The Pioneers: Jack Parsons's Significance for JPL

"Any sufficiently advanced technology is indistinguishable from magic" (Arthur C. Clarke).

I ran across the name Jack Parsons as a trainee at JPL in 1970 in connection with a picture I saw in one of the hallways of Building 230. The picture showed the early Arroyo Seco outfit consisting of a couple of simple huts, called "Parsons's test site".

"Parsons's test site": The first permanent facilities of the GALCIT Rocket Research project in 1942, at the edge of the river bed of the Arroyo Seco, the eastern edge of to-days JPL [5]

Returning to JPL in 1980 for one year as representative for the German contributions to the Galileo project, I had a privileged on-site parking slot on the east side of the JPL premises being exactly on the edge of a steep decline down into the Arroyo Seco. Judging from the picture of the first GALCIT test site, this must have been exactly the spot of the first test site used by Parsons "suicide squad" back in the 1930's.
I forgot all about Jack Parsons until I ran across the book "Strange Angel" by George Pendle and got reminded on my incidental "brush with history" through my on-site parking lot.
With lifelong connections to JPL and its unprecedented projects I decided to trace Jack Parsons's role in establishing JPL.

Born as Marvel Whiteside Parsons in 1914, he was a mama's boy who hated authority and detested social mores. Embittered by her adulterous husband, also named Marvel, who abandoned his family, Ruth began calling her son John. John was reared by his aging, wealthy grandparents and his mother, Ruth in an upscale house on Orange Grove Blvd in Pasadena. [1]
Joung John found his pleasure in poetry, which he read the way other boys read comic books. He also devoured the space and sci-fi fantasies of Jules Verne and subsequently was fascinated by the "extravagant stories of science fictions" published by Hugo Gernsberg (Amazing Stories), H.P Lovecroft and other pulp fiction writers. He and his childhood pal, the mechanically gifted Ed Forman, tinkered with black-powder rockets in Jack's backyard and in the close by, deserted Arroyo Seco. [2]
Later Jack joined the L.A. Science Fiction Lodge (LASFL) and came in touch with aspiring sci-fi writers like Ray Bradbury and Robert A. Heinlein.
During this time Parsons also had a brief encounter with communism, participating in discussions with Sidney Weinbaum living also in Pasadena
In July 1934 Parsons married his first love Helen Northrup. They moved into a house on South Terrace Drive, Pasadena and Parsons got a job at the explosives manufacturer Hercules Powder Company in Los Angeles. Much to Helen's dismay, Parsons spent most of his wages funding the GALCIT Rocket Research Group. For extra money he manufactured nitroglycerin in their home, constructing a laboratory on their front porch. At one point he pawned Helen's engagement ring, and he often asked her family for loans. [2].
Five years later they got into a fateful and long lasting association with English sect leader and "Great Priest" Aleister Cowley ("love is the law"), the founder of the O.T.O (Ordo Templi Orientis) cult, combining magic, religion and science into what in the 1960's was interpreted as a kind of a forerunner of the "free love" hippy-culture. [2]
Parsons entanglement with this cult is a separate story and should not be subject of this more technical oriented article, but interested readers are referred to the excellent book by George Pendle ("Strange Angel", ISBN-10: 0156031795).

1935: Attracted by a public presentation given by Bollay , a Karman assistant, on the Eugen Saenger rocket motor experiments, Parsons and Forman "wandered into this enclave of scientific brilliance", the California Institute of Technology (CIT or Caltech) and its associated Guggenheim Aeronautical

Laboratory California Institute of Technology (GALCIT). The chief of the GALCIT wind-tunnel for aeronautical testing, Clark Millikan – professor and son of Nobel Prize winner Robert Millikan - declined their application, but GALCIT's director Theodor von Karman, triggered by one of his graduate students Frank Malina, supported their request and allowed them to use GALCIT facilities after hours but without pay nor any funding. [2]
The proposal was to use Parson's knowledge and experience with explosives gained while working at the Hercules powder company and Forman's mechanical skills to build rocket motors for sounding rocket experiments surpassing the reachable altitudes of 25 miles by meteorological balloons. [5]
The small group consisted of Malina, Parsons, Forman and other part-time student associates. Sharing socialist values, the group operated on an egalitarian basis; Malina taught the others about his academic work and scientific principles and they taught him about the practical elements of rocketry. They socialized, smoking marijuana and drinking, while Malina and Parsons set about writing a semiautobiographical science fiction screenplay they planned to pitch to Hollywood with strong anti-capitalist and pacifist themes in order to raise money. [3]

1936: The fearless but enthusiastic rocket experimental group started out with their first hands-on experiments in late October 1936 (Halloween test) at the Arroyo Seco beyond the "Devils Gate Dam" where they set up their first motor stand with their own money and primitive second hand equipment they procured in salvage lots during the weekends.
Their first motor test failed by premature explosion, and so did the following two trials by blowing the fuses. Fueled with a brew of gaseous oxygen and methyl alcohol, the motor burned for three seconds during the fourth test by tying the fuse to the chamber – by luck nobody got hurt.

Left foreground to right: Rudolph Schott, Apollo M.O. Smith, Frank Malina, Ed Forman, and Jack Parsons.[4]

In November 1936 they achieved their first motor test running for 15 sec before failing.
These initial tests were carried out by Caltech graduate students Frank Malina, Apollo M. O. Smith and Randolph Schott, along with Jack Parsons and Edward S. Forman and Weld Arnold (photographer).
On January 16, 1937 the last test of the initial series took place with a remarkable burn duration of 44 seconds, but having funded all their experimentation privately, they were too cash strapped to continue.

1937: The photographer Weld Arnold eased their funding problems significantly as he granted to procure $1.000 in cash for further experimenting: he delivered the cash wrapped in old newspaper in a bundle of $1, $5 and 100 $ bills, never revealing where the money came from.
Von Karman got interested in their successful tests after Malina and Smith summarized their experience in a new sounding rockets analysis paper predicting flights of several hundred feet and allowed the group to start a small-scale rocket-motor test set-up at GALCIT on campus.
In spring 1937 the group attracted another rocket enthusiast, Hsue-Shen Tsien, a Chinese Caltech student, who happened to share Smith's office.
They soon became known as "suicide squad" after some dangerous and unwarranted explosions – but again luck prevailed, only damage to the lab-facilities and test equipment occurred. However their paper "Flight Analysis of Sounding Rockets" could be presented by Malina at the Institute of Aeronautical Sciences in New York in 1938. Malina and Smith cautiously predicted heights of 1.000 miles. [2], [5]

1938: In May 1938 they achieved their best results with a new graphite lined copper nozzle with motor burns for a full minute or longer – but the project got stuck because lack of money, so part of the group disbanded. Parsons and Forman took jobs with the Halifax powder company to earn some money for living.

However interest was re-kindled by politics and the threatening political situation in Europe H.H. "Hap Arnold, commanding General of the Army Air Corps (AAC) was very interested. He paid a visit to the GALCIT laboratories in spring 1938 and was fascinated by the rocket work. He initiated a couple of research projects among others a "rocket assisted takeoff for aircraft" project through the Committee on Air Corps Research, a committee which von Karman and Millikan were members of. MIT passed ("Karman can take the Buck Rogers Job") and Caltech accepted eagerly. Karman and Millikan asked Malina to prepare a paper for the NAS committee. Malina reported that relying on rockets for sole means of powering an aircraft conjunction with propellers might be very productive, but the use of rockets alone too risky. He also proposed to start experimentation with liquid and solid propellant rockets. [5]

1939: Malina's report convinced the NAS committee to provide a $1.000 grant to GALCIT for a study leading to a research proposal for rocket assisted takeoff for aircraft. Although Malina was skeptical about "whole sale" military support he reported to NAS in June and came back with another $10.000 grant for additional work. The spaceflight goals where set aside to develop a rocket "immediately applicable to aeronautical purposes". [5]

1940: Parsons had tried all kinds of slow burning black powder combinations but all mixtures exploded when the camber pressure rose. The group wanted to give up on solid propellants, but Karman and Malina worked out four differential equations theoretically proving that, under the right conditions a slow burning solid propellant engine was possible. After their report to NAS, AAC took control granting another $22.000 for funding.
With the new money source the GALCIT group negotiated with the city of Pasadena to lease seven acres in the Arroyo Seco where they had first tested their rockets in 1936. Reluctantly the city agreed under the conditions that the lease would be terminated and the facilities removed after the war. In late summer 1940 the group moved into their new "home", exactly where the future Jet Propulsion Laboratory (JPL) would be established.
On July 1, 1940 GALCIT also established a liquid propellant section headed by Martin Summerfiled, hoping to develop a JATO (Jet Assisted Take Off) for AAC bombers with a thrust of 1.000 pounds.[5]

1941: The expanded GALCIT group had developed an engine which they suggested to be tested on an aircraft: A 2-pound propellant charge, called GALCIT 27, an amidic black powder charge pressed in 22 increments at a pressure of 18 tons into a cylinder 10 inches long and 1.75 inches in diameter, whith a blotting-paper liner – was another of Parsons's ideas.

During flight tests on August 21, 1941, the JATO rockets cut the takeoff distance of a small civilian airplane (Ercoupe) by half

After some preparatory tests at March Field, near Riverside which inflicted damage to the test airplane, an small Ercoupe ("Well, at least it wasn't a big hole"), on August 12, 1941 Homer Boushey, a Caltech student and pilot taxied down the runway and ignited the solid propellant engine, called JATO. After a steep climb and circling over the airfield he landed safely without incident. This was the first time an airplane has taken off assisted by rocket power. The JATO rocket has cut the takeoff distance from 580 to 300 feet and the time to become airborne (rotation point) from 13.1 to 7.5 seconds. [2], [5]

However another problem occurred, it turned out that the fueled JATOs could not be stored, because – as an analysis revealed –the propellant developed cracks overnight causing uncontrollable burns and explosions during the tests. Parsons as the chief-chemist mulled over the problem, first solving the problem in filling the JATOs during early morning before a test – but that would not be practicable in real field applications. Through his occult experiences Parson knew about the "Greek fire", an asphalt based material used by ancient Greeks. Why not do away with black powder and use less brittle fuel e.g., common paving asphalt and use potassium perchlorate as oxidizer? It was later told that Parsons had this idea watching a roof being tarred. The asphalt was heated to 350^0 F to liquefy to be mixed with potassium perchlorate, set aside to be filled into the combustion chamber and bounced for easy

distribution and uniform settling in the combustion chamber, after cooling the filling had the consistence of stiff paving tar. This new solid fuel was called GALCIT 53 and was a success at once. Further refinements in 1943 led to GALCIT 61-C which was used extensively throughout the war. It enabled to fulfill the navy's requirement for rocket assisted airplane takeoffs from aircraft carriers. Aiming for a small rocket engine the GALCIT project had managed to make a fundamental breakthrough in solid propellant rocketry – which is still in use today and even was used for the solid boosters of the Space Shuttle.
In 1941 military requirements also asked for easy to handle liquid fuels, the focus was on gasoline and kerosine. Goddard and the German group around Wernher von Braun used liquid oxygen as oxidizer which was not that popular with the military for practical reasons. So Parsons came up with another inspiration – red fuming acid. Tests were successful, but another problem showed up, the motor began to pulse often shutting down or even exploding.
After discussions with R.C. Truax (Naval Engineering Station, Annapolis) who suggested to add aniline to the gasoline to prohibit motor throbbing, Malina thought: "instead of adding aniline to the fuel, why not substitute aniline as fuel entirely?" This solved the problem and Karman enthusiastically proclaimed: "This is the beginning of practical rocketry in the United States". [5]

***1942*:** In March several members of the GALCIT rocket group got the idea to form their own company to manufacture JATO rockets. Karman, Malina, Summerfield, Parsons, Forman and Andrew Haley as the new company's lawyer each put up $200 and formed Aerojet Engineering Corporation, located at East Colorado Street, Pasadena. Karman became President, Malina was Treasurer; and Haley was Secretary. The company had three vice-presidents: Parsons (half-time, his other half was still committed to GALCIT), Summerfield, and Forman. Conflicts of interest, on-going GALCIT activities at the Arroyo Seco and the staff's division of time between the two projects made a rocky start. Nevertheless developments progressed.

Douglas A-20A Havoc takes off using liquid-propellant rocket JATO from Muroc (now Edwards AFB) [Courtesy JPL 383-93 1942].

On April 15, 1942 two of the new "acid-aniline" JATOs were mounted on a Douglas A-20A Havoc bomber at Muroc Airfield in the Mojave. Major Paul H. Dane raced the engines, then ignited the JATOs and took off "as though scooped upward by a sudden draft".

This was the first time an airplane had taken off in the United Stated with a permanently installed rocket power plant.[4], [5]

***1943*:** In September two army liaison officers to Caltech, Capt. R. Staver and Col. W.H. Joiner asked Malina, still GALCIT rocket project chief engineer for a study of how to use their rocket engines to propel long-range missiles. Malina and Tsien (now a graduate student) told Joiner in November they could not match the German's reported range of 100 miles, however their rockets could be a basis for aircraft super performance.
Karman used the Malina-Tsien report to propose an expansion of GALCIT's rocket engine research. He suggested a four stage program, the fourth stage to provide and construct a 10.000 pound, liquid-propellant rocket missile with a range of 75 miles. The expanded Karman-Malina-Tsien proposal of 20th November carried the designation JPL-1, the first use of the term "Jet Propulsion Laboratory". The project then took on the name Jet Propulsion Laboratory for the facility at Arroyo Seco in November 1943, formally becoming an Army facility operated under contract by the university. [5]

***1944*:** Guided missile work began officially on July 1, 1944 under the new name Jet Propulsion Laboratory/GALCIT. The use of "rocket" in the new name was avoided because of its science-fiction "Buck Rogers" connotation and "jet" had also a broader technical meaning.[5]

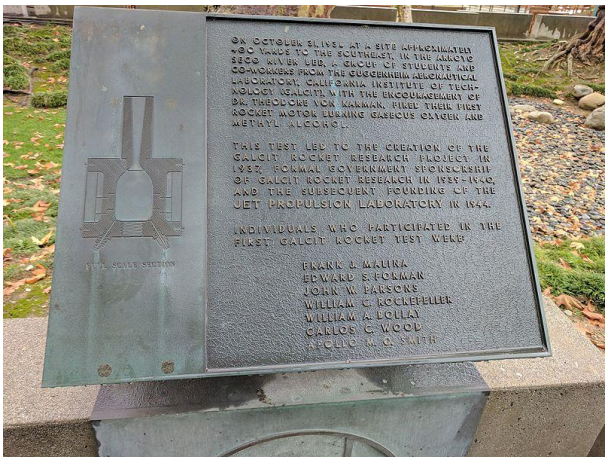
In 1944 Parsons was expelled from JPL due to his "unorthodox and unsafe working methods" following one of several FBI investigations into early contacts with communism and his involvement with the occult, drugs and sexual promiscuity. He also sold all his Aerojet stocks. [1]

Since the very beginning Caltech's project oriented structure is still dominating JPL's organization today. William Pickering, a professor of electrical engineering at Caltech became the first director of JPL. Karman left Caltech in December 1944, this left a vacuum which was attempted to be filled by a JPL executive board. Clark Millikan the new acting director of GALCIT became acting chairman of the board, Malina was elevated to acting director of JPL. [5]

***1952*:** "Rocket Scientist Killed in Pasadena Explosion" the Los Angeles Times front page shocked its readers on June 17, 1952. "Police reports say the explosives expert dropped the concoction of fulminate of mercury. A deadly blast that could be felt a mile away ripped through Parsons' garage lab, blowing off his right arm, breaking his other arm and both legs, and leaving a gaping hole in his jaw. He died 45 minutes later. When his mother heard the news, she joined him in death, gulping down a bottle of sleeping pills". [1]
Since becoming vice President of the prospering Aerojet company in 1944, Parsons own career did not go as smooth as expected. Worn out from Aerojet and JPL/GALCIT to fulfil the growing demands of the military, his dominating role in the occultism scene, in particular his liaisons with Aleister Crowley and other notorious members of the cult like a certain Ron L. Hubbard, his dark masses and parties in his new 1003 Orange Grove home and his final dismissal from JPL Parsons had to seek for other jobs, but various, temporary employments failed. Parsons finally got divorced from Helen, married the "occult" artist Majorie Cameron and finally ended up living on South Orange Grove on the Cruikshank Estate in the rooms on top the large coach house. On the spacious ground floor he could establish his private laboratory where he did odd jobs for Hollywood special effects – and died by an accidental explosion a day before leaving for a vacation to Mexico. [1], [2].

Credit must be given to Parsons's dedication, tenacity and goal orientation to live up to his childhood dream to "go to the Moon", inspired by Jules Verne as many of his age.
He might be compared to Wernher von Braun who also closed a pact with military powers – in Parsons case it was with the occult, rather than to give up his dreams to go to the Moon and Mars.

Malina said during the 1968 memorial celebration of Parson's contributions to JPL:
"I want to pay homage to Jack Parsons, who made key contributions to development of storable propellants and of long duration solid propellant engines that play such important roles in American and European space technology. He has not received yet his due for his pioneering work." [2]



Memorial Plaque at the JPL "campus" [6]

Memorial Plaque transcript:
On October 31, 1936 at a site approximately 400 yards to the southeast in the Arroyo Seco river bed, a group of students and co-workers from the Guggenheiem Aeronautical Laboratory, California Institute of Technology (GALCIT), with the encouragement of Dr. Theodore von Karman, fired their first rocket motor burning gaseous oxygen and methyl alcohol.
This test led to the creation of the GALCIT Rocket Research Project in 1937. Formal Government sponsorship of GALCIT Rocket Research in 1939-1940 and the subsequent founding of the Jet Propulsion Laboratory in 1944.

Individuals who participated in the first GALCIT rocket test were:
Frank J. Malina, Edward Forman, John W. Parsons,
William A. Rockefeller,
William A. Bollay, Carlos C. Wood, Apollo O. Smith
Plaque dedication 1968

Parsons's "rocket" contributions were acknowledged by naming a Moon crater in his honor, which happens to be on the moon's dark side, alluding to his pact with the occult and dark magic.

Located besides craters for the Russian mathematician Aleksey Krylov, the German Nobel Prize winner Paul Ehrlich and the British scientist John Cockcroft, professor of cardiology, John Parsons found a place where he finally could find equal acceptance among his peers. [1]

Jack Parsons was cremated, his ashes scattered on his favorite spot in the Mojave desert.

References:
[1] https://www.latimes.com/archives/la-xpm-2000-mar-19-me-10501-story.html
[2] Strange Angel by George Pendle (ISBN-10: 0156031795)
[3] https://www.airspacemag.com/daily-planet/how-suicide-squad-became-one-worlds-first-rocket-companies-180962548/
[4] https://en.wikipedia.org/wiki/Jack_Parsons_(rocket_engineer)
[5] JPL and the American Space Program _Clayton R. Coppers (1982, Yale University, (ISBN 0-30002408-8)
[6] Memorial Plaque: https://www.followthesparks.com/articles/2017/8/15/they-let-me-into-nasas-secretive-jet-propulsion-laboratory

JPL today: Coming back to my "brush with history" through my JPL on-site parking lot (lower right) – I never had the chance to use the parking lot during the night, as I would have being assigned to operations shifts – missing the chance to meet the shadows of the past under a bright starry night.