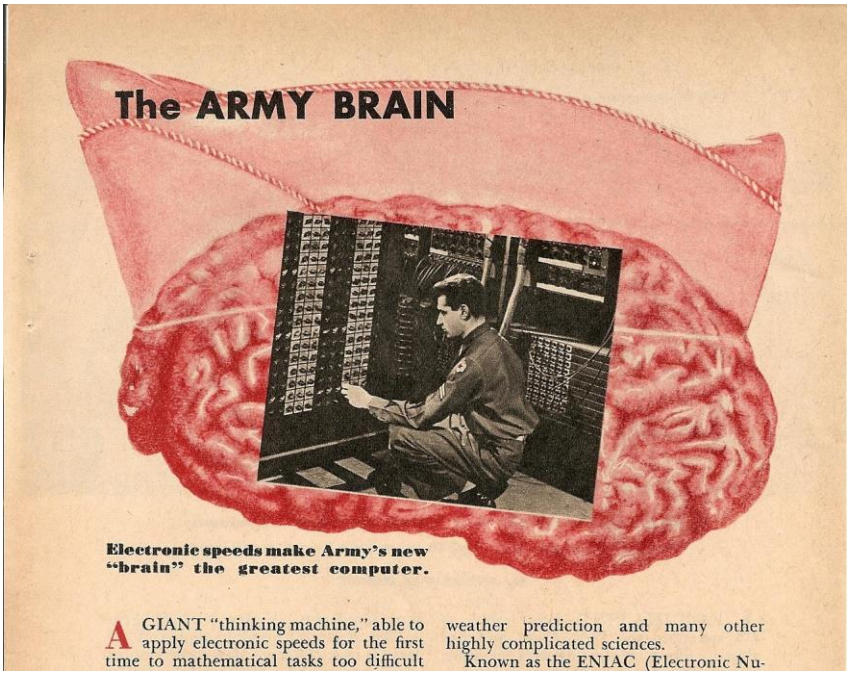
PIPER'S CLIPPINGS



The ARMY BRAIN

Electronic speeds make Army's new "brain" the greatest computer.

A GIANT "thinking machine," able to apply electronic speeds for the first time to mathematical tasks too difficult weather prediction and many other highly complicated sciences.

Known as the ENIAC (Electronic Nu-

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1. Piper's Satellite Drawing

In John F. Carr's biography of H. Beam Piper, he mentions Piper's patriotically angry reaction to the October 1957 launch of Sputnik. "DAMN!" Plus the very interesting fact that, in front of witnesses, Beam was not only able to draw what he called a "simple spherical space-oriented vehicular orbiter", but describe it in detail. "He turned to the bar, pulled the ever-existent pad of paper from his breast pocket, and taking his multi-color pen to hand, began to draw "Sputnik." Beam utilized the four colors of ink on the small sheet of paper, telling us all the details of how it worked, how it was built and how it was launched." [1] Then, " "Amazing thing happened the next day; the newspaper had a full account of it, including a staff drawing. It was astoundingly similar to the picture Beam had drawn the night before!" Far from crude, the likeness by Piper was undeniable in fact, and as sound as his own logic in his conception of space…" [2]

The question is, was Beam really ahead of his time, or was he simply demonstrating superior knowledge of current events? Because in January of 1956, over a year and a half before Sputnik, *Popular Science* magazine published an article titled "Plastic Moon to Circle Earth 16 Times a Day". The piece included several different pictures of a clear plastic-encased mockup of America's coming spherical satellite, which detailed its inner workings. And the device actually made the cover, with the heading "Inside the New Midget Moon".

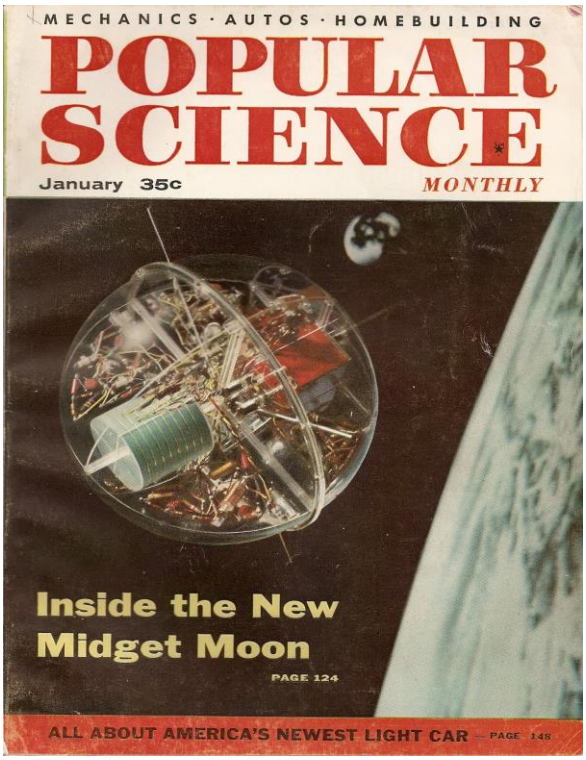

Figure 1. The cover of *Popular Science*, January 1956 issue.

The seven-page article contains a great deal of information, including how these satellites were going to be built and launched. "Three-stage rockets will be used to do this. The first, or launching part, of each rocket will be a special Martin Viking with a new and more powerful engine that General Electric is now building…The payloads—the actual satellites—probably will be designed and built at the Naval Research Laboratory, where electronic heads for sounding rockets such as the Deacon already have been constructed." [3] Subsections of the article have titles such as *Size, Shape, Materials, Weight, Inside the Satellite,* and *Space Missions.* [4]

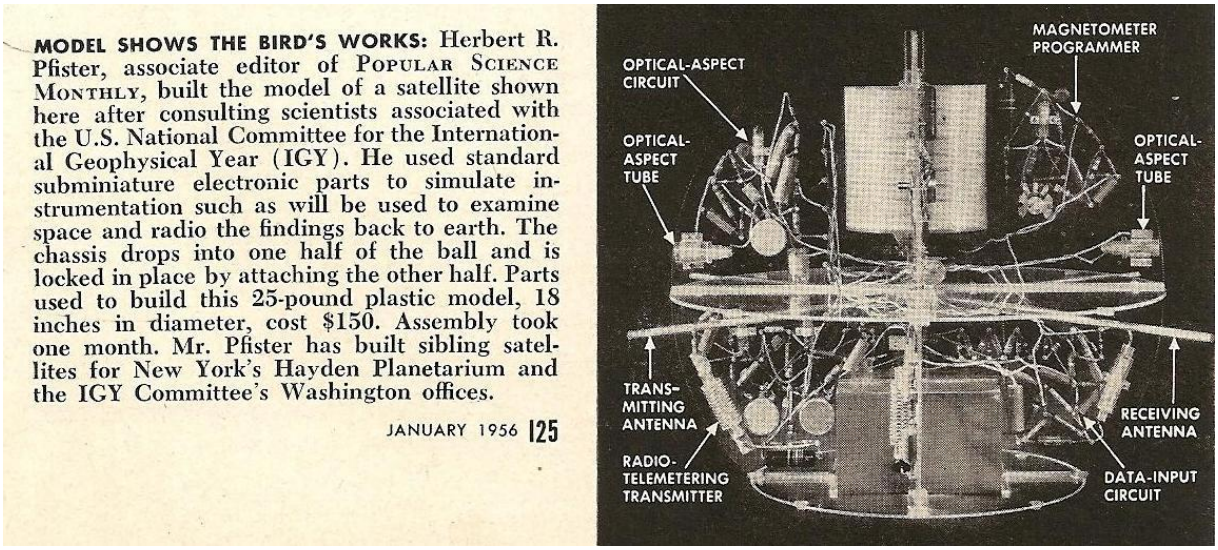

Figure 2. Inner configuration of the satellite model. [5]

Moreover, the last two paragraphs of the article include these words: "This, then, is what the first artificial satellite may be like—the details of its construction, its close-up appearance, [and] its probable functions…As an American, you will be able to look at that dim spot of light moving swiftly across the sky and say, with pride, "I know what that is. I helped to put it there." " [6]

I know what that is. Essentially what Piper was saying with his little demonstration.

Well, you might counter, that's an American satellite; Beam described a Russian one. But he could have also known about an upcoming Russian launch, because the Soviet Union had announced its intention of orbiting a satellite *over two years* before. In August 1955, at the Sixth Congress of the International Astronautical Federation held in Copenhagen, Denmark, "Academician Leonid I. Sedov, a Soviet physicist, [was] telling fifty or so reporters at the Soviet Embassy that the Soviet Union would soon put an artificial satellite into orbit around Earth." [7]

This was reported in a paper Piper was known to have read. "The *New York Times* gave the story fewer than four hundred words on an inside page, under a one-column heading reading SOVIET PLANNING EARLY SATELLITE [with the subheading] Russian Expert in Denmark Says Success in 2 Years Is "Quite Possible" ". [8]

The problem was, in 1955 nobody believed him. "It seemed absurd, talking about Russian rockets and space travel, but there he was, a senior Soviet scientist calling a press conference in Copenhagen to make yet another absurd claim about his country's technological greatness. Such claims were so common in the 1950s that even the Sunday funnies parodied them. Americans were accustomed to reading claims that Russians had invented the bicycle, the electric lightbulb, the telephone." [9]

In addition, the *New York Times* article was not the only public warning that Russia was serious. Over a year later, in September 1956, and still over a year before Sputnik, the organizing committee of the International Geophysical Year met in Barcelona, Spain. Leonid Sedov was there, and spoke at a dinner, revealing that the Soviet satellite would be launched "in the fourth quarter of 1957...Sedov even gave them the satellite's radio frequency." [10] When word was brought back to the US, however, "Neither CIA nor NRL [Naval Research Laboratory] followed up…the impact of knowing the Russian plans more than a year in advance was zero. Almost nobody listened." [1] However, "One of the few who did was Washington columnist Drew Pearson. Word of the Russian plan leaked to him, and for nearly a year, he used his *Washington Merry-Go-Round* column to warn that 1957 would be Russia's year in space. But his columns were dismissed as the rantings of a muckraker." [12]

That Piper did not foresee the Russians would beat us to the punch—or launch—means that he held the same view as the vast majority of Americans, and so was caught off-guard just like everyone else. But his ability to immediately draw a satellite so well, and then thoroughly describe it, indicates that either Beam had some prior knowledge about Sputnik, or he was extrapolating from information already

available, such as the *Popular Science* article or Drew Pearson's columns.

His apparent knowledge of Sputnik's weight and diameter ("the DAMN thing is no bigger around than a boxcar wheel; and only a mere 25 pounds heavier than yours truly!"), [13] plus his calling it a 'simple' spherical orbiter, supports the prior-knowledge scenario. Sputnik was actually a backup satellite to something called Object D, which was to carry 700 pounds of scientific instruments. But Object D was hopelessly behind schedule. Fearful that the US would launch a satellite before them, the Soviets moved the backup satellite, which only carried a radio transmitter, to the fore. It was called PS-1, which stands for "*Prostreishiy Sputnik*, "Simple Satellite." " It weighed 184 pounds. [14] That means if Piper were correct, the 'thin man' himself weighed about 159 pounds at the time. [15]

By way of contrast, the *Popular Science* article predicted that the first (American) orbiter would weigh much less; "a good guess is that each satellite will weigh about 30 pounds." [16] That was actually an excellent guess, because Explorer 1, launched two years later on January 31, 1958, weighed "just shy of thirty-one pounds, including eighteen pounds of instruments." [17] Previous plans had been for a 22-pound satellite. [18]

Another reason I think Piper may have simply had superior knowledge is from personal experience. Prior to the 1991 Gulf War, I had been reading about Tomahawk cruise missiles. I no longer remember just where; it may have been a then-new book on military weaponry, including the latest operational advances. With the Reagan buildup of the 1980s, there was certainly plenty of new hardware to write about. Anyway, on the night the war began, I was working the afternoon shift in the Geography Department of the Census Bureau, with several other persons. We had a radio on, and the announcer mentioned the launch of Tomahawk missiles from US ships, heading toward targets in Iraq. Armed with my recent knowledge, I turned to the others, saying something like "Those Tomahawks are pretty amazing. They launch like a missile but fly like a plane. After launching, they deploy wings and descend to a pre-determined altitude. They actually have a map in their brain, and terrain-following radar that compares the map with the ground below. This allows them to fly low, and cruise right to their targets, with great accuracy."

Literally seconds later, the radio announcer began describing Tomahawk missiles, saying the very things I had just said! The other people in the office stared at me; by the looks on their faces, obviously impressed. But in truth, I didn't know anything that the others ***couldn't*** have known—I was just better-read. And if the source of my knowledge on Tomahawks included a picture (and I think it did), I probably could have *drawn* a cruise missile for my co-workers, and given some details about it, such as its length, weight, wingspan, range, and even manufacturer. That would undoubtedly have made an even greater impression, especially if the picture of a Tomahawk happened to appear in the next day's newspaper! — Which may well have been the case, though I don't recall.

Since Piper *did* think to draw something very similar to Sputnik, he was therefore smarter—and better at seizing a dramatic opportunity—than I was.

John Carr's biography of Beam supports the fact that he was interested in articles on scientific advances. Carr quotes from a letter to Eleanor Border (presumably from the late 1940s or early 50s) in which Piper wrote, "Your letter, accompanying the Mawster's, very gladly received. No, I hadn't the dimmest idea that it had been you who'd sent me *the clipping on the new method of aiming guided missiles by the stars.* I should have thought of you, since you gave me *another clipping of a similar character,* about some French scientist who claimed to have developed some sort of a "perpetual daylight" system." [19]

Though these 'clippings' could have come from newspapers, I wouldn't be at all surprised if they were from magazines like *Popular Science* or *Scientific American*. Because in those pre-internet days, publications like these were usually the first to report such advances in detail. And an eye-catching cover like that in Figure 1 would certainly interest Beam, who was always looking for new ideas. As Carr states, "Piper was continually moaning of being bereft of ideas." [20] More importantly, "as his "fame" as a science-fiction author spread, Piper began to tailor his life along those lines, *paying more attention to scientific events and their effects on the future."* [21]

Incidentally, the 'aiming guided missiles by the stars' article may have found its way into Beam's story, "Day of the Moron" (published in 1951). There, he describes the fear that by 1968, American nuclear-power plants would be "a tempting target for enemy—which still meant Soviet—bombers and guided

missiles." [22] Although unstated by Piper, these guided missiles would presumably be launched from Russia, and would then fly above the atmosphere over the North Pole. Being far above the clouds, they could therefore be guided by the stars—especially the North Star, which is 'fixed' relative to the Earth's axis of rotation.

2. "The Army Brain"

From the launch of Sputnik, let's go back in time one decade. Another clipping Piper may have had—and I'd bet big money he at least saw it—comes from the June 1946 issue of *Mechanix Illustrated.* This is titled "The Army Brain", and describes ENIAC; a giant computer "capable of solving thousands of technical and scientific problems so complex and difficult that all previous methods of solution were considered impractical, if not impossible." [23] (Figure 3.)

Simply add the words 'fleet' and 'force' to the title, and we have "The Fleet-Army Force Brain" found in "Graveyard of Dreams" (published 1958). [24] Thus, the 1946 article may well contain the genesis of Merlin, the Cosmic Computer. In Piper's Future History, Merlin is the greatest computer ever built, and the subheading says of ENIAC, "Electronic speeds make Army's new "brain" the greatest computer." [25]

The ARMY BRAIN

Electronic speeds make Army's new "brain" the greatest computer.

A GIANT "thinking machine," able to apply electronic speeds for the first time to mathematical tasks too difficult for previous solution, is now in use by the U. S. Army. It can compute 1,000 times faster than the most advanced calculating device previously known, can solve in hours problems which would take years on a mechanical machine and shows promise of revolutionizing long-range weather prediction and many other highly complicated sciences.

Known as the ENIAC (Electronic Numerical Integrator and Computer), the revolutionary robot weighs 30 tons and occupies a room 80 by 50 feet in size. Temporarily housed at the University of Pennsylvania, the machine's permanent home will be the Army Ordnance Proving Grounds at Aberdeen, Md.

The first all-electronic, general purpose computer ever developed, it was designed and constructed for Army Ordnance at the Moore School of Electrical Engineering, University of Pennsylvania. The electronic robot is capable of solving thousands of technical and scientific problems so complex and difficult that all previous methods of solution were considered impractical, if not impossible.

Overall view of the ENIAC being set up for a complicated math problem.

59

Figure 3. Single-page article about ENIAC from *Mechanix Illustrated*, June 1946.

Looking at the photographs in the article, ENIAC seems to be mostly a lot of buttons, switches and dials. And when the legendary Merlin is finally revealed, the people of Poictesme find that it "was nothing but a lot of dials and buttons, and interestedly [began] watching broadcast views of it." [26] The fact that

Merlin can predict the future, or “handle large-group behavior with absolute accuracy” [27] is also telling. Because the *Mechanix Illustrated* clipping states that ENIAC “shows promise of revolutionizing *long-range weather prediction* and many other highly complicated sciences.” [28] From long-range weather prediction, Piper apparently extrapolated long-range *historical* prediction, which could certainly be classified as a ‘highly complicated science’. Paraphrasing the earlier quote from the article, the Cosmic Computer has therefore ‘solved a scientific problem so complex and difficult that all previous methods of solution were considered impractical, if not impossible’. Accurately forecasting the future has been an impossible dream of mankind since time immemorial.

A little further research reveals that ENIAC “was designed to calculate artillery firing tables for the United States Army’s Ballistics Research Laboratory.” [29] That of course would interest the military-minded Piper, particularly since ENIAC was built in his home state. It “was designed and constructed for Army Ordnance at the Moore School of Electrical Engineering, University of Pennsylvania.” [30] However, although “Temporarily housed at the University of Pennsylvania, the machine’s permanent home will be the Army Ordnance Proving Grounds at Aberdeen, Md.” [31] And, guess what—in both “Graveyard of Dreams” and *The Cosmic Computer*, Piper actually mentions Army Ordnance, of the Terran Federation variety. The former has, “Inside, Kurt Fawzi’s laborers were floating out cargo for the ship—casks of brandy, of course, and a lot of boxes and crates painted light blue and marked with the wreathed globe of the Terran Federation and the gold triangle of the Third Fleet-Army Force and the eight-pointed red star of Ordnance Service.” [32] The later novel replaced the gold triangle with a “gold trefoil”, and dropped the ‘Service’. [33]

Even at full size, it is difficult to make out. But the squatting soldier in the article’s top picture has a patch on his left shoulder, above the chevrons. In the center is a dark star—a five-pointed red star of Ordnance? Because if so, those five points, plus ‘three’ for the ‘Third’ Fleet-Army Force, would equal an eight-pointed red star. The patch itself appears to be six-sided, with rounded segments. If it is gold in color, then these six rondures, or ‘foils‘, minus three, would equal the gold trefoil in *The Cosmic Computer.*

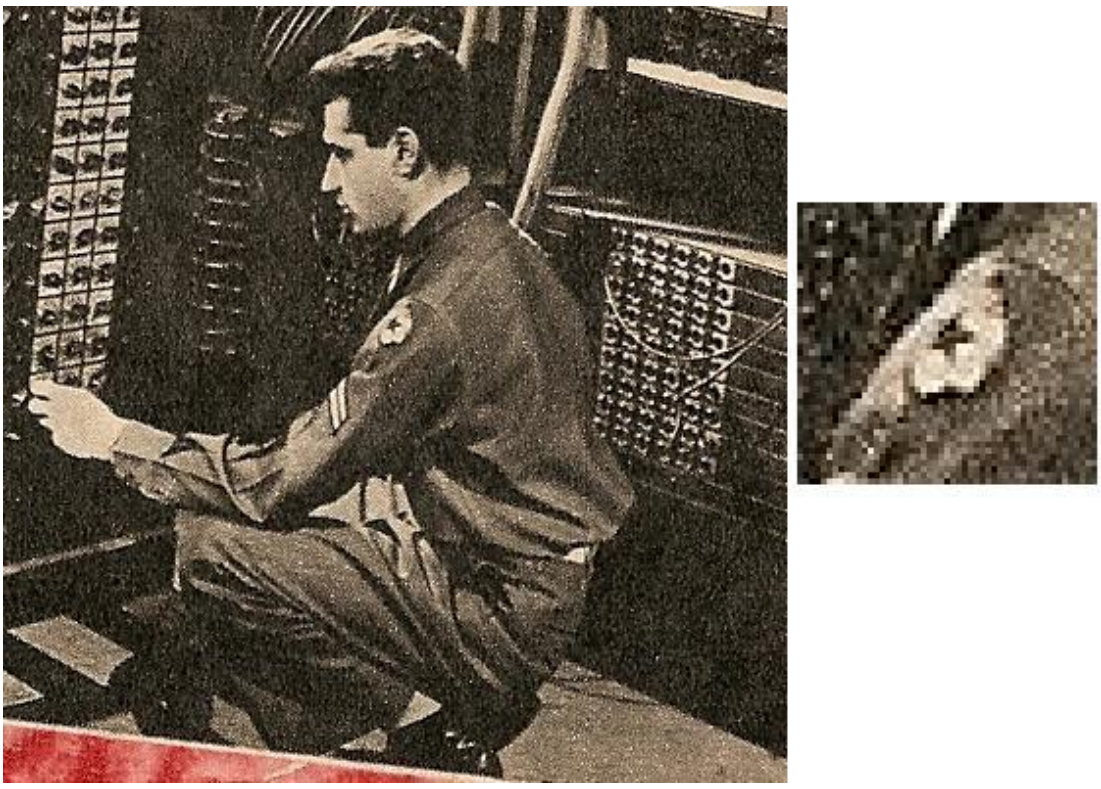

Figure 4. A soldier of Army Ordnance, with close-up of shoulder patch.

One gets the feeling that the "TOP SECRET. PROJECT MERLIN." [34] is the 'Manhattan Project' of the System States War. The top secret development of the atomic bomb enabled the US to win the Second World War—at least against Japan—and the top secret development of Merlin enables the Federation to win the System States War. Former Alliance officer Klem Zareff states unequivocally that *"We'd have won the war*, except for Merlin." [35] Like the Manhattan Project, and Project Merlin, ENIAC was a secret wartime project, too. "The ENIAC's design and construction was financed by the United States Army during World War II. The construction contract was signed on June 5, 1943, and work on the computer began in secret starting the following month under the code name "Project PX"." [36]

This brings us to the interesting fact that 'Merlin' is actually *not* the cosmic computer's real name. It's a *code* name. " "But there *was* a computer *code-named* Merlin," Judge Ledue was insisting." [37] This means that Project Merlin actually parallels Project PX, the code-name for ENIAC. So what is 'Project Merlin' the code-name for; what's Merlin's *real* name? Though he eventually comes clean about everything else, General Shanlee never reveals that piece of information. But we can extrapolate that it is probably an acronym of Merlin's functions, like ENIAC. E.N.I.A.C. stands for "Electronic Numerical Integrator and Computer". [38] Instead of electronic, the properly-futuristic brain of Merlin is "positronic", [39] and the cosmic computer "was capable of scanning all its data instantaneously, and combining, and forming associations, and reasoning with absolute accuracy, and extrapolating to produce new facts, and predicting future events, and…" [40]

Positronic, scanning, instantaneous, combining, forming, reasoning, accuracy, extrapolating, predicting. One acronym that comes to mind out of all this is P.I.P.E.R. (Positronic Instantaneous Predictive and Extrapolative Reasoner) If that were Merlin's real name, it would certainly constitute a very good reason for Beam not to let General Shanlee reveal it! But it is more likely to be based on E.N.I.A.C. itself, because such an acronym would be true within the imagined universe, as well as to its historical model. That would result in Merlin being the code name for something like P.A.C.P.C. (Positronic Analyzing, Combining and Predicting Computer), or P.I.S.E.C. (Positronic Instantaneous Strategic Extrapolating Computer). More elegant acronyms could probably be devised, but that may explain why the cosmic computer's real name is never divulged. The deduced examples would be pronounced 'pack-pick' and 'pie-seck'; thus, 'Merlin' just plain sounds better. [41]

At any rate, unlike Project Merlin, which remained classified for decades after the System States War, Project PX was declassified after WWII. "The completed machine was announced to the world on the evening of February 14, 1946 and formally dedicated the next day at the University of Pennsylvania". [42] Its unveiling "captured the world's imagination", for "When ENIAC was announced…it was heralded by the press as a "Giant Brain". It boasted speeds one thousand times faster than electro-mechanical machines, a leap in computing power that no single machine has since matched." [43] Thus, it is likely that Piper first learned about the Giant Brain/Army Brain from newspaper accounts, and along with a lot of other people, it 'captured his imagination'.

One way his imagination took form was in the size of Merlin, which is actually related to that of ENIAC. The *Mechanix Illustrated* article says that "the revolutionary robot weighs 30 tons and occupies a room 30 by 50 feet in size." [44] Wikipedia elaborates that ENIAC "was roughly 8 x 3 x 100 feet…took up 1800 square feet…and consumed 150 kW of electricity." [45] As seen in Figure 5, ENIAC appears to literally wrap around the room. Since it was 100 feet long, it presumably took up most of the two fifty-foot walls of the room, plus one thirty-foot wall. And ENIAC's hundred-foot length is the same as "the hundred-foot collapsium-covered structure" discovered above Force Command Duplicate, near the top of the mesa on Poictesme. [46]

After a collapsium-cutter is brought from Koshchei and the 100-foot drum-shaped structure broken into, Mike Shanlee says derisively to Conn Maxwell, "You're supposed to be a computerman. You think that little thing could be Merlin?" And Conn replies, "The controls and programming machine for Merlin." [47] Thus, ENIAC—wrapping around a circular rather than a rectangular room—seems to be the direct inspiration for the controls and programming machine of Merlin. Because the pictured soldiers in the *Mechanix Illustrated* article are programming (adding data) and controlling (running computations and maintaining) ENIAC. In the article, the caption beside the picture shown in Figure 5 reads, "Overall view of the ENIAC being set up for a complicated math problem." [48]

Piper apparently reasoned that, as large and groundbreaking as ENIAC was, in the future this Army Brain—of one nation on one planet—would be just 'that little thing'; merely the operating end of a truly

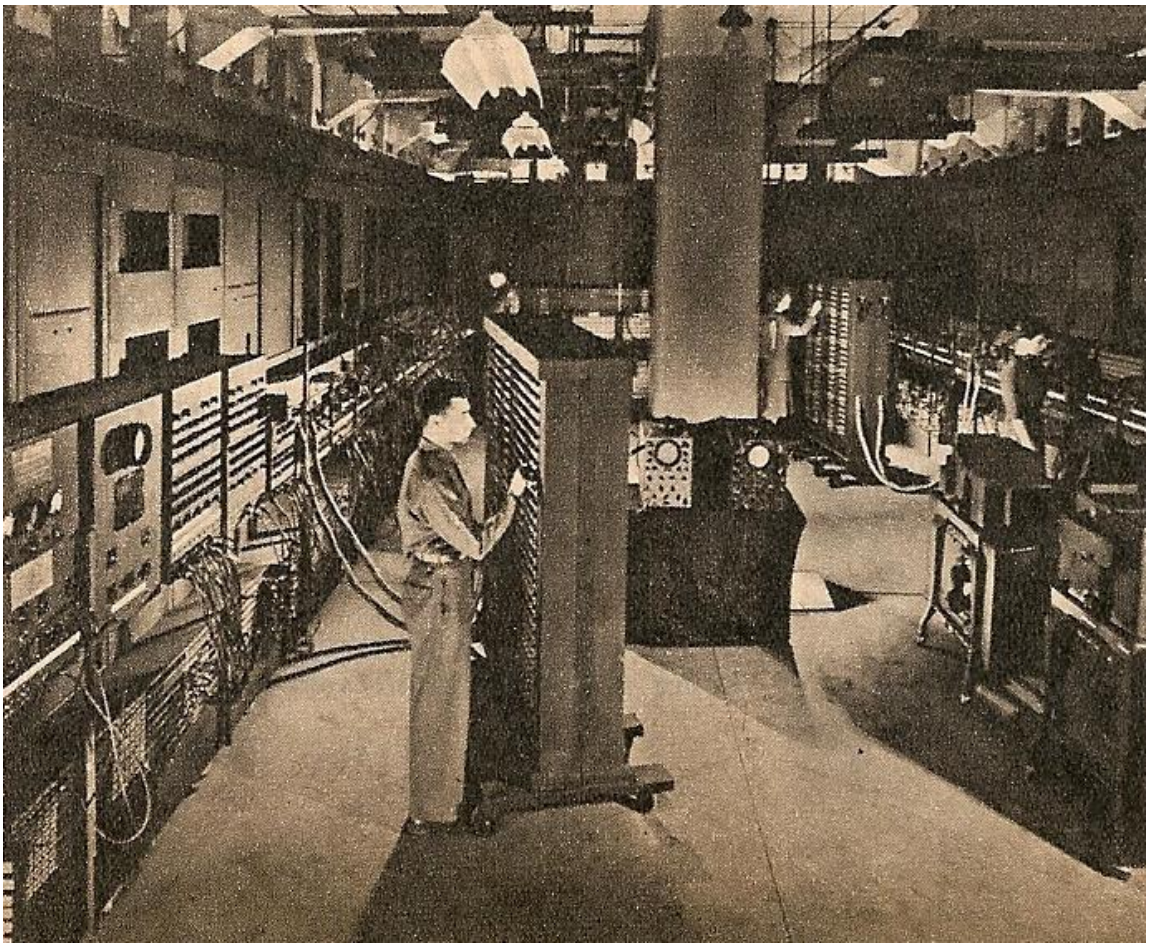

Figure 5. A roomful of computer; ENIAC in action.

gigantic supercomputer, a Fleet-Army Force Brain running calculations for 500 planets on an interstellar scale. Conn says to Kurt Fawzi, "You always claimed that Merlin was here in Force Command. You had it backward. Force Command is inside Merlin…The walls; the fifty-foot walls, shielded inside and out. Merlin—the circuitry, the memory-bank, the relays, everything—was installed inside them. What's up above is only what was needed to operate the computer." [49] Merlin is not only 'cosmic' in the scope of its predictive ability, it is also a cosmic-*sized* computer. Conn says that "the astrophysics computer at the University [of Montevideo] occupied a volume of a hundred thousand cubic feet. For all Merlin was supposed to do, I'd say something of the order of three million to five million." [50] At approximately 4 million square feet, Merlin is quite a jump from ENIAC's mere 1800 square feet!

The first large computers they find at Force Command Duplicate are believed by Kurt Fawzi to be Merlin. " "It's Merlin!" Fawzi almost screamed. "We've found it!" " [51] Though these computers turn out to be only "the personnel-file machine" of the Third Fleet-Army Force, [52] Piper's description of them seems similar to the picture of ENIAC. "Then they found big ones; rank on rank of cabinets, long consoles studded with lights and buttons; programming machines." [53]

Another pertinent fact is that ENIAC was distantly connected to the Manhattan Project. "Although the Ballistics Research Laboratory was the sponsor of ENIAC, one year into this three-year project John von Neumann, a mathematician working on the hydrogen bomb at Los Alamos, became aware of this computer. Los Alamos subsequently became so involved with ENIAC that *the first test problem run was computations for the hydrogen bomb, not artillery tables.*" [54]

And finally, "ENIAC was a one-of-a-kind design and was never repeated." [55]

Just like Merlin. [56]

3. An “Invasion Base on the Moon”

A third possible Piper clipping is also from *Mechanix Illustrated*, the April 1948 issue. This one is called “Invasion Base on the Moon”, and contains several excellent pictures of this lunar military facility. Here is a combined scan of pages 60 and 61, which provides an overall view.

Figure 6. Two-page panorama of future moon missile-launching base, from *Mechanix Illustrated*, April 1948.

The quote under the title reads, “ “The first nation to establish a lunar military outpost will rule the earth,” says Willy Ley, expert in rocket research.” [57] The article expands on this, with “The aggressor who sets up the first interplanetary outpost on the moon can dominate not only the world but the entire solar system.” [58] This idea is of course found in Piper’s story “The Mercenaries” (published two years later, in 1950), described as “the Lunar fortress that would insure world supremacy.” [59] That’s before the facility is actually built. “The Edge of the Knife” (1957) takes place after the America beats the Soviet Union to the Moon. The outpost has recently been completed, and is called “the United States Lunar Base”. [60]

The US moon base has a huge and direct impact on WWIII, which Piper called the Thirty Days’ War.

> There would be an Eastern-inspired uprising in Azerbaijan by the middle of the next year; before autumn, the Indian Communists would make their fatal attempt: the Thirty Days’ War would be the immediate result. By that time, the Lunar Base would be completed and ready; the enemy missiles would be aimed primarily at the rocketports from which it was supplied. Delivered without warning, it should have succeeded—except that every rocket port had its secret duplicate and triplicate. That was Operation Triple Cross; no wonder Major Cutler had been so startled at the words, last evening. The enemy would be utterly overwhelmed under the rain of missiles from across space, but until the moon-rockets began to fall, the United States would suffer grievously. [61]

The moon base’s role in a future Third World War is also the subject of the 1948 *Mechanix Illustrated*

article. The first two paragraphs read, “The man in the moon may plot the attack that will open World War III. For the man in the moon will be a powerful “spy in the sky” rocketed to the earth’s satellite by the aggressor nation to prepare the way for an all-out assault to conquer the world. Soon after a 20th-century Columbus pilots his rocket to the moon, the nation that sent him there will have a lunar base that will expose any spot on earth to celestial spying and sudden rocket invasion.” [62]

By ‘aggressor’ and ‘aggressor nation’, the article is certainly implying the Soviet Union, which by 1948 had become America’s main enemy in the new Cold War. This is also suggested by the red-tipped missiles and airlock, as well as other pictures which show the rockets with red wings and tails. (Figure 7.) Even the moon itself is given a reddish tinge.

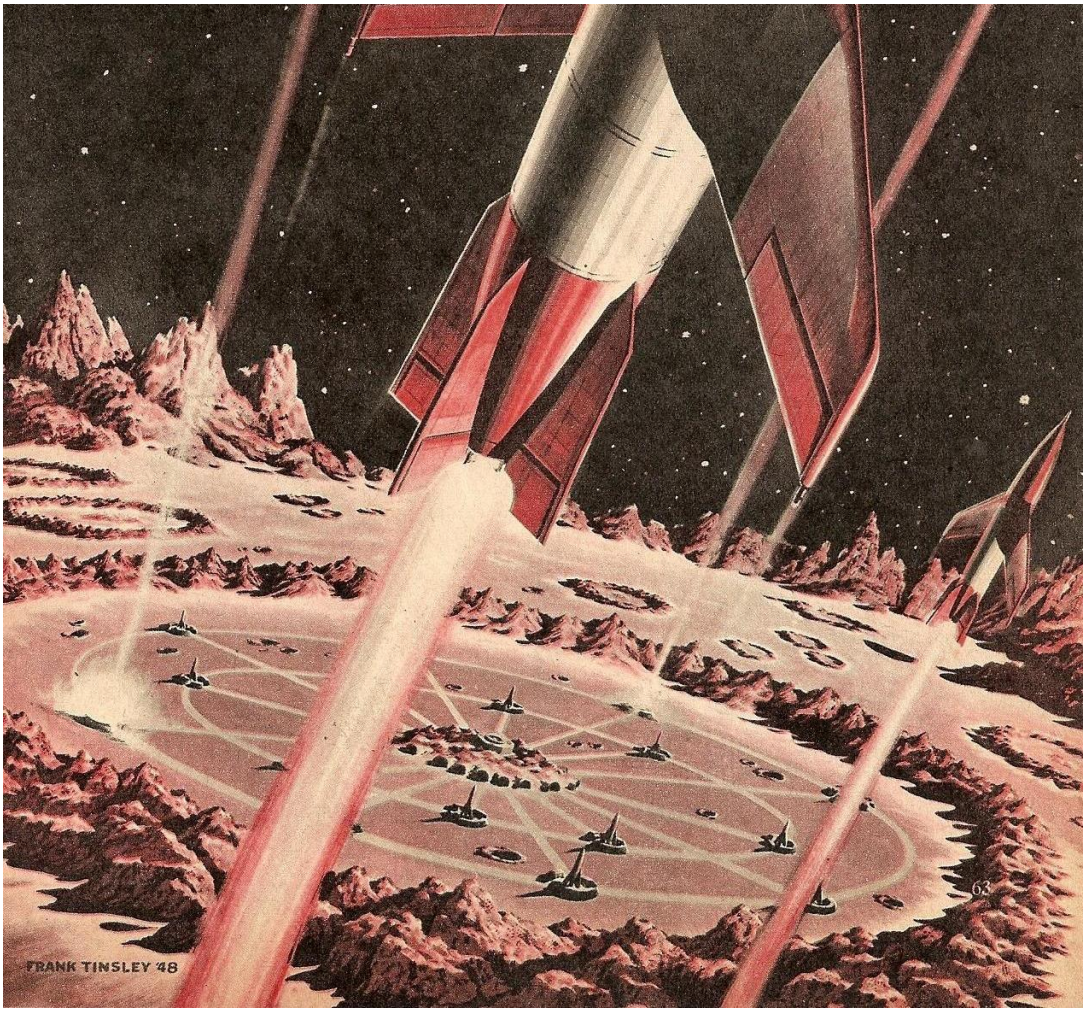

Figure 7. ‘Red’ moon base launching its missiles toward targets on Earth. From an illustration by Frank Tinsley. [63]

Thus, the article seems to paint a ‘worst-case’ scenario, meant to show the danger facing America, and to motivate action to prevent it. In effect, if Russia beats us to the moon, we are in big trouble. This warning could be a foreshadowing of the ‘Red Scare’ of the 1950s. For when this article appeared in 1948, the Republic of China was falling to the communist forces of Mao Tse Tung, the Korean War would immediately follow, and America’s biggest fear after WWII was a ‘nuclear Pearl Harbor’ by the USSR. [64]

However, both Willy Ley and Beam Piper appear to have been inspired by Robert Heinlein. For, as far as I can tell, the moonbase concept first appeared a year before Ley’s article. In 1947, Heinlein’s ‘juvenile’ novel *Rocket Ship Galileo* was published. The plot involves the first American rocket to the

moon, whose crewmen are surprised to find that some Nazi exiles have beaten them there. These Nazis had escaped the ruin of the Third Reich, and had then set up "a remote mountain base", somewhere in the southern hemisphere. [65] In the postwar years, and through devious means, they had obtained a state-of-the-art commercial rocket, and modified it to reach the moon.

By the time the Americans arrive in the *Galileo*, the Nazis have constructed a lunar missile base. With about a hundred nuclear missiles already stockpiled, the Germans are halfway ready to resurrect the Reich. Once their moon base is fully operational, they will demand the surrender of Earth. If the nations of the world are foolish enough to refuse, the Nazis will begin launching missiles on their cities. "They would sit safely out of reach on the moon and destroy the cities of earth one after another by guided missiles launched from the moon, until the completely helpless nations of earth surrendered and pleaded for mercy." [66] The Third Reich will rule the world after all. But the Americans foil the plot by blowing out the airlock of the moon base, killing almost all the station's occupants, and thus saving mankind (again) from conquest and enslavement by the Nazis.

Rocket Ship Galileo was also the basis for "Destination Moon", a critically-acclaimed movie that came out in 1950, coincidentally the same year as Piper's "The Mercenaries". In the movie version of *RSG*, the Soviet Union takes the place of the remnant Nazis as America's rival to be the first on the moon. The critical importance of the moon is dramatically defined by General Thayer to a gathering of American industrialists.

> "The reason is quite simple. We are not the only ones who know that the Moon can be reached. We are not the only ones who are planning to go there. The race is on. And we'd better win it. Because—there is absolutely no way to stop an attack from outer space. The first country that can use the Moon for the launching of missiles—will control the Earth. That, gentlemen, is the most important military fact of this century." [67]

I'm not conversant with Heinlein's full body of work, but am not aware that he ever used the moon base idea again, at least in print. It did appear in "Project Moonbase", a much inferior 1953 movie sequel to "Destination Moon", in which the Americans, dogged by Soviet agents, land a rocket on our satellite preparatory to building the base. Piper, however, saw the long-term implications of the concept. He took this near-future idea of a 'world-supremacy' moon base and projected it into the far future. The most important military fact of the Twentieth Century is still very important in later centuries. In the Fuzzy novels, 600 years after the US Lunar fortress in "The Edge of the Knife", the Terran Federation has a naval base on Zarathustra's outer moon, Xerxes. [68] This allows the Federation Navy to take control of the planet—in other words, exercise world supremacy—when the probable sapience of the Fuzzies calls the Zarathustra Company's charter into serious question. Unlike Terra, in which world supremacy was achieved by the US through the destruction of the USSR in WWIII, world supremacy on Zarathustra is accomplished without bloodshed. Undoubtedly because the Zarathustra Company has no military to oppose the naval takeover from Xerxes.

Characteristically, Beam doesn't make it explicit, but the Space Navy probably has other such lunar bases scattered around the Federation, at strategic points. Because in *Space Viking*, a thousand years after the Fuzzy novels, the Moonbase of Marduk plays a decisive role in defeating Zaspar Makann's and Andray Dunnan's attempt to conquer the planet below. The Moonbase is held by royalists, who keep the fascistic Dunnan-Makann ships tied down long enough for an allied fleet to arrive and wipe them out. But this lunar fortress is in no immediate danger of falling to the enemy. The Mardukan Prince, Simon Bentrick, says that "It's a strong base. It was built four hundred years ago, when Marduk was fighting a combination of six other planets. It held out against continuous attack, once, for almost a year. It's been constantly strengthened ever since." [69]

Now, hold on a minute. The Moonbase fought the combined space forces of *six other planets*—and *won*?! And it's much stronger now?? That's one hell of a base! Talk about world supremacy; that's more like 'worlds' supremacy. Thus, the Moonbase may be an important factor in Marduk's founding of the First Galactic Empire. Because it would seem nearly impossible to conquer a planet which has defenses like that. And that agrees with what Prince Lucas Trask says. "Dunnan…wasn't planning any raid; he was planning conquest, *in the only way a great civilization can be conquered –by subversion.*" [70]

Not *invasion.* It won't work—unless you can gain control of that invasion base on the moon.

4. Atomic Trains

In the late 1940s and early 1950s, it was believed that nuclear power would soon impact every area of our lives. Atomic energy would replace fossil fuels as the main source of electricity, we would have atomic-powered rockets to take us to space and the moon, atomic-powered ships and airplanes to transport us across continents and oceans, even atomic-powered tanks and cars. The first of these to come true was the nuclear-powered submarine, with the launch of the USS *Nautilus* in 1954.

Another postulated atomic-powered vehicle was the train. In the March 1946 issue of *Mechanix Illustrated*, Willy Ley published an article entitled, "Atomic Engines for Peace", which pictured such a locomotive. (Figure 8.) This subject would also certainly interest Piper, who worked for the Pennsylvania

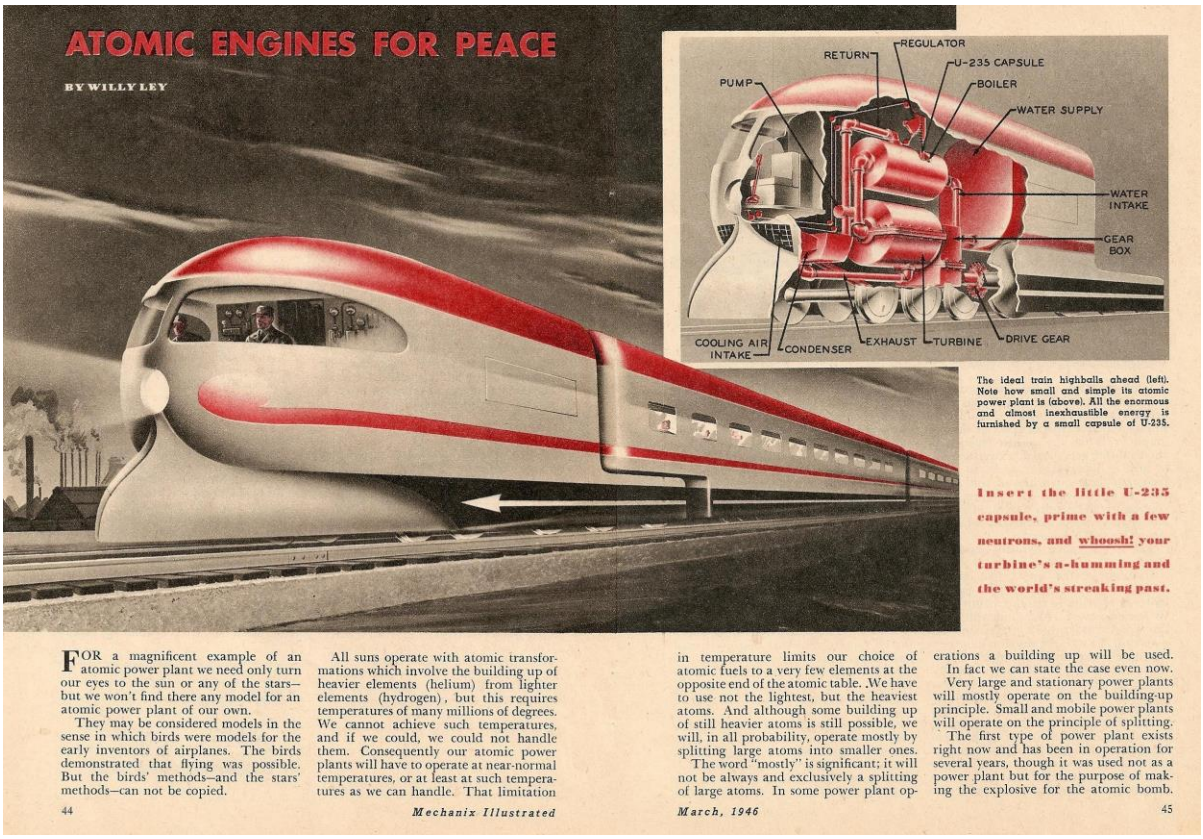

Figure 8. Two-page spread on atomic train, *Mechanix Illustrated*, March 1946. [71]

Railroad most of his life. And Beam does mention nuclear-powered trains at least twice in his works. In *Lone Star Planet*, the most important life-form on Capella IV is the supercow. This extraterrestrial animal "is a big mammal looking like the unsuccessful attempt of a hippopotamus to impersonate a dachshund and about the size of a nuclear-steam locomotive." [72] This implies that nuclear-steam locomotives are common at the time of the story, which is 2193 A.D. [73] *Lone Star Planet* was published in 1957, eleven years after Willy Ley's article.

Ley writes that "Some possible methods of using the heat [generated by the uranium] are shown in the illustrations. The hot water could be used to heat boilers which then feed steam turbines which in turn drive electric generators." [74] That would make his atomic train in fact the nuclear-steam locomotive of Piper. Because the cutaway view of the engine shows the water supply, boiler and turbine. (Figure 9.) Ley further writes, "The boiler itself would furnish nothing more unconventional than plain steam and that plain steam would drive a plain steam turbine. Gear trains would reduce the rotational speed to what is required for the wheels of a car or a locomotive and the propeller of a ship or airplane." [75]

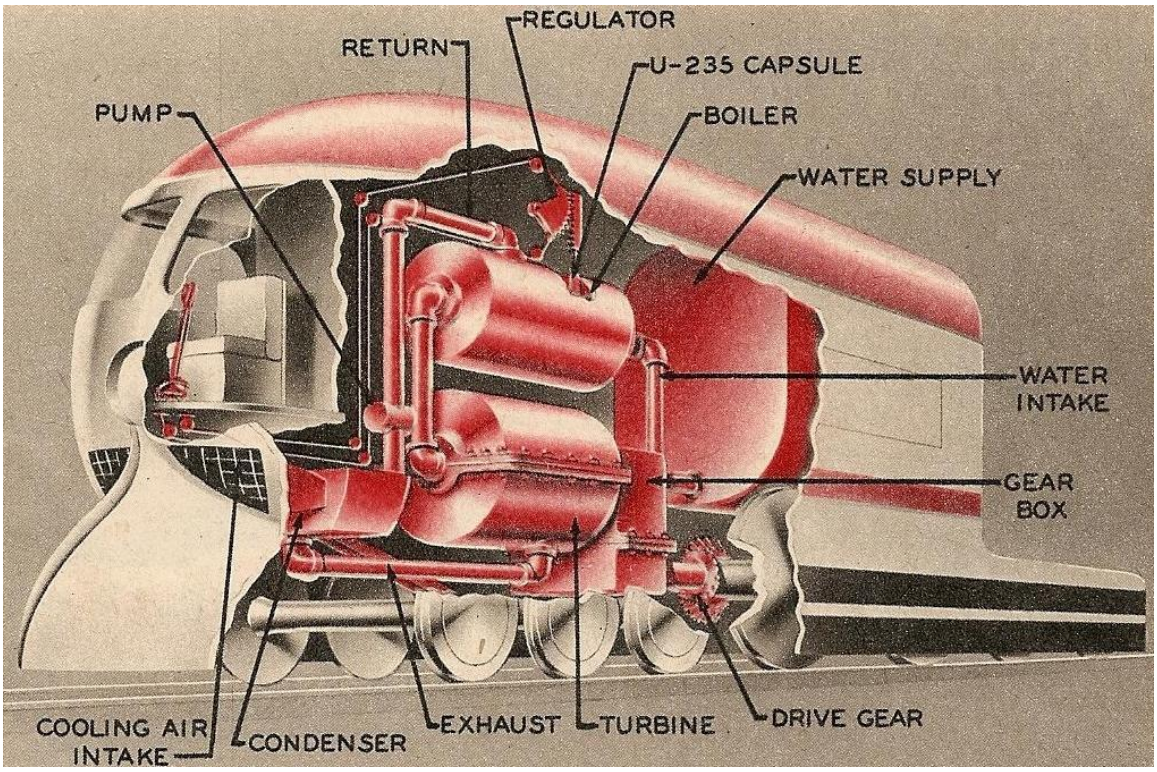

Figure 9. Cutaway view of the atomic train's engine. [76]

In the article, the caption to the cutaway view includes the words, "Note how small and simple its atomic power plant is (above)." Piper says something similar in *The Cosmic Computer*. "Nuclear reactors had become simple and easier to service since the First Day of the Year Zero, when Enrico Fermi put the first one into operation". [77]

At the time of Ley's 1946 article, it was still the dawn of the Atomic Age. Certainly Beam picked up the common belief in a nuclear future, as the civilizations in his Future History are all centered around atomic power. Perhaps the best example of this is found in *The Cosmic Computer*, where some Poictesmeans travel to Koshchei in search of a hypership, but also to get some abandoned industrial plants restarted. At "The nuclear-electric power-unit plant", power cartridges come in a variety of sizes for all sorts of uses. "The production line continued…at the end, the finished power cartridges came off, big ones for heavy machines and tiny ones for things like hand tools and pocket lighters and razors." [78] Just about everything runs on these nuclear-electric cartridges. Including "Electric light units, household appliance units, aircar and airboat units, any size at all." [79]

This is echoed in *Space Viking*, written close in time to *The Cosmic Computer* (and published the same year, 1963), in which Lucas Trask raids the planet Beowulf for these same types of cartridges. At "the power-unit cartridge factory…lifters were bringing out loads of nuclear-electric power-unit cartridges, some as big as a ten-liter jar, to power a spaceship engine, and some small as a round of pistol ammunition, for things like flashlights." [80]

Perhaps not surprisingly, Willy Ley speculated on the potential various sizes of atomic engines.

> The trouble with prophecy regarding the second type of atomic power plant is that nobody at the present moment knows just how large or small it will have to be. It is a question of the minimum mass of U-235 that will still perform properly. It is likely that there is a "critical mass," a mass which is too small to operate.
>
> If, for example, a mass weighing five ounces will still operate one might think of an atomic motor for an automobile. If nothing lighter than a pound will operate, the smallest useful atomic motor might be about right for a locomotive. If the minimum is, say, five pounds, one could consider atomic motors only for ships. Large size aircraft would be somewhere in between. [81]

Piper, in what John Carr calls “His early optimism for nuclear power”, [82] seems to have extrapolated a very low lower limit. Nuclear energy would become ubiquitous in the early part of his Future History, which he called the Atomic Era (AE).

Atomic Era is certainly a modified form of Atomic Age. Probably because, with Beam’s keen interest in history, ‘Era’ is a more precise term for a successor to the dating system used by historians of our time, which is the Christian or Common Era (CE). In addition, his eye for detail probably also recognized that the word ‘age’ usually describes a certain period within the current era, as historians or journalists dub major events, inventions or individuals the start of a new age. So, for example, in the Fifteenth Century we had the beginning of the Age of Exploration, in the Eighteenth Century there was the Age of Enlightenment, and the Nineteenth saw the Age of Napoleon and the Industrial Age. In the Twentieth Century, we entered the Age of Flight in 1903, the Space Age in 1957, and the Information Age in the 1980s. We are currently living in several of these ages, but all under the umbrella of the Common Era. Thus, we are still in the Atomic Age, because we use atomic power, but are not in an Atomic Era, because nuclear power is not the predominant form of energy. It is not the fundamental basis of our technological civilization. [83]

Getting back to atomic trains, Beam included them in another story. Published in 1951, “Day of the Moron” postulated that by 1968, nuclear power plants would generate just about all our electricity. One of these is “the Long Island Nuclear Reaction Plant”, which “generates every kilowatt of current used between Trenton and Albany, the New York metropolitan area included. Except for a few little storage-battery or Diesel generator systems… it’s been the only source of electric current here since 1962, when the last coal-burning plant was dismantled.” [84] Everything is dependent on electrical power from this nuclear plant, even “the railroads—there aren’t a dozen steam or Diesel locomotives left in the whole area.” [85]

This seems to mean that the trains in “Day of the Moron” get their power from the nuclear power plant, instead of possessing their own atomic engine. That would make them, not steam locomotives, but “Electric locomotives [which] draw power from a stationary source via an overhead wire or third rail.” [86] Later in the story, Beam also mentions “the railroads and the interurban lines”. [87] Since “Day of the Moron” was published five years before President Eisenhower authorized the construction of an interstate highway system in 1956, [88] these are interurban *railroad* lines. “In North America, interurbans became a common mode to reach suburban areas.” [89]

Thus, the ‘railroads’ described in “Day of the Moron” are short-distance lines servicing the metropolitan areas. The long-distance rural lines running between major cities, and spanning wide open areas like the Great Plains, are probably nuclear-steam locomotives, just as in Willy Ley’s article and *Lone Star Planet*.

5. Conclusion

From the four articles analyzed in this paper, we can see that some of the key elements in Piper’s vision of the future are derived from concepts and inventions of the 1940s and 1950s. For a variety of reasons, predictive articles such as these sometimes fail to come true. Though doubtless it sounded perfectly logical at the time, a nuclear missile site on the moon has never been built; probably because of the enormous expense that would entail, plus the fact that nuclear weapons much closer to home served the same purpose more cheaply. The certainty of destruction by massive retaliation, and at much shorter range, was guaranteed by platforms such as hard-to-detect ballistic missile submarines.

The development of computers has changed course, too; from larger and larger single units to large numbers of small units networked together. And the railroads have never gone atomic, at least to the extent of carrying their own reactors. But some of today’s high-speed lines, such as in Japan, may indeed get their electricity from nuclear power plants. And the current trend toward a mag-lev (magnetic levitation) future may bring with it power demands that can only be met by such installations.

But however much the actual future has diverged from the future foreseen in the lens of the mid-Twentieth Century, the four articles described in this paper suggest that there may be more Piper-related discoveries to be made among the science and technology magazines of that period. This can only be good news for those of us who greatly enjoy his stories, for such articles will continue to further our understanding of H. Beam Piper and his literary universe.

ENDNOTES

1. Piper's Satellite Drawing

1. John F. Carr, *H. Beam Piper: A Biography* (Jefferson, North Carolina: McFarland & Company, Inc., 2008), p. 136 Sourced from Don Coleman, "The Early Letters," pp. 251-253.

2. Ibid.

3. Herbert O. Johansen, "Plastic Moon to Circle Earth 16 Times a Day," *Popular Science*, January 1956, p. 126

4. Ibid., pp. 127, 128, 268

5. Ibid., p. 125

6. Ibid., p. 270 Carr also says that "Like most American science-fiction writers of the time, Piper was chagrined that it wasn't an American craft orbiting the Earth." (Carr, *Piper Biography*, p. 135) This could help explain Piper's negative reaction to the first satellite being Russian rather than American. Based on the *Popular Science* article—and overwhelming public opinion—his Future History probably postulated that the US would launch the first satellite, followed some years later by another American first; the landing on the Moon. But since the Soviets actually succeeded in launching the first satellite, that meant they might also beat us to the Moon. And that would spell disaster for the United States. See section **"An Invasion Base on the Moon"** in the current paper, and endnote 62.

7. James Schefter, *The Race* (New York, NY: Doubleday, 1999), p. 3

8. Ibid., p. 4

9. Ibid.

10. Ibid., p. 16

11. Ibid., p. 17

12. Ibid.

13. Carr, *Piper Biography*, p. 136 Sourced from Don Coleman, "The Early Letters," pp. 251-253.

14. Schefter, *The Race*, pp. 19-20

15. This seems a bit high, though perhaps I take the thin man description too literally. Piper's estimate of Sputnik's diameter seems to be off, as well. According to Wikipedia, the Soviet satellite was a 23-inch sphere (http://en.wikipedia.org/wiki/Sputnik_1), while boxcar wheels are about a foot wider. "The boxcar's trucks also determine the weight it can handle. Trucks are rated for 70 ton (33" diameter wheels/220,000 lbs.) and 100 ton (36" diameter wheels/263,000 lbs.)." (http://www.alaskarails.org/fp/Boxcars.html)

Of course, in both examples Piper was probably approximating. And in his defense, the Soviets were notoriously secretive about their military and scientific programs. Although they announced their intention to launch a satellite, I am not aware they provided any details on the design and construction of Sputnik—or their rockets, for that matter. So Beam may indeed have done some accurate extrapolating, or perhaps he had another source of information not yet discovered.

16. Johansen, "Plastic Moon", *Popular Science*, p. 128

17. Schefter, *The Race*, p. 29

18. Ibid.

19. Carr, *Piper Biography*, p. 77, emphases added

20. Ibid., p. 74

21. Ibid., p. 82, emphasis added

22. H. Beam Piper, *The Worlds of H. Beam Piper* (New York, NY: Ace Books, 1983), p. 199

2. "The Army Brain"

23. Author uncredited, "The Army Brain", *Mechanix Illustrated*, June 1946, p. 59

24. H. Beam Piper, *Federation* (New York, NY: Ace Books, 1981), p. 189

25. Uncredited, "The Army Brain", *Mechanix Illustrated*, p. 59

26. H. Beam Piper, *The Cosmic Computer* (New York, NY: Ace Books, 1963), p. 241

27. Ibid., p. 227

28. Uncredited, "The Army Brain", *Mechanix Illustrated*, p. 59, emphasis added

29. http://en.wikipedia.org/wiki/ENIAC

30. Uncredited, "The Army Brain", *Mechanix Illustrated*, p. 59

31. Ibid. For those living in the area, four of ENIAC's original forty panels are on display at the Moore School of Electrical Engineering (now part of the School of Engineering and Applied Science) at the University of Pennsylvania in Philadelphia. (http://www.seas.upenn.edu/about-seas/eniac/) "The U.S. Army Ordnance Museum in Aberdeen, Maryland, also has some of ENIAC." (http://www.workshopoftheworld.com/west_phila/eniac.html)

32. Piper, *Federation*, p. 184

33. Piper, *Cosmic Computer*, pp. 10-11 It's phrased a bit differently, too. "The cargo was coming off, now. Cask staves, and more cask staves. Zareff swore bitterly at the sight, and then they started toward the wide doors of the shipping floor, inside the Airlines Building. Outgoing cargo was beginning to come out; casks of brandy, of course, and a lot of boxes and crates, painted light blue and bearing the yellow trefoil of the Third Fleet-Army Force and the eight-pointed red star of Ordnance."

34. Ibid., p. 198

35. Ibid., p. 16, emphasis added In "Graveyard of Dreams", Zareff says the same thing, only substituting "the Brain" for Merlin. Moreover, he adds "Every move we made was known and anticipated by the Federation. How could they have done that without something like the Brain?" (Piper, *Federation*, p. 190)

36. http://en.wikipedia.org/wiki/ENIAC

37. Piper, *Cosmic Computer*, p. 16, emphasis added

38. Uncredited, "The Army Brain", *Mechanix Illustrated*, p. 59

39. Piper, *Cosmic Computer*, p. 17 This is part of the Asimov influence on science fiction and on H. Beam Piper. "A **positronic brain** is a fictional technological device, originally conceived by science fiction writer Isaac Asimov. Its role is to serve as a central computer for a robot, and, in some unspecified way, to provide it with a form of consciousness recognizable to humans. When Asimov wrote his first robot stories in 1939/1940, the positron was a newly-discovered particle and so the buzz word *positronic*, coined by analogy with *electronic*, added a contemporary gloss of popular science to the concept." (http://en.wikipedia.org/wiki/Positronic_brain)

40. Ibid., p. 16

41. Piper had a great love of acrostics. I would therefore guess an acronym that actually spelled out a word, such as the postulated P.I.P.E.R., is most likely what he intended for the real name of Merlin.

42. http://en.wikipedia.org/wiki/ENIAC If it had not predicted the end of the Terran Federation, Merlin may well

have been declassified after the System States War, like ENIAC. To put it the shoe on the other foot, if ENIAC had predicted the end of the United States, Project PX would probably have remained secret, like Project Merlin.

And this creates a couple more interesting parallels. First, as stated, the completed ENIAC was revealed to the public just after the end of WWII, in February 1946. And Merlin's initial prediction of the end of the Federation is made just after the SSW ends. "Then we did something we really weren't called upon to do, because that was policy-planning and wasn't our province, but we were going to move an occupation army into System States planets, and we didn't want to do anything that would embarrass the Federation Government later." (Piper, *Cosmic Computer*, pp. 225-226)

Second, Merlin predicts that there are "Two centuries for the Federation, as such". (ibid., p. 241) And if ENIAC could have predicted the future, it would have foreseen the end of America in less than two centuries. Actually, in not much more than one. ENIAC was apparently completed in late 1945 or early 1946, which in Piper's chronology would be AE 3 or 4. And in his Future History, America is finally destroyed about 110 years later, in "the debacle in the United States in A.E. 114". (H. Beam Piper, *Uller Uprising*, (New York, NY: Ace Books, 1983), p. 169)

43. http://en.wikipedia.org/wiki/ENIAC

44. Uncredited, "The Army Brain", *Mechanix Illustrated*, p. 59

45. http://en.wikipedia.org/wiki/ENIAC

46. Piper, *Cosmic Computer*, p. 211

47. Ibid., p. 224

48. Uncredited, "The Army Brain", *Mechanix Illustrated*, p. 59

49. Piper, *Cosmic Computer*, p. 224 And here we note that the real Merlin does have fifty-foot walls, just like ENIAC.

50. Ibid., p. 16 In "Graveyard of Dreams", Conn's estimate of the Brain's size is much greater, but still related to ENIAC. "Well, I'd say that a hundred million cubic feet is the smallest even conceivable." (Piper, *Federation*, p. 191) There's that '100 feet' again.

Another aspect of Piper's extrapolation on ENIAC may be the alleged speed of Merlin. As stated, the electronic ENIAC was a thousand times faster than previous electrically-powered mechanical computers; a giant leap in computing power. And at the meeting in Kurt Fawzi's office, Conn tells them that computers of the Ninth Century have "neutrino-circuits", which seems to be related to Judge Ledue's assertion that Merlin could scan all its data "instantaneously" (ibid., pp. 16-17). Neutrino-circuits would presumably make instantaneity possible, which in turn would obviously be a giant leap over a mere 186,000 miles per second, the theoretical operating speed of electronics.

However, the judge may have been speaking in general terms (on a planet's surface, the speed of light is pretty much instantaneous), because later in the novel Piper says that Merlin is not really instantaneous. "Even a positronic computer does not work instantaneously. Nothing does." (ibid., p. 242) And a neutrino is not instantaneous, either, being "an elementary particle that usually travels close to the speed of light". (http://en.wikipedi.org/wiki/Neutrino) Perhaps Beam was inferring that neutrinos move closer to the speed of light than electrons, which would make neutrino-circuits an improvement over electronic circuits.

Piper's technological device of neutrino-circuits could be called 'neutrinics', which would put it in the same category as Asimov's technological device, positronics. If so, then Beam was elaborating on, and possibly improving, Asimov's concept of future computers and robot brains. This deduction is supported by the fact that Piper's use of neutrinos "adds a contemporary gloss of popular science to the concept", to use wikipedia's description of Asimov's invention of positronics in endnote 39. When Asimov was writing his robot stories in 1939 and 1940, the positron was a newly-discovered particle, and when Piper was writing "Graveyard of Dreams" in the mid-1950s, the neutrino was finally detected.

They were first postulated in 1930 by Wolfgang Pauli, to preserve the conservation of energy, momentum and angular momentum in the decay of atomic nuclei, called beta-decay. (http://en.wikipedia.org/Neutrino) Pertinent to the subject of this paper, it is interesting that when neutrinos were finally detected over twenty-five years later, it was announced in the pages of a scientific magazine. "In the July 20, 1956 issue of *Science*, Clyde Cowan, Frederick Reines, F. B. Harrison, H. W. Kruse, and A. D. McGuire published confirmation that they had detected the neutrino". (ibid.) This may in fact have been where Piper read about them, because "Graveyard of Dreams" was sold a little over a year later (September 1957, published January 1958), and only six years after that was expanded into *The Cosmic Computer* (published 1963), a novel that contains many examples of robots and robot brains.

Instantaneity and sub-atomic particles must have been on Piper's mind, because they are also found in "Ministry of Disturbance", like "Graveyard of Dreams" published in 1958. At the Imperial University in Asgard on Odin, capital planet of the Galactic Empire, an experiment is performed "to establish more accurately the velocity of sub-nucleonic particles, micro-positos". (Piper, *Empire*, p. 151) Professor Klenn Faress says that "…until the micropositos were accelerated to 16.067543333 1/3 times light-speed, they registered much as expected. Beyond that velocity, however, the target for the micropositos began registering impacts before the source registered emission…I think that beyond 16.067543333 1/3 times light-speed, the micropositos ceased to have any velocity at all, velocity being defined as rate of motion in four-dimensional spacetime. I believe they moved through the three spatial dimensions without moving at all in the fourth, temporal, dimension. They made that kilometer from source to target, literally, in nothing flat. Instantaneity." (ibid., pp. 163-164)

The practical effect of this discovery is revealed by Prince Yorn Travann. "If he can propagate a wave that behaves like those micropositos, we may not have to depend on ships for communication. We may be able, some day, to screen Baldur or Vishnu or Aton or Thor as easily as you screened Dorflay, up in the mountains." (ibid., p. 178) Though unstated, instantaneity will probably be applied to other technologies, such as computers.

Thus, even though Merlin's computing speed is not instantaneous, its positronic brain and neutrino circuits are undoubtedly an improvement over electronic devices. That would place them at an intermediate level of technology; eight hundred years after our time, and more than 2000 years before the truly instantaneous devices that are probably invented soon after "Ministry of Disturbance".

51. Piper, *Cosmic Computer*, p. 75

52. Ibid., p. 76

53. Ibid., p. 75 "Rank on rank" actually suggests many rows of cabinet-size computers, rather than just along the walls. Nevertheless, Beam's description is certainly based on 1950s/early 1960s technology.

54. http://en.wikipedia.org/wiki/ENIAC,emphasis added

55. Ibid.

56. Near the beginning of the novel, two of the reasons Rodney Maxwell never believed in Merlin is because he "can't see why they didn't come back for it after the pressure to get the troops home was off, or *why they didn't build a dozen Merlins*. This isn't the only planet that has problems they can't solve for themselves." (Piper, *Cosmic Computer*, p. 22, emphasis added)

Though never made explicit, the answer seems to be that Merlin predicts the end of the Federation. If they had built a dozen Merlins after the System States War, the Awful Truth that there were only "Two centuries for the Federation as such" (ibid., p. 241) could not help but get out. Then, you'd have "the whole Federation breaking up into bloody anarchy", rather than "a slow, peaceful decay". (ibid., pp. 225, 227) The latter is much preferable, because less death and destruction means that civilization will recover much more rapidly. The nucleus of a new civilization will arise "in five or so centuries", but in a catastrophic collapse, "there would be a Galactic night of barbarism for no one knows how many thousand years." (ibid., p. 227)

3. An "Invasion Base on the Moon"

57. Author uncredited, "Invasion Base on the Moon", *Mechanix Illustrated*, April 1948, p. 60

Piper actually heard Willy Ley speak at a science fiction convention. "On August 31, 1962, Piper flew to Chicago for ChiCon, the annual World Science Fiction Convention…On September 2, there was more partying. The next day, Piper wrote: "Managed to get in on tail end of lecture by Willy Ley and then a muster of the Hyborian Legion." " (Carr, *Piper Biography*, p. 177)

Though unstated, it is quite possible that Piper actually met Ley, and had a few drinks with him. And later in this paper, we will look at an article written by Ley. See **Atomic Trains**.

58. Ibid., p. 62

59. Piper, *Worlds*, p. 30

60. H. Beam Piper, *Empire* (New York, NY: Ace Books, 1981), p. 30

61. Ibid., pp. 55-56

62. Uncredited, “Invasion Base on the Moon”, *Mechanix Illustrated*, p. 61
And in “The Edge of the Knife” (published 1957), Professor Chalmers compares the early period of space exploration to the time of Columbus. “And when Mars and Venus are colonized, there will be the same historic situations, at least in general shape, as arose when the European powers were colonizing the New World” (Piper, *Empire*, p. 55).

63. Ibid., p. 63 The two missiles in the foreground appear to have been launched from a second site in a neighboring crater. The moon base panorama from pages 60-61 is also Tinsley’s work. This brings us to the topic of where the missiles are headed. In that illustration, the lead missile appears to be ‘crossing the Atlantic’, which would place their targets in the Eastern Hemisphere. That would actually make the moon base an American installation, rather than Russian. And in that regard, the cropped-out caption to the picture in Figure 7 reads, “A well-known aircraft company, which desires to remain anonymous, is working on this man-carrying rocket depicted by an MI artist. Wings control it in air.” (ibid.) This well-known company is certainly American, making the moon-missiles, and by extension, the base, a US facility.
However, it will undoubtedly take some hours for the rockets to traverse the 240,000 miles to Earth. If their time to target is about eight or nine hours, the missiles will come down in the Western Hemisphere, most probably North America. That would confirm the moon base as an ‘aggressor’, or Soviet, installation.
Thus, the creators of the article seem to have employed a little Piper-style vagueness about this future invasion base on the moon! Will it be Russian—or American?

64. One wonders if this played a role in Piper’s suicide. By 1964, the Soviet Union had launched the first satellite, followed by the first man in space, the first woman, and the first three-man ship. They had all the firsts, and also held the endurance records for time in space. At that rate, it would certainly be a logical extrapolation for them to beat the US to the Moon. Then they would annex Luna, and build the moon base, giving Russia world supremacy by about 1975. The 1948 article would therefore come true, with Luna turning Red and the ‘aggressor nation’ in control of the world. And with the defeat of Barry Goldwater in the 1964 election, the Democrats, traditionally soft on Communism, were still running the country.
Given that line of reasoning, is it surprising Piper despaired?
One of Jerry Pournelle’s oft-used phrases is, “Despair is a sin”, but Beam was not a religious man. Under the circumstances, his view that only a miracle could avert disaster is understandable. “The only thing that will save this country now is an Act of God, and God doesn‘t exist.” (Carr, *Piper Biography*, p. 194) His denial of a deity meant that he felt there was no hope. Add that to all the other reasons he had to kill himself.
If only Beam could have remembered the lessons of history, and not just the history of long ago. In WWII, the aggressor nations—Nazi Germany and Imperial Japan—opened hostilities, yet they were finally defeated by the mainly democratic Allies in a ‘come from behind’ victory. We can assume Piper saw that the shock of Russian successes in the Space Race had awakened the US to the mammoth lunar effort. Thus, he could have just as easily extrapolated that America would again come from behind, and win in the end—as indeed happened. And if Beam had lived, he might have even felt vindicated, as the 1969 manned landing of the *Eagle* was only two years off his postulated 1971 landing of the unmanned *Kilroy*. (Piper, *Empire*, p. 22)

65. Robert A. Heinlein, *Rocket Ship Galileo* (New York, NY: Charles Scribner’s Sons, 1947), pp. 171-172
The specific location of the Nazi mountain base is not revealed. “The [German] sergeant appeared not to know where the base was; Cargraves questioned him closely. Africa? South America? An island? But all that he could get out of him was that it was a long submarine trip from Germany.” This clearly implies the Southern Hemisphere.

66. Ibid., p. 172

67. Robert A. Heinlein, screenplay, “Destination Moon“, Eagle-Lion Pictures, 1950

68. H. Beam Piper, *Little Fuzzy* (New York, NY: Ace Books, 1963), p. 13

69. H. Beam Piper, *Space Viking* (New York, NY: Ace Books, 1963), pp. 214-215

70. Ibid., p. 215, emphasis added

4. Atomic Trains

71. Willy Ley, “Atomic Engines for Peace”, *Mechanix Illustrated*, March 1946, pp. 44-45 That’s the second time Willy Ley’s name has come up in this paper. See endnote 56.

72. H. Beam Piper, *Four Day Planet/Lone Star Planet* (New York, NY: Ace Books, 1958), p. 230

73. Ibid., p. 269 In my paper "A Study of *Lone Star Planet"*, I show that the period of the novel is a future parallel of the mid-Nineteenth Century. Thus, the nuclear-steam locomotive parallels the plain old steam locomotive, which first came into service in the early Nineteenth Century, but really came of age in the mid to late part of that century.

74. Ley, "Atomic Engines for Peace", *Mechanix Illustrated*, p. 46

75. Ibid., p. 79

76. Ibid., p. 45

77. Piper, *Cosmic Computer*, p. 143

78. Ibid., p. 151

79. Ibid., p. 161

80. Piper, *Space Viking*, pp. 96-97

81. Ley, "Atomic Engines for Peace", *Mechanix Illustrated*, p. 79

82. John F. Carr, Introduction to *The Worlds of H. Beam Piper*, p. 6

83. Piper's term 'Atomic Era' may also owe a debt to the clippings in this paper. At the very end of the "Plastic Moon" article, and presumably placed there to fill in the space between the article and the bottom of the page, is a short joke titled "**New Era**". It reads, "The girl filling out a job application did not hesitate at the little square labeled "Age". She wrote, "Atomic." ' (Johansen, "Plastic Moon", *Popular Science*, p. 270)

Ever the perfectionist, Piper even foresaw a time when the Atomic Era itself would be supplanted. Atomic power takes man into space, allowing him to land on the moon and colonize the Solar System. But the "Keane-Gonzalez-Dillingham Theory of Non-Einsteinian Relativity, A.E. 172", and "Dillingham Hyperdrive developed, A.E. 183" are events of even greater importance. (Carr, *Piper Biography*, p. 213) They enable Terro-Humanity to colonize the stars, beginning with the "first expedition to Alpha Centauri, 192 A.E." (ibid.) This begins what later comes to be called the "Interstellar Era." (Piper, *Empire*, p. 28)

84. Piper, *Worlds*, pp. 200, 207

85. Ibid., p. 207

86. http://en.wikipedia.org/wiki/Rail_transport These first came into use in the late Nineteenth Century.

87. Piper, *Worlds*, p. 230

88. http://en.wikipedia.org/wiki/Interstate_Highway_System

89. http://en.wikipedia.org/wiki/Rail_transport