DESCRIPTION by PG OF THE ENGINE The purpose of this description is so that I can show it to Google Ai either in Google Search or in Google Gemini. Thus I do not have to keep describing the engine if I start a new Search Topic or I start a new Gemini Chat The engine is a free piston type. It has these free pistons as two pistons these pistons are permanently connected to each other by a rod. Thus they are dual chamber units. One unit is the combustion chamber unit. The other unit is the supercharger unit. The two pistons in the combustion chamber unit (for ease of typing) I will name PCfire and PChyd. The rod between these two pistons I will name fire-hyd-rod. The supercharger unit has two pistons I will name them PCpress and PCair the rod name will be press-air-rod. There is a volume of fresh air (essentially 20% oxygen and 80% nitrogen) that is present in the combustion chamber at the start of the cycle. I will call this volume of air the air charge. Of note the value to the functioning of this engine of this air charge is its grams of oxygen and grams of nitrogen. As the pressure and/or temp and/or volume of the air charge may change the grams in it do not. So it is the air charge regardless of its temp and/or pressure and/or volume. The diam of the combustion chamber is 3.5 inches its stroke is 2.6 inches. The fire-hyd rod goes from the combustion chamber piston to the hyd pump piston this hyd pump piston is in a hydraulic pump chamber.
The diam of the hyd pump piston is 2.6 in and its stroke is 2.6 in. When the PCfire is at its BDC then the PChyd is also at its BDC. The fuel is kept in a reservoir it goes through a fuel pump and moves to the combustion chamber via tubing, the fuel is kept in a zero oxygen available status throughout its transfer through these various tubes. Near to the combustion chamber this tubing is heated some amount above the spontaneous ignition temp of the fuel. The fuel is sprayed into the combustion chamber with enough pressure and through a small enough and also heated nozzle that the fuel nebulizes into small droplets and these droplets are at a temp where they start to burn immediately upon contact with oxygen molecules. To start a cycle a bolus of fuel is sprayed into the combustion chamber, fuel ignition occurs. The air charge is present. The air charge is raised to 380 dgg F. Pressure increases. The PCfire because of fire-hyd-rod moves also the PChyd. The hydraulic chamber immediately then sends hyd fluid at 20 atm through a one way valve to an accumulator. The accumulator will only accept hyd fluid at 20 atm or greater. The accumulator hyd fluid is always at 20 atm. If fluid is added to the accumulator its piston moves back, a strong spring pushes on the accumulator's piston so the accumulator pressure is always 20 atm. Via a one way valve fluid from the accumulator can go out to the robot to allow the cpu of the robot to use this pressurized fluid to do the activities of the robot including using hydraulic cylinders to move items and hyd motor-generator-battery systems to create and maintain availability of electrical power inside the robot. The fuel bolus is only sufficient that the temp of the gases in the combustion chamber are brought to 380 degF, after this no more fuel is added. Initially gas pressure is sufficient for the fire-hyd rod to transmit enough force that the PChyd

> can pump out fluid at 20 atm. As further expansion of the gases of combustion occur with no new addition of heat from combustion, there is not enough force for the fire-hyd rod to create 20atm hyd pressure, however… additional mass is present in PCfire, the burning of the fuel bolus creates actually a force impulse so that fire-hyd rod can initially create 20 atm, but the impulse is strong enough that the PCfire has enough velocity that it has gained kinetic energy. So even though gas pressure is dropping PCfire has enough kinetic energy and travel velocity that it keeps moving exchanging via the fire-hyd rod kinetic energy for velocity… so it is slowing down from its initial movement velocity. PCfire transmits enough kinetic motion to fire-hyd rod that the PChyd piston goes all the way to BDC as does the PDfire goes all the way to BDC. This concludes the direct transfer

of fuel energy into mechanical energy, this mechanical energy being that the accumulator has more pressurized hyd fluid in it than it did before the cycle started. The gases of combustion at ?temp and ?atm are still present in the combustion chamber and PDfire is still at BDC. A valve opens connecting the combustion chamber to the compression chamber. PCpress is in this compression chamber. This is an adiabatic expansion. The diam of PCpress is 5.2 inches. There is now a pressure in this adiabatically expanded gases of combustion of 5 atm. These gases push on the PCpress and via the press-air rod the PCair is risen up as the PCpress is risen up. The air at room temp and 1 atm in the PCair chamber begins to lose volume, increase pressure and increase temp. The stroke of this action is ? inches. The diam of the PCair piston is 2.4 inches. When the PCpress is very close to TDC but not at TDC it stops, as does the PCair is near its TDC but not at its TDC. There is a spring on the end of the press-air rod, during the moving up of both PCpress and PCair this spring was compressed. A hydraulic actuated “click lock” is activated and the press-hyd rod is now held where it cannot move. The PCpress chamber and the PCfire chambers are still connected that valve is still open. The gases in the PCpress chamber and the PCfire chamber are allowed via another valve and tubing setup so that these gases flow toward the exhaust tubing. The end of the exhaust tubing is open to air, its interior stays at 1 atm. This is a second adiabatic expansion of the gases of combustion. They go from 2 atm to 1 atm, as they do they flow through a 1 inch ID tubing except this tubing is necked down to ¼ inch ID and this ¼ inch tubing is fed into an intercooler which is a counter current gas heat exchanger. This heat exchanger is copper and has enough mass to give it thermal inertia. This second adiabatic expansion allows these gases of combustion to bring the heat exchanger temp down to 5-10 deg F. This intercooler is the air charge intercooler. After this intercooler reaches 5-10degF, another valve is opened and the air charge currently being held in the air charge chamber is allowed to flow through this intercooler and on to enter the combustion chamber. This air charge was at ?volume, temp 451 degF, and 23 atm. After passing through the intercooler this air charge is at 70 degF and ? volume and ? pressure. There is a rod control function capability for both rods. A shaft collar is around the rod except it is not tightened in place via a set screw. There is a hydraulic cylinder squeeze or unsqueeze setup on the collar. This hydraulic cylinder is about the size of a human thumb. In the squeeze position it causes the two halves of the collar to squeeze on the rod shaft. In the unsqueeze position the collar halve open up some and the collar has no real physical

connection to the rod except it is just touching it a little. There is hydraulic cylinder whose piston rod is connected to this collar. When the collar is squeezed it grasps and holds the rod, if the hydraulic cylinder piston rod connected to the collar moves (via either extension or retraction of this piston rod) then that piston rod motion will via the clamped collar force that linear motion on the rod also. Thus adjusting this extension/retraction value of this hydraulic cylinder piston rod (provided the collar is squeezed tight) allows the cpu to force the press-air rod and/or the fire-hyd rods to be forced to move. Thus when the proper valve is opened and the air charge leaves its 23 atm, 451 degF state in the air chamber and the spring extends and the air charge moves to the compression chamber. Then the transfer valve is closed and the hydraulic click lock is released and then collar-hydraulic cylinder system will “pull” the PCpress back from its now full TDC position all the way back to its full BDC position. In a similar manner, prior to the air charge being sent to the combustion chamber, the collar-hydraulic cylinder movement capability there caused the PCfire to go from BDC to just below TDC and so did the PChyd cylinder went also from BDC to its actual

TDC. Of note, all the pressurized fluid sent out from the accumulator to the robot (this exit point I will call the aorta of the robot) when that fluid (under the control of the cpu and the valving etc) has done its work, all this fluid flows back through tubing connecting to larger and larger common tubing until it is all in one large common return tubing (I will call this the vena cava) this large common return tubing is connected via a one way valve to the intake port of the hyd pump. So when PDhyd goes from its BDC to its TDC it refills itself from fluid it is drawing in from the vena cava. A full hydraulic fluid recirculating loop. If needed a fan turned by a hydraulic motor may need to blow outside air on an intercooler located between the outlet of the accumulator and the beginning of the aorta. This allows the cpu to run up or run down the rpm value of that fan so that intercooler can keep the hydraulic fluid flowing into the robot to always begin its flowing in at room temperature. 2 Thank you for sharing