

THE APPLICATION OF A NON-POLLUTING PLASMA TECHNOLOGY AS A PROTOCOL FOR SURVIVAL

By
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A new form of energy has emerged, in the form of hydrogen plasma that shows great promise for replacing fossil fuel as a mainstay for practically all our energy users. The attached briefs identify the major areas where plasma technology can be applied.

The Plasma Gas Turbine for power generation and marine propulsion.
The Plasma Turbojet for all aircraft [also for spacecraft for propulsion in the atmosphere].
The Plasma Ramjet [to supplement the Plasma turbojet] for hypersonic aircraft.
The Plasma Rocket for spacecraft [involved in exploration or tourism].

List of illustrations:

- Fig. 1 The Ocean Going Global Fast Ferry
- Fig. 2 The Supersonic Transport
- Fig. 3 The Hypersonic Transport
- Fig. 4 The Space Tour Bus – Moon Orbiter

Background: Almost a decade ago, an American, Dr. Randell Mills created a process, currently under development, that promises to replace fossil fuel as the mainstay of our energy source [with the added benefit that it is non-polluting].

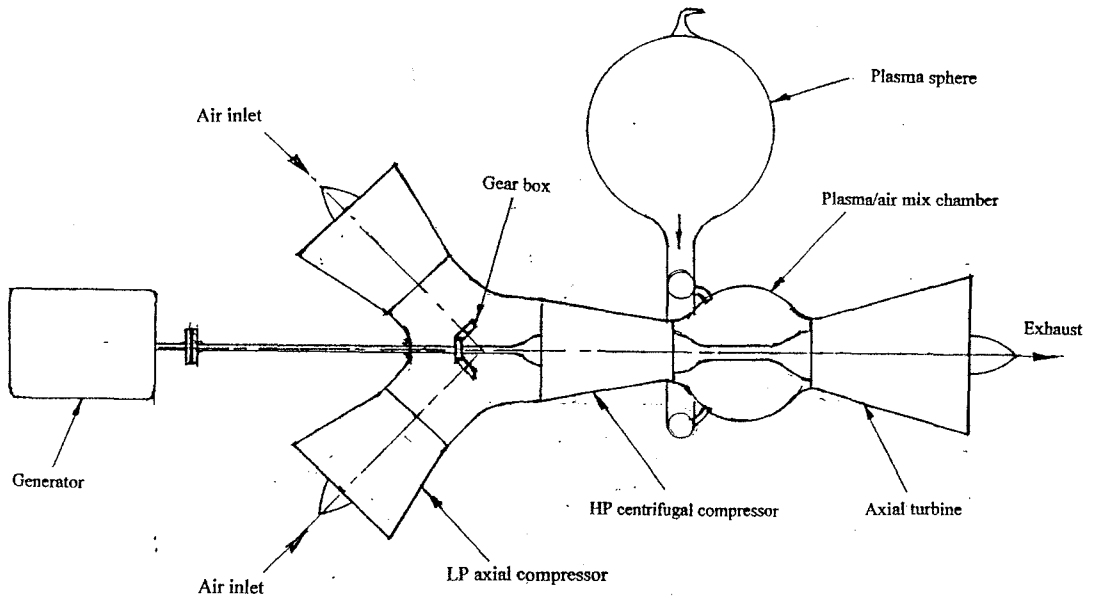
The electron of the hydrogen atom, in the presence of a suitable catalyst and in a vacuum chamber [equipped with weak electromagnetic fields], undergoes a series of orbit contractions, that, in liberating a large amount of heat, forms a unique hydrogen plasma. This heat is claimed to be in excess of one hundred times the heat from hydrogen combustion [equal to five million b.t.u./lb of hydrogen processed]. Should this plasma process be developed to operate under a pressure environment it can, via injection into a machine compressed or a ram compressed air stream, be used for all types of vehicle propulsion, power generation and in industrial processes.

A related “Hydrino Hydride Battery” is also being developed and this remarkable unit has over 1000 times the gravimetric energy density and over 100 times the capacity of an existing lithium- ion battery. This collective technology will certainly represent a protocol for our survival, providing the energy corporations can be dissuaded from suffocating this energy source, which would effectively end their era of exploitation from marketing fossil fuel.

If ammonia [NH₃] can be a practical feedstock, with the nitrogen component [with its strong bond to the 3 isolated atoms of hydrogen] providing the role of catalyst, then huge advantage will be gained in storage and handling, using this common-place commodity, compared with liquid hydrogen.

THE SMALL PLASMA GAS TURBINE

Designed by J Varney - June 5th. 2007



Performance @ ISO conditions For a range of plasma gas turbines

Power generated- kw	1,000	5,000	10,000	15,000	20,000
Shaft r.p.m [all shafts]	14,400	14,400	14,400	14,400	14,400
Axial LP comp. Stages/ PR	6/4	6/4	6/4	6/4	6/4
Centrifugal HP comp. PR	8	8	8	8	8
Axial turbine Stages/PR	5/30	5/30	5/30	5/30	5/30
Intake [and exhaust] air rate lbs/sec.	9.935	49.68	99.35	149.03	198.7
Hydrogen [plasma] rate lbs/sec.	0.000586	0.00293	0.00586	0.00879	0.01172
Heat rate b.t.u./kw.hr.	10,543	10,543	10,543	10,543	10,543

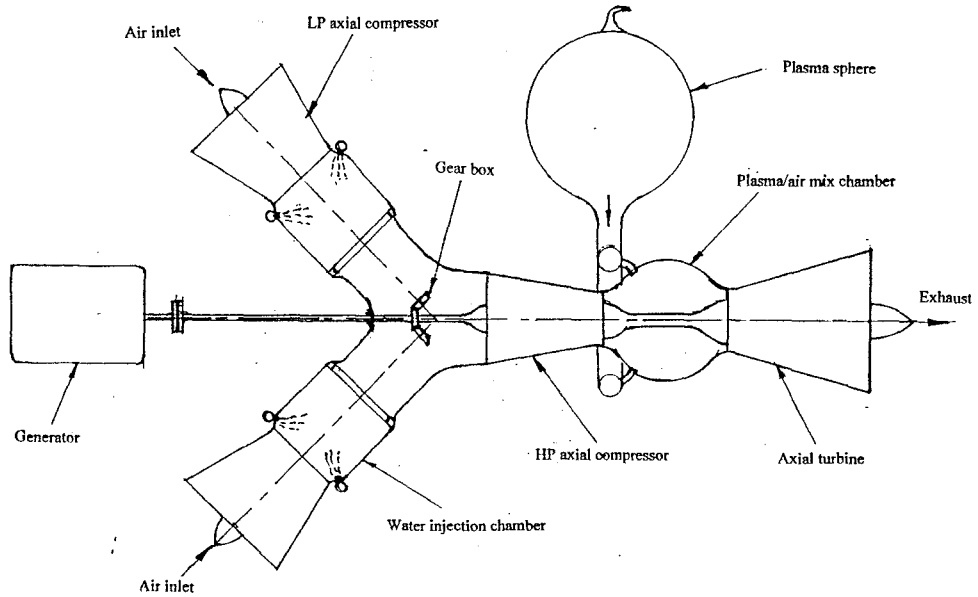
Notes: Heat rate does not account for power to auxiliaries and electro-magnetic fields.
 Plasma/air mix chamber and turbine have water-cooled casings.
 Tip speeds [mach #] are maximum on last stage of turbine but are less than mach 0.9
 Isentropic efficiency, applied to compressor and turbine work rates, are assumed at 90%
 Generator efficiency is assumed at 90%
 Gearing loss is assumed at 4% and applied to LP compressor demand work rate.
 Bearing loss is assumed at 2% and applied to turbine output work rate.

Engine pathway PRESSURE/TEMPERATURE profiles For all units

	LP compressor		HP compressor		Turbine	
	inlet	outlet	inlet	outlet	inlet	outlet
Tot. press. p.s.i.a.	14.6	58.4	57.82	462.56	455.62	15.2
Tot. temp. deg. R	520	773	773	1390	2460	1087

THE LARGE PLASMA GAS TURBINE

Designed by J Varney - June 5th. 2007



Performance @ ISO conditions For a range of plasma gas turbines

Power generated-MW	25	50	100	200	400	1600
Shaft r.p.m [all shafts]	7200	7200	7200	3600	3600	1800
Axial LP comp. Stages/ PR	6/4	10/10	10/10	10/10	10/10	10/10
Axial HP comp. Stages/PR	12/15	12/15	12/15	12/15	12/15	12/15
Axial turbine Stages/PR	7/57	8/141	8/141	8/141	8/141	8/141
Intake [total] air rate lbs/sec.	144.3	172	344	688	1376	5504
Water injection rate lbs/sec.	2.2	12	24	48	96	384
Exhaust rate lbs/sec.	146.5	184	368	736	1472	5888
Hydrogen [plasma] rate lbs/sec.	0.0123	0.0222	0.0444	0.0888	0.0178	0.711
Heat rate b.t.u./kw.hr.	8824	7998	7998	7998	7998	7998

Notes: Heat rate does not account for power to auxiliaries and electro-magnetic fields.

HP compressor, plasma/air mix chamber and turbine have water-cooled casings.

Tip speeds [mach #] are maximum on last stage of turbine but are less than mach 0.983

Isentropic efficiency, applied to compressor and turbine work rates, are assumed at 90%

Generator efficiency is assumed at 90%

Gearing loss is assumed at 4% and applied to LP compressor demand work rate.

Bearing loss is assumed at 2% and applied to turbine output work rate.

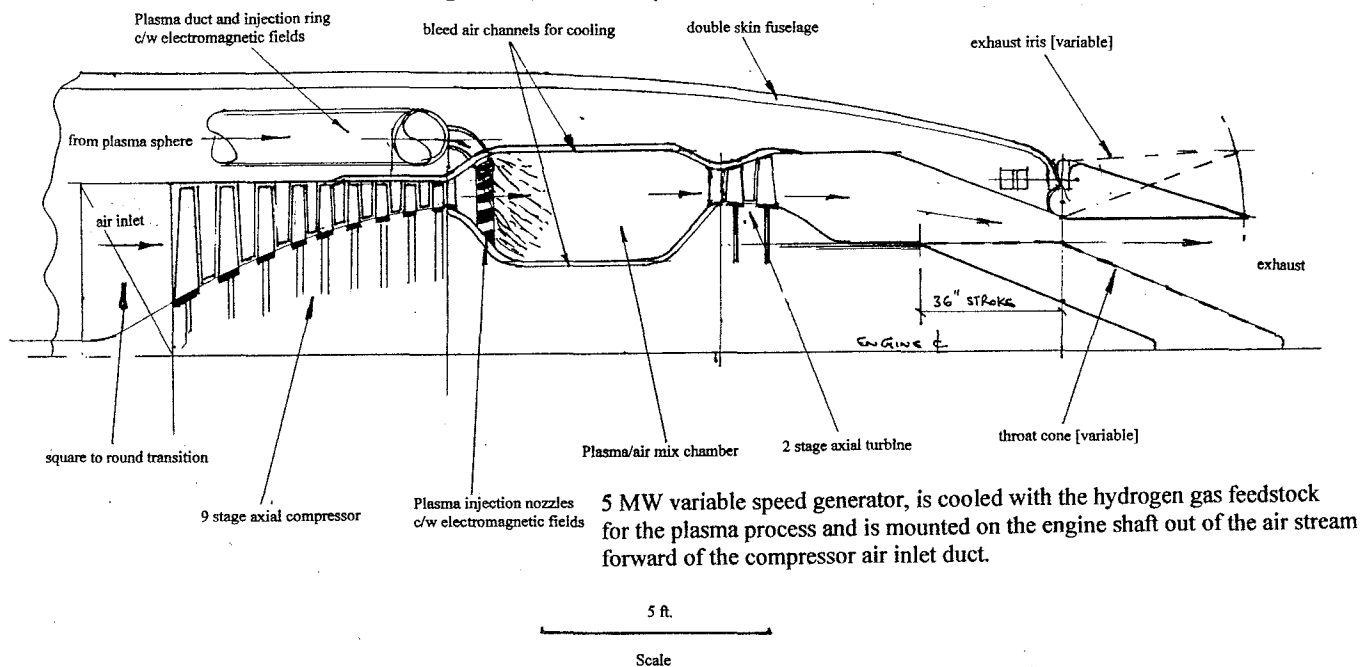
Water injection station provides evaporative cooling and also tight control of final compression temp.

Engine pathway PRESSURE/TEMPERATURE profiles

		LP compressor		HP compressor		Turbine	
		inlet	outlet	inlet	outlet	inlet	outlet
25MW unit	Tot. press. p.s.i.a.	14.6	58.4	57.82	867.3	858.6	15.2
	Tot. temp. deg. R	520	773	696	1500	2960	1148
50-1600 MW units	Tot. press. p.s.i.a.	14.6	146	144.5	2168	2146	15.2
	Tot. temp. deg. R	520	1004	696	1500	3460	1108

THE PLASMA TURBOJET FOR SUPERSONIC TRANSPORTS AND SPACECRAFT

Designed by J Varney – June 15th. 2007



5 MW variable speed generator, is cooled with the hydrogen gas feedstock for the plasma process and is mounted on the engine shaft out of the air stream forward of the compressor air inlet duct.

The performance below is for a supersonic transport of 200,000 lbs all up weight using a single engine.

Performance	Take-off @ 75% r.p.m.	Transonic @ 40,000 ft.	Mach 3 cruise @ 70,000 ft.	Supersonic Transport data
Air rate lbs/sec	1578	710	476	Number of passengers - 200 on 2 decks
Overall comp ratio	7.5	14.15	110	Range at mach 3 cruise - 12,000 miles
Temp to Turb. Deg. F	1340	3000	2660	Construction – carbon composites
Press. to Turb. P.s.i.a.	108.82	38.13	66.55	All-up weight – 200,000 lbs
Exhaust vel. ft/sec.	1660	4020	4726	Hydrogen fuel tank capacity - 1000 lbs
Thrust lbs. force	81350	67207	26608	Length - 170 ft. Fuselage O D 150 inches
Hydrogen rate lbs/sec.	0.0672	0.0977	0.041	Wing span – 65 ft. Wing area - 2200 sq.ft.

Notes:

Bleed air [at 6.3% of total air rate] is extracted from the compressor after the 5th. stage and cools the final casing of compressor, surfaces of the plasma/air mix chamber and the casing of the 2 stage turbine.

Isentropic eff. = 88% and is applied to both compressor and turbine. Variable speed generator eff. = 88%

Frictional losses are assessed at 2% of turbine output work-rate.

Intake loss [at take-off] = 0.3% of total pressure. Plasma/air mix chamber loss = 1.0% of total pressure.

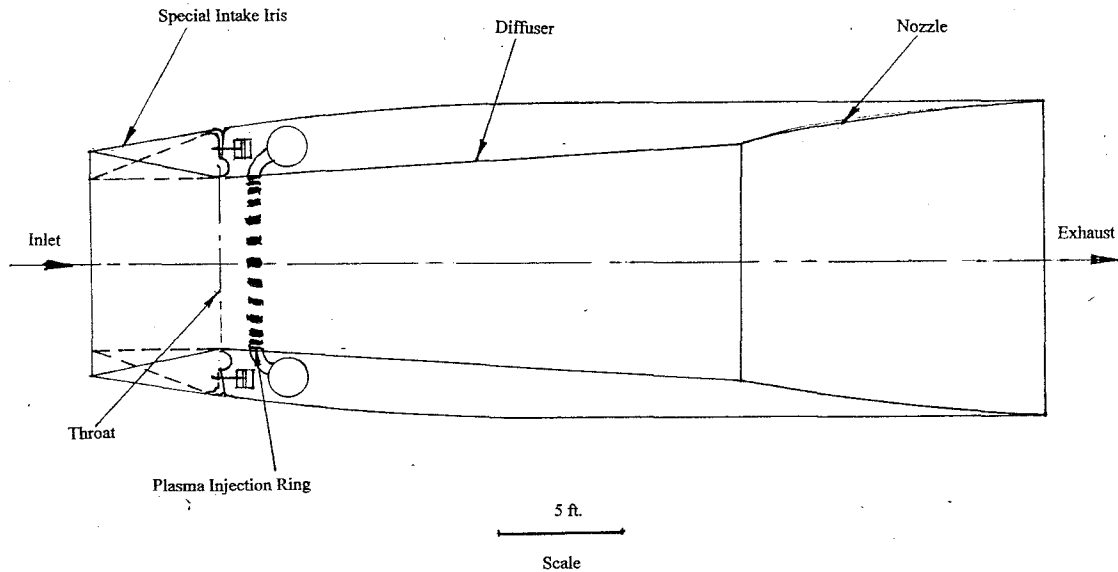
The local axial mach.# at the compressor inlet face, at the transonic phase is 0.75.

The intake system [on either side of the fuselage] incorporates two-dimensional ducts with profiling and ramps to accommodate intake air to vehicle speeds of mach.3.

The exhaust system, integrated into the tail end of the fuselage, to include a throat cone [for varying throat area] and an exhaust iris, to vary final area of exhaust aperture.

THE PLASMA RAMJET – FOR HYPERSONIC AIRCRAFT

[assisted by the plasma turbojet]
Designed by J Varney - June 15th. 2007



Operating envelope: Start-up at mach 0.9 at 40,000 ft. [with minimum intake face area].
Design point at mach 2 at 45,000 ft. [with maximum intake face area].
Max. cruise speed at mach 9 at 120,000 ft. [with maximum intake face area].

Performance: [based on a hypersonic transport of 215,000 lbs. max. wt.]
Thrust at mach.2 [design point] = 100,000 lbs.f Air rate = 1883 lbs/sec. Hydrogen rate = 0.1713 lbs/sec.
Thrust at mach. 9 cruise = 46,350 lbs.f. Air rate = 228.8 lbs/sec. Hydrogen rate = 0.0204 lbs/sec.

Note: Between mach 1 and mach 2 aircraft speed, the intake face area is increased [by use of an intake device that is the equivalent of the traditional exhaust iris] to maintain sonic velocity at the throat of the ramjet. Therefore an aircraft speed of mach 2 with sonic throat velocity provides the design point of the ramjet. The plasma is introduced just downstream of the throat, rapidly mixing with and heating the air to a temperature of about 2000 deg. F. at the end of the mixing diffuser section. The heated air [still at local sonic condition] then expands and accelerates in the fixed exhaust nozzle to provide the unit's thrust.

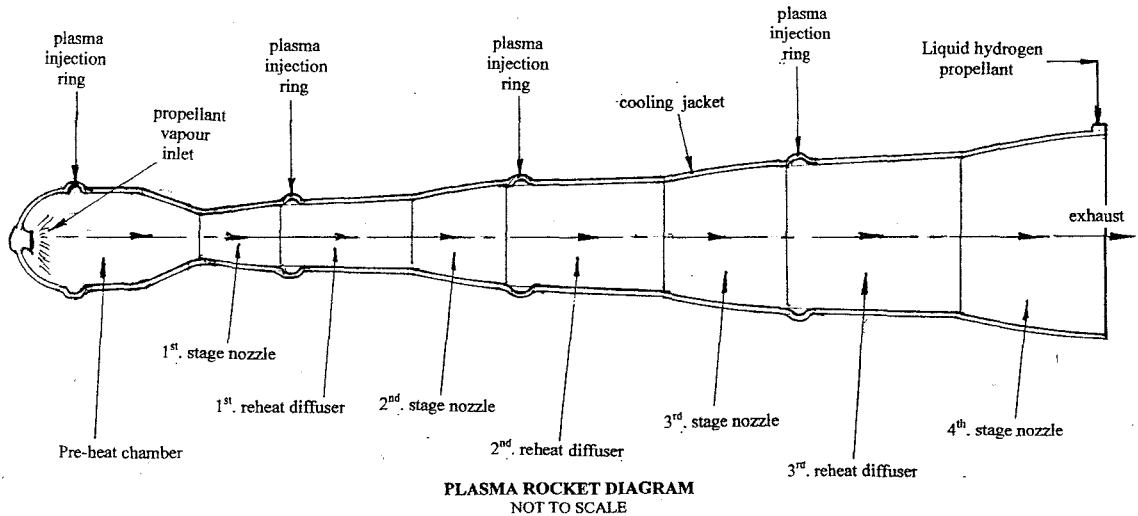
As the aircraft accelerates to cruise speed mach 9, the local mach # at throat and diffuser, reaches mach 4.5. Although the plasma/air mixing is supersonic, this unique process ensures complete mixing within diffuser. **The plasma turbojet [located in the fuselage] that powers the aircraft below mach 3 is of course shut down and isolated during speeds above this value but will restart as aircraft slows to mach. 0.9.**

The drag created by the plasma ramjet nacelle is a burden on the turbojet until ramjet start-up at mach 0.9. Location: The plasma ramjet in the form of a nacelle to be located above the aft end of the fuselage and between twin tail planes.

Features: The plasma sphere, located in the fuselage, is a shared item [also serving the plasma turbojet]. A separate [small] variable speed a.c. generator operating from a supersonic turbine [fed by intake air partially decelerated but still substantially supersonic] will be located in the nose of the aircraft and provide power during the operation of the plasma ramjet.

THE PLASMA ROCKET FOR SPACECRAFT

Designed by J Varney – June 15th. 2007



The plasma rocket system is a means of applying heat energy to the hydrogen propellant without using the process of combustion, prior to its expansion in a nozzle to develop high velocity and therefore thrust. A relatively small amount of high temperature plasma, injected directly into the propellant stream, is the process employed to achieve this end.

In order to achieve extremely high final exhaust velocity and thus high thrust, it is necessary to heat, expand and then reheat the gaseous propellant several times in a sequence of heating chambers and expansion nozzles [utilizing an initial high pressure condition of the propellant]

The liquid propellant, at cryogenic temperature and at a pressure of about 4000 p.s.i., is conveyed through the cooling jackets of the chambers and nozzles before starting its **straight line** journey through those components as a gas, undergoing a cascading pressure and temperature condition in the nozzles and a reheating process in the plasma injected heating chambers. As the plasma imparts its heat to the propellant stream instantaneously, extreme velocities are achievable and a final exhaust velocity of just over one million ft/sec. is theoretically possible.

Operating envelope – Deep space or above 180,000 ft in our atmosphere.

A practical size range for the plasma rocket is as follows:

The smallest unit - Thrust = 100,000 lbs.f. Final mass flow = 3.162 lbs/sec. nozzle outlet dia. of 46 inches.

The largest unit - Thrust = 1,000,000 lbs.f. Final mass flow = 31.62 lbs/sec. nozzle outlet dia. of 145 inches.

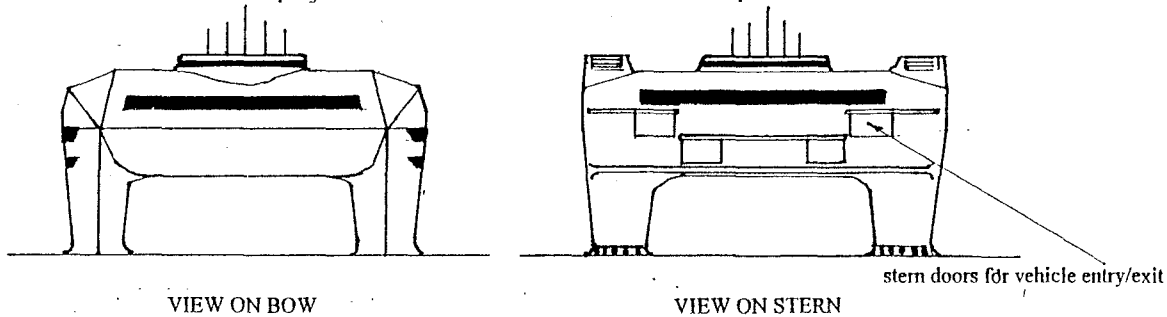
The theoretical and no doubt optimistic, Specific Impulse for this design of unit is 31,628 secs.

The table below identifies the sequence of components in the plasma rocket and their primary parameters.

	Static Pressure p.s.i.a.	Static Temperature deg. R	Local mach #	Actual velocity ft./sec.
Pre-heat chamber exit	3413	5000	1	12,730
1 st . stage nozzle exit	160.4	2456	2.814	25,355
1 st . reheat diffuser exit	157.1	5000	2.814	35,823
2 nd . stage nozzle exit	7.385	2456	7.919	71,352
2 nd . reheat diffuser exit	7.237	5000	7.919	100,810
3 rd . stage nozzle exit	0.340	2456	22.285	200,790
3 rd . reheat diffuser exit	0.333	15000	22.285	487,963
4 th . stage nozzle exit	0.010	6892	68.380	1,018,438

THE OCEAN GOING GLOBAL FAST FERRY

Concept designed by J Varney April 12th. 2007
[style based on the Stena HSS 1500]

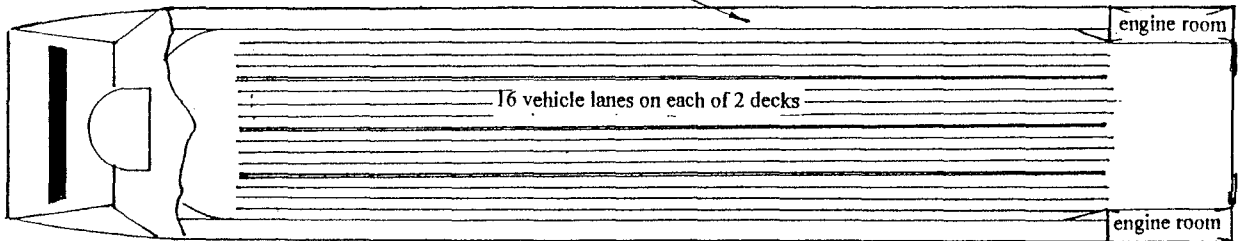


VIEW ON BOW

VIEW ON STERN

stern doors for vehicle entry/exit

enclosed promenades each side of both freight decks

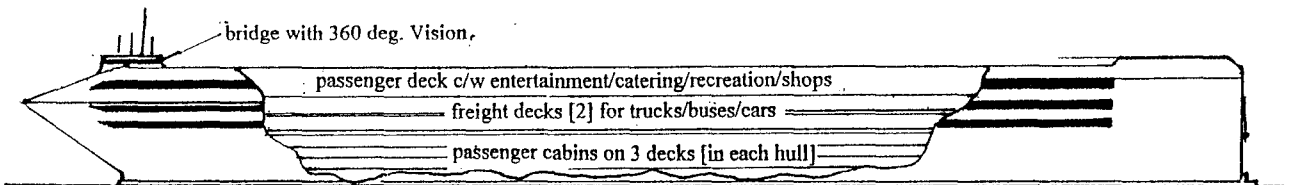


16 vehicle lanes on each of 2 decks

engine room

engine room

VESSEL PLAN



bridge with 360 deg. vision.

passenger deck c/w entertainment/catering/recreation/shops

freight decks [2] for trucks/buses/cars

passenger cabins on 3 decks [in each hull]

VESSEL SECTION

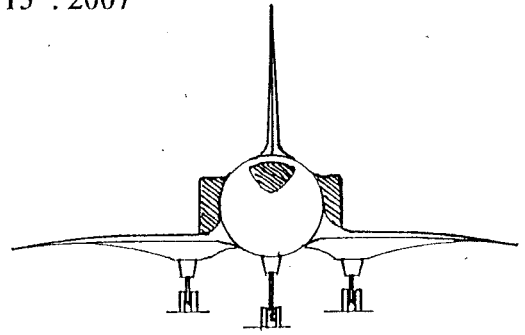
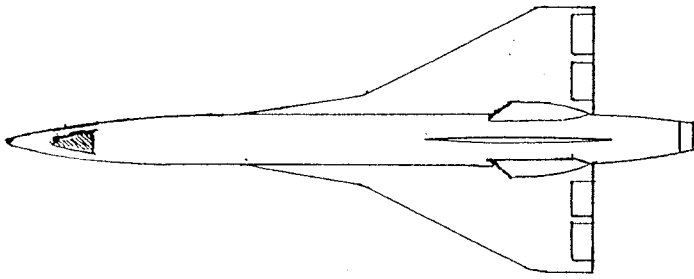
VESSEL DATA

Construction: Aluminum and some components of carbon composites.
Vessel Type: Twin hull catamaran propelled by motor driven water jets.
Dimensions: O/A length – 1200 feet. Beam – 225 feet. O/A height – 125 feet.
height of bow – 80 feet. Tunnel height [water clearance] – 50 feet.
Displacement: 50,000 tons. [c/w roll on roll off freight and passengers].
Freight: Trucks/buses/cars with a total of 30,000 lane feet on two main decks.
Passengers: 4,000 with utility cabins [bunks/w.c./sink/shower] on 3 hull decks.
Engines: 2 – “Large Plasma gas Turbines”, each rated at 150MW of electric power.
Ships services power: 2 “Small Plasma Gas Turbines”, each rated at 10 MW
Propulsion: 10 motor driven water jets [5 per hull], each rated at 30 MW.
Vessel’s service speed 70 knots. Total hydrogen rate [plasma], – 492 lbs/hour.
Liquid hydrogen tankage for a vessel range of 20,000 miles – 123,000 lbs [27,800 cu.ft.]
Reverse osmosis plant rated at 400,000 gallons per day, in each hull.

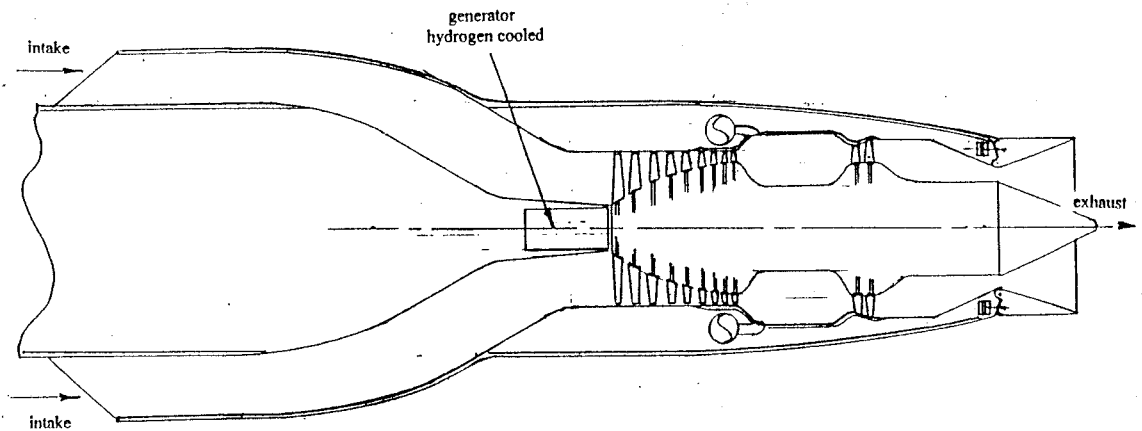
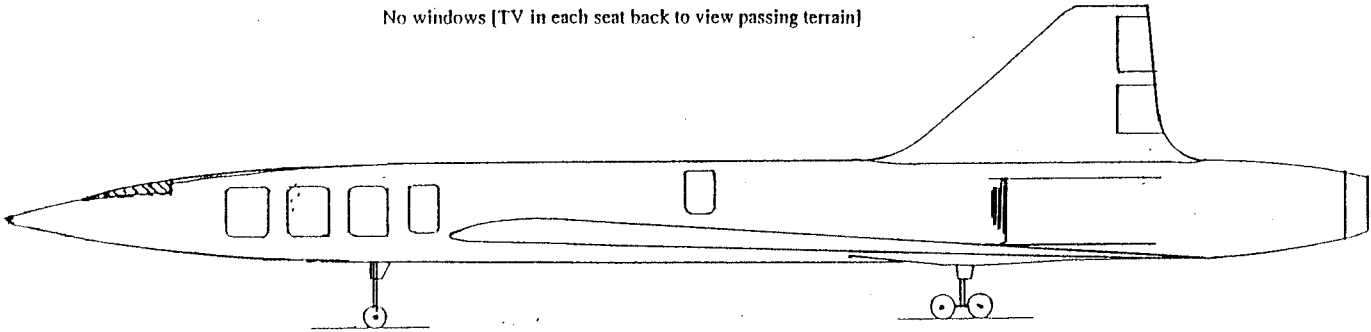
Fig. 1

THE SUPERSONIC TRANSPORT - CRUISING AT MACH 3

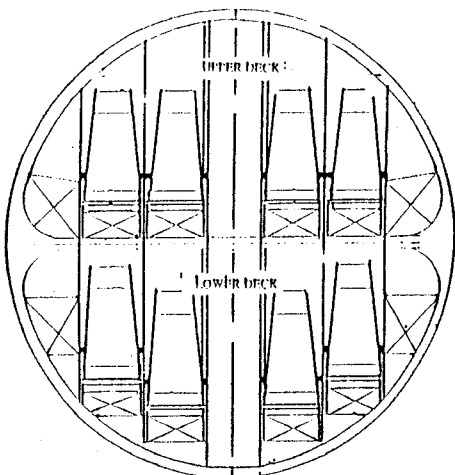
Designed by J Varney – June 15th. 2007



No windows [TV in each seat back to view passing terrain]



PLAN OF SINGLE PLASMA TURBOJET ENGINE INTEGRATED WITH FUSELAGE



CROSS SECTION

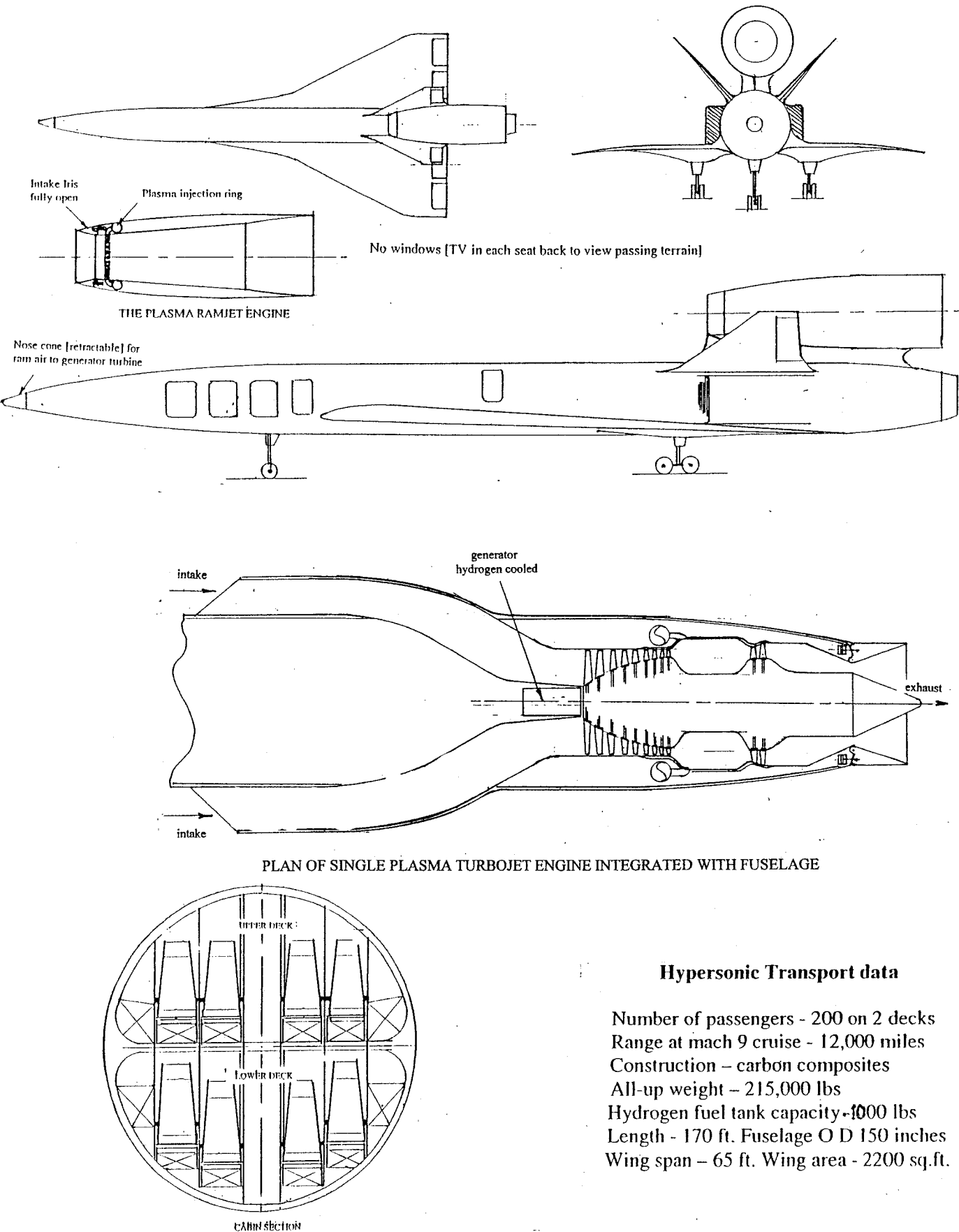
Supersonic Transport data

Number of passengers - 200 on 2 decks
Range at mach 3 cruise - 12,000 miles
Construction - carbon composites
All-up weight - 200,000 lbs
Hydrogen fuel tank capacity - 1000 lbs
Length - 170 ft. Fuselage O D 150 inches
Wing span - 65 ft. Wing area - 2200 sq.ft.

Fig.2

THE HYPERSONIC TRANSPORT - CRUISING AT MACH 9

Designed by J Varney – June 15th. 2007



Hypersonic Transport data

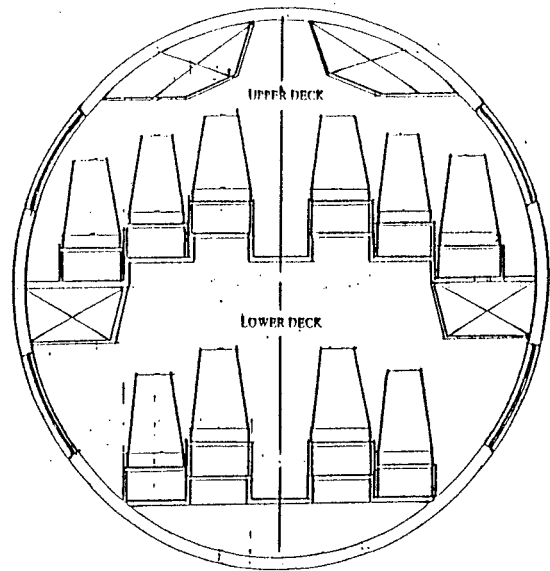
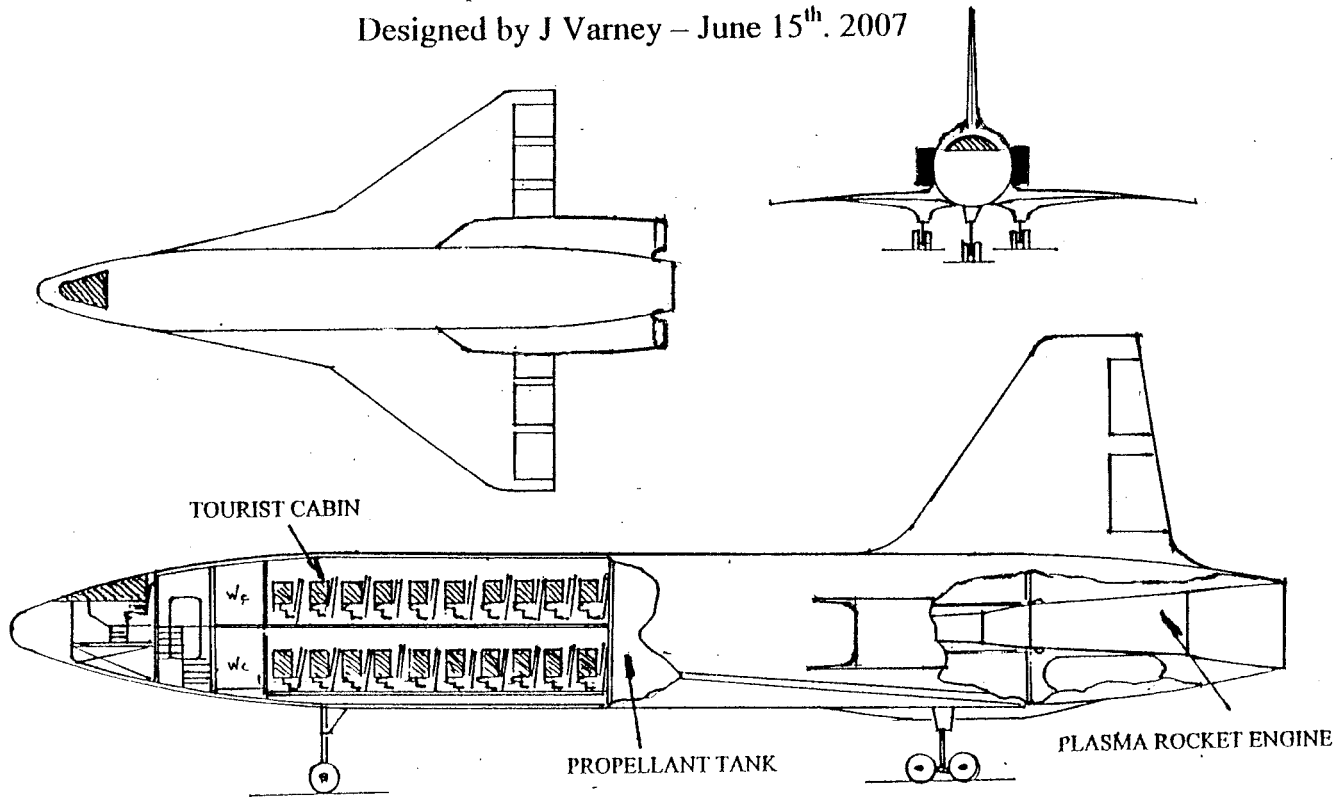
Number of passengers - 200 on 2 decks
 Range at mach 9 cruise - 12,000 miles
 Construction - carbon composites
 All-up weight - 215,000 lbs
 Hydrogen fuel tank capacity - 1000 lbs
 Length - 170 ft. Fuselage O D 150 inches
 Wing span - 65 ft. Wing area - 2200 sq.ft.

Fig.3

THE SPACE TOUR BUS – MOON ORBITER

[2 DAY ROUND TRIP]

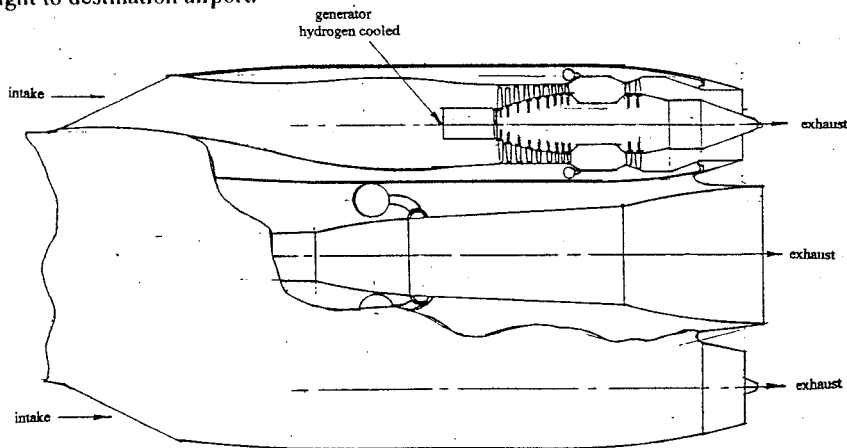
Designed by J Varney – June 15th. 2007



Space Tour Bus data

- Plasma rocket thrust - 475,000 lbs.f.
- Number of passengers - 100 on 2 decks
- Cruise in space at 30,000 M.P.H. max.
- Construction – carbon composites
- All-up weight – 200,000 lbs
- Hydrogen tank – 5,650 cu.ft.[25,000 lbs.]
- Length - 120 ft. Fuselage O D 15 ft.
- Wing span – 75 ft. Wing area - 2200 sq.ft.

During deceleration mode, the vehicle will be oriented in the backwards position such that the plasma rocket functions as a retro-rocket. As the vehicle negotiates re-entry, deceleration to less than mach 1 at the upper atmosphere, will ensure that no excessive frictional heating occurs. The craft will then re-orientate to the forward position and, after glide to 70,000 ft., will start-up the plasma turbojet for powered flight to destination airport.



PLAN OF TWIN PLASMA TURBOJET ENGINES AND SINGLE PLASMA ROCKET ENGINE

Fig.4