USATC S160

Contents

 Release Version 1.0

Introduction

Thank you for purchasing the USATC S160 Steam Locomotive Add-on for Train Simulator.

It is hard to know where to begin talking about this add-on, the project scope being so huge! 2120 locomotives shipped world-wide, every country making its own changes and modifications, every one of them with its own livery. Just narrowing down a sub-set of these that were achievable in a reasonable amount of time was a major task. Then the research to get the correct information, much of it from non-English speaking countries to get the details correct was a another huge task in itself. We are indebted to some very generous people who have given much time and effort to provide plans, research, photographs and an English-speaking point of contact to some of the great Train Simulator communities around the world.
They are listed in the credits and we cannot thank them enough.
As always, Steam Sounds Supreme have provided us with a superb sound track to the highly detailed modelling with two different sound sets (required due to chimney modifications) and with whistle sounds using a brand new dynamic system that are second to none.
This is by far our biggest add-on to date and we hope that the scope of it will appeal to many people across the world by providing locomotives native to their own countries as well as a chance to try something different from elsewhere.
Although the included scenarios were limited by the routes available on Steam we look forward to seeing many more local scenarios on appropriate routes via the Workshop and on the many excellent fan sites.

Kind Regards,
Victory Works

Click on the links below to read about future projects, see Work in Progress pictures and read more about the research, detail and passion that we put into our Train Simulator add-ons.

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Features

- Simple, Standard and Advanced driving modes
- Xbox controller support ***SIMPLE AND STANDARD MODES ONLY***

- USATC S160 Locomotive and Tender in 10 authentic liveries and 15 base variants – listed below with the included coupling and brake types
    - USATC Black
        - Wartime
            - Hook/Vacuum (UK)
            - Hook/Air (Europe)
            - Buckeye/Air (USA)
            - Willison/Air (USSR)
        - French 140U
            - Hook/Air (Europe)
        - Polish Tr201
            - Hook/Air (Europe)
        - USSR Ша
            - Willison/Air (USSR)
    - USATC Grey
        - Hook/Vacuum (UK)
        - Hook/Air (Europe)
        - Buckeye/Air (USA)
        - Willison/Air (USSR)
    - UK Longmoor Military Railway
        - Hook/Vacuum (UK)
    - UK British Railways preservation livery
        - Hook/Vacuum (UK)
    - USSR Ша Post-War
        - Willison/Air (USSR)
    - USA Alaska Railroad
        - Early livery
            - Buckeye/Air (USA)
        - Late livery
            - Buckeye/Air (USA)
    - USA Army
        - Buckeye/Air (USA)

    - Poland Post-War
        - Tr201
            - Hook/Air (Europe)
        - Tr203
            - Hook/Air (Europe)
    - USATC Black – 11th Dec 1942 handing over ceremony
        - Hook/Vacuum (UK)
    - USATC Black Wartime Delivery
        - Static non-driveable version as delivered overseas
- Numerous optional parts relevant to each livery and country of use for locomotives and cabs
- Up to 4 different types of tender facing relevant to each livery type
- USSR fitted locomotives available with standard and 1520mm gauge wheels
- Custom sound sets inside and out recorded from preserved S160's from around the world with two different sets of chuffs, crafted by the experts at Steam Sounds Supreme
- Dynamic whistle control, even outside of the cab – the more you "pull" the whistle, the more steam is passed through it
- Realistic cab with multiple views including integrated head out view and a fully modelled firebox and coal level
- Fully operable tender controls including stoking
- Custom, realistic wheel slip physics and effects with auto detection of weather conditions ***ADVANCED MODE ONLY***
- Simulated steam chest ***ADVANCED MODE ONLY***
- Cylinder cock management ***ADVANCED MODE ONLY***
- Boiler management with priming damage possible ***ADVANCED MODE ONLY***
- Realistic injector control ***ADVANCED MODE ONLY***
- Dynamic steam and smoke colour and quantity
- Realistic boiler water gauges effected by gradient, acceleration and speed and with blow down test
- Visual priming effect from chimney when overfilling the boiler
- Opening windows with rain effects, and roof hatch
- Dynamic lamp setting on both locomotive and tender for every country
- Cab light effects including firebox glow, cab light and tender light (where fitted)

- Wartime period rolling stock
    - Rich and detailed sound sets created by Steam Sounds Supreme
    - Animated handbrakes with sound
    - Passenger views for all brake vans
    - USSR fitted rolling stock available with standard and 1520mm gauge wheels

    - USATC 56 Ton Flat Car
        - Empty
            - Hook/Vacuum (UK)
            - Hook/Air (Europe)
            - Buckeye/Air (USA)
            - Willison/Air (USSR)
        - T34-76 (USSR)
            - Willison/Air (USSR)
        - T34-85 (USSR)
            - Willison/Air (USSR)
        - T34-76 (Poland)
            - Hook/Air (Europe)
        - M10 Tank Destroyer
            - Hook/Vacuum (UK)
            - Hook/Air (Europe)
            - Buckeye/Air (USA)
        - Cromwell
            - Hook/Vacuum (UK)
        - Char B1
            - Hook/Air (Europe)
        - US6 Military Truck
            - Loaded as single or double, with 5 random variations of truck
            - Hook/Vacuum (UK)
            - Hook/Air (Europe)
            - Buckeye/Air (USA)
            - Willison/Air (USSR)
    - 40ft Flat Car
        - USSR Ша locomotive (1520mm gauge) delivery

        - Willison/Air (USSR)
    - USSR Ша tender (1520mm gauge) delivery
        - Willison/Air (USSR)
- USATC 9900 Gallon Tank
    - 3 random logo variations
        - Hook/Air (Europe)
        - Buckeye/Air (USA)
- USATC Caboose
    - Hook/Air (Europe)
    - Buckeye/Air (USA)
- Warwell
    - Empty
        - Hook/Vacuum (UK)
    - Cromwell
        - Hook/Vacuum (UK)
    - M10
        - Hook/Vacuum (UK)
- LMS Brake Van
    - Hook/Vacuum (UK)
- USSR 20 Ton Flat Car
    - Empty
        - Willison/Air (USSR)
    - Katyusha
        - Willison/Air (USSR)
    - ZIS-3 75mm Anti-tank gun
        - With random cloth cover
        - Willison/Air (USSR)
- USSR Brake Van
    - Green or brown
    - Willison/Air (USSR)

- 3 scenarios for the **West Somerset Railway** Route Add-On
- 3 scenarios for the **Riviera Line in the Fifties** Route Add-On
- 4 scenarios for the **Horseshoe Curve** Route Add-On
- 68 Quick Drive consists with appropriate stock

Background

In 1942 when an invasion of Europe by Allied forces became inevitable it was clear that there would be a shortage of locomotives that could be used on all routes for the mass movement of troops and equipment due to the state of the railways after bombing and sabotage.

Two locomotives were designed specifically for the purpose of heavy freight movements, the British War Department Austerity 2-8-0 and the U.S.A. S160. 935 Austerity's were produced and 2,120 S160's were built and they worked on railways all across the world including Africa, Asia, Europe and America.

Even though designed by committee by the USATC, Alco, Baldwin and Lima, the S160 design was a resounding success. A wide, riveted steel firebox heated water in a 5'10" diameter boiler driving powerful 19"x26" pistons with a 10" stroke and producing 31,490 lb/f of tractive effort. Fitted with a Westinghouse pump for air brakes mounted on the smokebox (and giving the S160 an off-centre smokebox door design) 800 of the S160's were landed in Britain and also fitted with vacuum brakes which many of them retained when they were moved to mainland Europe by 1945 so they could assist with the motley collection of rolling stock that had been shipped after the Allied invasion.

Two hundred S160's were also built for use on the Russian gauge of 1520mm. Named Ша (ShA) they were used to help the Soviet war effort and after the war were taken into regular service and by 1957 50 of them had even been converted to narrow gauge, being renamed Шу.

After the war the S160's were scattered all over the world and continued to be maintained and used in almost every Allied country. Most of them renamed and renumbered, this is a non-exhaustive list of some of them to show the diversity of their locations:

Algeria: Class 140-U (number unknown)
Austria: ÖBB Class 956 (30)
China: Class KD6 (number unknown)
Czechoslovakia: CSD Class 456.1 (80)
France: SNCF Class 140U (121)
Hungary: MÁV Class 411 (510)
India: class AWC (60)
Italy: FS Class 736 (244)
Korea (North & South): Class Sori2 (number unknown)
Mexico: Class GR-28 (10)

Morocco: Class 140-B (number unknown)
Peru: Class 80 (2)
Poland: PKP (575)
Soviet Union: Ша (200)
Spain: Class 553 (6)
Tunisia: Class 140-250 (number unknown)
Turkey: TCDD 45171 (50 units)
Yugoslavia: JZ Class 37 (80)

Some of these locomotives were still in full time use up until 1997! A great feat considering the expected design life of the locomotives was just 90 days – effectively nothing more than a disposable locomotive to help win the war.

A number are currently running in preservation and as static displays and these have provided invaluable research opportunities to make this add-on as accurate as possible. However due to the sheer number of S160's, and the countries that took delivery of them and then made them their own with innumerable modifications some compromises have had to be made and some of the more obscure or "one off" alterations have not been included. Despite this we have still included 15 variants covering 10 liveries and 6 countries, each one with at least a dozen options.

As well as producing locomotives the USATC also built a large amount of rolling stock, provided on a lead lease programme, which was also shipped abroad for the movement of equipment and supplies. Some of these are also included with this add-on carrying loads appropriate to the UK, USA, USSR, Poland, France and most of Europe. We have also built some specific USSR rolling stock available in the game in 1520mm and standard gauge.

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Scenarios

Horseshoe Curve Route Add-on [View on Steam]

S160: [1] International Co-operation, Part 1
Tuesday April 18th 1944
War has been raging in Europe since 1939 but the events of December 1941 changed the conflict and began the full scale involvement of the United States of America. As well as using man power to defend themselves and their allies the USA begins to produce a huge amount of equipment, among which are 2120 steam locomotives. These locomotives are to be used by allied nations all over the world and this even includes 200 converted for use by the USSR where a railway gauge of 1520mm (4' 11 27/32") is used. To move these locomotives from the Baldwin factory in Eddystone, Pennsylvania to the port in New York, NY for shipping to the Soviet Union they must be loaded onto flat cars and moved by rail.
Complete part of the journey for 10 of these locomotives and tenders from Johnstown to Gallitzin using 2 S160's at the front and a banking S160 at the rear which will assist on the steep inclines to the summit.

S160: [1] International Co-operation, Part 2
Tuesday April 18th 1944
Having uncoupled the banking locomotive, continue the delivery of the Russian gauge Ша locomotives down the steep gradients to Altoona.

S160: [3] Army Switch
Thursday September 27th 1956
Use Army S160 No. 607 to marshall 12 ex-WW2 9,900 gallon tanks and a caboose at Cresson Yard and taking them to the Army base at Fort Eustis, VA.

4. S160: [4] Alaska RR Rail Tour
Friday February 13th 1959
Drive Alaska Railroad S160 No. 557 on a special rail tour on the Pennsylvania Railroad from Altoona to Cresson on a cold, crisp day in February.

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West Somerset Railway Route Add-on [View on Steam]

S160: [1] Gala Preparation
Friday 5th August 2016
The West Somerset Railway is holding a unique gala with visiting S160 locomotives from all over the world.
The event is taking place over the weekend so today you will be driving Polish Tr203.451 and getting some coaching stock into order ready to carry passengers tomorrow.
Note: If you are familiar with driving S160's be aware that the Tr203 version runs at a reduced boiler pressure of 191psi.

S160: [2] Gala Opening Day
Saturday 6th August 2016
It is the opening day of the S160 gala and today you will be driving Russian ShA 122 and a consist of authentic WW2 wagons into Minehead where there is a large display of locomotives and rolling stock.

S160: [3] Gala Replacement
Sunday 7th August 2016
Day 2 of the WSR S160 Gala and the inevitable has happened.
As is quite common with running preserved trains we have suffered a failed locomotive - British Railways S160 92138 has broken down just east of Doniford Halt. We are prepared for this event and S160 5820 is standing by at Washford Yard ready to assist. You will be collecting the train, completing the timetable and dropping the failed locomotive at Williton.

Riviera Line in the Fifties Route [View on Steam]

S160: [1] D-Day Preparations
Friday 26th May 1944
Preparations are taking place for Operation Overlord, the plan to retake occupied Western Europe. Britain is the staging area for this invasion by land, sea and air and the railways are playing a huge part in moving all the required supplies, equipment and vehicles in to place. Today you will be taking 10 Cromwell tanks of the 7th Armoured Division to Kingswear/Dartmouth for use in the plans for Gold Beach in Normandy. There is a lot of traffic on the railways so keep a close eye on distant signals and be prepared to stop when required.

S160: [2] Leftovers
Friday 5th September 1952
The Longmoor Military Railway has sent S160 locomotive WD 701 to collect some ex-WW2 flats and return them to Hampshire.
Having travelled to Newton Abbot yesterday, today you will be shunting the flats and taking them back to the LMR.

S160: [3] Rewriting History
In a change to reality, rather than Britain sending all of the S160's to Europe and only seeing them return in preservation, we have imagined how BR would have incorporated the S160 into their engine assignments. Everything else is true to life.
Friday 27th June 1952
Over one hundred S160's are spread throughout all of Britain, now newly painted in standard black livery, and today you will be driving 92378 on the Western region pulling a stopping passenger service from Kingswear to Taunton.
Note: All services in this scenario including your own are based on an actual 1952 weekday timetable so stops are the real length and there is more waiting than in the average Train Simulator scenario.

Control Modes

There are 3 ways to drive the USATC S160 locomotive.

Simple Mode

This is selected using the menu in Train Simulator and provides a simple stop/go, forwards/backwards set of controls via the simulators built in HUD.

Standard Mode

This is the default mode if you choose to drive in Expert mode using the Train Simulator menu. The locomotive will operate with more complex controls and can be driven using the F4 HUD or an Xbox controller.

Advanced Mode

This is an advanced mode for those who want a more realistic experience and introduces features such as condensed water in the cylinders, overfilling the boiler, realistic wheel slip and a simulated steam chest. To achieve these extra functions use of a keyboard is required, although this can be used in conjunction with mouse operation or the F4 HUD.

To turn on Advanced Mode you can press Control A at any time and this will also turn it off again.

The ***Advanced Mode*** features are shown below for each control.

Driving Controls

Listed below are the controls available when driving the USATC S160 locomotive in standard and advanced modes.

Each S160 has up to a dozen optional components some of which are in the cab therefore the pictures below will often show more than one type of the specific control. The controls are also coloured differently for many liveries so may not be identical to those in the pictures.

Also see the following section, “Driving in Advanced Mode” for additional information.

1. Regulator

This controls the amount of steam allowed into the cylinders, hence directly controlling the speed in conjunction with the reverser.

The S160 is fitted with either an original horizontal regulator or a vertical regulator.

Keys: A,D

Advanced Mode

In advanced mode the locomotive steam chest is simulated. This will add a delay and smoothing to the increase and decrease of the regulators power to simulate steam moving through the locomotives pipes and valves. Please note that the F5 HUD regulator value will not reflect the actual position of the in-cab regulator but the value used to simulate the chest.

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2. Reverser

The reverser is somewhat like the gear lever on a car. It is usual to start with the reverser set at 75 percent cut-off (full). As you pick up speed you reduce the cut-off, thereby allowing economic driving as well as good speed whilst hauling a load.

The S160 is fitted with either a lever or a screw reverser dependant on the livery type or the locomotive number.

Keys: W, S

Advanced Mode

To move the reverser requires the lock to be taken off. To do this, press and hold the E key on the keyboard, move the reverser to the required position, and then release the lock (let go of the E key).

Key: E

When using the lever reverser it is also necessary to reduce the regulator from full when taking the lock off. Failure to do this will cause the reverser lever to be ripped from the drivers hands as the steam pressure pushes it to maximum cut-off.

3. Cylinder Cocks

Advanced Mode

Never move away from more than a short standing start without ensuring that these are open. When a locomotive sits static for any amount of time, water condensation builds up in the cylinders. Thus when the piston is in motion, and because water does not compress, the cylinder may crack and be damaged. If this happens you may continue but a lot of the working effort of the piston will be wasted and will not translate to powering the wheels.

The cylinder cocks are designed to expel this condensed water and should be opened for at least 4 turns of the locomotive wheels when the locomotive sets off after being stationary for some time.

The amount of stationary time varies depending on the time of day (the assumption that most steam locomotives were working from early in the morning) and also the weather. If you stop for more than a couple of minutes it's safer to open them for a few wheel rotations just to be sure and always ensure they are open when first setting off in a scenario.

Key: C

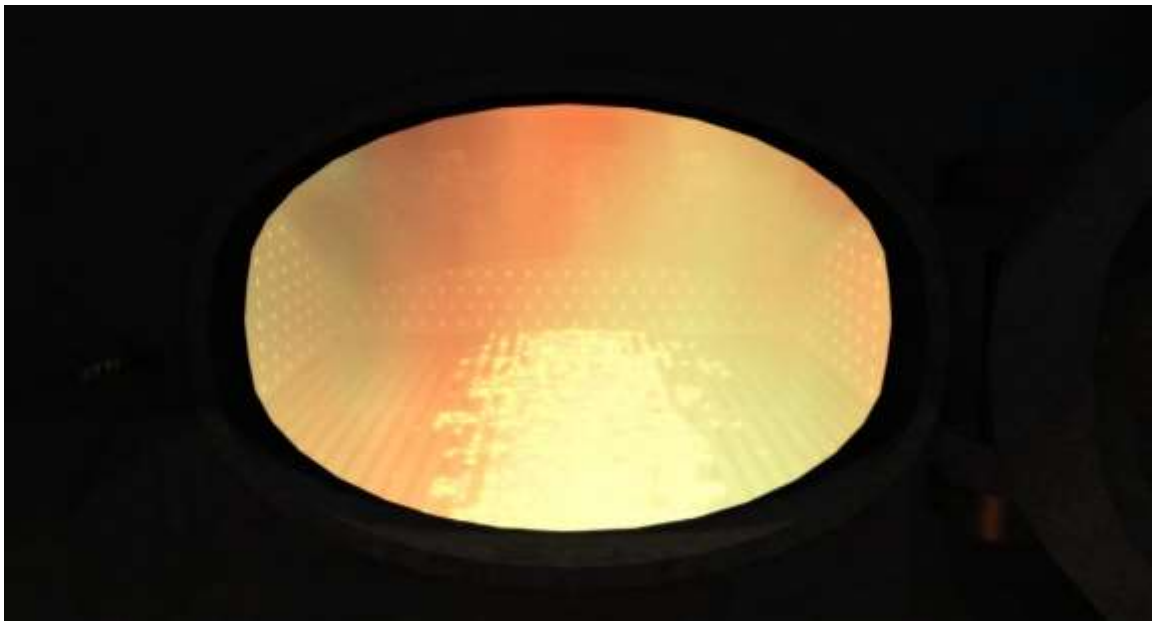
4. Firebox

Ensure the firebox doors are fully open to allow maximum stoking. A related tool is the shovel on the tender. When the firebox door is open, pull the shovel down to regulate the input of coal into the firebox.

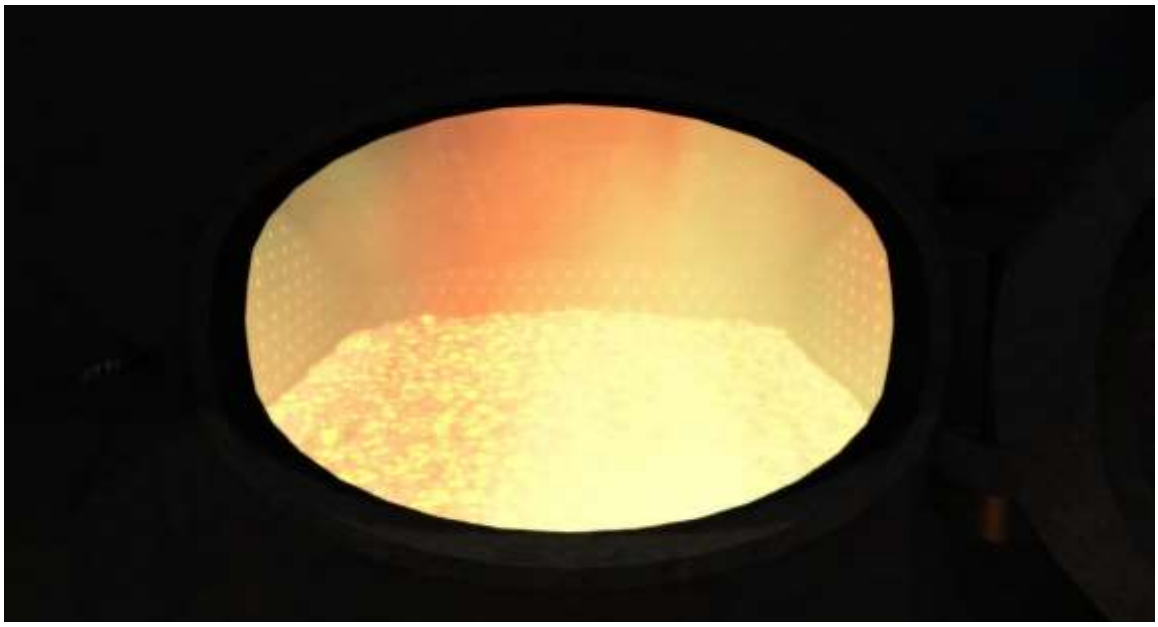
Key: F
Keys: R, Shift R (stoking)

As an additional tool for those who like to drive with minimal or no HUD display the firebox and coal is fully modelled with a specific cab view for checking the fire mass.

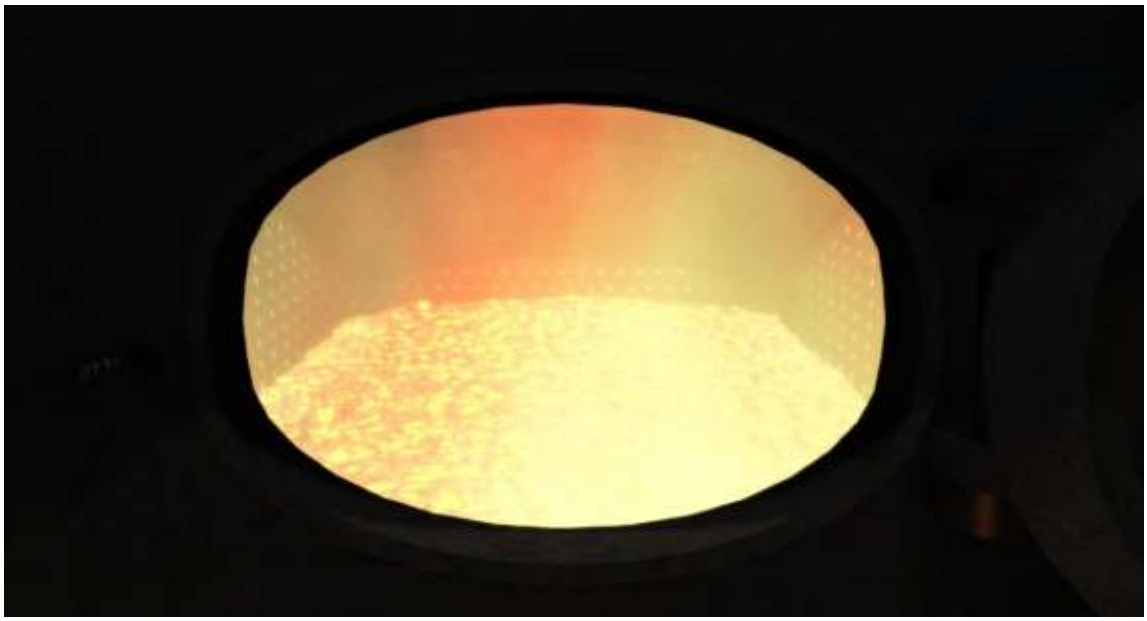
The coal level is slightly exaggerated over its working range so it can be used as a visual indicator of when firing is needed. The coal level rises and falls gradually but the images below will help in visualising how this can help.



Coal level low *< 42% 1221 lbs*
The grate can be clearly seen with a very small amount of coal in the centre.



Coal level average *60% 1770 lbs*
The grate is covered with the coal's centre on the 3rd rivet down on the back wall.



Coal level high *> 76% 2220 lbs*
The grate is deeply covered with the coal's centre almost up to the 2nd row of rivets on the back wall.

The shovel or coal doors on the tender control the stoking speed. When pulled fully down or open stoking is at maximum.

5. Blower and Boiler Pressure Gauge

The most useful application of the blower is when the regulator is at idle. Since there is no throughput of steam when at idle, air flow is minimised and therefore the fire loses heat. In some circumstances (such as when the safety valve is going off) this is acceptable but if you need to get some pressure into the boiler while the regulator is closed then fully opening the blower will force air over the fire, increasing temperature and then boiler pressure. It is good practice to turn off the blower again when you open the regulator to save on unnecessary steam usage.

Keys: N, Shift N

Although originally fitted with American pressure gauges reading in PSI, after the war many S160's were converted to local gauges and this add-on replicates this by changing the dial faces for Russian and Polish post-war locomotives.

On most S160's the boiler runs best at around 220 psi (15.47 Kg/cm^2, 1.5168 MPa). At 225 psi (15.82 Kg/cm^2, 1.5513 MPa) the first safety valve will open and the excess steam will vent quickly and noisily. If the boiler is still continuing to gain pressure a second larger valve will open at 228 psi (16.03 Kg/cm^2, 1.5720 MPa). Both valves close again when the boiler is under 222 psi (15.61 Kg/cm^2, 1.5306 MPa).

Please note that the Post-War Polish Tr201/3 had their maximum pressure reduced to 1.3169 MPa (191 psi) and therefore on this locomotive the safety valves will trigger at a lower pressure.

6. Dampers

Another tool related to the firebox. This helps control the heat of the firebox, closing it will reduce the air flow through the fire, thereby lowering heat and steam production. Opening it will allow more air in, hence producing more heat and steam.

The damper has 3 notches: closed, half and full. It is fully open in the raised position.

Keys: M, Shift M

Next to the damper lever is the blowdown lever. This is used to blast steam from the bottom of the boiler and clear out dirt and sludge that may have built up there. In Train Simulator it has no practical function, just an audio/visual effect.

7. Steam Injectors

Injectors use steam to blast water from the tender into the boiler.

The exhaust injector uses steam from the cylinders and recycles it so it is preferable when you are running low on steam.

Key: I, Shift I

The Live injector works the same as the Exhaust injector but uses live steam from the boiler, rather than exhaust steam. This is the preferred method when you have lots of steam and need to fill the boiler quickly.

Key: O, Shift O

To make the injectors work you also require water from the tender (see Water Taps below) and to turn on the relevant injector using the Injector Lever.

Key: Ctrl I (Exhaust), Ctrl O (Live)

Advanced Mode

In Advanced mode the exhaust injector will only work when there is exhaust steam to be used, i.e. the regulator is open and the locomotive is in motion.

Injector water taps

These are used to adjust the flow of water for the appropriate Live or Exhaust injector control.
The exhaust tap is on the left side of the cab, the live tap on the right side.

Keys: K, Shift K / L, Shift L

Advanced Mode

In Advanced Mode you will need to operate the injectors as the real thing and balance the water and steam to use them properly.
The correct procedure is as follows – for either Live or Exhaust injectors use the appropriately named controls:

- Fully open the water control tap.
    - You will hear and see water coming from under of the cab if the overflow is not closed.
- Turn on the injector.
- Turn the injector steam lever until you hear the injector start working.
    - If you hear a hiss and see a jet of steam under the cab you have too much steam pressure and the water is not entering the injector.
    - If you hear running water and see water running from the pipe under the cab you will need more steam to force it into the boiler.

The injector taps also have an overflow tap next to them. This allows any overflowing water from the injector to return to the tender rather than be spilled onto the ground – **however** there is the danger that closing the overflow removes the tell-tale sign that the injectors are not picking up the water and therefore no water is going into the boiler. This, along with the odd location of the gauge glass shut off tap, was the cause of at least one boiler explosion in the early days of the S160's.

8. Boiler Gauge Glasses

Attached to the boiler are strong glass tubes indicating the current level of water in the boiler. If this reaches the bottom then the fusible plugs will melt and relieve the boiler pressure whilst providing a warning to the locomotive crew.

The water level is not static when the locomotive is in motion and will wobble around appropriately. It is also affected by gradients, acceleration and deceleration.

Overfilling the boiler past 102% will cause priming and water will be ejected from the chimney.

Advanced Mode

Overfilling the boiler (past 110%) at high pressure can force water into the cylinders and cause the same problems as having condensed water from standing still. If you overfill the boiler open the cylinder cocks immediately and leave them open until the water level in the glass falls.

Another danger of overfilling the boiler is that of flooding the regulator. If this occurs then the regulator may become stuck open and even the combined strength of the driver and fireman will not be able to move it. In this event you need to run the water level down until the regulator can be moved again – in real life this happened many times, on one occasion forcing a crew to run their locomotive up and down the yard on the reverser until the water level dropped enough that they could regain control.

You can also perform blow down tests on the gauge glasses by doing the following:

1. Shut off the water supply to the top and bottom of the glass by turning taps **A** and **B**.
2. Turn the tap **C** at the bottom of the gauge, the water will empty from the glass.
3. Return the taps to their previous positions by reversing the above process to refill the glass.

When people talk about the S160 they often mention that they were dangerous and that there were some boiler explosions in their early days. This is often attributed to poor design, cheap materials etc. but in truth it was primarily caused by a lack of training and experience of British train crews with American locomotive cab layouts – sadly the time to fully train everyone being secondary to the war effort.

The water gauge top tap was one of these issues, being located on a long rod and situated in front of the driver and far from the gauge itself. This was sometimes not turned back on fully due to being very stiff, creating an airlock and freezing the gauge glass level despite water still being used up in the boiler. Add to this the unusual (to British eyes) gauge itself where water appears black against a silver background and a catastrophic accident involving an empty boiler was inevitable.

Triple Cock

As with many US locomotives the S160 has a backup device in case of failure of the boiler gauge glass. This is the triple cock and is located on the right side of the backhead. 3 taps are connected to the boiler at different levels with a trough below them to take expelled water away. In case of failure of the glass these taps can be opened to see how high the water in the boiler is. If no water comes out of the tap then the water is below that level.

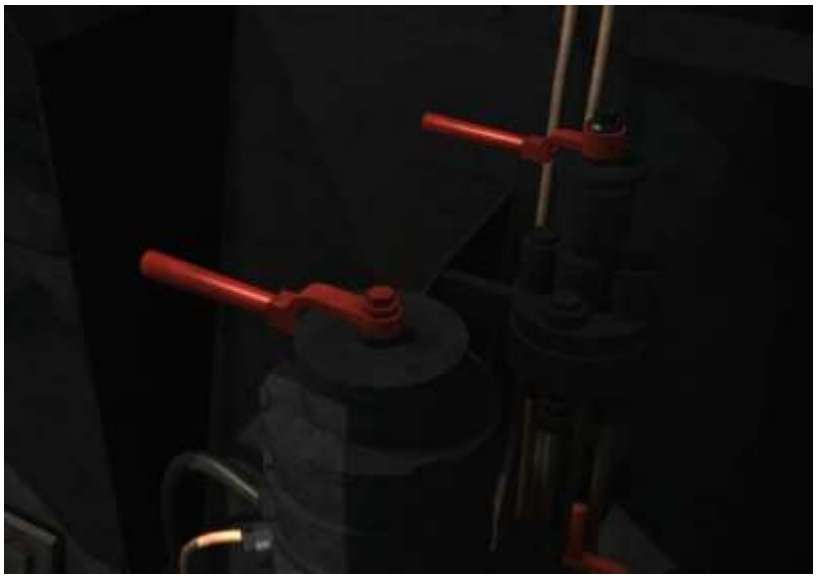
The 3 taps are set at approximately, just below full, $^{2}/_{3}$ full and $^{1}/_{3}$ full.

9. Air and Vacuum Brakes

As originally built the S160's were fitted with air braking, the pressure provided by the Westinghouse pump situated on the front of the smokebox. However 800 S160's were sent to Europe via Britain and these were also fitted with vacuum braking equipment for use with British rolling stock.
This add-on lists all locomotive types with their coupling type and their brake type – although the UK vacuum fitted locomotives still have visible air brake equipment in the cabs please note that it is non-functional in Train Simulator. You can use any rolling stock with the correct coupling type however be aware that if you use a different brake type then the rolling stock will act as if it is unfitted (i.e. with no braking of its own). This was actually not uncommon at this time and the included USATC 9900 Gallon Tank was moved all over the UK as unfitted stock.

Keys: ' (apostrophe), ; (semicolon)

Air Brakes



Vacuum Brakes

Advanced Mode

When using vacuum brakes it is important to keep the boiler pressure at a reasonable level. If your boiler drops below 205 PSI then you will find it very hard to generate enough pressure to release the brakes. If the pressure drops a lot lower then releasing the brakes will be impossible and you will need to wait until the pressure builds again.

10. Sander

The air powered sander assists in starting and stopping the locomotive without the wheels slipping by placing sand on the rail in front of and behind the driving wheels. It is controlled by the small brass lever located to the left of the reverser, if fitted – some S160's had their sanders removed whilst others had the normal 2 pipes per side increased to 3.

Keys: X, Shift X

Advanced Mode

Sand is essential in pulling away with minimal wheel slip in wet or icy conditions.

11. Whistle and Bell

Steam locomotive whistles are powered by steam from the boiler and are used to signal a trains approach, warn of danger and often to signify departure. This add-on has 3 whistle types: original 5 chime, USSR and USA bald top 3 chime.

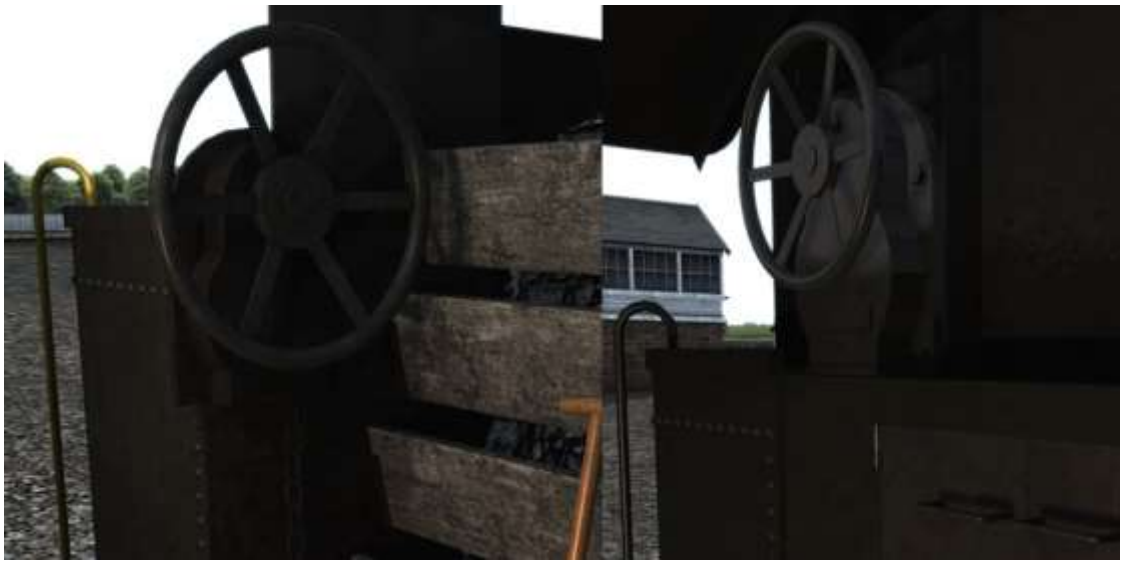
Key: Space

The original 5 chime whistle also has a series of short bursts using Ctrl-Space.

The S160 is also fitted with a brand new feature – the dynamic whistle. Together with Steam Sounds Supreme we have created a whistle that will be louder and produce a different tone depending on how much the whistle cord is pulled. This can be operated via the mouse from inside the cab, however a new feature unique to this locomotive is the HUD operated dynamic whistle. On pressing Shift-Space the F4 HUD brake control becomes a whistle control instead. Using the brake control you can then operate the dynamic whistle to get a really authentic whistle tone. The brake is locked at its current setting and will remain that way until Shift-Space is pressed again.

On USA livery locos a bell is fitted and can be turned on and off.

Key: B



12. Handbrake

A hand operated screw that applies the brakes to the locomotive and tender without the need to release the vacuum in the brake pipes.

Key: /

13. Speedometer

After the war when S160's were modified by their owning countries for everyday use, and also more recently in preservation, some were fitted with speedometers.

This add-on has 2 such speedometers: the simple UK British Railways version and the more complex USSR version.

The USSR speedometer also features a working tachometer, 24 hour clock and uses a notched mechanism that moves the speed hand in 2.5 kph ticks. It also features an over speed warning bell at 65 kph.

14. Headlights

There are 4 styles of headlights available for the various liveries in this pack some of which feature a reverse running light.

All locomotives use the same system for selecting whether the lights are on and in which direction the locomotive is running. You can cycle through the 4 settings using keys, H (cycle forward) and Shift H (cycle back), or the X-Box controller Headlight button.

The settings are as follows:

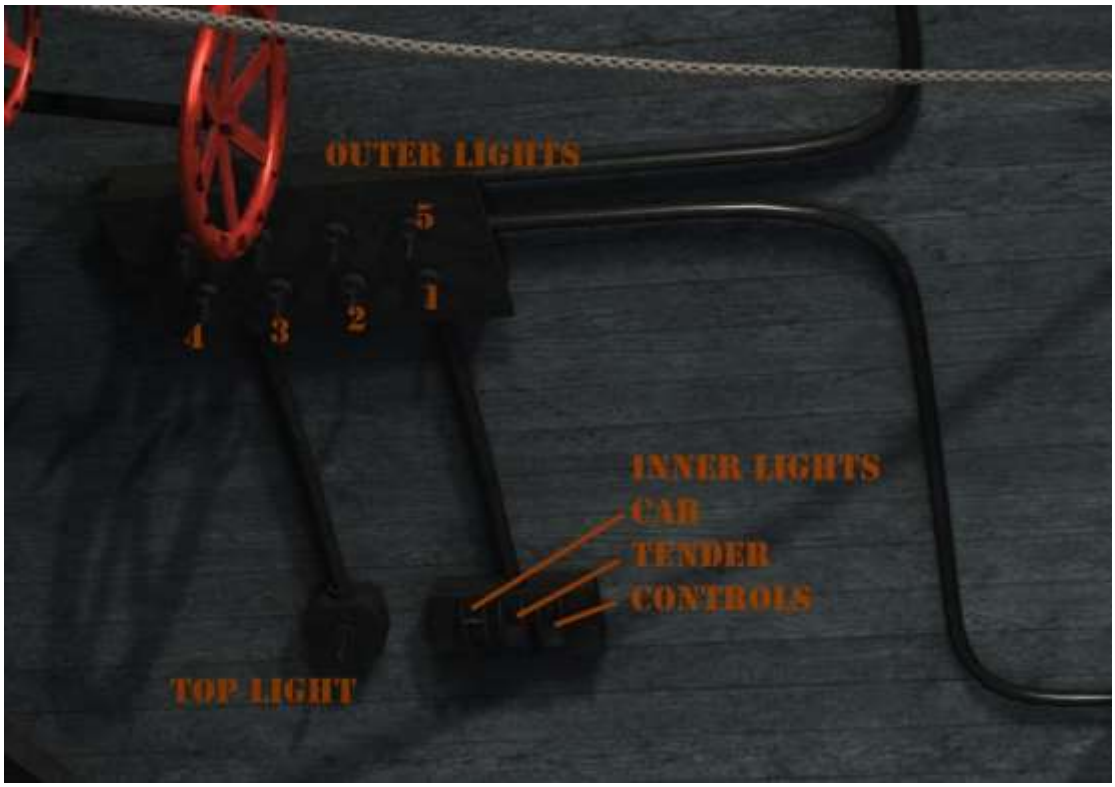
0 – Running **FORWARDS**, lights **OFF**

1 – Running **FORWARDS**, lights **ON**

2 – Running **BACKWARDS**, lights **ON**

3 – Running **BACKWARDS**, lights **OFF**

Key: H, Shift H



15. Switch panel

Although when built none of the 2120 S160's were fitted with electrical generators these quickly became a normal feature even during the war with electrical lights being added, both outside and inside.

The number of electrical panels fitted is perhaps even more diverse than the other numerous modifications made to S160's but for this add-on we have created a standard panel which when fitted provides the following functionality:

Which controls are operable is dependent on the locomotive livery; however they are as shown above.

The "Inner Lights" Controls switch operates lamps fitted to the boiler pressure gauge and/or the boiler water glass if they are fitted.

The "Outer Lights" are for UK lamps, numbers 1 to 4 relating to lamps at the top, left, middle and right respectively. Switch 5 can be used as an Off/On switch. All of these can also be operated using keys: Ctrl-1 to 5.

16. Windows, window ledges and roof hatch

To provide ventilation for the crew or to protect them from the elements you can open and close the windows and the roof hatch. Click and drag with the mouse.

Driving in Advanced Mode

Advanced Mode ONLY

The following is a summary of how to drive successfully in Advanced Mode. It does not contain hard figures – e.g. set the reverser at 25% and the regulator at 30% - as these are the things you will learn by driving the locomotive.

However, there are some realistic features that are incorporated that require some specific knowledge for the best operation.

Before you start

Fire – Assuming you are not using the auto-fireman and not about to run downhill for a long way you will want to start building the fire as soon as possible (see Controls Section 4).

Gauge Glass Test – If you have time at the start of a scenario then you can perform gauge glass blow down tests to pass the time (see Controls Section 10).

Setting Off

Cylinder Cocks – If you are just starting or have been stationary for a while, ensure that the cylinder cocks are open. As you drive off, listen for the change in pitch as the water empties or count 4 full revolutions of the wheels and then close them (see Controls Section 3).

Wheel Slip – In wet or icy conditions due to the accurate wheel slip and simulated steam chest you will need to use the regulator like a real driver would. Primarily on starting (when the reverser cut off is high) this means you must manage the steam entering the pistons to make sure that the power being applied to the rails does not exceed the amount of grip available.

If you open the regulator and just leave it open the pressure will continue to build as will the amount of power being applied to the rail. This will likely cause wheel slipping.
As a real driver would you need to “pump” the regulator to gradually build the pressure in the cylinders as you accelerate. This means opening the regulator for a moment and then closing it again, the residual steam will continue to work and

cause the locomotive to carry on accelerating. Continually doing this will allow the locomotive to build speed and pressure gradually and avoid wheel slip.

Once a slow speed is reached you can then leave the regulator open and accelerate and adjust as needed to maintain a constant speed.
The speed at which you can stop pumping varies and is based on how much grip is available – an icy rail will need a much higher speed to allow full power than a dry rail.

The weight of the consist will also affect how long it takes before this speed is reached (simply because a heavier load takes longer to accelerate) which means you are more likely to have to manage the wheel slip for longer, therefore making it more likely.

In summary, as you set off do not throw the regulator to full and leave it there! Pump it gradually, increasing the power slowly until you can leave the regulator open. And be aware of the weather, a wet or icy rail provides a lot less grip.
This brings us to:

Sander – The sander helps to provide grip for the wheels on the rail and should be used when starting in wet or icy conditions (see Controls Section 10).

Under Way

Water Filling – You will need to use the injector levels, water taps and the injector steam levers to fill the boiler (see Controls Section 7).
Due to the water gauge glasses wobbling around and being effected by gradient and acceleration it is normal procedure to try and keep the boiler between half and three quarters full to avoid overfilling the boiler and causing priming to occur.

Rolling Stock

- USATC 56 Ton Flat Car
  - Empty
  - T34-76 (USSR)
  - T34-85 (USSR)
  - T34-76 (Poland)
  - M10 Tank Destroyer
  - Cromwell
  - Char B1
  - US6 Military Truck
    - Loaded as single or double
    - 5 random variations of truck

- 40ft Flat Car
  - USSR Ша locomotive (delivery)
  - USSR Ша tender (delivery)

- USATC 9900 Gallon Tank
  - 3 random logo variations

- USATC Caboose

- Warwell
  - Empty
  - Cromwell
  - M10

- USSR 20 Ton Flat Car
  - Empty
  - Katyusha
  - ZIS-3 75mm Anti-tank gun
    - Random cloth cover

- USSR Brake Van
  - Green or brown

Modification Policy

You are free to create modifications (including but not limited to re-skins, sound updates, “enhancement” packs, etc.) within the guidelines of Dovetail Games current policies (for example, no inclusion of 3D model files) however if they are made public then they must be provided **free of charge**. They can be hosted on a site that asks a nominal membership fee for quicker downloads (e.g. UK Train Sim) but cannot be sold in any way without the express permission of Victory Works.

If you wish to discuss terms for selling modifications please contact us via email at victoryworks@live.co.uk

To summarise – free mods are fine, as long as they adhere to DTG’s current policies. If you wish to sell mods then you **MUST** get permission first.

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- Łukasz “Havner” Pawelczyk
- Olivier “cerbere22” Fakih
- Jason Underwood

Appendix 1: Locomotive Numbering

When an S160 is added to a scenario the number will be randomly chosen from a list of all relevant members of the class.

These are pre-set with as close to the correct configuration as possible for each number as they were historically outfitted. However if you wish to change any of the components then the setups are listed below.

represents a digit in the loco number or tender number, numbers 1 to 9 or # for empty
Some settings are standardised as follows

- [Y,N] is always Yes or No to a particular option
- Regulator [O,R] is Original or Roof mounted
- Reverser [L,S] is Lever or Screw
- Firebox Doors [O,T] is Original or Twin
- Tender: Front [1,2,3,4,5] are different styles from 1 being the basic original to 5 being totally rebuilt in preservation
- Wheel Gauge [S,B], Standard or USSR Broad (1520mm)

Ceremony – Hook/Vacuum
Engine
/ Lamp Code [A-G] e.g. 1604G
Tender
e.g. 1234

Polish TR201/3 – Hook/Air
Engine
Tr201 or 3 [1,3] / # # # / Numbering Cast or Painted [C,P] / Depot(see below) [1-9,A-G] / Number on Smokebox Door [Y,N] / Flared or Straight Chimney [F,S] /, Side or Top Water Feed [S,T] / Cover on W'house [Y,N] / Pilot [Y,N] / Regulator [O,R] / Reverser [L,S] / Firebox Doors [O,T]
e.g. 3451C1NFSYNOST
Tender
Tr201 or 3 [1,3] / # # # / Numbering matching Loco, Cast or Painted [L,C,P] / Front [1,2] / Water Rods [Y,N] / Extra Planks [Y,Y]
e.g. 1451L1YY

Polish Depots use the following codes

- Dyr. Warszawa
    1. Par. W-wa Wsch.
    2. Par. W-wa Zach.
    3. Par. Olszynka Grochowska
    4. Par. Skierniewice
- Dyr. Poznan

5. Par. Wolsztyn
6. Par. Ostrów Wlkp.
7. Par. Leszno
8. Par. Gniezno
9. Par. Pila

- Dyr. Wroclaw
  A. Par. Jelenia Góra
  B. Par. Jaworzyna Slaska
- Dyr. Gdansk
  C. Par. Chojnice
  D. Par. Zajaczkowo Tczewskie
  E. Par. Koscierzyna
- Dyr. Katowice
  F. Par. Szczakowa
  G. Par. Czestochowa

British Railways – Hook/Vacuum
Engine
/ Shed Code(# # #) / Regulator[O,R] / Reverser[S,L] / Warning Flashes [Y,N] / Head Code [A-G] e.g. 958205JOSYA
Tender
/ Wheel or BR Handbrake [W,B] / Warning Flashes [Y,N] / BR Logo pRe 1956, pOst 1956 or none [R,O,#] e.g. 1234WYR

LMR Blue – Hook/Vacuum
Engine
/ Regulator [O,R] / Reverser [S,L] / Speedo [N,Y] / Head Code [A-G]
e.g. 701OSNG
Tender
e.g. 1234

Alaska Railroad (Early and Late versions) – Buckeye/Air
Engine
/ Logo 1 Early, 2 Alternate Early, 3 Late [1,2,3] / Short or Tall Chimney [S,T] / Original or Vertical Whistle [O,V] / Firebox cover [Y,N] / Pilot (see below) [W,C,S], Generator location [F,B,X] / Bell location [B,F] / Reverser [L,S]
e.g. 5571SVNWFBS
Tender
e.g. 1234

Alaska Railroad and US Army locos have 3 options for the pilot.

- C = Cow catcher
- S = Snow plough
- W = Weather controlled. In snow a plough will be shown else a cow catcher

US Army – Buckeye/Air
Engine
Tall or Short Chimney [T,S] / Original or Vertical Whistle [V,O] / Firebox cover [Y,N] / Black or Yellow Buffer Plate [B,Y] / Westinghouse location [B,S] / Pilot (see below) [W,E,B,Y,S] / Front Steps or Stairs[A,E] / Bell location [F,B] / Reverser [S,L] / Yellow or White Hand Rails [Y,W] / Front Number on Smokebox or Lamp [S,L] / White Wheel Rims [N,Y]
e.g. 607TVYBBWAFSYSN
Tender
/ Lettering or Number Logo [L,N] / Yellow or Black Buffer Plate [Y,B] / White Wheel Rims [Y,N]
e.g. 1001LYY

The pilot is set as follows

- W – weather controlled with black cow catcher
- E – weather controlled with yellow cow catcher
- B – Black cow catcher
- Y – Yellow cow catcher
- S – Snow plough

USATC Black – Buckeye/Air, Hook/Air, Hook/Vacuum, Willison/Air
All engines except the French 140U have same settings
Engine
/ Sanders Pipes [0,2] / Reverser [L,S] / Firebox Cover [Y,N]
e.g. 58202LN
All tenders have the same settings
Tender
/ Full, USA or no Logo [F,U,#] / No, U**S**A or U**K** Graffiti [#,K,S] / Kilroy cartoon [N,Y] e.g. 1234F#N

USATC Black – French 140U – Hook/Air
Engine
/ Sanders Pipes [0,2] / Reverser [L,S] / Firebox Cover [Y,N] / Depot (see below) [A-Z,1- 4]
e.g. 58202LNA

French Depot List
A - CHÂLONS - SUR - MARNE
B - MOHON
C - THIONVILLE
D - HAUSBERGEN
E - REDING
F - CHALINDREY
G - METZ
H - NANCY
I - BLAINVILLE

J - SAINT -
K - DIZIER
L - AULNOYE
M - TERGNIER
N - LAON
O - HIRSON
P - PARIS - BATIGNOLLES
Q - DREUX
R - TRAPPES
S - LE - HAVRE
T - CHERBOURG
U - MÉZIDON
V - LISIEUX
W - ARGENTAN
X - CAEN
Y - SAINTE - GAUBURGE
Z - LISON
1 - LYON - MOUCHE
2 - MARSEILLE - BLANCARDE
3 - CHALON - SUR - SAÔNE
4 - VITRY - LE – FRANÇOIS

USATC Grey – Buckeye/Air
Engine
/ Tall or Flared Chimney [T,F] / Side or Top Water Feed [S,T] / Original or Vertical Whistle [O,V] / Cow Catcher [Y,N] / Original Steps or Stairs [O,S] / Generator location [1,2,3] / Bell location [F,R] / Window Shades [Y,N] / Regulator [O,R] / Reverser [L,S] / Single or Twin Water Gauge [S,T]
e.g. 5820TSONO3FYOLS
Tender
/ Front [5,4] / Tender Lamp [Y,N] / Logo [Y,N] e.g. 12345YY

USATC Grey – Hook/Air
Engine
/ Tall or Short Chimney [T,S] / Sander [Y/N] / Side or Top Water Feed [S,T] / Westinghouse style [1,2,3,4] / Cow Catcher [Y,N] / Painted Soviet Star [Y,N] / Regulator [O,R] / Reverser [S,L] / Toolbox for fireman's seat [Y,N] / Polish Dials [Y,N]
e.g. 5820TYS4NNOSNN
Tender
/ Front [5,4] / Tender Lamp [Y,N] / Logo [Y,N] e.g. 12345YY

USATC Grey – Hook/Vacuum
Engine
/ Red Warning Flashes [R,#] /Plain or Ribbed Chimney [#,R] / Sander Pipes [0,2,3] / Side or Top Water Feed [S,T] / Buffer plate [#,R,S] / Electrics [N,Y] /

Regulator [O,R] / Reverser[S,L] / Speedo [N,Y] / Firebox Doors [T,O] / Water Gauge [1,2,3,4,5] / Head Code [A-G]
e.g. 5820R#2S#NOSNT5F
Tender
/ Front [1,2,3,4] / Wheel or British Handbrake [W,B] / Tender Lamp [Y,N] / Red Warning Flashes [R,#] / Logo [Y,N] e.g. 12343WNRY

USATC Grey – Willison/Air
Engine
/ Side or Top Water Feed [S,T] / Original or USSR Whistle [O,H] / Westinghouse style [1,2,3,4] / Generator location [2,1,4] / Radio fitted [Y,N] / Soviet Star [N,Y] / Left, right or no firehose box [R,L,#] / Reverser [L,S] / Cab Rear Panels Style [1,2,3] / Top Lamp [Y,N] / Wheel Gauge [S,B]
e.g. 5820SO32YNRL2YS
Tender
/ Front [4,5] / Tender Lamp [Y,N] / Toolbox [Y,N] / Logo [Y,N] / Wheel Gauge [S,B]
e.g. 12345YYYS

USSR Ша Post WW2 – Willison/Air
Engine
Side or Top Water Feed [S,T] / Original or USSR Whistle [O,V] / Firebox cover [Y/N] / Cow Catcher [N,Y] / Radio [N,Y] / Firehose[L,R,#] / Painted, Cast or no Soviet Star [P,C,#] / Reverser [L,S] / Firebox Doors [O,T] / Cab Rear Panels [1,2,3] / USSR, USA or no Top Lamp [R,A,#] / Depot (see below) [1-6,#] / Buffers [N,Y] / Wheel Gauge [S,B]
e.g. #60SOYNNRPLO1R1NS
Tender
/ Front [2,1] / Buffers [N,Y] / Top Lamp [N,Y] / Water Rods [N,Y] / Extra Planks [N,Y] / Wheel Gauge [S,B]
e.g. 12342NNNNS

USSR Depot List
1 – БЕЛ. Ж.Д.
2 – ПРИВ. Ж.Д.
3 – ПРИБ. Ж.Д.
4 – ЭСТ. Ж.Д.
5 – Кз. Ж.Д.
6 - ОКТ. Ж.Д.

USSR Ша WW2 – Willison/Air
Engine
/ Original or Tall Chimney [O,T] / Firebox cover [N,Y] / Radio [N,Y] / Reverser [L,S] / Speedometer [N,Y] / Dial/Gauge Lamps [N,Y] / USSR Dials [N,Y] / Sha text on Step [Y,N] / Buffers [Y/N] / Wheel Gauge [S,B]
e.g. 120ONNLNNNYYS

Tender
/ Front [2,1] / Extra Planks [N,Y] / Top Lamp [N,Y] / Buffers[Y,N] / Wheel Gauge [S,B]
e.g. 12342NNYS

Appendix 2: Rolling Stock Numbering

Some of the rolling stock can be also be customised.

9900 Gallon Tank
/ *Optional [1,4,5]*
If the 9900 gallon tank is given a 6th digit it will show the logo as follows

1. Plain
4. Transport Corps
5. AV Gas

With only a 5 digit number the logo style will be random

56t Flat Car
/ Wheel Gauge [S,B]

USSR 20t Flat Car
/ Sides [#,F,E,M] / Wheel Gauge [S,B]
The side flaps can be set as follows

- All up
F – All down
E – Ends down
M – Middle down

The ZIS-3 anti-tank guns are shown with a cover over them if the 6th digit of the wagon number is between 6 and 9

USSR Brake Van
/ Wheel Gauge [S,B]