

Tribute Oliver XO-121 with original Engine. Only 3 produced in 1954

In 1954, Oliver Tractor Corporation's unveiled their experimental high compression (12-1) engine. It utilized a Hercules DOOB diesel block and experimental high compression gasoline head. 100 octane fuel was developed for this test produced by the EytI Corporation. Tested against Oliver 70 & 77, the XO-121 had 44% more horsepower output per cubic-inch than the 77 and 92% more than the 70. Fuel economy was greatly increased, also. When measured on the drawbar, there was an 43% increase in power over the 77 and an 85% increase over the 70. (Oliver Heritage magazine, 10/22) Pictured is the original XO-121 as it resides in the Floyd County Museum—Charles City, IA



Several miscellaneous pieces were acquired from Floyd County Museum of the #3 original XO-121 motor that was suspected to have been seized at some point in testing. No specifications or detailed information existed for this engine which consisted of a Hercules DOOB diesel block with a custom experimental high compression (12-1) gasoline head. Engine was 199 CID with 3.75" bore and 4.5" stroke. The block was rusted and pitted badly. Intake, exhaust, head, block, cam, front cover and oil pan were the only usable parts.

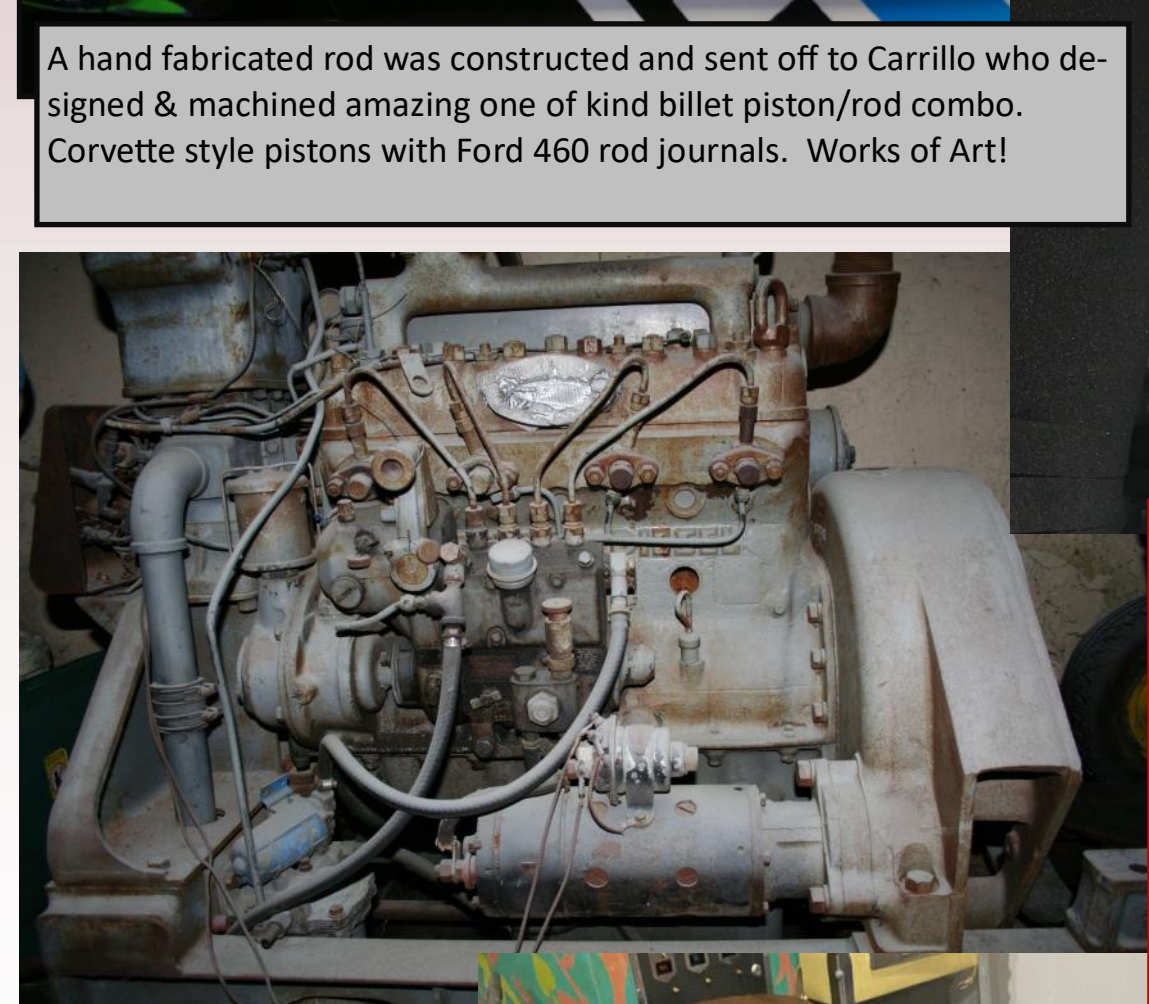
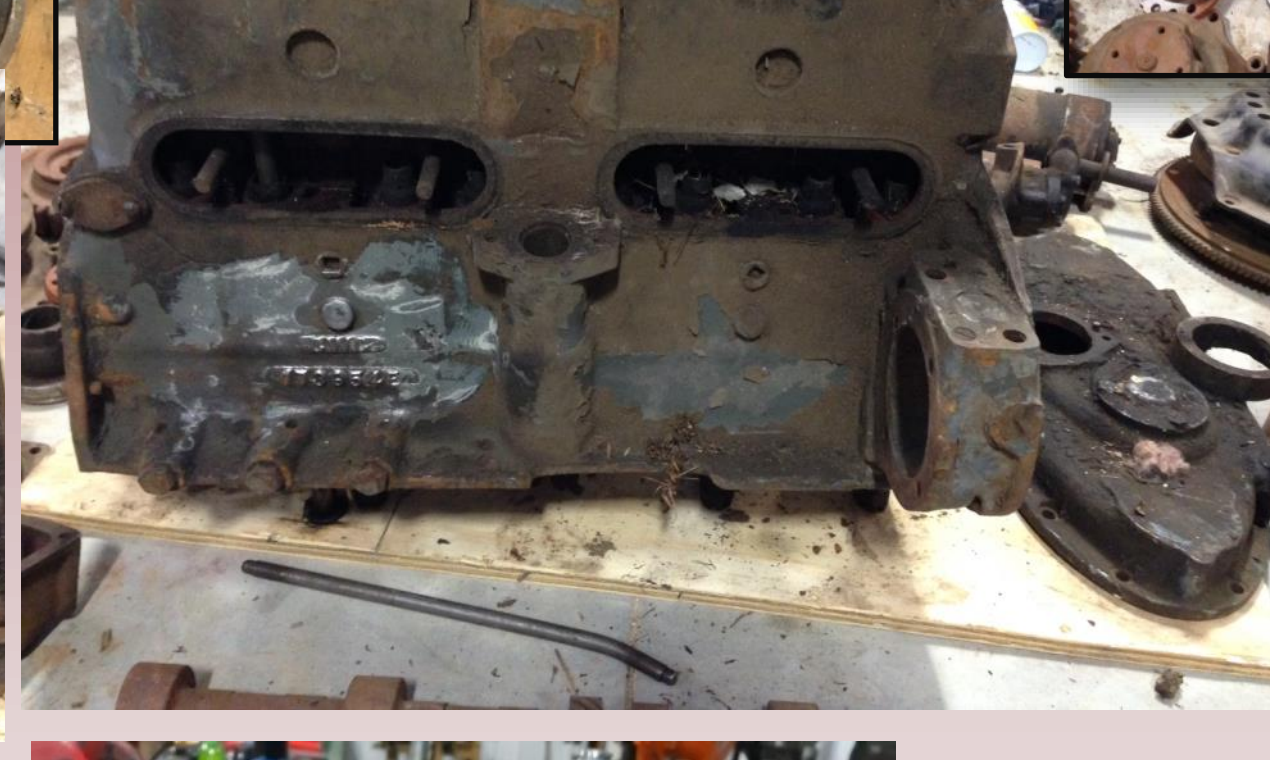
This Original XO-121 (#3 of 3) motor was acquired in 2013 from the Floyd County Museum.



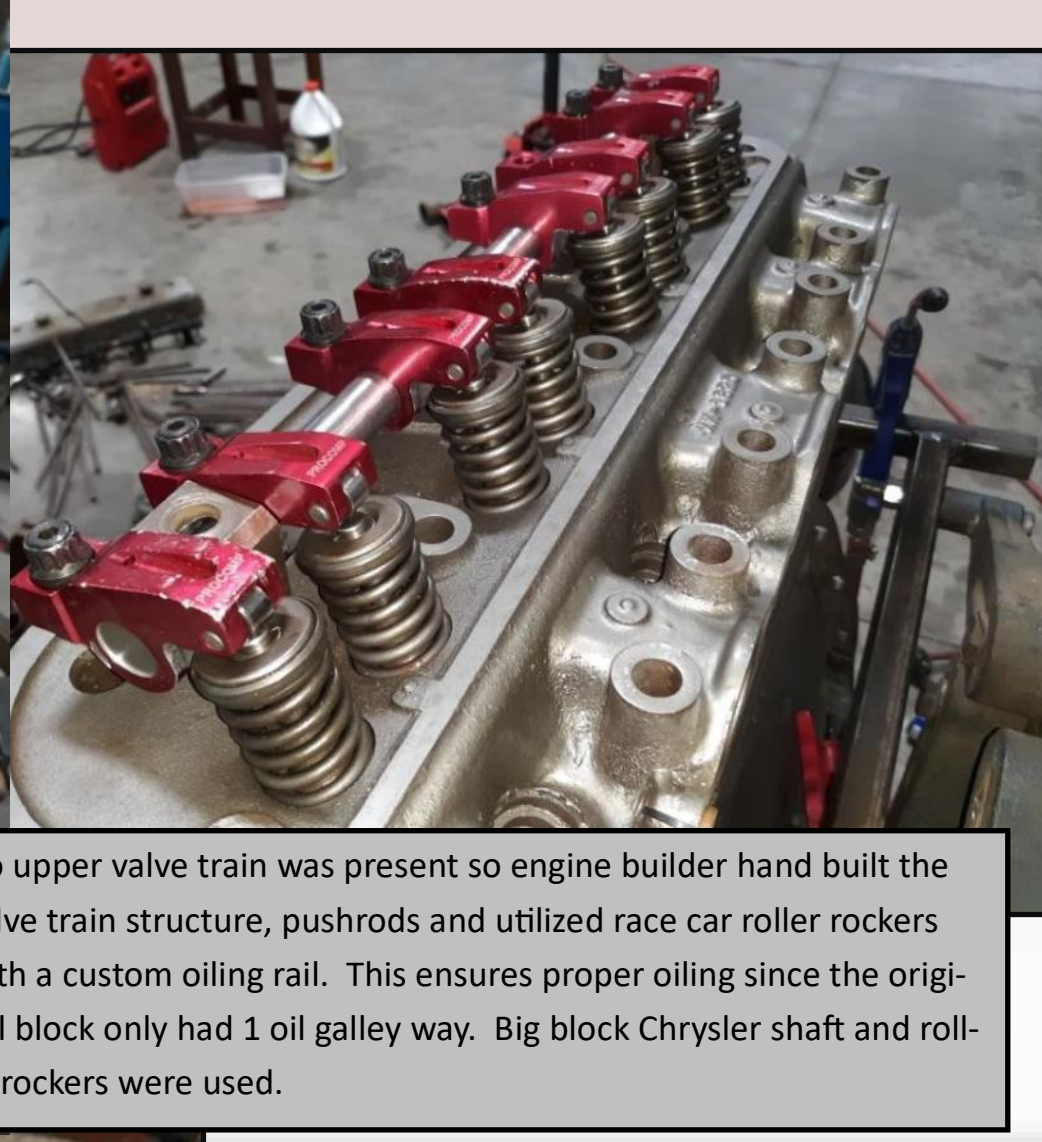
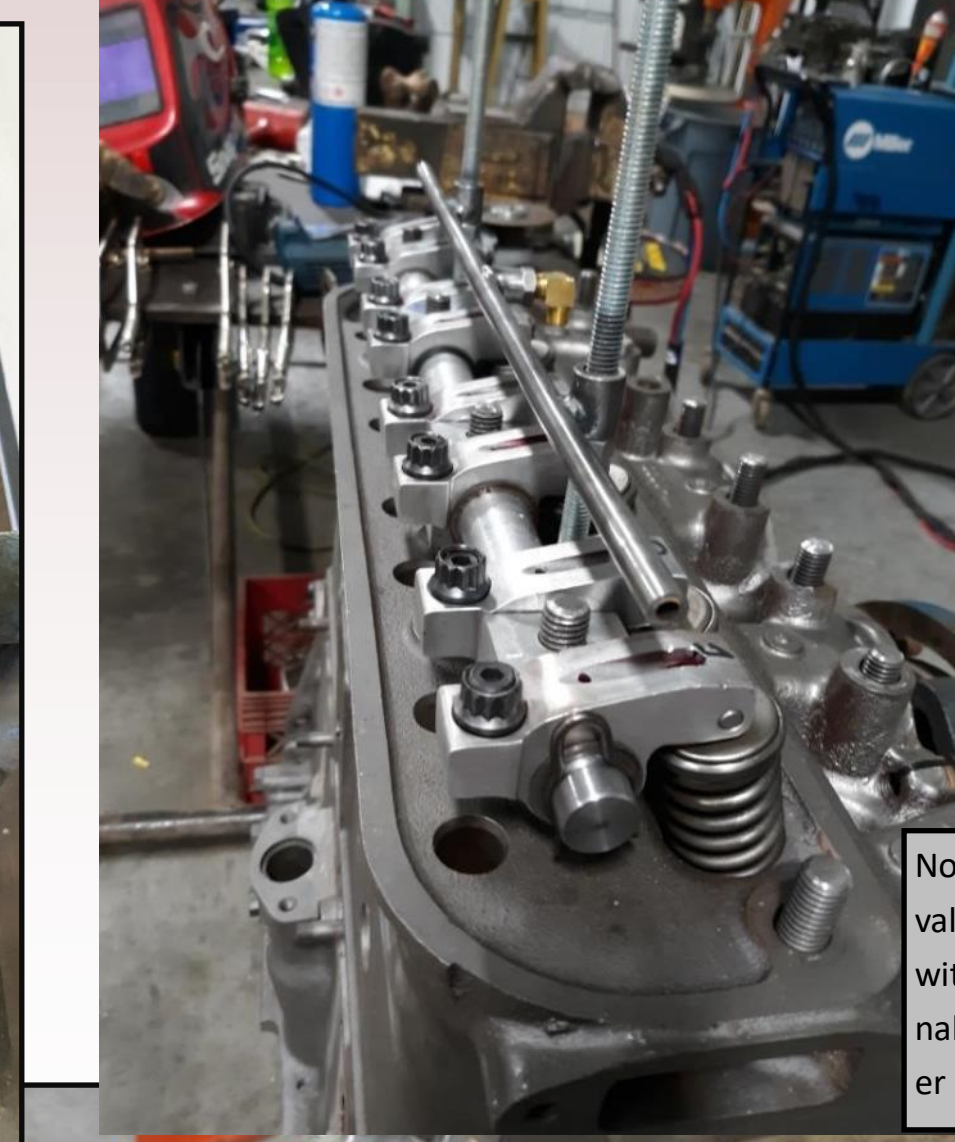
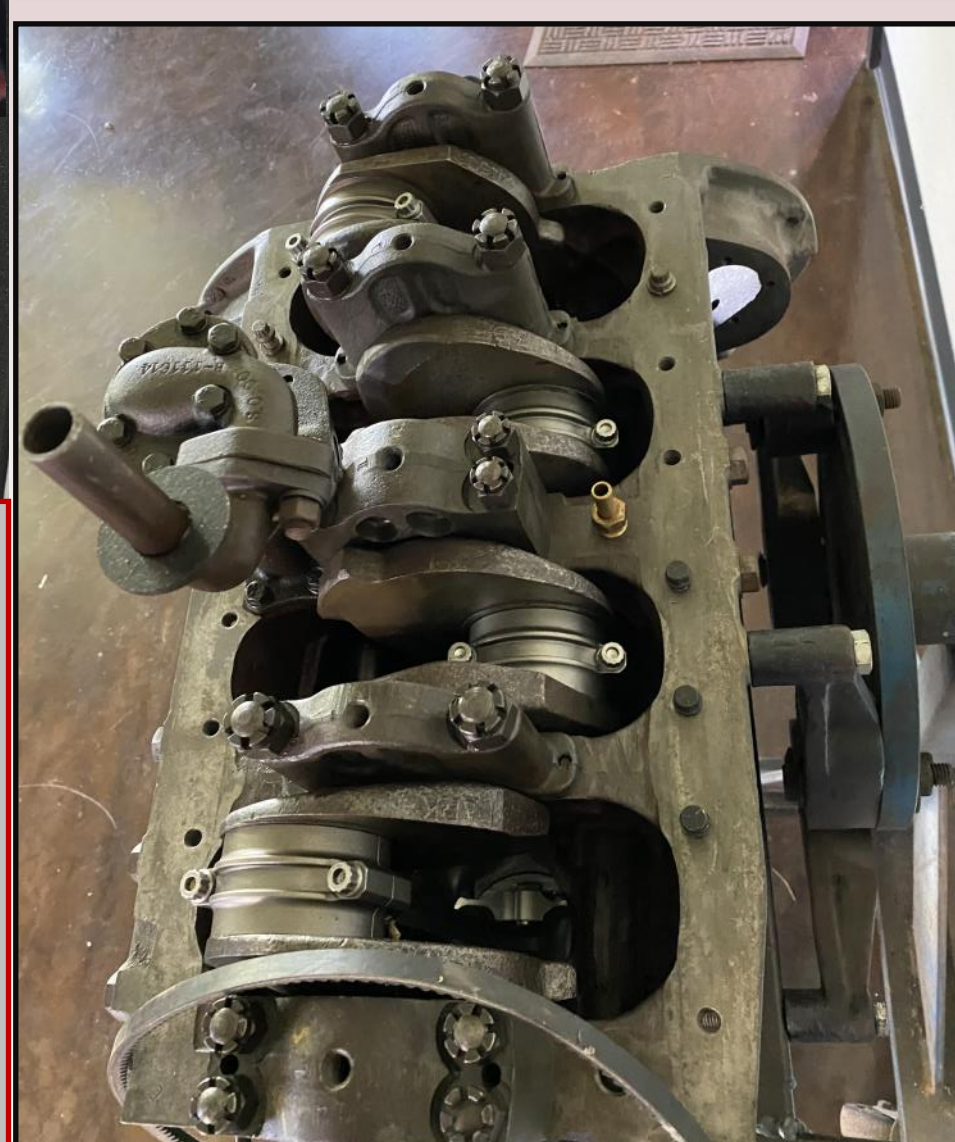
Several engine builders and machinists looked at the pile of parts saying it could not be used or rebuilt. The original box for the head is hand labeled "OX-121 high compression". It is not known when the label was written or why it said OX not XO. Is it a typo or maybe they floated the idea of naming the tractor OX-121 for Oliver Experimental vs Experimental Oliver?



A hand fabricated rod was constructed and sent off to Carrillo who designed & machined amazing one of kind billet piston/rod combo. Corvette style pistons with Ford 460 rod journals. Works of Art!

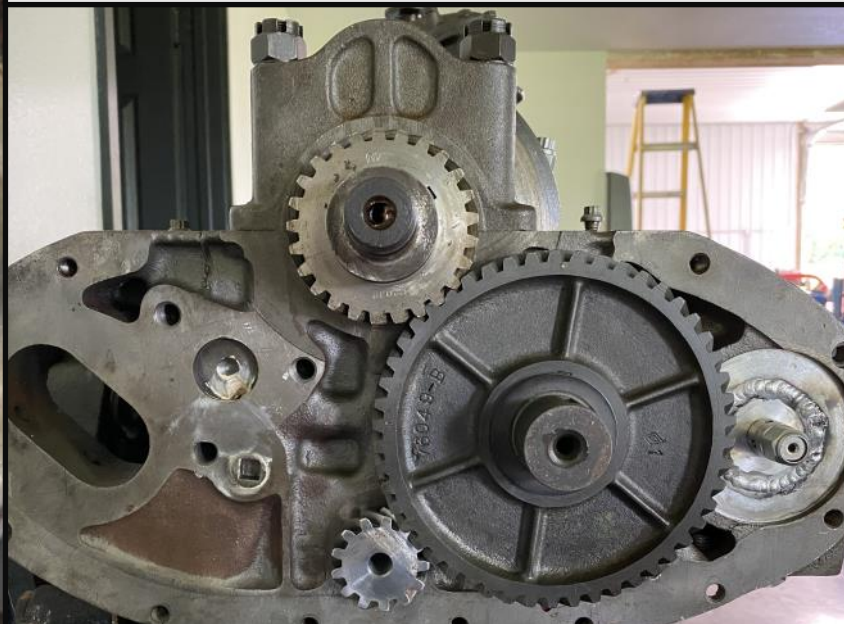
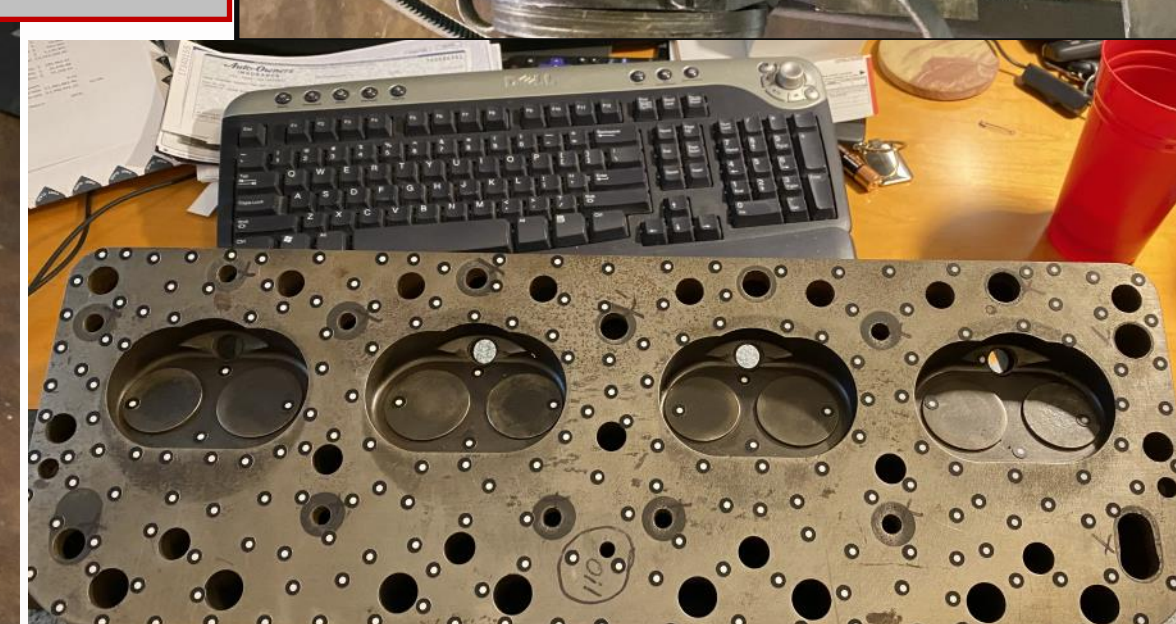


Another Hercules motor (DOOD) was purchased in CA to source a crankshaft and main bearings. The heavily pitted original block was decked and bored .030 over. A shorter piston was also utilized which increased the stroke over the stock 4.5". Bored & Stroked from 199ci to approx. 225ci



No upper valve train was present so engine builder hand built the valve train structure, pushrods and utilized race car roller rockers with a custom oiling rail. This ensures proper oiling since the original block only had 1 oil galley way. Big block Chrysler shaft and roller rockers were used.

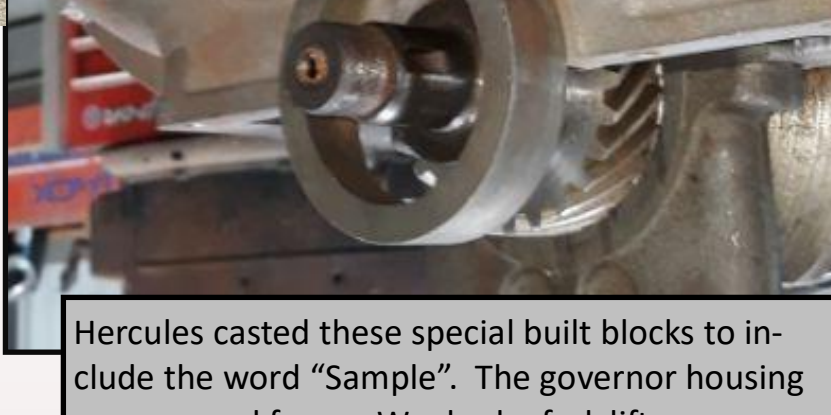
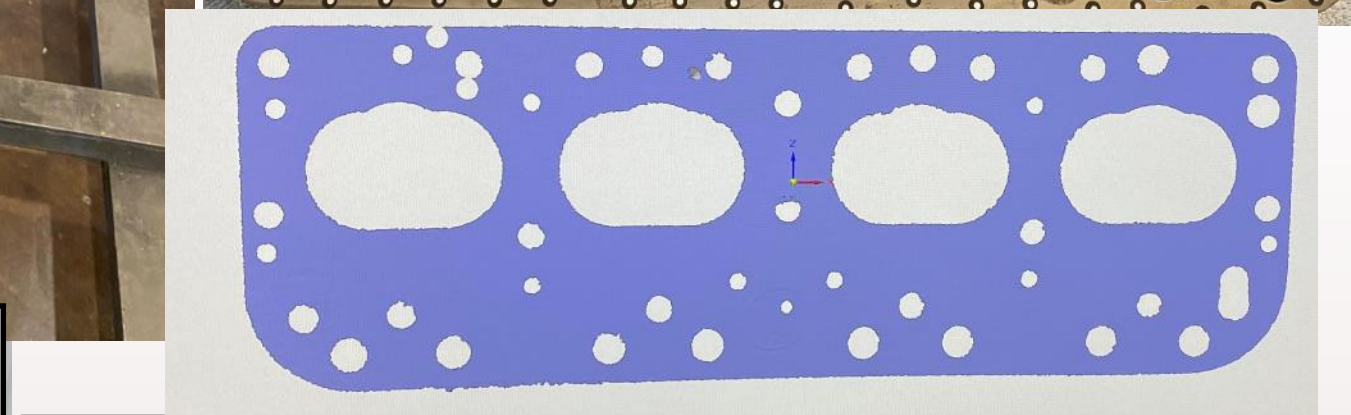
A paper model was built of the block for the head gasket and the head was 3D scanned. Both pieces were utilized to create a CAD file for the head gasket. This file was given to the waterjet company to create the copper head gasket.



A custom gear was locally manufactured to allow the engine to have a working governor. Many hours went into building a custom governor mechanism.



The crank was machined to fit a modern day 1 piece rear main seal



Hercules casted these special built blocks to include the word "Sample". The governor housing was sourced from a Waukesha fork lift.

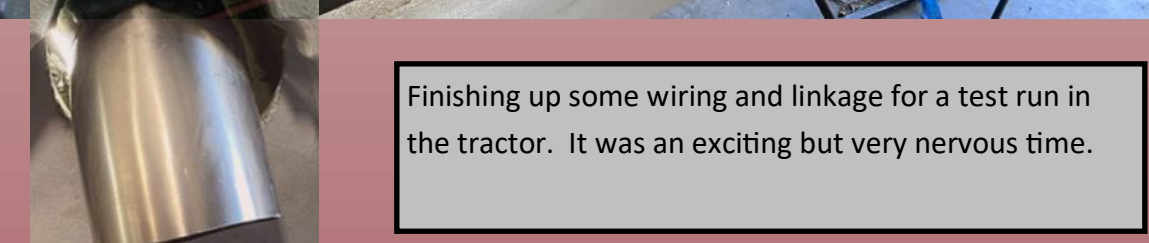
Several carburetor setups were experimented with until the tractor was running smoothly on E85. The motor builder and expert tuner felt this was the best option to keep engine cool and have a long life.



Proper oil pressure and reach was critical. Custom upper end oil rail throttled by Holley carburetor jets and oil sprayers on all cam bearings. Even a pressure relief valve from a corvette was used. Several dry run tests helped us to find problem areas prior to first startup. We found 2 issues after startup that could have resulted in catastrophic failure but close eye on oiling saved us. One original internal oil plug failed but was caught in time.

To get the hood without any access holes in it, low rise stainless steel exhaust was fabricated. Dual exhaust was run through the bottom of the tractor and created challenges with fuel cell and custom clutch linkage.

7.25" was machined off the very large donor DOOD flywheel to fit within the Oliver tractor!



Finishing up some wiring and linkage for a test run in the tractor. It was an exciting but very nervous time.

After a successful startup, the motor had to be fitted into a stock Oliver Row Crop 88. Custom motor mounts, clutch linkage, clutch housing, exhaust, wiring, fuel cell, radiator cooling system had to be fabricated to get the XO-121 engine in harmony with the chassis. To keep the hood free of access holes, a remote fill fuel cell was added. The battery was relocated to a tray in place of a drawbar. This tray will house the battery, misc electronics and fuel pump to fill the fuel cell. The original area for the battery is where the CDI box and ignition timing box reside. The timing is retarded 12-15 degrees upon startup. This aids in starting and then is returned to full timing approximately 5 seconds after startup. The engine went through about 10 hours of run time while testing and fixing of mechanical issues of the tractor. Several rear end and transmission gears had to be replaced due to damaged/missing teeth. The entire front end & steering had to be reworked as well.



Much work and detail to get a part machined to match a spin on oil filter to the original block. Aluminum side plates allow for external oil lines to spray the cam and lower end. A custom starter (gm starter with Ford 5.4 ring gear) & water pump were also fabricated.

- The Compound—Jeremy Coker
- Marionville, MO [Motor & Grill]
- Welters Farm Supply—
- Verona, MO [Misc parts & experience]
- C&R Metalworks
- Springfield, MO [head gasket waterjet]
- Floyd County Museum
- Charles City, IA [Block & Head]
- Shop for custom governor gear
- Carrillo—Custom rods & pistons

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A 'restored' 1952 Oliver 88 was purchased at auction in Kentucky for the base of the XO-121 Tribute Tractor build. It was stripped down to begin the long process. It became apparent over time that this tractor had several major issues and lived a very difficult life.



We were very optimistic test fitting an empty block and head into a very rough build.



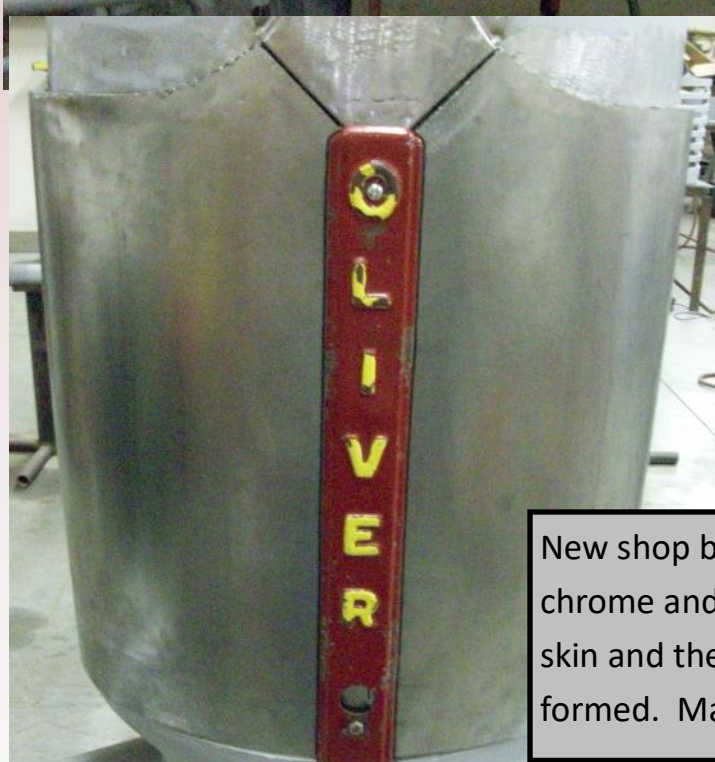
Several attempts were made to get the correct look of the side as well as make them look very clean. Ultimately we made new custom side panels without hinges.



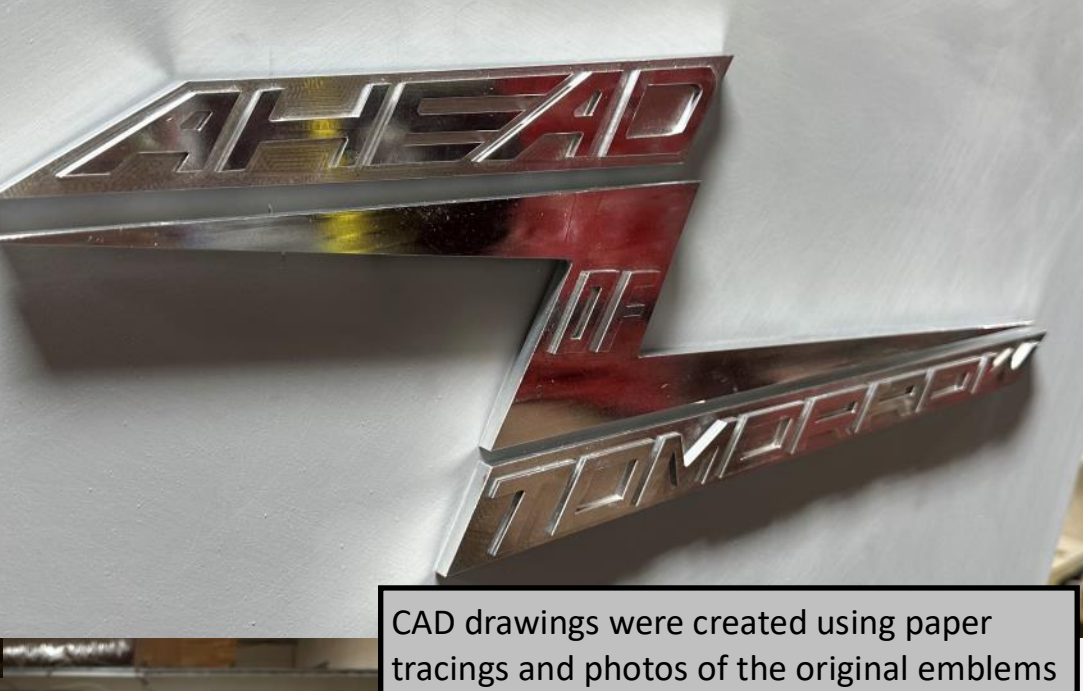
Custom fenders were fabricated to hide inner supports and wiring for the fender lights.

After not being satisfied with current build, the decision to find a new shop which took a few years. Many problems were found. I had to purchase a new front end because the front bolster had been broken and poorly rewelded. We drove to Michigan during COVID to purchase a new wide front end. It is clear that this tractor had a very rough life.

Several transmission/rear end gears had to be replaced due to missing teeth.

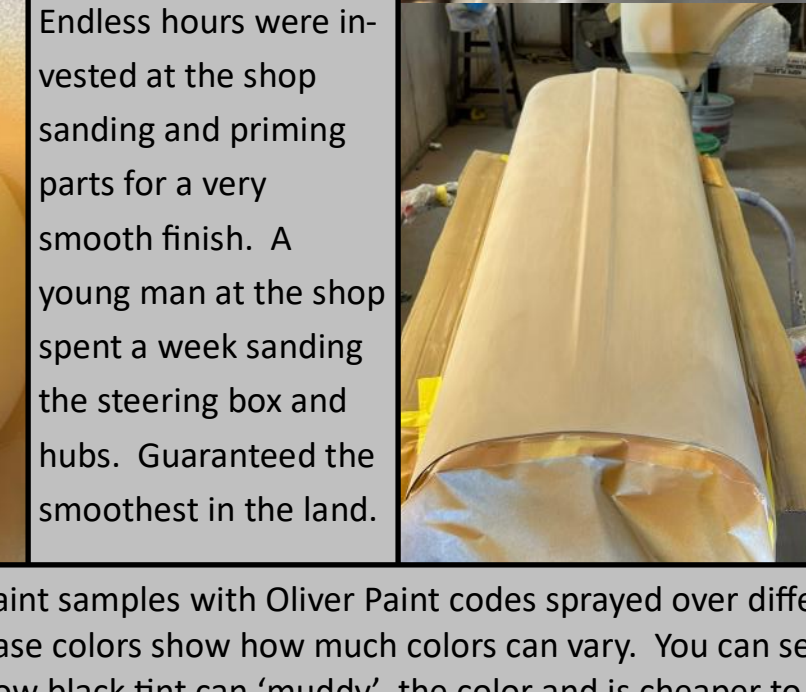
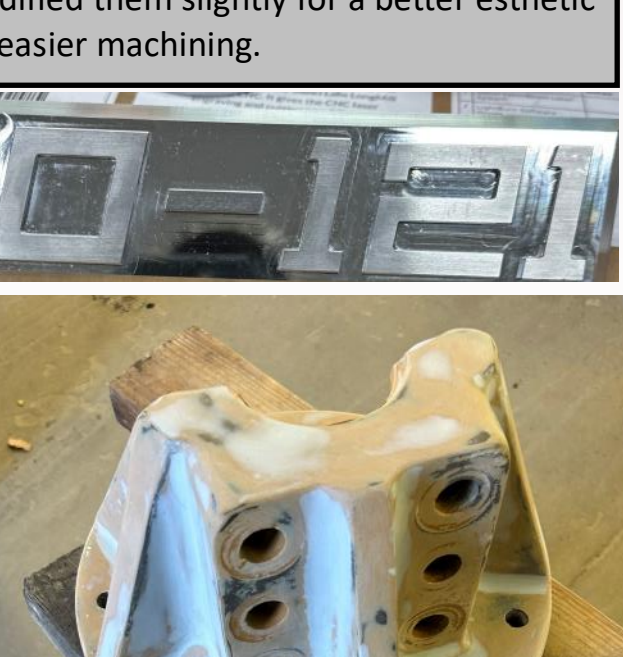


Many models of the grill were created and several people attempted to build it. In the end, I found someone who used a vintage pullmax with a buck to make it. Polishing the grill didn't hold up so I was able to find Whitworx metal that chromed the grill so that the finish would hold up. The grill proved to be the most difficult piece of the tractor.



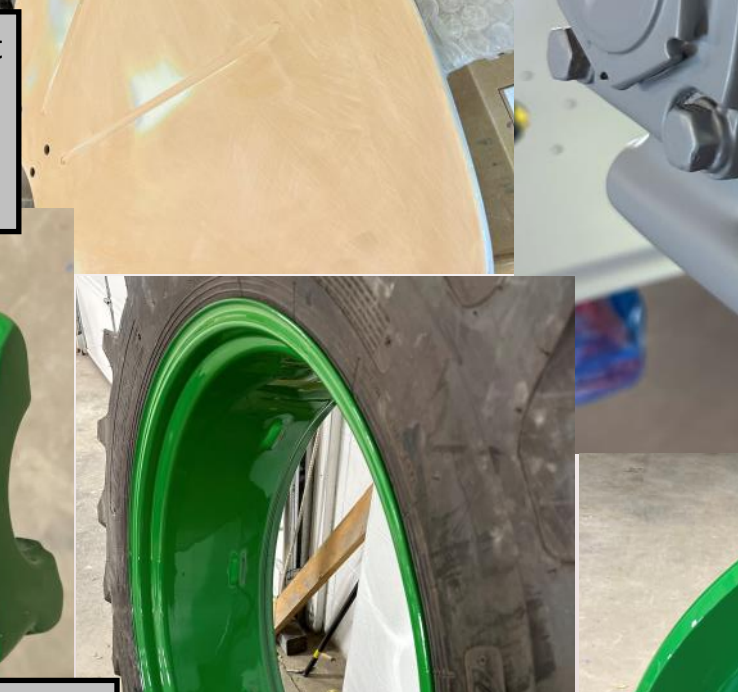
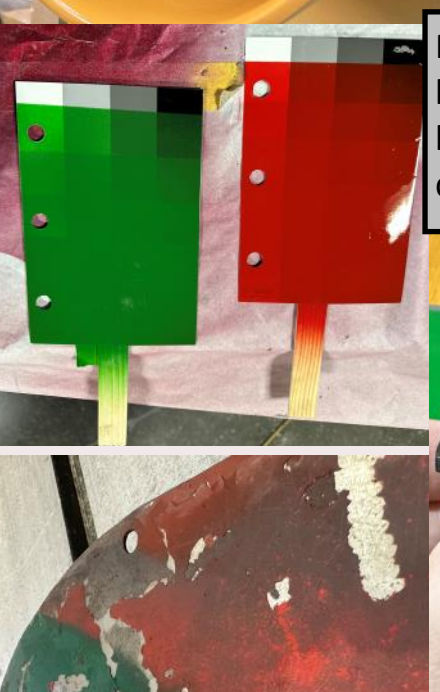
CAD drawings were created using paper tracings and photos of the original emblems and recreated in machined billet aluminum. I modified them slightly for a better esthetic and easier machining.

New shop broke the tractor down again. We decided to remake the hood once again. All pieces were shot with Z-chrome and blocked multiple times for a mirror finish. The hood is built in 4 pieces—a skeleton frame, left & right skin and the molded center raised piece. The hood skins were 3D modeled from the skeleton and computer formed. Many hours of precision forming took place after that for a perfect fit.



Endless hours were invested at the shop sanding and priming parts for a very smooth finish. A young man at the shop spent a week sanding the steering box and hubs. Guaranteed the smoothest in the land.

Documentation of paint codes were unable to be located to find the original color of the XO-121. To my knowledge no color photographs existed unless held privately. The original tractor had been repainted by Living Farms in Des Moines, IA then repainted again to its current color. 2 pieces were discovered that I believe document the original color of the XO-121. The air cleaner has red paint inside and out that had been covered by tubing and black paint. This makes sense that Living Farms would have covered the red air intake in black paint to blend in with the radiator. Under the rubber air intake hose was perfect bright red paint! It was easy to chip off some black paint to expose the red underneath on other parts of the intake. The second piece is the dust shield under the tractor. One side (presumably the engine side) has burnt red paint from the engine getting hot. The other side (ground side) again has red paint with some green overspray on top of the red paint. Is it possible that when Living Farms repainted the tractor that this area was hard to reach and they didn't really try to cover the bottom of the tractor well? Anyway, we picked a higher quality of paint that closely matched this newly discovered paint. The green is also of higher quality which removes some of the black tint which can 'muddy' the color a bit. The green very closely matches the FFA XO-121 toy tractor. Our red will be brighter than the current state of the original tractor but we feel better matches the discovery of what we believe is the original paint color of the Oliver XO-121.



Great to see some green going on! The wheel hubs almost look plastic. New rear rims and larger tires mounted and painted.



Every part is stripped to metal, primed, smoothed, z-chromed, primed, painted white, painted red then clear coated.



Chris Rude & Team skillfully putting tires/wheels onto the hubs without scratching the perfect paint.



The painful journey of this hood over several years seems to be forgotten when you look down the rib and envision it on the tractor soon.

The dash has extra holes for more gauges that will be covered with a custom aluminum overlay.

The side panel buffed to perfection.



Chris Rude—Nixa, MO [Body & Paint]
The Compound—Jeremy Coker
Marionville, MO [Grill]
Rose Metal—Springfield, MO [hood skin]
Emachineshop.com—Billet Emblems
Whitworx Fine Metal Finishing —
Lincoln, AR—Chrome grill