



NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
MANNED SPACECRAFT CENTER
HOUSTON, TEXAS 77058

JUL 22 1970

REPLY TO
ATTN OFF: EA/70/31

MEMORANDUM TO: Sec attached list

FROM : Chairman, Software Control Board

SUBJECT : A little status report on Apollo spacecraft computer programs

A number of interesting spacecraft computer program things came up at our July 10 Software Control Board Meeting and subsequently. I would like to just make a note of them before the normal minutes are distributed.

a. MIT's long range attack on the Luminary computer cycle problem during descent is development of what they call "variable servicer." They have an offline version called "Zerlina" running now. We plan to hold a design review and then decide what to do with it at our August meeting which will be in time to apply to Apollo 15. I have mixed feelings about variable servicer. Obviously, we think the steps we have taken for Apollo 13 and 14 are adequate. An interesting off-shoot of Zerlina, though, is that it is designed to correct a couple of other problems. Specifically, MIT now agrees with Gramman that the cross pointers can be in error by as much as 3.5 fps during terminal descent. (Note: This is not a new anomaly. It existed on all previous flights. We just were not aware of how bad it was until Clint Tillman rubbed our noses in it - several times.) This display of horizontal velocity is not mandatory but Apollo 14 crew feedback since the meeting indicates it nearly is! Gene Cernan in particular thinks it's very important that we fix it right away. Coincidentally, some manufacturing problem has made it necessary for Raytheon to start over on the Luminary ropes. And the flight schedule has slipped such that mid-September is now the "normal" program release date. Therefore, we have shelved the original Apollo 14 version of Luminary and MIT is preparing a program development plan for transferring about 300 words of the Landing Analog Display Routine (R 10) from Zerlina to Luminary - this being the easiest, least risky way of fixing the cross pointer anomaly in MIT's opinion. And, that's what we'll probably end up flying. Incidentally, this R 10 change also fixes the h error which occurs earlier in descent and we may tune up a few other things, too.

b. As you know, there are three rather significant new capabilities we are adding to the command module computer program. They have all been under development for some time and are implemented in an offline version for analysis and crew evaluation. We are now putting two of these programs under configuration control. They are the reduced workload "Monkey" rendezvous and the Universal Pointing Programs. We are doing this even

though I am sure a number of changes are still desirable because they are in pretty good shape now and we'll never get them settled down without configuration control.

c. The third addition is the new SATURN DAP which was supposed to make manual steering during the launch phase easier for the crew. Currently, there is some uncertainty that the new system is better. Don Cheatham is attempting to settle this issue with the help of FCSU, MIT, and some astronauts. I am hoping we may find we can delete it and save everybody a lot of work and grief. It was interesting to discover that the design of the DAP does not only help the crew but even provides the capability of manual steering with unrelated Saturn failures such as engine-out or hard-over.

d. In order to relieve the massive workload of the LMP during rendezvous, we have finally agreed to provide automatic rendezvous radar updating into the AGS for Apollo 15. This data will be relayed to the AGS through the PCNS downlink. All the necessary coordination has been done to insure compatibility of the two systems.

e. We also intend to do something to help the Skylab command module crew during rendezvous. Specifically, we are "creating" a rendezvous radar using software with the VHF ranging by implementing a program developed by TRW which is said to deduce accurate range rate information from the range data. We are going to provide two modes. One will display to the crew the current range and range rate on the DSKY. The other will permit the crew to input a future time at which the DSKY will freeze on the range rate value for convenience in working the backup chart solutions.

f. Finally, Steve Copps suggested a worthwhile economy, i.e., deletion of all testing of the rendezvous and landmark tracking programs in earth orbit. This, of course, implies that they can not be used but no alternate mission requires them, so that's fine. The price was right so we bought it.


Howard W. Tindall, Jr.

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