



Left: Newly fabricated big-end bearings and strap for crosshead connecting rod and fresh bearing castings prior to final machining (inset).

Bottom: The Swan is really coming together by June 1999.

missing from the engine. I made the lobe of the exhaust cam quite wide to make sure I had enough material to achieve the right duration on the exhaust valve. I used the existing intake cam lobe as a reference, since they are effectively similar aside from the exhaust cam lobe profile being different than the intake cam lobe.

This led me to the rocker arms, which needed some attention. I had to make a new rocker arm pivot shaft and had to bore the pivot holes in the rocker arms and press in new bushings. Both rocker arms also needed new rollers and shoulder screws, which I made. I also fabricated new valve adjusters.

Fresh Air and First Fire

Suddenly, it was time to pull the Swan out of the shop and put the final touches on it. The flywheels still had to be painted, a chore my two sons Joseph and Christopher took care of once the engine was outside. I installed the gas line and gas valve, and also fabricated and mounted an air intake pipe and choke plate. I fabricated a hot tube chimney and plumbed up its gas line. I finished rebuilding the governor linkages and welded up the pivot holes, re-drilled them, reamed them to size and made new pivot pins. All this work made for a nice, responsive governor.

The day finally arrived to start the Swan. I hooked up propane tanks and an accumulator, lit the hot tube and oiled up the engine. I rotated the flywheels to make sure everything was working properly and stopped the engine on its power stroke for priming. Not sure exactly where to set the gas and air, I made an educated guess. Was the hot tube the right length? How much fuel would it need? How much air? I'm sure many of you have been in this situation.

When I felt things were ready, I primed the engine with gasoline and back-kicked it. I did this quite a few times, but I didn't

even get a pop out of it. Looking around my shop, I saw my Ferguson TO30 tractor. I backed the tractor up to the engine and put a belt over the flywheel. I don't really like starting an engine this way, so I spent a lot of time making sure everything was lined up right. With the compression release open and the tractor pulling, the Swan's flywheels started to rotate. After making sure the belt was tracking okay on the flywheel and everything on the engine was working properly (sideshaft, rocker arms, valves, etc.), I closed the compression release, opened the gas valve, and the Swan fired in a few short seconds. It was firing erratically and running lean so I gave it a little more gas – but it was running. Quickly, I went over to the tractor and put the PTO in neutral. With a small pipe, I slid the belt off of the flywheel. Wow! I wondered how long it had been since the Swan had last run under its own power.

It wasn't knocking or making any load-related noises, so I started adjusting the gas and air mixture (it's a throttle-governed engine). After a few minutes of adjusting, the Swan started slowing down and hit every time – it sounded nice. After about 20 minutes of running – and my heart going a mile a minute – the engine made a loud bang, but kept running. Listening, I could hear a hissing sound every time the piston came up on compression. I discovered that a cover gasket on the exhaust valve chest had blown, so I shut the engine down. Also, I didn't have any water in the engine, and it was starting to get a little warm.

After removing the cover and gasket from the exhaust valve chest, I decided to machine the cover-

