

Raildriver and steam locomotives

Background

“The RailDriver desktop train cab controller puts levers, switches, and buttons in your hands to make you feel like you're driving a train, not a computer. Programmable keys put commands on the RailDriver, so you can put the keyboard away.” This quote from the Raildriver website is true for diesel and electric locomotives with minor changes to the CabMaker files, although most add-on locomotives also need their ENG files modified. **Electric.rdf, Diesel.rdf and Combobrake.rdf** CabMaker files are available from the RailDriver website together with modified ENG files for various add-ons. For steam locomotives the performance has limitations and you still need to use the keyboard. It is surprising that large numbers of the trainsim community still believe that RailDriver does not work with steam locomotives.

This tutorial will show you how to dramatically improve the driving performance of the RailDriver unit with steam locomotives. You will be able to drive using the AIfireman without the need for the keyboard. If you wish to drive firing the locomotive yourself you can but you will either have to use the keyboard for the fireman controls or put the fireman controls on the programmable buttons on the RailDriver unit. I have not done this because a) I have no idea how to manually fire a locomotive (I'm learning) and b) you can choose for yourself which functions on the programmable buttons to replace.

The problems

In the default configuration (out of the box) the problems are:

1. **Reverser**

The reverser lever only has three positions, fully forward, neutral and fully reversed. To achieve efficient use of steam the reverser must be completely adjustable between the limits of fully forward and fully reversed.

2. **Cylinder cocks open/close, activate water/coal.**

These can only be operated by the keyboard.

3. **Brakes**

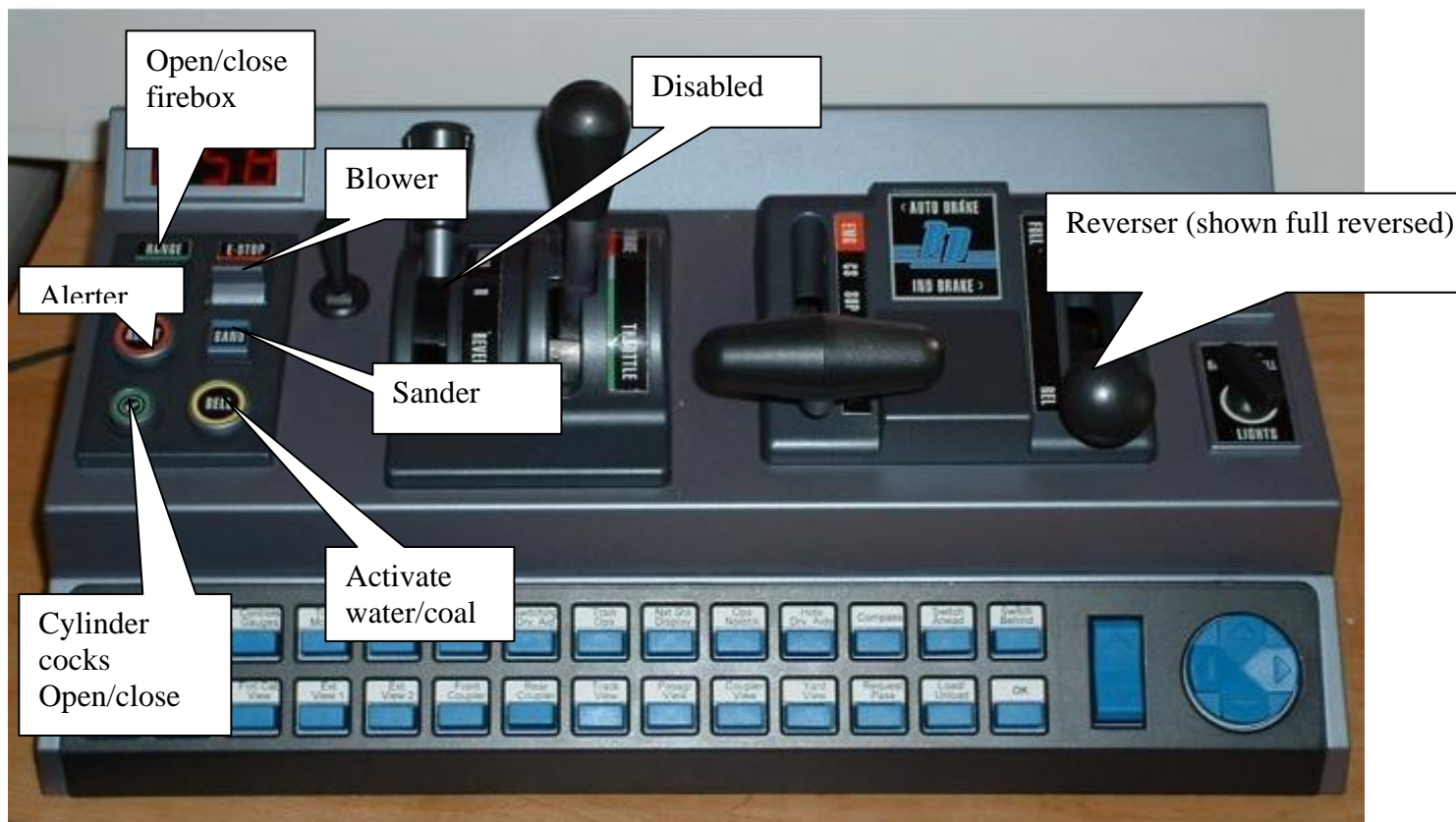
For RailDriver to operate with MSTS it has to work outside of it, this is because as a shortcoming of MSTS. MSTS was never designed for external control, it makes no feedback and will only understand keyboard and mouse commands. The RailDriver works by having to read the Heads Up Display by taking screenshots so many times a second, this is transferred to data the software can read, this is then fed back to the simulator to move the cab levers and set the controls in the same position as they are on the RailDriver. This inevitably puts a delay in the system.

If you are driving a steam loco with RailDriver on a preserved route at, say 25mph, and you approach a 10mph limit by the time you apply some braking and then immediately release the brakes the loco has stopped long before you can open the regulator again.

UK steam locomotives in MSTS use "Vacuum single pipe" braking systems. In these systems to apply brakes you have to go through release, 0-100%, running 0-100% and then apply 0-100%. To release brakes from Apply with RailDriver can take about 13 seconds.

The solution

A new CabMaker file **SteamAfireman.rdf** has been developed which transfers the reverser function to the loco brake lever. Continuous adjustment is now possible. Cylinder cocks open/close and activate water/coal are now operated from the RailDriver unit. The **SteamAfireman.rdf** CabMaker file can be obtained from the RailDriver website.



The braking system on the steam locomotives are changed to "Air_single_pipe". This is achieved by modifying the ENG file. The brakes now go from release to hold to apply. To release brakes from apply now takes about 3 seconds (as opposed to 13 seconds). The locomotive is now run with brakes on release (as opposed to running) as there is now no loss of steam with this setting. It does not affect the performance of the loco in any other way. I have found no problems to date with running a train with differing braking systems so I have not modified tenders or carriages (most UK carriages have Air, single pipe braking systems). The one consist I did modify (Flying Scotsman) as a test showed no change in performance.

I now feel, for the first time, that I am fully in control of a steam locomotive.

Changing the braking system

There are three areas of the ENG file that need to be changed using cut and paste. For this example I have used the default Flying Scotsman locomotive. **Make a backup of the ENG file before you start.**

1. Find the portion of the Eng file that reads:

```
BrakeEquipmentType( "Vacuum_brake, Handbrake, Auxilary_reservoir" )  
BrakeSystemType( "Vacuum_single_pipe" )  
MaxBrakeForce( 90kN )
```

```
MaxHandbrakeForce( 80kN )  
NumberOfHandbrakeLeverSteps( 100 )
```

```
MaxReleaseRate( 10 )  
MaxApplicationRate( 10 )  
MaxAuxilaryChargingRate( 10 )  
BrakeCylinderPressureForMaxBrakeBrakeForce( 21 )
```

Make a note of the value in the line MaxBrakeForce.

Replace this portion of the ENG file with:

```
BrakeEquipmentType( "Triple_valve, Auxilary_reservoir, Emergency_brake_reservoir" )
```

```
    BrakeSystemType( "Air_single_pipe" )
```

```
    MaxBrakeForce( 90kN )
```

```
    EmergencyBrakeResMaxPressure( 110 )  
    TripleValveRatio( 2.5 )  
    MaxReleaseRate( 20 )  
    MaxApplicationRate( 20 )  
    MaxAuxilaryChargingRate( 30 )  
    EmergencyResCapacity( 10 )  
    EmergencyResChargingRate( 30 )  
    BrakeCylinderPressureForMaxBrakeBrakeForce( 70 )
```

```
    BrakeDistributorFullServicePressure( 82 )  
    BrakeDistributorMaxAuxilaryResPressure( 110 )  
    BrakeDistributorEmergencyResPressure( 110 )  
    BrakeDistributorReleaseRate( 10 )  
    BrakeDistributorApplicationRate( 15 )  
    BrakeDistributorTrainPipeControlRatio( 2.03 )  
    BrakeDistributorNormalFullReleasePressure( 110 )
```

Change the value of MaxBrakeForce to whatever value your locomotive has.

2. Find the portion of the ENG file that reads:

```
VacuumBrakesSmallEjectorPowerRating( 3.5 )  
VacuumBrakesMinBoilerPressureMax Vacuum( 110 )  
VacuumBrakesSmallEjectorUsageRate( 500 )  
VacuumBrakesLargeEjectorUsageRate( 2400 )  
VacuumBrakesHasVacuumPump( 0 )  
TrainBrakesControllerMaxReleaseRate( 12 )  
TrainBrakesControllerMinSystemPressure( 0 )  
TrainBrakesControllerMaxSystemPressure( 21 )  
EngineBrakesControllerHasProportionalBrake( 1 )  
EngineBrakesProportionalBrakeLag( 0.9 )  
BrakesEngineBrakeType( "Vacuum_single_pipe" )  
BrakesTrainBrakeType( "Vacuum_single_pipe" )  
BrakesEngineControllers( "Hand, Train" )
```

And replace it with

```
AirBrakesAirCompressorPowerRating( 3.5 )  
AirBrakesMainMinResAirPressure( 0 )  
AirBrakesMainMaxAirPressure( 140 )  
AirBrakesMainResVolume( 10 )  
AirBrakesAirCompressorWattage( 19000 )  
AirBrakesCompressorRestartPressure( 130 )  
AirBrakesAirUsedPerPoundsOfBrakePipePressure( 0.5 )  
AirBrakesHasLowPressureTest( 1 )  
AirBrakesIsCompressorElectricOrMechanical( 1 )
```

```
EngineBrakesControllerHasProportionalBrake( 1 )  
EngineBrakesProportionalBrakeLag( 1 )
```

```
TrainBrakesControllerMinPressureReduction( 6 )  
TrainBrakesControllerMaxApplicationRate( 10 )  
TrainBrakesControllerMaxReleaseRate( 2 )  
TrainBrakesControllerEmergencyApplicationRate( 40 )  
TrainBrakesControllerMinSystemPressure( 0 )  
TrainBrakesControllerMaxSystemPressure( 110 )  
TrainBrakesControllerEmergencyBrakeTimePenalty( 60 )  
TrainBrakesControllerFullServicePressureDrop( 26 )
```

```
DynamicBrakesMinUsableSpeed( 5 )  
DynamicBrakesMaximumEffectiveSpeed( 25 )  
DynamicBrakesMaximumForce( 20000 )  
DynamicBrakesResistorCurrentLimit ( 5000 )  
DynamicBrakesCutInSpeed( 8 )  
DynamicBrakesMaxAirBrakePressure ( 15 )  
DynamicBrakesFadingSpeed( 25 )  
DynamicBrakesDelayTimeBeforeEngaging ( 10 )  
DynamicBrakesMaximumSpeedForFadeOut ( 65 )  
DynamicBrakesEffectAtMaximumFadeOut( 0 )  
DynamicBrakesHigherSpeedCurveExponent( 1 )  
DynamicBrakesLowerSpeedCurveExponent( 1 )  
DynamicBrakesNumberOfControllerNotches( 8 )
```

```
BrakesEngineBrakeType( "Air_twin_pipe" )
```

```
BrakesTrainBrakeType( "Air_twin_pipe" )
BrakesEngineControllers( "Train, Dynamic, Blended" )
```

3. . Find the portion of the ENG file that reads:

```
EngineControllers (
  comment( Engine controls )

  Regulator ( 0 1 0.025 0
    NumNotches( 0 )
  )
  Cutoff ( -0.55 0.75 0.01 0
    NumNotches( 0 )
  )
  Brake_Train ( 0 1 0.01 0.65
    NumNotches( 3
      Notch(0 1 TrainBrakesControllerReleaseStart )
      Notch(0.4 1 TrainBrakesControllerRunningStart )
      Notch(0.5 1 TrainBrakesControllerApplyStart )
    )
  )
  Brake_Hand ( 0 1 0.0125 0
    NumNotches( 0 )
```

And replace it with

```
EngineControllers (
  Throttle ( 0 1 0.025 0
    NumNotches ( 0 )
  )
  Brake_Train ( 0 1 0.0125 0.5
    NumNotches ( 5
      Notch ( 0 0 TrainBrakesControllerReleaseStart )
      Notch ( 0.2 0 TrainBrakesControllerHoldLappedStart )
      Notch ( 0.25 1 TrainBrakesControllerGraduatedSelfLapLimitedHoldingStart )
      Notch ( 0.85 0 TrainBrakesControllerSuppressionStart )
      Notch ( 0.9 0 TrainBrakesControllerContinuousServiceStart )
    )
  )
  Brake_Dynamic ( 0 1 0.0125 0
    NumNotches( 0 )
```

I have modified some 60 locomotives so far and they have all worked extremely well.

Have fun!!

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