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 TrainTraxx.com

# Web View – Import



The screenshot displays the TrainTraxx web application interface. In the background, the 'Tools' menu is highlighted with a red circle. Overlaid on this is the 'Import' dialog box. The dialog features a 'Upload Type' dropdown menu currently set to 'Inventory'. Below this, there's a section for 'Choose your import file' with a 'Browse...' button and the text 'No file selected.'. A 'Flush Existing Records' checkbox is present, accompanied by the instruction 'Please complete an export of your information first.'. The 'Instructions' section provides a bulleted list of guidelines for CSV imports, including file format requirements, delimiters, quoting, header usage, and the availability of a template download and custom field creation. A 'CLOSE' button is located at the bottom right of the dialog.

**Import**

Upload Type  
Inventory

Select the type of information you are importing.

Choose your import file  
Browse... No file selected.

Select the type of information you are importing.

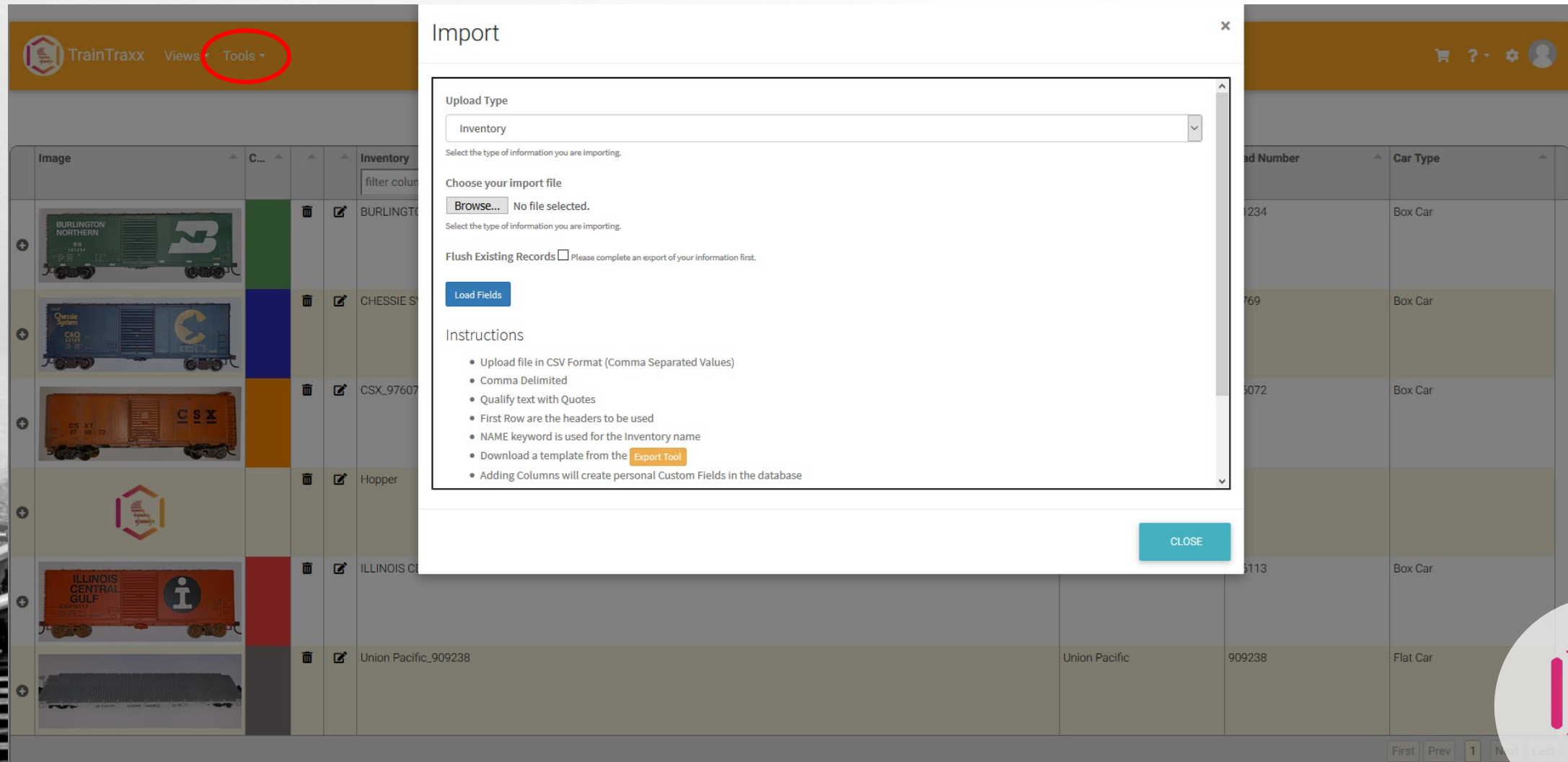
Flush Existing Records ☐ Please complete an export of your information first.

Load Fields

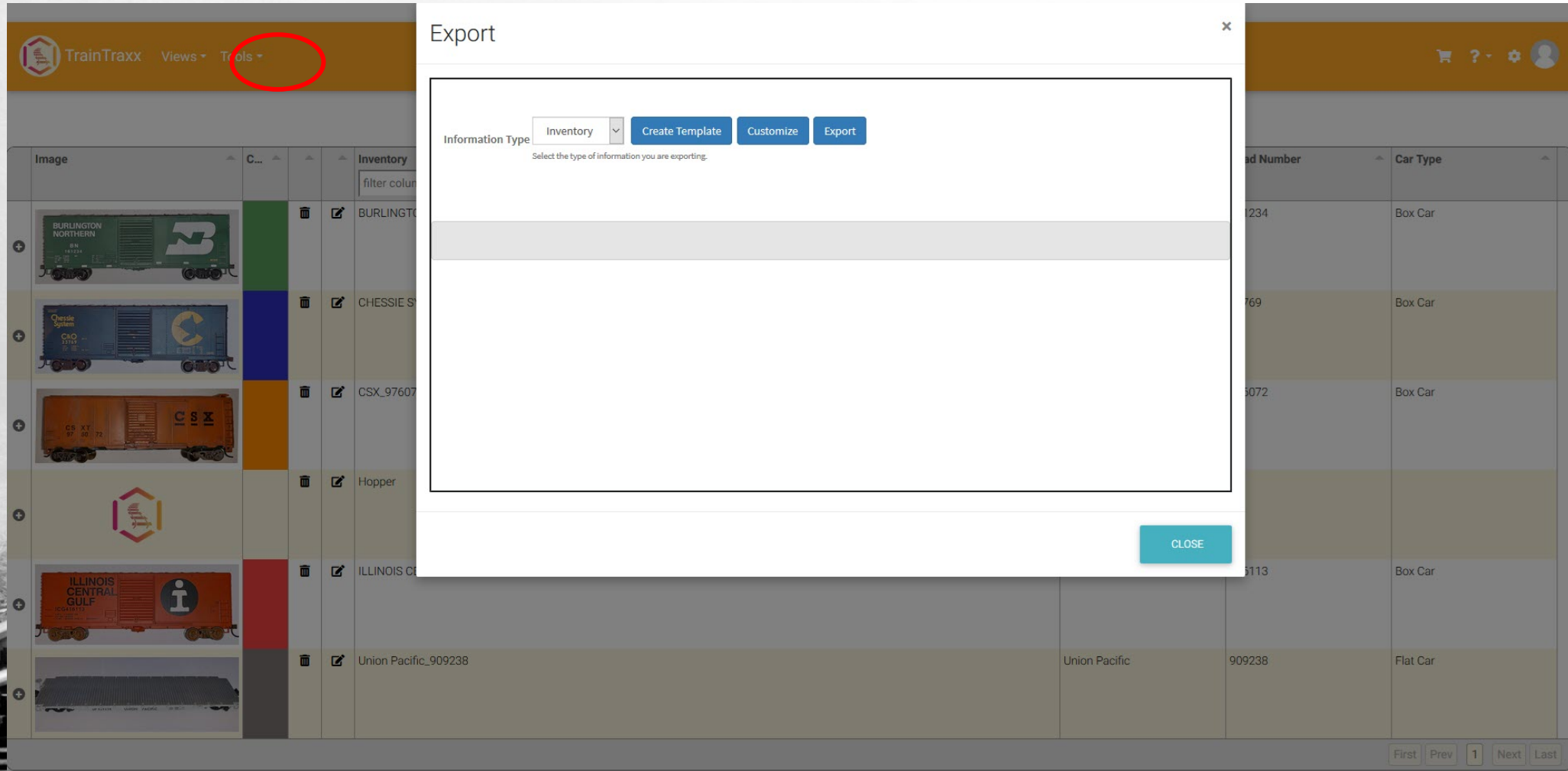
Instructions

- Upload file in CSV Format (Comma Separated Values)
- Comma Delimited
- Qualify text with Quotes
- First Row are the headers to be used
- NAME keyword is used for the Inventory name
- Download a template from the [Export Tool](#)
- Adding Columns will create personal Custom Fields in the database







CLOSE



# Web View – Export



The screenshot displays the TrainTraxx web application interface. In the top navigation bar, the 'Tools' menu is highlighted with a red circle. An 'Export' dialog box is open in the center, allowing users to export data. The dialog includes a dropdown menu for 'Information Type' set to 'Inventory', and buttons for 'Create Template', 'Customize', and 'Export'. Below these buttons, a text prompt reads 'Select the type of information you are exporting.' followed by a large empty text area. A 'CLOSE' button is located at the bottom right of the dialog. The background shows a table of train cars with columns for 'Image', 'Car Number', and 'Car Type'. The table lists several cars, including Burlington Northern, Chessie System, CSX, and Union Pacific.

Image	Car Number	Car Type
	BURLINGTON	Box Car
	CHESSIE S	Box Car
	CSX_97607	Box Car
	Hopper	Box Car
	ILLINOIS C	Box Car
	Union Pacific_909238	Flat Car

# Local Device Management

LOCAL DEVICE MANAGEMENT



# JMRI Integration

## JMRI

- TrainTraxx and Hive-ID sponsored a substantial expansion of the current REST interfaces in JMRI. The new TrainTraxx to JMRI capabilities are currently available in their test release 4.17.5 and will be available in the next production release.
- TrainTraxx to JMRI capabilities will include:
  - Real-time updates of Sensors, Reports and Car/Engine Locations
  - Inventory, Location and Tags Importing and Updating from TrainTraxx.com Inventory Management
  - System Summary, Local Activity, Node Manager and JMRI Operation Links



# System Summary of Local Interface

### System Summary

#### Host Information

Host Name  
HIVE033

CHECK FOR NEW VERSIONS

HiveID Version  
20191104.0001 (current)

JMRI Version  
4.17.5 (current)

OS Linux-arm-4.19.57-v7+

OS UPGRADES

Change Password

Password \*

Confirm \*

CHANGE CANCEL


#### Network Interfaces

eth0 192.168.0.235

wlan0 192.168.6.1

Update latest TT release

CHANGE NETWORK MODE



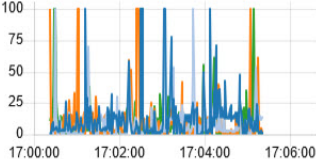
Connect to HIVE033

Update to latest JMRI release

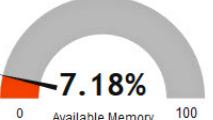
#### Performance

Uptime 67152 seconds

##### Processor Performance



17:00:00 17:02:00 17:04:00 17:06:00



7.18%

0 Available Memory 100

CLEAN MEMORY

#### System Controls

APPLICATION SETTINGS

SERVICE MANAGER

UPDATE HIVEID CODE (SLOW)

RESTART WIRELESS GATEWAY SERVICE

REBOOT

RESTART EDITOR AND INTERFACE


SHUTDOWN

# Local Train Activity on HivEID Gateway

Local Train Activity

Activity

Local Activity - Cars/Inventory



Name: Union Pacific\_9189


Road Name/Number: UP9189

Time: 2019-11-03 13:37:53

Location: East Yard->EY Track #2

JMRI Location: (Left Loaded) East Yard->EY Track #2

JMRI Destination: East Yard->EY Track #2



Name: Union Pacific\_50504


Road Name/Number: UP50504

Time: 2019-11-03 13:36:57

Location: East Yard->EY Track #2

JMRI Location: (Left Empty) East Yard->EY Track #2

JMRI Destination: East Yard->EY Track #2



Name: UNION PACIFIC\_150112


Road Name/Number: UP150112

Time: 2019-11-03 13:36:26

Location: East Yard->EY Track #1

JMRI Location: (Left Loaded) East Yard->EY Track #1

JMRI Destination: East Yard->EY Track #1



Name: SOUTHERN PACIFIC\_20138


Road Name/Number: SP20138

Time: 2019-11-03 13:35:41

Location: Danville->Lee's Warehouse

JMRI Location: (Left Empty) Danville->Lee's Warehouse

JMRI Destination: Danville->Lee's Warehouse



Name: CSX\_976072


Road Name/Number: CSX976072

Time: 2019-11-03 13:34:52

Location: Danville->Lee's Warehouse

JMRI Location: (Arrived Loaded) Danville->Lee's Warehouse

JMRI Destination: Danville->Lee's Warehouse



Name: RIO GRANDE\_60004


Road Name/Number: D&RGW60004

Time: 2019-11-03 13:32:36

Location: Danville->Dawson's Freight Car Dock

JMRI Location: (Left Empty) Danville->Dawson's Freight Car Dock

JMRI Destination: Danville->Dawson's Freight Car Dock



Name: ILLINOIS CENTRAL GULF\_416113

Road Name/Number: IC416113

Time: 2019-11-03 13:30:26

Location: Danville->Dawson's Freight Car Dock

JMRI Location: (Arrived Loaded) Danville->Dawson's Freight Car Dock

JMRI Destination: Danville->Dawson's Freight Car Dock

CLEAR ACTIVITY

REFRESH ACTIVITY

Find Inventory


Select Inventory Name

Inventory Name  
BN161234

JMRI Info

Name: BN161234

Car Type: Boxcar

Color: 

Length: 40

Weight: 3.8

Weight Tons: 75

Load: L

RFID: IDHIVE1854

Out of Service: No

Last Location: East Yard->EY Track #1


Destination: Not Set

Final Destination: Not Set

Return When Empty: Not Set

TrainTraxx Info


Name: BURLINGTON NORTHERN\_161234

Image: 

Road Name: BN

Road Number: 161234

Car Type: Box Car

Color: 

AAR: BN

Car Length: 40

Inventory Type: Car

Last Detected Location: East Yard->EY Track #1

Manage Information

CLEAN CACHE

REFRESH JMRI

REFRESH TRAINTRAXX

REFRESH ALL

TRAINTRAXX TO JMRI

Find Locations of any car or engine on the layout

Sync TT and JMRI

Component tracking for TT & JMRI

Summary

TrainTraxx

Gateways: 1

Readers: 8

Tags: 38

Activity: 863

Inventory: 21

Locations: 7

JMRI

Sensors: 9

Reporters: 8

Cars: 17


Engines: 2


Locations: 3

Tags: 38

NOTES:

- JMRI summary will only show the parent location counts
- TrainTraxx inventory will report under JMRI cars and engines
- TrainTraxx locations with readers will report under reporters and sensors both.
- JMRI has an extra sensor

Refresh Summary 

The logo for TrainTraxx.com, featuring a stylized train engine icon inside a hexagonal frame with orange and yellow accents, and the text "TrainTraxx.com" below it.

# JMRI Train Auditor

≡ JMRI Train Auditor

Trains

Danville Run

Build Train in East Yard with Destination to Danville

Lead Engine: CRR 2414

Route: East Yard-Danville Turn

Departs: East Yard

Departure Time: 07:00

Terminates: East Yard

Location: East Yard

Status: Partial 8/10 cars

Stops:

Name	Direction	Arrives	Departs	Location
East Yard	East	07:00	07:00	East Yard
Danville	West	07:04	07:28	Danville
Danville	West	07:15	07:30	Danville
East Yard	East	07:34	07:49	East Yard

Engines

✓ Name: CRR2414

Location: East Yard->EY Track #1

Destination: East Yard->EY Track #1

Cars

✓ Name: UP50504

Location: Danville->Dawson's Flatcar Depot (Empty)

Current Route: East Yard heading East

Destination: Danville->Dawson's Flatcar Depot

✗ Name: UP9189

Location: East Yard->EY Track #2 (Loaded)

Current Route: East Yard heading East

Destination: Danville->Dawson's Freight Car Dock

✓ Name: C&O23769

Location: Danville->Lee's Warehouse (Loaded)

Current Route: East Yard heading East

Destination: Danville->Lee's Warehouse

✗ Name: UP913150

Location: Danville->Dawson's Flatcar Depot (Empty)

Current Route: Danville heading West

Destination: East Yard->EY Track #1

✗ Name: IC416113

Location: Danville->Dawson's Freight Car Dock (Empty)

Current Route: Danville heading West

Destination: East Yard->EY Track #1

✗ Name: D&RGW60004

Location: Danville->Dawson's Freight Car Dock (Loaded)

Current Route: Danville heading West

Destination: East Yard->EY Track #2

Name: SP20138

Train and Car information displayed for each Built Train

Each car will show a check mark when it has arrived at it's Destination



REFRESH



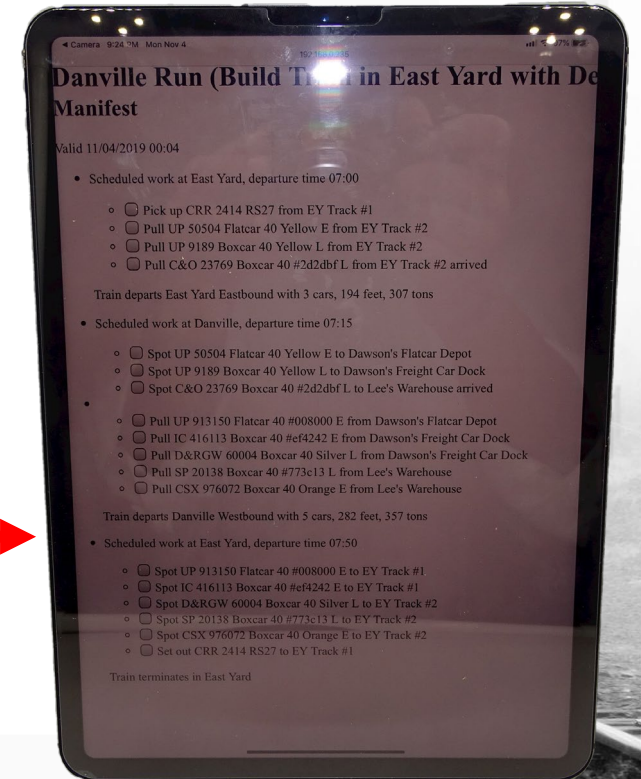
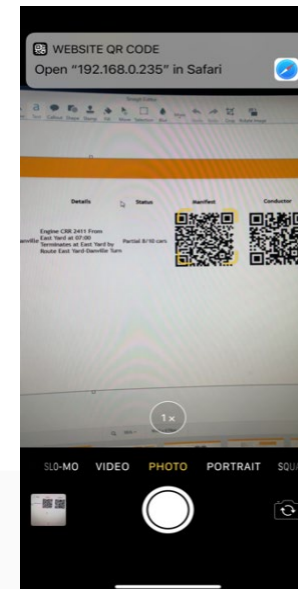
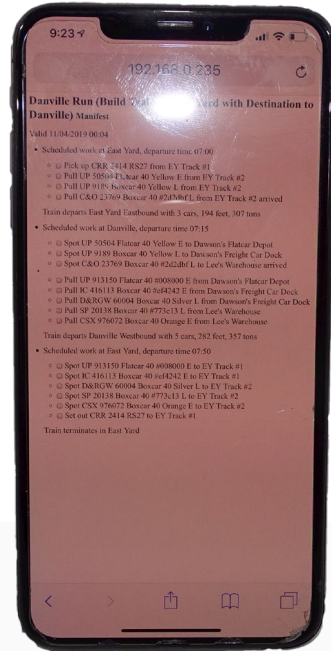
# Operation Links

≡ JMRI Operations Links

## Trains

Name	Details	Status	Manifest	Conductor
<b>Danville Run</b> Build Train in East Yard with Destination to Danville <a href="#">Select View</a>	Engine CRR 2414 From East Yard at 07:00 Terminates at East Yard by Route East Yard-Danville Turn	Train reset		

Display smart phone or Tablet over QR scan and import manifest



# Node Information (WiFi/Reader)

Node Manger

Nodes

✓

TrainTraxx Location: Danville->Lee's Warehouse

IP: 192.168.6.58

MAC: 84:F3:EB:B7:C0:F0

Version: 2019.07.08.01.00.00

Endpoint: http://local.hive-id.com:1880/tracker

Signal: -57dBm

Success Rate: 3/3 = 100.0%

✓

TrainTraxx Location: East Yard->EY Track #1

IP: 192.168.6.244

MAC: 38:2B:78:03:76:CE

Version: 2019.07.08.01.00.00

Endpoint: http://local.hive-id.com:1880/tracker

Signal: -59dBm

Success Rate: 4/4 = 100.0%

✓

TrainTraxx Location: Danville->Dawson's Freight Car Dock

IP: 192.168.6.25

MAC: 38:2B:78:03:95:20

Version: 2019.07.08.01.00.00

Endpoint: http://local.hive-id.com:1880/tracker

Signal: -48dBm

Success Rate: 2/2 = 100.0%

✓

TrainTraxx Location:

IP: 192.168.6.143

MAC: 84:F3:EB:B3:F4:2A

Version: 2019.07.08.01.00.00

Endpoint: http://local.hive-id.com:1880/tracker

Signal: -57dBm

Success Rate: 4/4 = 100.0%

http://local.hive-id.com:1880/tracker

FLUSH CACHE

RESTART ALL NODES

Available Firmware Versions

CHECK FOR UPDATED READER FIRMWARE

UPDATE READERS USING USB

UPDATE READERS WIRELESSLY

✓

AutoConnect.20190708.bin

[www.TrainTraxx.com](http://www.TrainTraxx.com)

Contact with questions:

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