

# Instruction Manual



## PENNSYLVANIA T1 4-4-4-4 LIVE STEAM - ALCOHOL FIRED



**ACCUCRAFT TRAINS**  
MUSEUM QUALITY BRASS MODELS



## T1 HISTORY

The Pennsylvania Railroad's 4-4-4-4 Class T1 passenger locomotives were their last-built steam locomotives. They were not articulated, but were Duplex drive and had poppet valves. The first two, #6110 and #6111, were built by Baldwin in 1942. These locomotives were considered successful and could pull 16 cars at 100 MPH. They were also technically advanced and more efficient than previous designs. Later, 50 more of these were built in 1945-46 for a total of 52. Locomotives #5500 to #5524 were built by the Pennsylvania Railroad's Juniata Shops and #5525 to #5549 were built by Baldwin. The large tenders carried 38.6 tons of coal, 19,200 gallons of water and could travel between Harrisburg, Pennsylvania and Chicago, Illinois with only one stop. Wheel slip problems were later found to be controllable by more experienced engineers. The streamline design by Raymond Loewy was in later years the inspiration for the Baldwin Lima "Shark Nose" diesels.

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## **General information:**

Operating a model live steam locomotive is much different from running an electrically powered engine. It is a more hands-on, interactive experience.

The locomotive must be periodically fueled, oiled and watered. As supplied, the locomotive is manually controlled, which means that you must actually drive the locomotive using the controls in the cab, just as you would a full-size engine.

The performance of the engine is also unlike electric locomotives. The locomotive should pull a dozen or more standard-size freight cars on good, level track. Grades and sharp curves will diminish its capability. A good engineer will learn the engine's characteristics and idiosyncrasies over time, to get the best performance and longest duration from it.

## **Safety:**

For your safety, there are certain rules that should be observed, as follows:

1. The safety valves have been set at the factory to release at around 60 pounds per square inch of pressure. Never tamper with the safety valve.
2. The alcohol firing system has been designed to use denatured alcohol. Do not use an other fuel. Other fuel will create a dangerous condition, and will also damage the locomotive!
3. Always make sure the fire is out before refueling the locomotive. The Alcohol fire is nearly invisible so be absolutely sure that there is no flame burning around the engine when refueling is being done!
4. A steam engine gets hot, Be careful.

The locomotive and tender should always be carried separately because of their weight. We suggest carrying the locomotive to the track by supporting it underneath the wheels with both hands, as opposed to lifting by the pilot (which may not stand the stress) and rear beam.

For general carrying, the engine can be carried on a carrying tray with handles.



**Model Features**

This limited production model has been handcrafted for Accucraft Trains by BMMC, which is one of the most respected makers of large scale brass models. This museum quality model features:

- Detailed boiler with fittings, domes, pipes and handrails
- Operating steel drive rods, valve gear and cross heads
- Prototypical livery and lettering

**Technical Specifications**

Scale/Gauge: 1:32, 45 mm Gauge

Total Weight: 36 lbs  
Length: 25.68 in.  
Width: 4.08 in.  
Height: 5.93 in.

Tender Information:  
Length: 20.21 in.  
Width: 4.02 in.  
Height: 5.76 in.  
Recommend Radius: 3M, 10ft.\*

Boiler water capacity  
to top of water glass: 450 ml  
Tender water capacity: 600 ml  
Alcohol tank capacity: 500 ml

\*Be sure to leave at least 3" clearance (measured from the inner rail) to allow for overhang.

**Caution!**

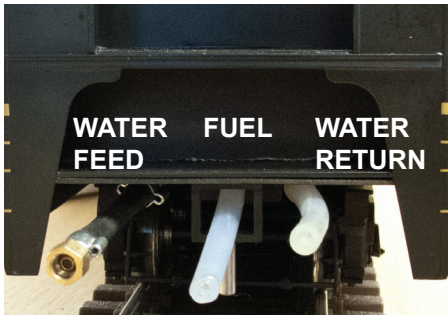
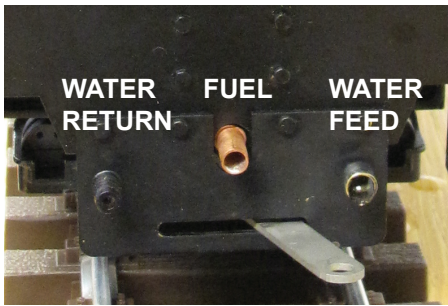
This model is an accurate replica of the original locomotive. It has sharp and moving parts. The locomotive drive rods are stainless steel with sharp edges.

OPERATORS MUST NOT COME IN CONTACT WITH A MODEL THAT IS BEING POWERED AT ANY TIME. UNDER NO CIRCUMSTANCES SHALL ACCUCRAFT TRAINS BE RESPONSIBLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING IN REGARD TO ANY ACCUCRAFT PRODUCT.

### **Preparing for operation:**

1. Oil all external moving parts of the engine and tender with a high grade, lightweight machine oil like 3-in-1. Don't forget the wheel bearings in the pilot and trailing trucks, as well as those in the tender. Don't over-oil; a tiny drop will do the job.

2. Place the engine and tender on the track and couple them together. The drawbar between the units has two holes. For tighter curves, use the rear hole. For wide-radius curves, the engine and tender can be coupled more closely together, using the front hole. Then connect the water feed, fuel and water return lines.



3. The displacement lubricator is disguised as an air tank under the left hand running board. This lubricator ensures the cylinders and valves are properly lubricated inside. As the steam passes through it, a small amount will condense into water. This water will sink to the bottom of the lubricator, forcing a similar quantity of oil into the steam line and thus to the cylinders.



Remove the lubricator cap and draw out any water from the previous run with a syringe. Use only proper steam cylinder oil. Fill the lubricator, but leave a small air space between the oil and the cap.

4. Fill the tender with water. Open the blower valve a little and pump water into the boiler. Fill the boiler until the water reaches the top of the glass.

This is a BIG locomotive and it will take a lot of water. Do not overfill the boiler; there needs to be room above the water for steam to form.

Use only distilled water in your engine's boiler. Tap water contains minerals that will leach out, cloud the water glass, and ultimately affect the performance of the engine.

Your locomotive burns denatured alcohol. The fuel tank is located in the tender beneath the oil bunker. Alcohol can be purchased at most home improvement stores.

The alcohol should be either Methyl alcohol or preferably Ethyl alcohol which will burn at a higher temperature, making the locomotive more efficient.

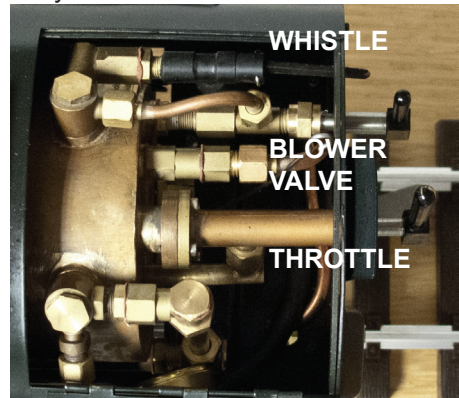
Use a syringe or a small funnel to fill the fuel tank with alcohol. The tank is designed to meter the fuel into the burner. It should saturate the wick material without leaking out over the top of the burner causing a puddle of alcohol under the locomotive. Completely clear up any split alcohol before attempting to light burner.



When fueling the locomotive the fuel valve should be shut. Replace filler cap immediately after filling tank. The alcohol will cause the O-ring to dry out, use a small drop of machine oil on the O-ring to keep it pliable.

### **Firing Up:**

Close the throttle and blower valve. Place the battery powered suction fan in the smoke stack, but do not turn it on yet. Make sure fire door is closed. Open the fuel valve on the tender 1/2 turn. Wait until the burner wicks are saturated with fuel. Open the fire door with the pull wire and light with a fire stick. Make sure the burner is lit by looking in the fire door, then immediately turn on the suction fan.



It will take approximately 7 minutes to raise pressure. Once the gauge reaches 20 lbs, you can shut off and remove suction fan from the stack



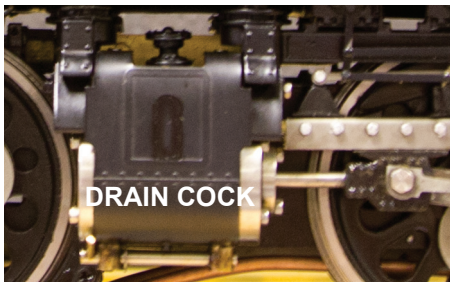
and then turn on the engines internal blower. At this point steam will rise rapidly!

Condensation that has formed in the blower line will run out the bottom of the locomotive, and then the dry steam will blast up the stack creating a draft pulling the hot gases forward through the flues. When the gauge reads 50 lbs. the engine is ready to run.

### **Drain Cocks:**

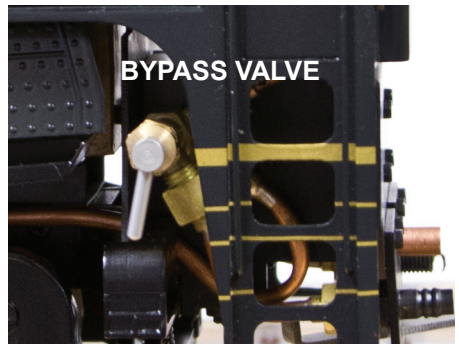
This locomotive is fitted with working drain cocks on the cylinders. When first starting out, the cocks should be open (levers moved to “outside” positions). This will allow water in the cylinders to drain while the cylinders heat up to working temperature.

As steam enters cold cylinders, it condenses, so expect a fair amount of water to come out at the beginning of each run. Once the cylinders have warmed up, you can close the drain cocks. To close them, move the levers to the “up” position.



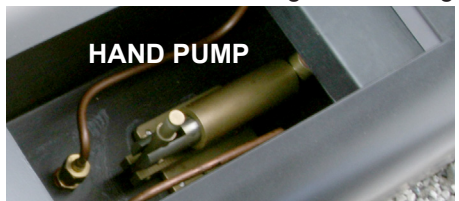
### **Running:**

Move the reversing lever at the right side of the cab to the forward position. With the engine on the track, and without a train, open the throttle. The engine may need to be pushed a little to overcome the steam condensing into water in the cold cylinders, but the open drain cocks will minimize this. After a few moments, the engine should take off on its own, moving away smoothly.



Once the engine is running smoothly, a train can be coupled on and the run can proceed.

Since all of the locomotive’s functions are controlled from the cab, it can be driven like a full-size engine, meaning





at a steady speed. Keep your eye on the water glass. With practice and good weather, steady runs of an hour or more are not uncommon for this engine.

### **Axle Pump:**

This locomotive is equipped with an axle pump and bypass valve. The pump moves water from the tender to a check valve on the locomotive. The bypass valve is located on the right side of the locomotive under the cab. When the bypass valve is completely shut, water is pumped into the locomotive. When the bypass valve is open, the pump will re-circulate water back into the tender. With careful adjustment of this valve, the engine will always have enough water to keep running for long periods of time until the tender water tank needs to be refilled. The tender is also equipped with the hand pump, which needs to be used to prime the axle pump. Only two or three strokes are necessary to prime the pump.

### **Shutting down:**

To shut the engine down, simply close the Fuel valve and use your CO2 tire inflator to extinguish the fire.

Make sure the fire is completely out before turning off the steam blower if engine is standing still. This will minimize the chance of the paint getting scorched from any fire still burning in the firebox that is not vented!

After a day's operation in the garden, you'll probably find that your engine has a coating of oil all over it. This is steam-cylinder oil that has been exhausted from the stack. A simple wipe down with a dry cloth is all that's necessary to restore the engine to pristine condition.

This is best done while the engine is still warm. Wipe any grit and excess oil from the wheels and running.



### Notes on Radio controls:

Although this locomotive was designed as a manually control locomotive, there is no reason why radio control (R/C) cannot be fitted, with some ingenuity for the throttle control. A single radio channel can be used. But what about forward & reverse? The prototype was equipped with poppet valves and no visible valving mechanism. Due to space constraints within the model, two different valve systems were tested extensively. It was determined that in this rare case, the slip eccentric system provided the best and most reliable performance.

### To Change Directions

You simply push the locomotive few inches in the direction you want it to go. You can start and stop and it will always go the same direction until you push it a few inches in the other direction and etc. The T1 only hauled passenger trains, so there was little reversing done.

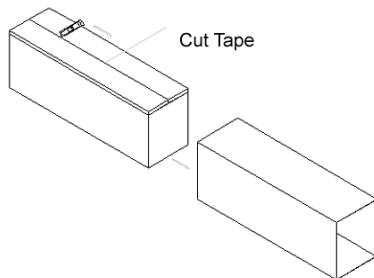
### Installing / Replacing Wicks

Install the wick material first, THEN cut to length. The wick material is in 3 basic strands. Carefully unwind the 3 strands, then unwind each of these. Bunch them together until it is large enough and can be pushed all the way to the bottom of the burner tube.

DO NOT PACK TIGHTLY. Material should just be retained in the tubes when inverted. Cut the wick off at 3/8" above the tube top. Then spread the top out similar to a flower arrangement.

Please read following directions before unpacking your locomotive.

1. Remove foam around the locomotive. Slide the inner box cover to the side, and open the inside cardboard box with a cutting knife.



2. Lift the locomotive from the cardboard box.
3. Place taped locomotive on a flat surface. Carefully cut the tape along the wood board side surface. Be sure to cut both sides of the wood board. Slowly lift the tape from the locomotive. Be very careful with small parts. Tape cannot be re-used to re-pack the model. Use new packing tape if necessary.



## PENNSYLVANIA T1 Live Steam - Alcohol Fired



NOTES:



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