

Ernest A. Amman, KSC Weather Bureau, May 24, 1967.

Grimwood: What is the difference in weather requirements, etc., from Mercury launches?

Amman: From an overall standpoint, the weather conditions throughout the Gemini program were a good deal easier for us to handle. This is not to say that the weather was significantly easier to predict, or anything of that nature, or that we weren't paying a great deal of attention to it. But the big difference, so far as we were concerned, was that the constraints were no where near as limiting. It was decided early in the Gemini program that, because of the restrictions on launch windows as a result of rendezvous, etc., launch could not even be delayed because of such considerations as a little local cloudiness that obscured the possibility of getting camera coverage. This was our biggest concern throughout the Mercury program - the fact that we had to delay so many flights just because they were unable to see the vehicle as a result of cloudiness in the local area, sometimes even a very small amount of cloudiness. In one or two instances in the Gemini program, the vehicle was launched right through solid cloud layers that were up in the neighborhood of five or six thousand feet. In reality, so far as ---

Grimwood: Do you remember which ones those were?

Amman: No, I can't pin down the numbers of these specifically. In reality, it turned out that cloudiness was not too much of a problem, anyway, even if we had been - this is just the circumstance of the day-to-day change in weather. We didn't have too many instances where it would have made any difference if we had been living under that. But the days preceding it which led up to it, we'd have been much more concerned about it if we'd been living under those constraints that we had in the other program. In addition to that, the Mercury orbit was somewhat - had a little bit higher inclination than Gemini - took these flights up to just a few degrees latitude farther north. This had a very significant effect so far as the weather over ---

Grimwood: This was the switch from 72 to 90 - is that what you're talking about? 72 east to 90?

Amman: No, the inclination in latitude. Mercury went up to about 32-1/2 degrees and Gemini was only just very little above 30 degrees. Of course, it did grow out of the launch azimuth, but surprisingly this does make quite a little bit of difference in the recovery area weather that you had to be prepared to forecast. It's really a matter of only some 120 to 150 miles there but this can be quite pertinent in some cases. But another consideration was the fact that we did not try to cover so many

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of the potential recovery sites with ships. Rather they wound up stationing the recovery ships somewhat even farther to the south of this maximum latitude; because he was down in that area anyway this tended to become the reported weather and, in this case, might have been a little less windy and a little less waves, but he was indicating anything that affected you to some extent in weather forecasts. Furthermore, there is the consideration that the spacecraft itself could stand somewhat more severity, whereas, at least in the early flights of the Mercury program, we were constraining ourselves to such minimized - 18 knots and 5 foot seas in the recovery areas. In Gemini this was boosted up to more like - we would have hardly any concern if the wind got up to about 25 knots and the seas up to 8 feet. And this would not necessarily be limiting. So we wouldn't redline anything because of the recovery area weather until it got up as high as about 12 feet and something over 30 knots. This took a lot of strain off us.

Grimwood: Did the problem on VIII write you a dirty letter?

Amman: We heard considerable rumor about - it shouldn't be rumor - considerable talk about the size of the swells that were incurred in the recovery area for VIII. We tried to check this down as much as we could and we're inclined to think that some of the talk about the size of these waves was over-emphasized, but you can't prove it.

Grimwood: They did get pretty sick.

Amman: You can get sick with exceedingly flat waves if you're out in the water for any length of time. A low swell of only a foot or two can cause you, if it's continued for any length of time, will make you sicker than a real sharp wave will. It goes up 5 or 6 feet on a very short degree of time. We did have - practically every flight - I'd say for 75 per cent of the days, at least one of the four recovery zones - and this principally was in the Western Pacific area - was somewhat unusual. They just chose to overfly it. We never did go into a launch countdown with the idea that we had to have completely satisfactory weather in every one of these areas. During the early period, at least, in the Mercury this was pretty much so. They wouldn't accept anything less than adequate in just about any one of these potential recovery areas.

Cromwood: I guess about your biggest workout, then, was Gemini V, where we had the fuel cell and they kept going from one area recovery to another area recovery, while they were checking it out.

Amman: This is pretty much true. Now, so far as I personally am

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concerned, I did not spend anywhere all the time, at least for the latter flights, in the Mission Control Center in Houston, so my personal experience with this was a little bit limited. I was over there in the case of V and this, of course, does add to the weather problem, if you constantly try to keep updated. But we had done this in the Mercury program, as well, all the time. As a matter of fact, the operations director was a little bit more concerned with this committing to successive recovery areas in the Mercury program than he was in Gemini, in general. At least it's my recollection that in Mercury he was using the four areas - he would come in from one to the next, and from that one to the following, etc., whereas in Gemini it was usually the case that once he passed the prime recovery area, one day, they'd commit him all the way to the next day. But, of course, when trouble came up, as it did in the case of V, then you did have to more or less think along the lines of being sure that you could keep them advised that it was good enough at the very next one. The same thing was true in the case of VIII. But I was not in the Mission Control Center at the time that VIII ---

Grimwood: Where were you on VIII?

Amman: I was home in bed, as a matter of fact. I got up when we the word started coming in that he was going to have to come home.

Grimwood: Didn't you kind of wonder how things were out there?

Amman: Of course I did. I'm no less concerned about the astronauts than I was back there in the Mercury program. So far as I personally am concerned, there are a lot of other things that enter into the reason I say that Gemini was a lot easier than Mercury; and that is the fact that we had a lot more help. During Mercury, the burden was very largely upon Ken Nagler and myself throughout the entire thing, prelaunch, launch phase, and recovery as well. Whereas in the Gemini program, I had most of the responsibility up until launch time. Subsequent to that, our effort becomes secondary and we went over to the Mission Control Center to lend a hand over there. We have a very good organization over there in Sanderson's group.

Grimwood: What help did you get in Gemini from the unmanned satellites? Was that more of a factor---

Amman: I should have mentioned that, I guess. In reality, this didn't touch me too closely. Because of the experiment program being conducted throughout Gemini, many of these experiments were very

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weather dependent and being conducted largely in areas where there was no other source of weather information. The thing that they were concerned about was the extent of cloudiness for conducting some of these experiments. We just would not have been able to answer a lot of the questions that we got from the experiments monitor had we not had available map analysis from the weather satellites.

Grimwood: Very good. Good point.

Amman: We certainly used those very extensively.

Grimwood: I hadn't thought about that. But other than planning recovery alone, you had quite a heavy experiments program ----

Amman: Yes, we did have a very heavy experiments program. As a matter of fact, during most of - I guess probably the last eight flights - we had pretty nearly continuously one man working specifically on that problem. At least, during the time when the astronauts were awake. It's quite a demanding thing. It - I'd say - probably consumes 20 per cent of the manhours that have to go into the effort, once the flight is in orbit.

Grimwood: Did he have to adjust his sleep period to theirs? Did you have one man, you say?

Amman: No, this is true. We had one man come in during the time when they were to be awake, to work on the problems specifically. But the rest of the people over in Mission Control Center would be giving heed to the problem, working with the experiments monitor, while the astronauts were asleep. So he could make his preparations as to whether or not today's going to be appropriate to conduct this type thing. I don't recall which flight it was, but the one in which they had the laser experiment over Hawaii ---

Ertel: It was VII.

Amman: This was a real busy thing, so far as we were concerned, because it took quite a little while to set the experiment up in the spacecraft and, of course, they didn't want to set the experiment up if they didn't have a chance. So this is the type of thing they like to try to plan away ahead of time. So they kept bugging the guys on duty over here in the Control Center right through - around the clock practically -

Ertel: Fourteen days. I was going to ask you, Ernie, how - I remember

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It took you 59 days to get John Glenn off the ground. I wondered how the hell you managed to get one off in seven seconds - Gemini XI.

Amman: It all goes back to the fact that they just were not as particular about taking the pictures of this thing getting off the ground.

Ertel: There were no constraints on the Atlas either - the Atlas/Agena - practically none, weather-wise.

Amman: There was practically none. There were a few cases, incidentally, in the Gemini program. I think it was VI, VII, and VIII, where we made real good forecasts for them because of the fact that we had weather going - had rain falling over here in this area, at the time that the countdown started. We did make in these cases good forecasts that the rain would stop before they - whether or not they would have launched in the rain is somewhat questionable, probably it wouldn't have made any difference, as light as the rain was. But they never like doing that. I haven't mentioned one real significant problem we had, and I think this was with Gemini ~~IX~~, in which the lightning storm came up and was, in one sense, at least, credited with having caused a one-day scrub on the thing, as the countdown proceeded on down. But this was a case where we knew there was going to be lightning in the area on that particular day. Actually what happened, they had difficulty getting the count started. They couldn't get the tanks - the hydraulic tanks - topped off in the spacecraft - or was it the cryo tanks, I don't remember which one - but at least they couldn't get the maximum fuel on board in the early morning and so the onset of the countdown on the spacecraft itself was delayed about five hours, I think, from the time they figured on, so we knew we were likely to be in trouble on that one. And as it turned out we did - we had a thunderstorm form in the near vicinity - a monstrous thing - it was growing right up over the pad - it did not ultimately evolve into the thunderstorm, and I think the comment that came out of one of the astronauts was something to the effect that he needed his windshield wiper while he was still on the pad over there. But in that case, what happened - a lightning strike close-by to some of the power facilities caused the computer to get itself - I guess this is probably one of the biggest weather problems - I know it was, that I had in Gemini. This may not be pertinent to the considerations here, but in terms of how significant this darn cloud cover thing is, you go back to the case of Apollo 202 - I guess it was - which we tried to get off in January last year. That thing sat on the pad for about three days waiting for the clouds to move away. And it was finally determined that the operations director was not as much of a camera bug as he had thought he was before. And

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... finally gave up on his requirements for it and then he got off the next day. Because he did. I guess, probably, you have to look at it as when the constraints are worse, then the weather also gets worse.

Birtel: Did you get completely away from your midnight weather briefings during Gemini? Like we had at MCC during Mercury?

Amman: No, I wouldn't say that. But we got considerably farther away from it than we had - the time of day that the countdown was started was the really important consideration. But, as I recall, people throughout the Gemini program were able to spend a good part of the night in bed. People that I'd have to talk to, at least, were in bed at the time. We didn't have anything like every single night in a row like we did back in the days of John Glenn. We were able to satisfy them the day before that it wouldn't be all that rough.

Grimwood: When they hit the two-month centers, this kind of called on the weather pretty regularly to be good.

Amman: This business - you have to mind it all the time; you can't just forget it for two months, because just as sure as you do - and then try to gin up in one weekend to be ready to go - you have to live with it from day to day; so really it is not that much more difficult from our standpoint. We could probably handle it just as easy or easier. You might be able to take an every month affair.

Grimwood: It keeps you up though?

Amman: Yes, it keeps you up to speed. It's the kind of thing you can't get away from for any period of time, or else you lose your knack for being able to handle it. And for that matter there are things going on around here all the time that we have to be monitoring weather behavior anyway so - - - The added work that is levied by the conduct of a launch is not that much additional, mainly in the nature of tailoring things for specific use, rather than coming up with something entirely different from what we do on a day-to-day basis. We do actually try to pay considerably more attention to the world - the weather in other parts of the world at a time like this. Our normal work around here does not entail being concerned about what is taking place down in Australia, or someplace like that.

Birtel: They don't ask you to control the humidity in the VAB, do they?

Amman: No, but you'd be surprised.. You get questions of this nature every once in a while from people, as to what can I expect in terms of

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humidity and things like that. There are things that are rather critical  
and more. It's not as much the VAB as it is right here in this building,  
the spacecraft checkout area. You have such things as a power out.  
These things are pretty much planned around here and one of the con-  
siderations in planning them is that the weather be satisfactory. A  
power-out, of course, affects the computers, of which we have so  
many in this building; because they can't control humidity, this has to  
be done at select times.

Artel: Very good, Ernie. We thank you.