

**MATHEMATICAL MODEL FOR THE SELF-SUSTAINING HYDRAULIC
ASSISTED ELECTRIC VEHICLE – S.S.H.A.E.V**

A) FORCE INPUT PARAMETERS – REFER TO DIAGRAM 1A, 1B

Number of Force Input Cylinders = 36 x 2

Radius of each cylinder = 1 cm; Height = 15 cm

Area of each cylinder - $\pi r^2 = \frac{22}{7} \times \frac{1}{1} \times \frac{1}{1} \text{ cm}^2 = 3.1 \text{ cm}^2$ (Take $\pi = \frac{22}{7}$)

Volume of each cylinder = Area x Height = $(3.1 \times 15) \text{ cm}^3 = 47.1 \text{ cm}^3$

Total volume of all 36 cylinders = $(36 \times 47.1 \times 15) \text{ cm}^3 = 1,697.1 \text{ cm}^3$

Force applied = 50HP

Force applied per cylinder = $\frac{50}{36} \text{ HP} = 1.4 \text{ HP}$

Pressure, P, developed, = $36 \times 0.45 \text{ HP cm}^{-2} = 16.26 \text{ HPcm}^{-2}$

B) FORCE OUTPUT PARAMETERS – REFERS TO DIAGRAM 1

Number of Force Output cylinders = 4

Radius of each force output cylinder = 4cm.

Area of each Force Output Cylinder, A = $\pi r^2 = \frac{22}{7} \times \frac{4}{1} \times \frac{4}{1} = 50.28 \text{ cm}^2$

Thrust developed per each Force Output Cylinder = P x A = $16.26 \times 50.28 \text{ HP} = 817.6 \text{ HP}$

Total Thrust developed by all 4 cylinders = $4 \times 817.6 \text{ HP} = 3,370.6 \text{ HP}$

Gross Thrust on crankshaft, disregarding friction = 3,270.6HP

C) ENGINE DISPLACEMENT: DISPLACEMENT IN RAMPISTON

Displacement in one Ram Piston = Hydraulic fluid entering output cylinder's height.

Assuming fluid in all 36 input cylinders enter into one output cylinder,

Unknown height of fluid in output cylinder = xcm.

Equating volumes in both force output and input cylinders,

$50.28x = 1,697$

$$x = \frac{1,697}{50.28} \text{ cm} = 33.75 \text{ cm}$$

Displacement height in each of 2 output cylinders = $\frac{33.75}{2} \text{ cm} = 16.9 \text{ cm}$

Engine displacement in other 2 output cylinders = 16.9 cm

D) DETERMINANT OF IDEAL CRANKSHAFT FOR MATHEMATICAL MODEL

Displacement in Ram Piston must effect 180° rotation in crankshaft

180° rotation = $\frac{1}{2}$ circumference of crankshaft

Assuming Radius of crankshaft to be r cm,

$$\frac{1}{2} \times 2 \pi r = 16.9 \text{ cm}$$

$$\pi r = 16.9$$

$$r = \frac{16.9}{\pi} = \frac{16.9 \times 7}{22} \text{ (Take } \pi = \frac{22}{7} \text{)}$$

$$\therefore r = 5.38 \text{ cm}$$

Δ idea Diameter of crankshaft from crankpin down to crankpin = $2 \times 5.38\text{cm}$
= 10.75cm

E) SUMMARY RESULTS – REFER TO DIAGRAM OF S.S.H.A.E.V

1. In applying a force of 50HP through a high speed Electricity motor to the hypothetical S.S.H.A.E.V,
 - i) Total pressure developed from 36 force input cylinders = 16.26 HP
 - ii) Total Thrust developed from all 4 force output cylinders = 3,270.6HP
 - iii) Engine displacement, ie lifting height of Ram Piston = 16.9 cm
 - iv) Diameter of crankshaft = 10.75 cm.
 - v) Force input scaling factor = $\frac{3,270}{50} = 65.4$

F) PERFORMANCE OF THE S.S.H.A.E.V MODEL IN REVIEW

- i) It can run a 100HP Alternator to charge all the batteries needed to operate a 50HP electric motor.
- ii) It can overcome all frictional forces with 100HP force.
- iii) It will still have more than 3000HP force to drive the car's wheels through a crankshaft 10.75 cm thick, perpetually!
- iv) It can be modified to operate ships and aircraft.
- v) It can be modified to operate as an electricity generator, whereby power output will far outweigh power input. Here, it will drive only alternators instead of wheels.

G) HOW TO INCREASE THE HORSEPOWER OF THE S.S.H.A.

- i) Principally, increase the horsepower of the Force Input Electric Motor, and Horsepower will increase.
- ii) Add unto both Force Input Cylinders and Force Input Output Cylinders, maintain the ratio of the parameters, and increase Horsepower.
 - a. Add nine pairs of Force Input Cylinders
 - b. Add two Force Output Cylinders or $\frac{1}{3}$ of total.
 - c. Maintain the 50HP Electric motor
 - d. Horsepower added = $\frac{1}{3} \times \frac{3270}{1} = 1,090\text{HP}$
 - e. New HP of S.S.H.A.V = $3,270.6 + 1090\text{HP} = 4,360\text{HP}$
 - At the same time, we can decrease Horsepower by reversing all the above Orders in propelling a small car:
 - Deploy electric motor with low Horse power.
 - Reduce number of Force Output, cylinders.
 - However, to maintain thickness of crankshaft, number of Force Input Cylinder must be maintained for the car.
- iii) Moreover, Force Input crankshaft can have its crankpins enhanced in numbers in order to operate layer of force input cylinders.

MATHEMATICAL MOFEL FOR MANUAL HYDRAULIC ASSISTED

ELECTRICITY GENERATOR – M.H.A.E.G

A. FORCE INPUT PARAMETERS – REFER TO DIAGRAM 2

- Number of Force Input Cylinders = 36×2
Radius on one Force Input Cylinder = 1cm; Height = 20cm
Area of one per force Input Cylinder = $\pi r^2 \frac{22}{7} \times 1 \times 1 = 3.1 \text{cm}^2$
Volume of one For Input Cylinder = $A \times h = (3.1 \times 20) \text{cm}^3 = 62 \text{cm}^3$
Total volume of Force Input Cylinder = $(62 \times 36) \text{cm}^3 = 2,232 \text{cm}^3$
Length of lever crow Bar = 200 cm; Height of Cylinder = 20cm

- Mechanical Advantage $M.A = \frac{200}{20} = 10$
Effort applied from one operator, E (assumed) = 20kgf
Load overcome = $M.A \times E = (20 \times 10) \text{kgf} = 200\text{kgf}$
- Total Effort from one operator using lever = 200kgf (ignoring friction)
Effort applied to one Force Input Cylinder = $\frac{200}{36} \text{kgf} = 5.6\text{kgf}$
- Pressure from one Force Input Cylinder = $\frac{\text{Force}}{\text{Area}} = \frac{5.6}{3.1} \text{kgf cm}^{-2} = 1.8 \text{kgf cm}^{-2}$
Total pressure from 36 cylinders = $(36 \times 1.8) \text{kgfcm}^{-2} = 64.8\text{kgf cm}^{-2}$

B. FORCE OUTPUT PARAMETERS – REFER TO DIAGRAM2

- Number of Force Output Cylinders = $2 \times 2 = 4$
Radius of one Force Output Cylinder = 5cm
Area of one Force Output Cylinder = $\pi r^2 = \frac{22}{7} \times \frac{5}{1} \times \frac{5}{1} \text{cm}^2 = 78.6\text{cm}^2$

Thrust developed per cylinder = Pressure \times Area = $78.6 \times 64.8 = 5,093.3\text{kgf}$

Total Thrust from all 4 cylinders = $4 \times 5,093\text{kgf} = 20,372\text{kgf}$

Converting to Horse Power, $20372\text{kgf} = \frac{20372}{76.4} = 268H.P$

Force Input scaling factor = $\frac{20372}{20} = 1,018.8$

C. DISPLACEMENT IN RAM PISTON

Displacement in one Ram Piston = Height of Hydraulic Fluid entering output cylinders. If all the Hydraulic Fluid in 36 Input Cylinders enter into 2 Output Cylinders, unknown height of Hydraulic Fluid in each Cylinder = x cm.
Equating volumes in both set of cylinders,

$$2 \times 78.6x = 2,232$$

$$x = 2,232$$

$$2 \times 78.6 = 14.2 \text{ cm}$$

Displacement in each of all 4 Ram Pistons = 14.2 cm

D. DETERMINANT OF IDEAL CRANKSHAFT FOR MATHEMATICAL MODEL

Displacement in Ram Piston must effect 180° rotation in crankshaft

180° rotation = $\frac{1}{2}$ circumference of crankshaft

Assuming radius of crankshaft to be r cm,

$$\frac{1}{2} \times 2\pi r = 14.2 \rightarrow \pi r = 14.2$$

$$r = \frac{14.2 \times 7}{22} = 4.5 \text{ cm}$$

Diameter of crankshaft = $2r = 2 \times 4.5 = 9 \text{ cm}$

E. CALCULATION ELECTIC POWER GENERATED FROM HYPOTHETICAL M.H.A.E.G

1,341 HP = 1 Megawatt of Electricity = 1000 kilowatt

268 HP developed by a manual force of 20kg = $\frac{268}{1,341} \times \frac{1000}{1}$

= 199.85 kilowatt = 200kw

F. COSTIN ELECTRIC POWER GENERATED FROM M.H.A.E.G

Man's average power in pushing and pulling = 25% of body weight

Energy expended by a man weighing 80kg = $\frac{1}{4} \times \frac{80}{1} = 20 \text{ kgf}$

Using M.H.A.E.G, the man develops a force = 268 HP

Now, 1341 HP serves 1000 houses with electricity

No of houses served by 80kg weight man = $\frac{268}{1341} \times \frac{1000}{1} = 200$

Assuming 4 persons of similar weight work for 24 hours in shifts, and each house expends GH¢1.00 on electricity a day (GH¢1.00 = 20cents)

Total receipt for a day = GH¢200 x 1 = GH¢200.00 (GH¢5.00 = 1 USD)

Earning of one operator a day = $\frac{GH¢200}{4} = GH¢50.00 = \10.00

A single person working for 6 hours a day will earn a gross amount of GH¢50.00 = \$10.00 a day + Reduction in total cost of electricity + priceless environmental preservation.

G. MILLITATING FACTORS AND SOLUTIONS TO M.H.A.E.E.G

- i) On our land, low weight among men will affect pushing, pulling and hard endurance needed to operate the M.H.A.E.G

To overcome these;

- a) Many hands are needed to generate plenty of electricity.
 - b) The lever bar can be adjust to maximize mechanical advantage (M.A).
 - c) Principally, the Hydraulic system can be made to be more powerful by deploying more force input and output cylinders. Speed of alternators can also be magnified by increasing the diameter of driving wheels, in order to maximize velocity ratio and alternator speed.
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- ii) Operators of the M.A.E.G could be affected by radiation from the alternators. This can be avoided by separating from the force input units far from the force output units, simply by extending the length of the pressure feeding pipes.
 - iii) Mosquitoes and other parasites can inflict diseases on operators during the night. This can be avoided by protective clothing and insect-proof shelter etc.

THE SELF-SUSTAINING HYDRAULIC ASSISTED ELECTRIC VEHICLE – S.S.H.A.E.V.

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GENERAL FUNCTION OF THE S.S.H.A.E.V. AND ITS DERIVATIVES: INTRODUCTION.

With the traditional electric vehicle, electric motors, powered by batteries, work the wheels directly through rotary action. This means that if, for instance, its direct current electric motor is rated 200Horsepower, that same torque propels the movement of the car and nothing more. After some hours of operation, the batteries of the traditional electric car run out, and they would need to be recharged, through the mains for some embarrassing hours, if power is available in the immediate environment where the car got stuck. Otherwise, that would be the end of journey for both the driver and the passenger. In Africa, for instance, where electricity is not readily available everywhere, a big limitation could be placed on the usage of the traditional electric car.

Because of its heavy reliance on the national electricity grid, most of which are fed with thermal power, the traditional electric car does little for environmental sanity in the long run. Can something be done about all these shortcomings associated with the traditional electric car?

The Self-Sustaining Hydraulic Assisted Electric Vehicle (S.S.H.A.E.V.) that I have conceived, however, works on the following principles that are aimed at turning round the shortcomings of the traditional electric vehicle (See diagrams 1A, 1B and Mathematical Model 1):

- A. The Direct Current Electric (D.C.) Motor, very small in Horsepower with limited electric power usage from few battery installation, works onboard force input boosting hydraulic pressing actuators.
- B. Hydraulic actuators transform the force input of D.C Motor tens of times, boosting its overall Horsepower (HP). In a mathematical model incorporated herein, a 50HP Motor has its output transformed into 3,270.6 HP gross. With the S.S.H.A.E.V., a small DC Motor rated 10HP, can drive a car through 654HP gross engine thrust.
- C. Boosted Horsepower imparts a rotary force to a special mathematically formulated Crankshaft. (See Determinant of Ideal Crankshaft in Mathematical Model.)
- D. Rotary force in one end of Crankshaft works the wheels of the car through traditional gearing system, shaft, differential gears, and axle.
- E. The other end of Crankshaft works a powerful Alternator that generates electricity to charge the car's batteries thoroughly; and it also works other onboard electrical gadgets as the car runs.
- F. Theoretically, therefore, the S.S.H.A.E.V. would be able to run indefinitely without the need to stop the car for recharge: it would develop more than enough energy to work the wheels, overcome all frictional forces, and run a powerful Alternator to feed all the installed batteries.
- G. The Horsepower of the S.S.H.A.E.V. can still be increased or decreased, according to the capacity and tonnage of vehicle it would drive. We could vary the output of the hydraulic system,

and increase or decrease the horsepower of the force inputting Direct Current Motor to suit the type of vehicle.

FURTHER DEVELOPMENTS FROM THE S.S.H.A.E.V. SCHEME:

- A. **S.S.H.A.E.V. MODIFIED INTO ELECTRIC POWER GENERATOR.** The S.S.H.A.E.V. scheme can be modified into an electric power generator. Here, both ends of the crankshaft shall be fitted with alternators – refer to diagram 2. It would work automatically; electric power output shall far outweigh electric power input. It shall run indefinitely because some electric power generated shall be diverted to charge installed batteries, whilst the big chunk of electric power feeds the national grid or used directly. Given that 1,341HP alternator serves 1,000 homes with electricity, a thrust of 3,270HP in the mathematical model will serve more than 2,000 houses. Some power would still be diverted to charge feeding batteries, whilst some force diverted to overcome friction.
- B. **S.S.H.A.E.V. MODIFIED TO RUN SHIPS AND AIRPLANES.** The technology can also be incorporated into electric airplanes, helicopters; and ships. Here, it would generate electricity onboard, and feed it to propellers and rotors. It would develop more than the capacity to lift itself and the rest of the components of the aircraft. Both ships and aircraft using this electric system can travel for infinite distances without the need to stop for recharge of batteries.
- C. **THE MANUAL HYDRAULIC ASSISTED ELECTRICITY GENERATOR.** Another big derivative of the S.S.H.A.E.V. is the Manual Hydraulic Assisted Electricity Generator (M.H.A.E.G.) that would benefit poor nations especially in Africa a great deal, and in the following ways: (See diagram 2 and Mathematical Model 2)
 - a. Energy to generate electricity would come from the massive unemployed men and women who roam our streets. Operators shall be comfortably seated, and they would operate a lever through upstroke and down stroke force input modalities, with both hands, to work the hydraulic system. (See Diagram 2)
 - b. Mathematical models depict that, given our present income rate, the M.H.A.E.G. would be economical, and would reduce the cost of electricity as compared to that of current thermal power generation. The mathematical model, incorporated herein, has scientifically asserted that a single individual person, deploying a force of 20kg in Ghana through levers and hydraulic actuators, can provide the electricity needs of more than 200 houses for 6 hours or more! (See mathematical model for M.H.A.E.G.). He would earn \$10.00 a day if each household spends a minimum of one cedi or 20 cents on electricity a day. To complete a day of 24 hours, 3 other persons could run the system in shifts for the rest 18 hours. All the personnel would receive equal amount of money. However, as many as possible persons could work the machine simultaneously to enhance force input, and hence electric power generation. In all instances, overall cost of electricity for consumers would be reduced, and operators shall be rewarded reasonably with respect to the national living wage. In the developed nations where power consumption is high and costly, operators (like idle refugees, the unemployed, prisoners etc.) could still be adequately rewarded.
 - c. Today, men are being paid for manual labor to dig for coal and drill for oil. Companies buy these and burn them at profit to generate electricity to ruin the Earth's ecology. It would be sensible for us to generate electricity directly through that same manual labor force without

- burning any fossil fuel on our land... and the M.H.A.E.G. can take over all thermal power generators and dangerous atomic fission reactors in the world.
- d. In today's industry, manually operated hydraulic presses are still being used everywhere to execute industrial tasks. We could also use it to generate electricity and benefit from its tremendous force transformative ability.
 - e. Besides, most poor nations import fossil fuels to generate electricity. The resources for generating electricity would thereby go into the pockets of the masses if we resort to M.H.A.E.G. Instead of the present day's fuel import induced capital flight situation, poor nation will retain hard foreign currency.
 - f. Today, all the rivers on our land are drying up because of climate change. Most hydropower generators are not working, or are working under capacity; and projection into the future as climate change worsens is bleak. To compliment wind and solar energies so that renewables take over all power generation, the best option for our earth is the M.H.A.E.G.
 - g. In Africa and other developing nations various governments are not able to take good care of prisoners. The introduction of the M.H.A.E.G. in all prison yards would enable prisoners to provide for their own means of living whilst in penal confinement. Again, certain kinds of disabled persons can provide manual force input for the M.H.A.E.G., instead of being a burden on society.
 - h. Power from the M.H.A.E.G. could be used to feed the national grid, energize rural factories, farms, hospitals, schools and colleges, grinding-mills, bore-holes, sea-water desalination plants, and also charge batteries and store energy for all these rural enterprises. Areas that are inaccessible to electricity would benefit, as it can be installed anywhere and be used at any time of the day. Smaller versions can be installed at homes to charge batteries for cooking etc., instead of the woman moving into the bush to fetch for fuel wood.
 - i. Instead of men going to the gym to shed extra weight wastefully, they can operate the M.H.A.E.G. to generate electricity in the urban areas. Its operation can therefore be a mean to check obesity and its attendant cardio vascular diseases: men would turn extra body fat into electricity, in both the developed and developing nations.
 - j. The M.H.A.E.G. presents no environmental hazard to operators and the community at large. It would produce no noise, environmentally damaging gases, nor radiation; it would be environmentally friendly. Operators shall be protected from mosquitoes and elements of the weather. They would be housed separately from power generating alternators through elongated pressure feeding pipes.

CONCLUSION:

The traditional electric car has few parts, and this has a good impact on its agility, speed and cost. However, it needs the deployment of big electric motors with high electric power consumption along with plenty battery installation with their attendant frequent recharge. All these vindicate the deployment of force input boosting hydraulic actuators as seen with the S.S.H.A.E.V. Let us remember that had men not invented and used electric power transformers, the discovery of electricity would not have been beneficial to all mankind. So is it with the electric car: we must boost its rotary force through hydraulic actuators for all the face of the earth to benefit from it.

COMPONENTS AND WORKING ORDER OF THE S.S.H.A.E.V AND ITS DERIVATIVES

PARTS AND FUNCTIONS OF THE S.S.H.A.E.V. – REFER TO DIAGRAM

- A. HIGH SPEED DIRECT CURRENT (DC) MOTOR: It shall provide the rotary force which shall be translated into reciprocating action to work hydraulic system. Given the force transformation scale factor of the hydraulic system, DC Motor shall be selected taking cognizance of the Horsepower needed to overcome the resistance of the vehicle's rated tonnage.
- B. FORCE INPUT CRANKSHAFT: Rotary action of the DC motor shall be translated into reciprocating force through a crankshaft. Motor shall induce Force Input Crankshaft into action through direct connection with bolts and nuts, angle gears, or chains. This shall be determined by the position and location of both parts with respect to one another. A single elongated crankpin shall work 12 pairs of Swinging-Reciprocating Pistons.
- C. SWINGING – RECIPROCATING PISTONS: These shall initiate the reciprocating action needed to work the hydraulic system, as they swing and reciprocate back and forth. There are two sets, with each comprising 12 pistons. They are connected to the force input crankpins through hinge bearings, and have metallic washers with low volumetric efficiency at their head fixed into Hollow Cylinders.
- D. HOLLOW CYLINDER: Swinging reciprocating action of Force input piston is set in Hollow Cylinders. Diameter of each shall be big enough to accommodate Swinging-Reciprocating Piston's domain of activity. It also holds Forked Force Input Pistons.
- E. FORKED FORCE INPUT PISTONS: These, numbering 12 pairs, are fixed to the base of metallic washers of the Swinging Reciprocating Pistons. They are forked so that each can work three force input cylinders independently and simultaneously. Each end of forked pistons end in a washer with 100% volumetric efficiency. These are set in Force Input Cylinders.
- F. FORCE INPUT CYLINDERS: There shall be 36 pairs of Force Input Cylinders. Each washer end of Forked Piston is fixed into one Force Input Cylinder. Volume per cylinder shall determine the volume of hydraulic fluid it shall deliver through pipes into Force Output Cylinders, after down stroke of piston. Again, its area shall determine the pressure it delivers per force input. (Pressure= force divided by area.)
- G. HYDRAULIC FLUID SUPPLY FACILITY: Hydraulic fluid, made up of water or oil, shall be reserved in a vessel, connected through pipes, and terminates into Force Input Cylinders through One-Way Valves. Here, when Force Input Piston relapses in upstroke, valve opens to make up for any shortage of fluid in the system. Under pressure, valve closes, allowing fluid to move into force output cylinders through Pressure Feeding Pipes.
- H. PRESSURE FEEDING PIPES: These shall connect the Force Input Cylinders to the Force Output Cylinders. Each Force Input Cylinder is connected to a main pipe, in a "pressure and fluid pooling" modality. The main pipe can be as long as possible, and be tough enough to hold the big pressure coming from the force input facilities. Pascal's principles asserts that if other pipes, one, two or more, are typed from the main Pressure Feeding Pipe, the pressure these pipes receive are the same as that of the original pipe. However, they would all share the same volume of pressure transmitting fluid equally.
- I. FORCE OUTPUT CYLINDERS: These, numbering 4, shall receive the needed pressure and volume of fluid from pipes to displace Ram Pistons. Their individual area shall determine the thrust they

Key to text

LET CHRIST BE FORMED IN YOU
(GAL 4:19)
Note that the letters in italics are italicized

Lesson 10
10/10/10

1		2		3	
m	: m.f s : l	s	: - - :	d	: d.d r : d
d	: d.d d : d	d	: - - :	m	: m.m t : t
s	: s.f m : f	m	: - - :	s	: s.s l : l
Let Christ be formed in		you		Let Christ be formed in	

4		5		6	
s	: - - : -s	d	: d l : -s	s	: m r : -
m	: - - : -m	m	: m f : -m	m	: d t : -
s	: - - : -s	s	: s d : -l	L	: L f : -
you	As	you	you eat	to	preach the word

7		1st time 8		2nd time 8	
s	: l.s m : :	d	: - - : -	d	: - - : -
d	: d.d d : t	d	: - - : -	d	: - - : s.t
m	: f.l s : f	m	: - - : -	m	: - - : m.f
Let Christ be formed in		you		you	your

9		10		11	
m	: - - : m	r.r	: - - : r.m	f	: - - : f
d	: - - : d	t.t	: - - : t.d	r	: - - : r
s	: - - : s	s.s	: - - : s.l	L	: - - : L
soul	and	body	your	mouth	and

12		13		14	
m.m	: - - : m.f	s.s	: - - : s	f.f	: - - :
d.d	: - - : d.r	m.m	: - - : m	r.r	: - - :
s.s	: - - : s.ta	ta.ta	: - - : ta	L.L	: - - : s
talking	your	dressing	and	walking	my sis ter

unleash, given the pressure supplied to them (Thrust=pressure multiplied by area). However, the height of volume of fluid they receive from Force Input Cylinders shall determine the displacement (height) of the Ram Pistons.

- J. **RAM PISTON:** Fixed into the Force Input Cylinders, reciprocating Ram Piston's washer is 100% volumetrically efficient. They shall have a perforated open/close air vent that permits air escape from the whole system when it is being filled with hydraulic fluid. Under pressure from hydraulic fluid injected into the Force Input Cylinder, the Ram Piston sees a displacement, the height of which is in direct proportion to the volume of fluid injected from Force Input Cylinders. Each reciprocating displacement of Ram Piston works the car's main Crankshaft.
- K. **CRANKSHAFT:** Its diameter is mathematically worked out from displacement in Ram Piston that imparts rotary force through crankpins. The crankshaft must be able to rotate through 180 degrees, or half of its circumference, through a single thrust displacement in Ram Piston. The right radius and diameter of crankshaft can therefore be calculated only after knowing the displacement height in Ram Piston. (See Mathematical Model.)
- L. **FLYWHEEL, FREEWHEEL BEARING, GEAR BOX, SHAFT, AXLE, ETC.:** All these traditional components with all cars shall be installed and operated through one end of the rotating crankshaft. They are aimed at providing locomotion to the car's Axle and wheels through differential gears. The S.S.H.A.E.V.'s speed and power, like all cars, shall be a direct function of the thrust and rotary force of the Crankshaft.
- M. **ALTERNATOR:** The other end of Crankshaft shall operate an alternator through a free wheel bearing and a wheel. As the wheel works off a free wheel bearing, it induces rotary force to the Alternator Armature Wheel through Spokes. The speed of the Alternator shall be enhanced, with respect to Armature Wheel's diameter relative to that of the driving Wheel. (See velocity ratio from Mathematical Model.)
- N. **BATTERIES, CHARGING SYSTEM:** Alternator shall charge installed batteries through traditional battery charging system, as batteries feed the force input DC motor, with the car running.

NOTE: When the S.S.H.A.E.V. is modified into an electricity generator, all the functional parts hold. However, facilities for car wheel operation are deleted in place of big alternators. (Refer to Diagrams One and Two.)

PARTS AND FUNCTIONS OF M.H.A.E.G.

- A. **FORCE INPUT LEVER:** A Force Input Lever shall be provided to work hydraulic system manually. It shall be made of a long crowbar in order to increase mechanical advantage (M.A); and it is pivoted to overcome multiple Force Input Piston load of hydraulic system. Distance of force application to pivot (fulcrum) must far exceed distance from Force Input Piston load to pivot.
- B. **MANUAL FORCE INPUT:** As many as possible men and women, well fed, shall operate the lever simultaneously. Comfortably seated, they shall use both hands to effect up and down stroke force input operations. Upstroke shall operate 36 set of force input cylinders, whilst down stroke shall operate the other 36 set. Stress, tiredness and monotony demand that manual operation shall be done in shifts 24 hours a day. At the same time, operators shall have a big "relax" advantage: According to the laws of Physics, once the Alternator attains its maximum rotary speed from rest, force input needed to maintain that speed and power generation is minimal, as compared to the original force input.

- C. FORKED FORCE INPUT PISTONS: There shall be 2 sets of 12 Forked Force input Pistons. Each of them shall work three force input cylinders. The head of the pistons are washers with 100% volumetric efficiency.
- D. FORCE INPUT CYLINDERS: There shall be two sets comprising 36 cylinders each. Their individual diameters shall be minimal, as they are set to release enhanced pressure. Down stroke from operators shall work one set of 36 cylinders, whilst upstroke operate the other 36 set. In all two operations, all the fluid in the cylinders shall be completely evacuated.
- E. HYDRAULIC FLUID INPUT FACILITY: There shall be a hydraulic fluid supply vessel connected to each Force Input Cylinder through a pipe terminating in a one-way valve. When piston is relapsed in upstroke, valve opens to inject hydraulic fluid and make up for a possible shortage. In down stroke, valve closes, allowing fluid to flow into Pressure Feeding Pipes.
- F. PRESSURE FEEDING PIPES: These are constructed to function like the pressure feeding pipes of the S.S.H.A.E.V. (Refer to it.)
- G. FORCE OUTPUT CYLINDERS: These are constructed to function like the Force Output Cylinders of the S.S.H.A.E.V. (Refer to it.)
- H. RAM PISTONS: These are constructed to function like the Ram Pistons of the S.S.H.A.E.V. (Refer to it.)
- I. CRANKSHAFT: These are constructed to function like the Crankshaft of the S.S.H.A.E.V. (Refer to it.)
- J. WHEELS WORKING ON FREEWHEEL BEARINGS: At both ends of the Crankshaft, big wheels shall be fixed, and both shall work off Freewheel bearings.
- K. ALTERNATORS AND ELECTRICITY GENERATION: Two Wheels at both ends of Crankshaft, shall work alternators through Spoke Connections to Armature wheels. The bigger the ratio of diameter of Wheel to that of Armature Wheel, the greater the rotational speed of Alternator; and the bigger the electric power generated.