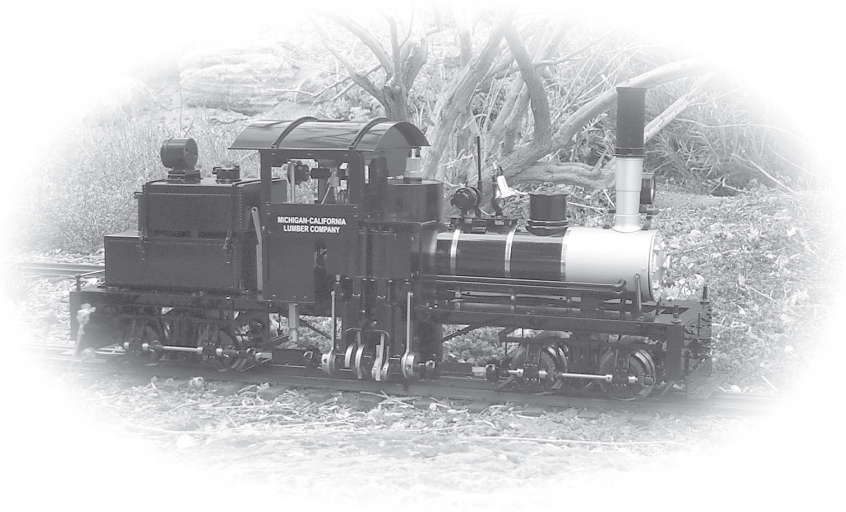
ACCUCRAFT TRAINS

Large Scale Electric and Live Steam Models

2 Cylinder Shay Live Steam



OWNER'S MANUAL

ACCUCRAFT
TRAINS

Thank you for purchasing Accucraft Trains
Live-steam Shay

Like other fine models from Accucraft Trains, Live-steam Shay has been designed to provide a lifetime of model railroading pleasure. Live-steam Shay is handcrafted in brass and is a precision piece of equipment. Like all fine equipment it must be properly maintained and cared for.

ACCUCRAFT TRAINS

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Introduction

Shay locomotives were developed by Ephraim Shay. His first successful engine that we would recognize today as a Shay locomotive was produced in 1880 by Lima Machine Works (later Lima Locomotive Works), who would go on to produce approximately 2,700 Shays up until 1945, when production ceased.

Shay locomotives are unusual in that they are powered by a steam engine of either two or three cylinders mounted vertically near the cab on the right side of the locomotive (although there were a very few with the engine on the left). The boiler was offset on the frame to counterbalance the weight of the engine. The engine drove a drive shaft that, through flexible couplings, turned bevel gears that engaged the wheels. This type of engine is known as a geared engine, since the wheels turn at a different rate from the engine, due to the gear ratio. This arrangement made the engine very flexible and able to negotiate raggedy track without derailing. Because of this characteristic, as well as its great power, it was an exceeding popular engine with logging companies and other industries that relied on tough engines in unforgiving environments.

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 Shay 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 Shay should pull up to a dozen 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:

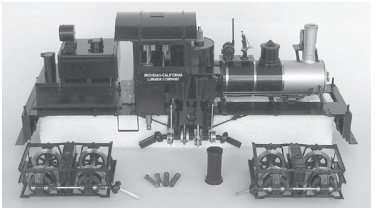
1. The safety valve is atop the "T" section of the boiler, just ahead of the cab. It has been set at the factory to release at 60 pounds per square inch of pressure. Never tamper with the safety valve.
2. The firing system has been designed to use butane gas only. Never use any other gas (including propane or butane/propane mix), as the storage pressures can reach unsafe levels.
3. Always refuel the engine away from other working live-steam locomotives. The fuel filling system allows a small amount of the gas to bleed off as the fuel tank is being filled. A passing engine can ignite this bleed-off gas, causing a potentially hazardous situation.
4. When lighting up, light your match first, then turn on the gas.
5. A steam engine gets hot. Be careful.

Unpacking and assembling your locomotive

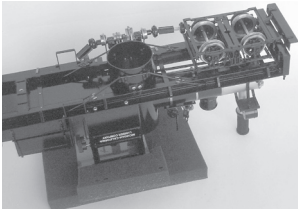
Your engine is securely packed at the factory. To unpack it and assemble it, follow this procedure:

1. Lift the carrying tray from the shipping box.
2. Undo the four nuts and bolts that secure the wooden pad to the tray.
3. Slide the wooden pad and locomotive out one end of the carrying tray.
4. The locomotive is wrapped in paper and is held in place with plastic tape. Carefully cut the tape to remove both the locomotive and the cardboard box also attached to the pad.

The engine's trucks are packed separately in the cardboard box. In this box you will also find 2 mounting screws, 2 springs, and the spark arrestor, which screws onto the smokestack. Attaching the trucks is a simple matter. Support the locomotive upside down with packing foam. Take one of the trucks and slip the sliding part of the drive shaft into the corresponding part from the engine. Position the truck over the mounting hole, slip the spring over the mounting screw, and drop them into the hole in the truck. With a screwdriver, press down on the screw, compressing the spring, and screw the mounting screw tightly into its hole. Repeat with the other truck, and you're done.



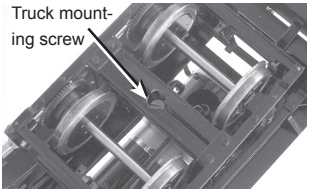
The engine unpacked. Trucks are separate.



Support loco on foam to mount trucks

In addition to the engine and the cardboard box, you should find a plastic bag containing two syringes and another that contains the following:

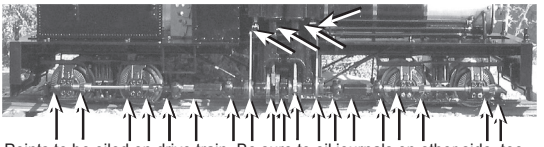
- A pair of links and pins for the couplers
- A butane adapter to be used with grocery-store butane cartridges (not the canisters that have screw threads at the top)
- An M2 nut driver for use in maintaining the engine
- Extra M2 screws and nuts
- Two allen wrenches. The smaller one is for the allen screws along the drive train, while the larger can be used to reset the eccentrics. NOTE: Do not adjust the eccentrics unless you are sure you know what you are doing
- Generator exhaust pipe (dummy), which screws into a hole on top of the generator.



Preparing the engine for operation

A steam-locomotive engineer goes through a lighting-up ritual every time the engine is to be run. It is good to follow the same routine each time so that nothing is overlooked.

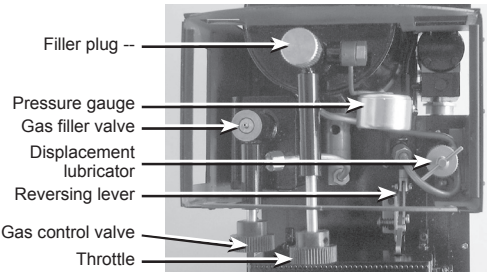
1. Oil all external moving parts of the engine, including wheel bearings, with a high grade, lightweight machine oil like 3-in-1. Be sure to oil all parts of the drive train. A little oil is all that's necessary.



Points to be oiled on drive train. Be sure to oil journals on other side, too.

   A lot of oil will just muck up your engine and attract dirt and grit.
2. Place the engine on the track and slide off the roof towards the rear.
3. The displacement lubricator is a vertical tank mounted to the floor on the right side of the cab. It has an extension handle built into the cap to aid in the cap's removal. 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's cap, then open the drain under the cab floor to drain off any water remaining from the previous run.

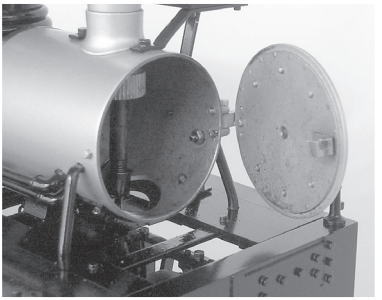
When oil begins to come out, close the drain, fill the lubricator to the top with proper steam-cylinder oil, and replace the cap.



4. Unscrew the filler plug, which is above the throttle in the cab, and fill the boiler to the top with water (220-230 cc). Then, with a syringe, remove about 30cc to create steam space above the water. Use only distilled water in your engine's boiler. Tap water contains minerals that will leach out and ultimately affect the performance of the engine. Replace the filler plug.
5. Finally, add fuel. Your Shay burns butane gas. The gas tank is the square box on the left side of the cab, and the filler valve is located on top of it, above the gas control valve. Butane gas can be purchased at the grocery store or at a tobacconist's as cigarette-lighter refills. These come with a nipple suitable for the filler valve on the Shay's gas tank. You may need to use the adapter provided if the nipple on the refill isn't long enough. (Butane can also be purchased in larger containers at camping-supply stores, but these cans will require a special adapter for filling the engine's tank.) Simply press the nozzle of the butane canister hard onto the filler valve atop the tank, making sure that the control valve on the back of the tank is closed. You will hear the gas transferring and will see a little gas bleeding out of the valve. When the tank is full, the gas will begin to splutter and much more gas will escape the valve. With the full tank, you are ready to fire up the engine.

Firing up

The engine's burner resides at the back of the flue inside the boiler. Open the hinged smokebox door at the front of the engine and you'll be able to see the flue. To light up, strike a match and hold it at the open smokebox door, while simultaneously opening the gas valve in the tender very slowly until the gas ignites. You should hear the gas coming into the burner. Opening the valve too wide or too fast may blow out the flame or cause the fire to burn in the smokebox.


Open the smokebox door to light the fire

The fire should should flash back into the back of the flue with a quiet "pop." If it wants to burn in the smokebox or in the forward part of the flue, slowly close the gas valve until it flashes back to the burner. Don't let the fire burn in the smokebox—your engine will not run as it should and may be damaged. The fire should burn *under* the burner in a crescent-shaped flame, which should be clearly visible through the smokebox door. The flame should be bright blue and should burn steadily. The object is to run the burner at the lowest setting possible to operate the engine, thereby increasing the efficiency of the engine and the duration of the run. You'll get the hang of this with practice.

Initially, the fire may gurgle and sputter a bit and you may have to relight it once or twice.

This is due to liquid butane getting into the gas line. After a couple of minutes, the gas should settle down and the fire burn steadily.

After another four to six minutes, pressure on the pressure gauge should read about 20psi (pounds per square inch) or so. The safety valve is set at 60 psi. When the pressure on the gauge reaches 40psi, the engine can be run.

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. Because the cylinders are cold, the hot steam entering them will condense into water and be exhausted into the smokebox. You will see water coming out of the bottom of the smokebox. This is perfectly normal. With the throttle open, move the reversing lever to reverse, then back to forward a few times. This will help to clear the condensate. After a few moments, the engine should take off on its own, moving away smoothly. After it has had a few runs and is more broken in, starting will be easier.

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 thecab, it can be driven like a full-size engine, meaning that you'll have to stay with the engine through the run if you want to change its speed or direction. If you have a suitable track, the engine can be left to run on its own at a steady speed. With practice, and depending on conditions, you should be able to get runs of 20-30 minutes from your Shay.

When the run is over, the engine will slow to a stop. If the engine has stopped and the fire is still going, immediately close the gas valve to prevent damage to the boiler, and close the throttle to prevent oil from being sucked back into the boiler. If the gas runs out first, close the throttle right away and make sure the gas valve is closed before refilling the tank. To shut the engine down before the water is gone, simply close the gas valve and allow the engine to run off any residual steam.

Shutting down

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 hot. Wipe any grit and excess oil from the wheels and running gear.

The boiler can be drained of water, or not, as you will. Leaving water in the boiler will not harm it. The lubricator can also be drained and refilled with steam oil in preparation for the next run.

Notes on the drive train

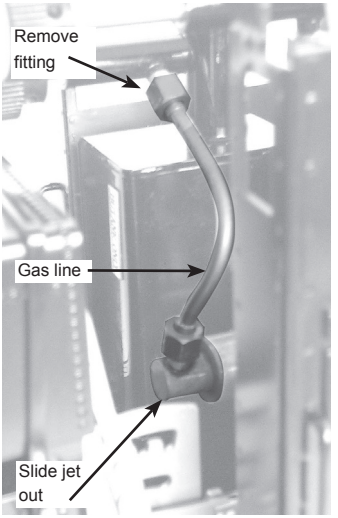
Your model Shay works the same way a full-size Shay works. Rotary motion is transmitted by the engine to the drive train. At the ends of the drive train are small bevel gears that engage large bevel gears on the wheels, thus providing a gear reduction. This reduction makes your engine more powerful, while it reduces its speed. Shay locomotives were known for lots of power at low speed.

The drive train incorporates four universal joints (U-joints) and a pair of sliding, square shafts. If a truck is turned too far, the male part of the sliding shaft could fall out. If this happens, simply slip it back into place. When the engine is in operation, this will not happen. Do not tamper with or try to adjust the position of the gears. These have been set at the factory.

Notes on the gas jet

It is possible for the gas jet at the rear of the burner (in the cab) to become clogged or blocked. This will be evident if the fire will not light, you hear no gas coming out, or the engine performs poorly even though the fire is lit (partial blockage). To solve this problem:

1. With a small, adjustable wrench, loosen the fitting on the gas control valve.
2. Carefully remove the gas line from the valve body, then slide the jet backward out of the burner.
3. Squirt a little butane into the jet from the front. The pressure should not only clear the blockage, but blow whatever was blocking the jet out of the line altogether.
4. Replace the jet and reattach the gas line.



Notes on radio control

Although the Shay was designed as a manually controlled locomotive,there is no reason why radio control (R/C) cannot be fitted, with some ingenuity. A two channel radio is all that's necessary, one for the throttle and one for the reversing lever. The gas valve should always be controlled manually.

The reversing lever will have to be modified so that it does not lock in position. To do this, simply remove the M2 screw near the top of the quadrant with the driver provided. There is room in the dummy oil tank to mount a servo, and a hole has been provided in the front of the tank for a linkage. To remove the tank, undo the four screws that hold it and the dummy water tank to the floor. Then separate the two tanks by undoing the four nuts that hold them together.

To control the throttle, the knob will have to be replaced by a lever. It might be possible to mount both servos in the oil tank, but a second hole would have to be made for the second servo's control arm. The receiver and battery pack can also be housed in the dummy tanks.

Specifications

Scale: 1:20.3 (15mm = 1'0")

Gauge: Nº 1 (45mm)

Boiler: Single flue, gas fired, silver-soldered copper. Blow-off pressure, 60 psi

Boiler fittings: Safety valve, throttle, pressure gauge

Fuel: Butane gas

Cylinder lubrication: Displacement lubricator on right-side floor of cab

Cylinders: Fixed cylinders, piston valves, exhaust through the stack

Valve gear: Fixed eccentric

Reversing gear: Reversing valve in cab

Limited One-Year Warranty

Accucraft Trains warrants that the mechanical components of its model trains will be free of any defect of malfunction under normal use for one year of the original purchaser and will remedy any mechanical components which prove to be thus malfunction, This warranty does not extend to : (1.) any damage to the locomotive resulting from any improper or unreasonable use of the locomotive or from any use of the locomotive in any manner other than that for which it is intended, (2.) any damage to the finish or casting of the locomotive, (3.) oversea purchase via non-designated distribution channel, or (4.) any other damage (except for damage resulting from a covered defect or malfunction) to the locomotive while in the possession of any consumer.

This warranty is given in lieu of alll other express warranties. All implied warranties, including but not limited to the implied warranties of merchant ability and fitness for a particular purpose shall expire one year from date of original purchase. (Note:The foregoing limitation on implied warranties is proper under the Magnuson-Moss Warranty Act.) UNDER NO CIRCUMSTANCES SHALL ACCUCRAFT TRAINS BE RESPONSIBLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING IN REGARD TO ANY ACCUCRAFT PRODUCT.

In order to validate this warranty , the Owner Registration Card enclosed with your locomotive must be completed and mailed within ten (10) days after purchase of the model.

If warranty service is required after more than one year from the date of purchase, please request return authorization by phone or letter. Upon receipt of authorization, please send the locomotive, postage prepaid, with a check or money order for the amount of $30.00 in U.S. currency, (price applies to U.S. only) to cover return postage and handling. Also please write a letter explaining the nature of your problem and enclose it with the locomotive.

Notice

The information in this document is subject to change without notice.