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## SKYLAB

were doing the exercise thing. We had a half-day off around day eight or nine, and we gave the ground a little television show. Weitz had a taped copy of "Thus spake Zarathustra." It was the theme for 2001, Strauss. We played that real loud, and we set up the TV camera, and we came down into the workshop for the docking the day after and we did our acrobatics thing. See,



**Pete Conrad undergoes a dental examination by the Medical Officer, Joseph Kerwin in the Skylab Medical Facility. In the absence of an examination chair, Conrad simply rotated his body to an upside down position to facilitate the procedure.**

we had learned how to do it in the first week, and the ground thought that was neat. So it relaxed everybody.

## EVA

**B**ut we were still a troubled mission until we got to the point of, I think it was about June 10, when we got ready to go out the door. Rusty [Russell L.] Schweickart had led the backup crew, again in the Marshall water tank, knowing what the problem was, to devise an EVA where we could go out, work our way around to that side of the workshop. There were no handholds, no footholds, no visual aids, no lights, because there was never any planned maintenance on Skylab. Too dangerous. There was, fortunately, planned EVA. It was to retrieve film and exchange film in the ATM. So we had the suits, we had the umbilicals, and we brought up some tools that we thought we'd need.

They planned an EVA that had us erect a 25-foot pole, put the cable cutter on the end of it, and the jaws, which are about three inches long, had to close around that aluminum scrap that we'd

seen, and bite halfway into it but not all the way. That was step one.

Now we had a handrail. Pete could go along the handrail while I stabilized the near end of it, with another rope attached to his sleeve. When he got as far out as he could, taking care to avoid sharp edges, please, he would hook that rope into the solar panel cover as far down as possible, so as to give it some leverage from the hinge. Because what we had to do was not only cut the scrap, but then break up that hinge which had frozen, and start the thing up. He was to go down, put the rope on, then I would tie the other end of the rope up to a handy stanchion, as close to the surface as possible, and then the two of us would get under the rope and stand up and hope for the best. That was the Rusty Schweickart solution. We said, "Well, okay, Rusty, we'll give it a go."

And out we went with all the equipment. I even had a dental saw from the medical kit taped to the chest of my suit, just in case, if all else failed, we thought maybe we could go down there with the dental saw and try to get that thing off. Didn't have to use it. Did have a couple extra tethers, six-foot equipment tethers, with hooks on both ends. This proved to be crucial to the mission. Because we went out there. Getting around to the area was no problem. Erecting the 25-foot-long pole with the ropes and all that was no problem.

We were a good 20 feet away and couldn't get any closer to the aluminum strap – getting the jaws onto the strap at a 20-foot distance with a pole with no foot restraints just was proving impossible. I had the pole in my hand and I would move it toward the jaws, trying to gauge whether I was exactly far enough there, and as I did that, my body would start turning. Newton's third law. Conrad was trying to grab my legs with one arm and a strut with another arm, but that's not a stable enough platform. We went nuts for one whole day-side pass and failed, just didn't do it.

## Solution

**I**t comes night-side, we're sitting around thinking about it. We found an eyebolt, a circular bolt which just looks like the end of a Yale lock, on the surface of the workshop near one of the antennas, right in a line. Don't know what it's there for, but what if we strapped

myself to that eyebolt? So we got the spare tether, and there's a hook on the front of the suit. Hooked it through there, ran it through the eye bolt, back up through the suit, tightened it up, and now I have a three-point suspension. Now I can stand. I'll place my feet on the surface of the workshop and almost straighten my knees all the way out, and suddenly I'm as stable as a rock. It was like standing in your garden at home. It was wonderful. Man, two minutes later, the job was done.

The rest of it unfolded as I said. We crawled under the rope that Pete had laid out. That was probably the most dangerous part of the space walk, was Pete going down there amid all that debris, but he got away with it. We stood up, and suddenly it released on us. We both [floated] into outer space. But our EVA system was an umbilical, a nice stout umbilical with an 1/8-inch steel cable in the middle of it, so we didn't have any worries about that. We went out to the end of our umbilicals, and then hand-over-handed ourselves back till we got something to hang onto. Turned around, and the prettiest sight I've ever seen in my life was that solar panel cover fully deployed, ninety degrees, and you could see the panels starting to come out as they warmed up in the sun. And we knew we had done the job. So that was great.

We finished the EVA. It was rather a short EVA. We actually went down to the sun end of the ATM, to sort of have a pre-look at the film-retrieval route and see whether that was all okay. I will mention that I was allowed to do that, because I had trained for it. You go up to

fly-around, take some nice pictures, it looks beautiful. We're rehearsing the reentry stuff. People have not been up there 28 days before, and we weren't quite sure what kind of shape we were going to be in. So we did a two-stage de-orbit from Skylab. Skylab was at 235 nautical miles, and they decided to do a service module burn to lower us to about 120 miles, and then another burn to do the final de-orbit....

Normal, routine landing. We landed so close to the carrier, they almost had to move to avoid our landing on the flight deck. This was the first mission at which the command module would be picked up by a shipboard crane, and actually settled down onto a place on the flight deck, and then we would get out. All the previous missions, they had sent a chopper out with rafts, and you got on a raft and then up into the chopper. They figured they would go easy on us, since we'd been up there for a month.

**RUSNAK:** Do you think there are any lessons that ISS could learn or could have learned from the Skylab Program?

**KERWIN:** Well, it's learned a lot that are by now so deeply ingrained into it that it would be almost hard to point them out, but the habitability, the diet and exercise, the workday structure, a lot of those things.

As a matter of fact, one thing I find that's good about this long gap between Skylab and space station is that it's kept me usefully employed for 25 years. [Laughter] People still come and ask for data. "How did you guys do that? How did you manage this? Give us a little

seminar, get some people together, and tell us about managing science on the Skylab. How did you manage to do that so efficiently? What did you do wrong, that we shouldn't repeat?" We had a lot of things that we did wrong that should not be done that way again.

So I figure that once the International Space Station has been in operation for about two years, Skylab will be as interesting as

Columbus' voyage. [Laughter] All those lessons will have been learned over again and new ones will be being learned. But now we're still popular, so it's kind of fun.

**RUSNAK:** It's good to know that your mission back then is still proving valuable today.

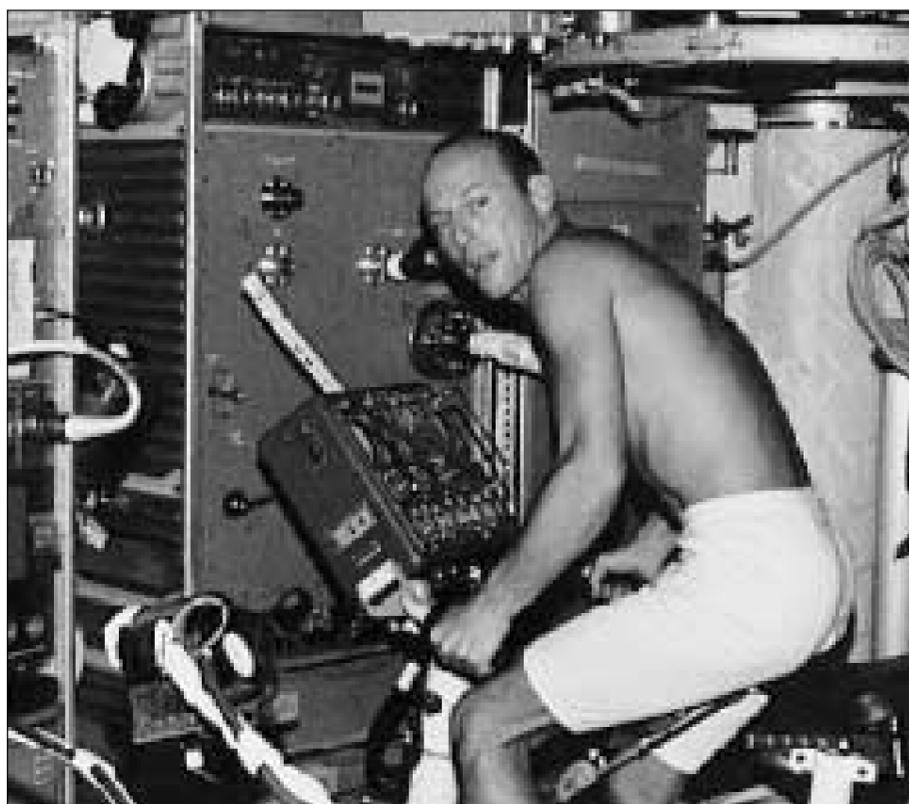
**KERWIN:** Yes. It was a good mission, a beautiful medical data set. Still, I think, the best, most complete medical data set on nine people that exists for weightlessness. Again, I can't wait for space station to do a much, much better job of that and to refine the exercise prescriptions and the diet prescriptions and the other countermeasures that will allow us to go for six months and a year safely, overcome physical, psychological, and environmental problems, and go to Mars. ■



**Joe Kerwin, Skylab 2 science pilot, serves as test subject for the Lower Body Negative Pressure Experiment. Paul Weitz, Skylab 2 pilot, assists Kerwin with the blood pressure cuff.**

the sunny end of the ATM. It's the middle of the day now, so this thing is pointed at the sun, and the Earth is now below you. You get up and stand in foot restraints up there, and you are king of the hill. I mean, here you are, standing up, looking down, and here's the world spread out, horizon to horizon. There's nothing like looking at the world through the helmet of a spacesuit. It's much better than the hatch. You just feel like you're in the middle of this big Cinerama movie. That was a heck of an experience. Described the color and condition of the parasol, and took a general look around and then went back in. It was over in less than three hours, but that was the best day of the flight....

So, day 28, we get up early in the morning, finish the deactivation, get in the command module, and depart. Do a



**Pete Conrad, Skylab 2 commander, exercises on the bicycle ergometer in the crew quarters.**