http://www.sf-arc.org/ AUGUST 2009 PO BOX 1005. NEWCASTLE. CA

At the key of SFARC

S F A R C

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History: Gary, KQ6RT
Misc Radio: Fred, K6DGW

RESOURCES

REPEATERS
145.430 (-0.6 MHz/PL 162.2)
440.575 (+5.0 MHz/PL 94.8)
223.860 (-1.6 MHz/PL 100.0)
CLUB NET
Thursdays, 7:30PM, K6ARR/R 145.430
CLUB MEETINGS
Second Friday of the month, 7:30PM at the Library, 350 Nevada St, Auburn CA
CLUB BREAKFAST
Last Sat of the month at Susie's Café, Cirby at Riverside, Roseville – 8:00 AM
NET CONTROL OPS
Dave Jenkins, WB6RBE
Gary Cunningham, KQ6RT
Norm Medland, W6AFR
Casey McPartland, W7IB
NEWSLETTER EDITOR
Matthew Diridoni, KC6RUO
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matteod@comcast.net

SPECIAL SERVICE CLUB ARRL

Calendar of Events

SFARC CLUB PICNIC

August 22, 2009

Dry Creek Rd and Highway 49

Listen to the SFARC Club Net for more picnic details. This is a great family event. See y'all there!

8/14/2009	Club Meeting
9/12/09	2nd Annual Sacramento Valley Hamfest, Lincoln, CA. Go to http://www.svhamfest.org for more information and flyer.

In this issue

August Meeting Program

This month's SFARC Meeting Program is a virtual tour of the Ameritron Factory. Don't miss this very informative presentation.

Bring a friend, visitors welcome!
See you all there!

We encourage members to receive Sierra Signals via email to save the Club the cost of reproduction and mailing

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Minutes of the Meeting of the General Membership of July 10, 2009

The meeting was called to order at 7:30 PM by President Norm Medland, W6AFR. The officers were introduced. Flag salute was followed by a VE report from Casey, K7IB. Greg, KO6TH, advised on the latest in space, including the plans for Suit Sat 2, sans suit. Gene, KG6NYH, gave a preview of the drawing.

Members and guests were introduced. Casey, K7IB, advised that the repeater was going to be used as back up for emergencies the following day, July 11, 2009.

The club has $1781.01 after Field Day expenses of $430.99 were purchased according to the Treasurer Leslie, K7NYE. Chuck, KG6FFK, updated ARES activity.

A Field Day summary was presented by Al, NI2U. He showed a summary of the activity for this year including the many bonus points we garnered and then gave a few ideas for improvement. A score sheet will be submitted for the first time in a few years. The program that was started a few meetings ago, a tour of ARRL headquarters, was concluded.

Richard, WA6RWS, updated the club on the status of the repeater and backup repeater. A donation to the club from the folks at the Tevis Cup and the Western States Trail Run will fun a new repeater. **Motion** by Richard, WA6RWS, As soon as the donation arrives; the treasurer is directed to purchase the new repeater from Radio Supply. Motion was seconded by Al NI2U. The motion passed on a show of hands.

Gary, N6UWQ, showed the club his emergency radio handhelds for 2m and 440 in a nice case with accessories.
The club picnic was tentatively set for August 22. Leslie, K7NYE will call the city to see if we can reserve a spot at the park near the corner of Dry Creek and Highway 49.

The drawing was held and the meeting adjourned at approximately 8:45 PM.

Respectfully submitted,

Wayne Stilwell, W6DT
Secretary

Local ARRL Exam Sessions
Courtesy of the ARRL

01-Aug-2009
Sponsor: UNSPONSORED
Time: 8:00AM (Walk-ins allowed)
Contact: LARRY R HODGE
(916)361-2476
Email: LARRYHODGE2000@COMCAST.NET
VEC: ARRL/VEC
Location: RALEY'S COMMUNITY EVENT CENTER
6845 DOUGLAS BLVD
GRANITE BAY, CA 95746

15-Aug-2009
Sponsor: RIVER CITY ARCS
Time: 7:30 AM (Walk-ins allowed)
Contact: KENNETH M HALL
(916)492-6115
Email: WO6J@ARRL.NET
VEC: ARRL/VEC
Location: CARMICHAEL ELKS LODGE-USE EAST ENTRANCE
5631 CYPRESS AVE
CARMICHAEL, CA 95608

22-Aug-2009
Sponsor: UNSPONSORED
Time: 9:00 AM (Walk-ins allowed)
Contact: BARRI BABOW
(916)838-9025
Email: B.BABOWB@COMCAST.NET
VEC: ARRL/VEC
Location: RALEY'S SUPERMARKET
4840 SAN JUAN AVE
FAIR OAKS, CA 95628

05-Sep-2009
Sponsor: UNSPONSORED
Time: 8:00AM (Walk-ins allowed)
Contact: LARRY R HODGE
(916)361-2476
Email: LARRYHODGE2000@COMCAST.NET
VEC: ARRL/VEC
Location: RALEY'S COMMUNITY EVENT CENTER
6845 DOUGLAS BLVD
GRANITE BAY, CA 95746

19-Sep-2009
Sponsor: RIVER CITY ARCS
Time: 7:30 AM (Walk-ins allowed)
Contact: KENNETH M HALL
(916)492-6115
Email: WO6J@ARRL.NET
VEC: ARRL/VEC
Location: CARMICHAEL ELKS LODGE-USE EAST ENTRANCE
5631 CYPRESS AVE
CARMICHAEL, CA 95608

Miscellaneous Radio

Apollo 11 – What "Uncle Walter" Didn't Say?

Unlike last month, I actually have some "radio fodder" for Matt this month, but given that the 20th of last month was the 40th anniversary of the Apollo 11 moon landing, and we have Greg who keeps space on the front burner for Sierra Signals, and the recent passing of Walter Cronkite, and that I worked on Apollo at NASA in Houston, I'll save the radio fodder for next month and disclose something that probably even Fox News doesn't know [gasp!].

When I came home in late Nov 1967, I had essentially been out of the country for close to 5 years – a year in the northern interior of Alaska and close to four in SE Asia. My assignment was to NASA in Houston and it was obviously a pretty exciting time. OK, I was also newly married which provided some additional excitement. I was in the Landing Analysis Branch, our overall task was the descent, landing, and ascent of the LM, and I was doing trajectory planning and guidance analysis. It is the only time I've been paid to do math. There was one other AF officer, Pat Condon, in the unit, and we may have had two dozen people total in the Branch. We worked in small groups with specific assignments; the crew I was on was four strong.

About 6 months before Apollo 11 launched, our little crew got an assignment to figure out a way for the crew to launch from the moon and manually fly into an acceptable orbit. It was sort of a last minute thing … the days until launch were ticking by and someone somewhere must have asked the question, "What if both PNGS and AGS fail?" The lunar module had two totally independent guidance systems to land and then get back into orbit, the Primary Navigation and Guidance System, and the Abort Guidance System. They were built by different contractors (AGS was TRW, I think PNGS was Grumman, but not sure), and separately powered. The odds of both failing except for some catastrophic failure of nearly everything were between slim and none, but the idea of stranding two crew members on the moon with an operable engine was something no one wanted to face. So we set out to come up with a way for the crew to become "real" pilots and fly the LM like the Red Baron.

Our plan was to look at ascent profiles when the guidance systems were working, and then use them to come up with a timeline for where on the window the crew should put the horizon to duplicate an acceptable profile. There were vertical and horizontal ruler scales etched on the window glass, and this seemed pretty easy, and as usual when you think "easy" is the operative word, that turned out to be seriously wrong. Of the 4 of us, I was the only one who had ever known how to fly an airplane, so they made me the DA (Dummy Astronaut).

The crew stood up in the LM [no seats], and under power, the force vector was through their feet just like standing on the ground. With the engine off, they were weightless and had some straps on the deck to stick their toes into tether them. The LM simulator was a very faithful mock-up and it moved around under control of the simulation computer and the pilot's controls. Consequently, there were some supports you strapped yourself into sort of like a parachute harness to keep you from falling over when you pitched it over. They had fabricated a lunar landscape out of some sort of epoxy that was maybe 200' x 150'. It was hung upside down from the building ceiling. The LM simulator windows looked directly into two TV monitors. Two TV cameras [one for each window] looked at the landscape model and were manipulated on tracks by the computer so that the image I saw out the window looked like the moon and moved like it would for the crew.

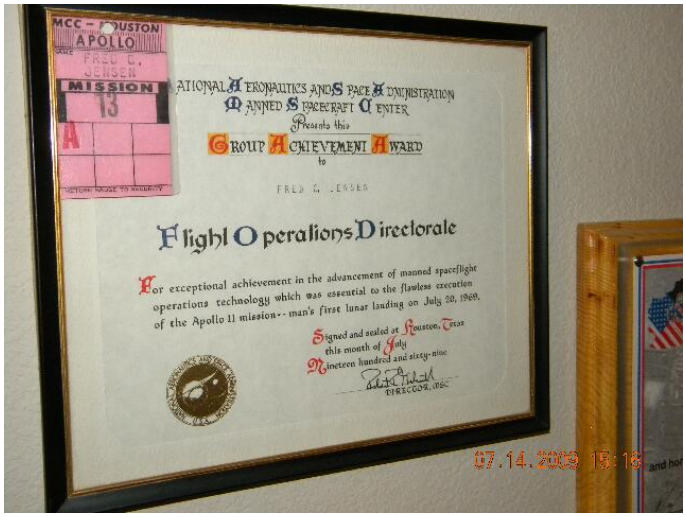
The really tricky part of manual ascent was knowing when to shut the engine down. It could be started once [on the surface], and shut down once. It couldn't be restarted. If you killed it too early, the crew would become additional debris on the surface of the moon. Too late and the CSM couldn't get to them and they'd become orbiting space junk. Plus, no two engines would have exactly the same thrust or specific impulse and there was some uncertainty about the mass of the LM since they wouldn't know exactly how much moon rock mass they had collected. So we got time on the simulator [mainly at night] and started trying our profiles.

I lost track of the number of times I became simulated surface debris or simulated space junk, and it was not looking good. When you crash in the simulator, you just reset the computer and start over. Unfortunately, that would not be an option for Neil and Buzz. And, it had become apparent that going back to the boss and telling him, "You can't do this from the moon," was not going to be a viable option. Quite by accident, around midnight one night, I managed to get into an acceptable orbit for the first time using a profile Alex had tweaked from a series of failures … not a great trajectory, but I didn't crash and the CSM could get to me, barely. We worked from that profile and tried to find the boundaries between where it worked and where it didn't, and it turned out there wasn't much room for error and sloppy piloting ... which, unfortunately, was sort of my forte`.

There would be two precision radar measurements during the ascent. Using those two measurements from which we could derive an estimate of the engine performance, we could come up with sort of real-time corrections to the planned profile. We showed it all to the Flight Dynamics Officer [FIDO, NASA is the absolute master of acronyms], he came up with a little circular slide rule gizmo he made with cardboard that would make the translation from coordinates to the corrections, we ran a couple dozen simulations with him at his mission control console and the real time system running (even at that early date, the simulators could be connected to the Mission Control

system for full-up simulations), and they all worked, but some just barely. I'm quite sure that Walter never mentioned on CBS News that, had manual ascent been necessary, it would have involved a cardboard gizmo. So much for high tech in the space biz. ☺

We finally decided, ready or not, we had to get the crew into this. Alex briefed them on the procedures and the way the profiles would be laid out on laminated cards and how the "cardboard corrections" would happen, I flew two missions with them in the simulator with FIDO at his MC console, and then they began practicing. They got very good very fast! Obviously, much better pilots than the Dummy Astronaut. ☺



But, the apparent success didn't feel real good. When you're an engineer and you build a bridge, you know that a huge earthquake or a bomb could take it down. But you also know for sure that it will never fall because too many trucks went over it. You made sure of that. That's what engineering is all about. We knew we had shown that, on a good day and if a whole bunch of unknowns went right, it was possible to manually fly off the moon and, we'd come up with a way to do it – again, if it was a really good day. But it was a far cry from knowing your bridge won't fall down.

They gave us a Group Achievement Award but I was truly scared on every Apollo mission that they'd have to make a manual ascent and our method would fail. Fortunately, a manual ascent was never needed and when 17 came home and I knew there wouldn't be any more, I was really relieved. Apollo 13 didn't land, it was a real nail biter too, just for different reasons. The doober in the upper left of the frame is my Apollo 13 Mission Control badge, the only one of eight that I saved. As Andrea reminds me often, sometimes I exhibit exactly no common sense ☹

I am quite sure I got that AF assignment for two reasons: I had a math degree, and it was a reward for doing 3 ¾ years in the CZ and not complaining about it. I knew some very basic orbital mechanics because of my degree, but I couldn't even begin to catalog the things I learned about space flight, computers and programming, mathematics, and especially engineering, which probably made my subsequent career possible. In that regard, and beyond the excitement, it was a real gift to me.

Alex, who had an astronomy degree but whose real love was geology left NASA, got a PhD in some sort of geophysical sciences – mainly on bodies other than the Earth – and you can find some of his stuff if you Google "Alex Woronow." Good luck trying to understand it. Pat remained in the AF and retired as a Lt. Gen. Jim stayed with NASA, moved to the Marshall Spaceflight Center in Alabama, and finally retired. You all know what happened to me. We are all very thankful a "Red Baron" ascent from the moon was never required.

Several months after Apollo 11 returned to Earth, Neil sat down with the four of us in the cafeteria at lunch. I told him, "Sometimes, when I look up at the full moon at night, I really can't believe that you and Buzz were there." He replied, "Sometimes, I really can't either."

I decided to make this detour from radio for this month when I was looking in the basement for an old FM radio I know I have but can't find, and ran across the rock hammer Alex gave me. He and Carol would take us on weekend geology tours around the area, and they once "rented" our not quite 1 year old daughter for a Saturday to see if they really wanted to make a kid.

After Apollo 11, a D-sized drawing of the descent profile circulated and we all signed it. One of the secretaries was given the job of deciphering the signatures and giving a copy to each. She finally came to me with two she couldn't figure out. One, I couldn't decipher. The other was "Johannes Kepler." I told her not to worry about his copy.

OK, radio next month.

Fred K6DGW

Radio Supply Company
11846 Atwood Road
Auburn, CA 95603
(right next door to Midas)
530.888.8483
dave@radiosupplyco.com

Fifty Years Ago at SFARC

Meeting of August 5, 1959

A discussion concerning the changing of the dues was held. Decision was delayed due to lack of attendance.

Moved, seconded and passed that a Bar-B-Q be held on August 29, 1959. Starts 4:00 P.M.

Walt Randall was present as a guest. Bob Davis's son was present also.

Decided to have steaks, pop and ice cream furnished free for members and family of club. Deadline for reservations to be the 22nd of August. Guest to be charged $.50.

Committee for Bar-B-Q
1. Jimmy Carman
2. Walt Dowdy
3. Harry Grieb
4. Mike Bowman

Lucius Waterman plans to resign from the club as he is moving.

Bob Davis won raffle.

W.B.Dowdy

SFARC SATELITE REPORT
Cyber Space

With all the attention turned to the recent 40th anniversary of the first Apollo moon landing, I've run into several "Look how far we've come in 40 years" sorts of articles posted to the Internet. It's both amazing to think back to the technology of that day, and also to think of the technology that those three guys were depending on to keep them alive and not get them blasted into outer space.

The article which caught my eye was a comparison between the Apollo computer and an iPhone. Cute, but instead I think I'll compare it to the machine I'm writing this article on.

The AGC (Apollo Guidance Computer, not Automatic Gain Control in this case) was a marvel in its day. Built from some 5,600 individual integrated circuits (each with maybe a couple of transistors inside), this custom computer ran at the amazing clock speed of 2.048 megahertz. (That's a decimal point in that number, not a comma!) Since a computer's clock speed is one of the primary things that determine how fast it is, and considering that this is a Ham radio newsletter, note that the AGC was running at the bottom of the shortwave band, little above 160 meters. By comparison, the PC I'm typing this article on right now has a clock speed of 3.2 gigahertz, which puts it well above the microwave oven in our kitchen, and just shy of the 9 centimeter Ham band (that's 0.09 meters).

Computers crunch numbers, of course, and the more numbers they crunch the more space it takes to store all of them, and yet more space to hold all the instructions to tell the computer *how* to do the crunching. To be fair, a good portion of the number crunching work of the Apollo missions was done back in Mission Control on Earth, but the AGC design engineers did an amazing job optimizing and fitting the rest of the orbital mechanics munching in a really small package. All of the data fit in a cozy 2k words of memory (a total of 4,096 characters), and the program memory (which was separate) only took only 36k. My computer has 1.5 gigabytes of memory (1,537,536k), and just the email program I'm using takes up several million characters of program space; the entire disk capacity is nearly a terrabyte (1,000,000,000,000 characters).

A lot of the evolution of computers since the 1960s has been in how we humans interact with them. While we have 103 key keyboards, voice command, full color graphical displays, and "mice" today, the Apollo computer boiled all that fluffy stuff down to the basics. The display consisted of some indicator lamps, and three 5-digit numbers. Input commands couldn't be simpler: pairs of two digit numbers to select a "verb" and a "noun", for example, 50,18 for "Request Maneuver_Angles, punched into a keypad. (They had a chart listing the codes, pasted on the wall next to the computer.) Can't get much more basic than that.

Besides the hardware itself, the software running on it was new and unique. While the modern Intel/AMD processors used in today's PCs have the ability to execute thousands of different instructions, the AGC had a total of 34. The software was written in what we call "Assembly Language", where each machine instruction is given a mnemonic, for example, "TC" for Transfer Control. The computer programmer would "program" the computer by writing a long series of these mnemonics, which would then be translated or "assembled" into the sequence of 1's and 0's that make up the actual program . Of the 34 instructions, one instruction, "EDRUPT", has historians a bit puzzled, as it is poorly documented and used only once in the entire machine. Underscoring how custom the Apollo computer was, it is believed to mean "Ed's Interrupt", and named after Ed Smally, one of the computer's designers. I guess that was the 1960's technology equivalent of today's real estate developers naming the streets after their kids.

Finally, the one comparison which shows how the more things change, the more they stay the same. The Apollo Guidance computer fit in a package about 24 inches, by 12.5 inches, by 6 inches, and consumed about 75 watts of power (15 watts on standby). That's nearly identical to a small desktop.

73's Greg KO6TH

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Address: _____ City: _____ State: _____ Zip: _____

Associate Name: _____ Call: _____ Class: _____

Phone Number: _____ Application: (Circle One) New Renewal

Member Dues: Circle Amounts That Apply.

Applications (for new members only) received in the middle of the year will be pro rated. Contact the President or Treasurer for exact rate.

Membership: (P)	$22.00	Name Badge: (R)	$7.00
Associate: (Q)	$ 7.00	Repeater Donation: (S)	$_____
Auto Patch Donation: (T)	$_____	Newsletter Booster: (V)	$_____
Misc. Donation: (X)	$_____	Christmas Donation: (W)	$_____
		TOTAL: (Y)	$_____

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