

Initial Test Results
STS-116 YERO SAIL Test 10/25/06

ACO

Greg Humble

We did not see any issues with any of our ACO displays or applications during the On-Orbit part of the test.

The only comment I have is to the ground FCOH procedure:

We need to factor in where payload customers fall in the priority of logging on and off. The Spacehab team will be here during the mission, and we need to understand where in the sequence of folks logging on and off they need to fit in. I figure it would be about the same time as the less critical folks, like we did the MER today, and that would be fine, but I'd like to see that get documented so that there will be no confusion on their part when they look at this procedure. Since this procedure is generic, you can use "Payload Customers" or some generic term that would capture all of them.

Boeing

Douglas Huntsman

RE: "It is not known at this time if Orbiter switches are as sensitive to minor jiggles as the SAIL switch is."

I did an investigation, if you can call it that, on the differences between orbiter switches and the SMS switches. In short, the orbiters all have good, solid, firm switches. The wear and tear on the simulators over the years has rounded off edges and loosen spring forces.

This was several years ago in the OPF at KSC. So I can't really vouch for every orbiter switch, of course, this is just a generic/general statement.

DPS

Jason Gibson

The following is a list of issues that occurred during the YERO testing. All occurred during the entry shift.

1) WFCR22 workstation rebooted "on its own". This occurred during the DPS block 7 (aka normal block 12) where we transition to OPS 3. AR 042504 was submitted as a "Major" AR. The flight director wants this worked as a high priority item to ensure that this workstation reboot was not in any way related to the YERO test.

2) The DTEX (DPS Real Time Expert) workstation application crashed on WFCR3. I started this application on WFCR3 after WFCR 22 rebooted (it was running on WFCR 22 prior to the crash). The crash occurred approximately 5 min or so after DTEX was started. AR 042505 was opened as a "Major" AR. The flight director wants this worked as a high priority item to ensure that application crash was not in any way related to the YERO test. DTEX provides

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the DPS operator with health and status data on the orbiter GPCs, MDMs, MMUs, data buses, etc.

3) During entry, at SGMT 1/06:30:55, all 4 PASS GPCs logged a single GPC error. The error details were as follows:
Code: 02/0D, PDE 06F4. The "02/0D" decodes to a GPC "cycle wrap", which means that a process that was scheduled to run on the GPC at a certain time did not run as scheduled because another higher priority process was still running. The PDE of 06F4 decodes to module "DCI_CYC" which "controls CRT dynamic data and fault message line updates". DPS believes that this GPC error is explained by a user note with the following details:

User Note 44391:

Title: "Cycle wraps in cyclic display processor"

Description: "When processes of higher priority than DCICYC generate a high CPU load, DCI will cycle wrap depending on the combination of DEUs/IDPs and the amount of data driven to the displays. No display data is lost."

The flight director requested that the SAIL GPCs be dumped and analyzed by the MER PASS FSW support to determine if this is an explained condition and confirm that it is unrelated to the YERO test. DPS was not involved in the capture of the dumps.

Jeremy Battan (PASS FSW):

Regarding Item (3) [above] - The Cycle Wrap is indeed an explainable condition covered by User Note 44391. This is no way related to YERO.

Details:

SPEC 50 HORIZ SIT is the most I/O intensive display in the PASS suite, and takes several minor cycles to complete a single refresh on any given CRT. Just prior to the Cycle Wrap, SPEC 50 was up on CRT2 when the crew decided to move it to CRT1.

The order of events: 1) Call up SPEC 50 PRO on CRT1; 2) RESUME on CRT2.

Another feature of PASS is that calling up any SPEC will incidentally refresh any instances of that SPEC on all other CRTs. (This is to meet the requirement of "Same display shall be at the same step on all CRTs".)

So calling up SPEC 50 on CRT1 resulted in a total refresh of all the fields on both CRT1 and CRT2 - combined with the already high CPU of Final Approach (65%) - resulting in a one-time Display Process Cycle wrap.

Ronnie Montgomery

Another "funny" we had was that during the mixed config (Shuttle on GMT day 366 and ground on GMT day 1) we were unable to retrieve TDRS vectors from

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the Traj server. We continued to receive ground site and shuttle vectors during the mixed config and the timetags on those vectors had GMT day 366. Once we re-IPL'd the onboard computers and synced them up to the real time (GMT day 1) we began receiving good TDRS vectors from the Traj server.

This isn't a major problem but it would impact DPS's ability to monitor onboard time drift during the crew sleep period.

EVA

David Beaver

For EVA everything was nominal for the SAIL Test, so nothing to report for the debrief

FAO

Terry Clancy

- FAO Overview shows GMTLO as 0/00:00:24.
- Mnv Display shows MET of 365 days and GMT of 366 days. Once crew did IPL update, Mnv Display times were correct.
- FAO Contamination - SAMMI display has wrong MET, incrementing 17 min every second (Ok in Contamination - GENX).

Carolyn Jarrett (DV)

Do you guys want to treat the SAMMI display problem as a YERO issue or will your GENX version be certified before flight?

The LO and MET change are related and are a known side effect of the YERO procedure. We will need your input in solidifying a plan for how to handle that so everyone one knows what to do.

Fisher Reynolds

The plan is to use the GENX version.

FDO

Dick Theis

First the biggies:

1) Commanding during the mixed config period (onboard & ground out-of-sync): We had trouble building a State Vector command on the primary activity with a vector timetag of 366/01:00 GMT to match the onboard after the ground YERO recycle. (I need to check with Stein, but I don't think he was ever able to build one. I'm not sure what happened as I built one on this same load during last week's ILC. Hmm. Mine was built while the TRS was in the old year - which I think he was also able to do.) I was able to build such a command on the 2ndary activity (TRS in 2006), but it was rejected by the onboard (possibly due to the time difference between SAIL & the MCC). Bob also had trouble deleting a

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vector command from the inventory. (I'm not sure how he was finally able to get rid of it.)

2) GenX displays: AR 042502 written - Displays show 000 instead of 365 for day. This was across many (all ??) disciplines. It didn't affect the FDO too much, but DFE was unable to see the times for vectors he shipped to Goddard - thus, he was unable to verify what he was sending. His log also showed the erroneous times. Goddard reported the correct times.

Others - more minor:

1) OMP (FDO's rendezvous targeting processor) - We were able to transfer burn plans that went over the YERO into an ephemeris with the TRS (TRAJ Server) in 2006. While retargeting the next burn in the sequence, if vectors were fetched just after midnight from the ephemeris, the processor output a warning message ("Input value is above interpolating range of table") and the resulting burn plan contained erroneous burns (values for 3 of the burns in the plan differed by ~ 0.5 fps).

2) POINTING: Post YERO recycle - TDRS vectors fetched showed the GMT of L/O (GMTLO) as -86400 seconds (the number of seconds in a day). Orbiter and other vectors fetched showed 0:0:0:0.001 as GMTLO.

3) DPS: Vector fetch tool - Did not get TDRS vectors until the onboard GPCs were IPL'd. This seems strange as I think the vectors were being fetched from the ground Traj Server.

4) Timeline: Post YERO vector files (EPH.ORB, EPH.ASC) were moved to IPS. When she tried to use the files and propagate a vector for a few days, she got the message "Density model altitude (Jachia-Lineberry) out of bounds." (I'm not sure this is strictly a YERO problem or one associated with the Lift Off time in the files being a fractional second off. FAO has had some problems using our files in the past, but I thought those were fixed.) She was able to use our files pre-YERO. Perhaps the L/O of 1/0:0:0 GMT is causing the problem.

5) FDO Ascending Node Display: Pre-YERO - cycled the display through time conversions (GMT, MET) several times. It would work for a few cycles, but then gave obviously bad results (-47 days MET) after displaying calendar GMT.

Biggest surprise: We were able to generate an entry set pre-YERO for a deorbit/entry in the new year. This set & an orbit planning set that spanned YERO were successfully shipped to GSFC FDF and received. All vectors w/ day 366 time tags were interpreted as day 1 of the new year in the GSFC software.

Overall the test was a success. We did not see any show-stoppers except the Command limitations. Since we do not expect the onboard vector to appreciably

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degrade while we're docked with the ISS, this limitation is acceptable. It does mean that we should not delay the re-IPL of the GPCs for more than 8-10 hrs or so.

A little clarification on the "biggest surprise" for those not familiar with our previous testing. This was a surprise (that we were able to generate an entry set for a deorbit opportunity in the new year with an ephemeris anchored in the old year) because we were not able to do this on one of our earlier tests. That GSFC successfully received them was also a surprise because previous conversations with the Goddard folks led us to believe (and expect) that shipping them vectors with day 366 time tags would fail.

RE: Vector command build problem

Robert Stein

Could never build a vector command on day 366. Apparently the command I was having trouble deleting was really gone, but the display did not update. I dropped the display and brought it back and the command was gone. Also note that we were able to monitor the health of the onboard vector and that in a real pinch we can wake the crew and make them go through the procedure if things get real bad.

Dick Theis

As Bob mentions, our navigators figured out how to monitor the health of the onboard vector from the prime activity during the mixed configuration. However, having the 2nd activity makes this monitor process continuous & easy to do.

RE: OMP problem

Carolyn Jarrett

Isn't the OMP problem a known "feature"? You can't generate a SV the first 2 minutes or something like that?

Dick

No, you're thinking of the ephemeris generation. We have to start the ephemeris at least 10 or so minutes after the new year.

The OMP worked before - at least as far as we had tested it. We had only tested part of its total usage. I had transferred one burn plan (multiple burns) to an ephemeris. Yesterday Susan transferred a multiple burn plan & then did some vector fetches to compute the next burn in the sequence -- which is SOP. These fetches, when close to the rollover, gave erroneous results. Usually we fetch vectors at least 15 minutes from other events in the ephemeris. Perhaps we will have to treat the rollover as such an event. The vector fetch/intrpolation scheme may be having problems when fetching vectors close to the rollover. This is just a guess on my part. Further testing would be required.

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Perhaps Susan's problem fetching vectors near (beyond YERO, but within 2 min, I think) YERO, were related to your MPTGEN problems. She got the following message: "Input value is above interpolating range of table." Here resulting burn plan had erroneous results (3 of the burns were 0.5 fps different than what was expected). See my note below - I think we could be running into interpolator problems. What do you think?

Susan Snyder

Actually, the problem for the interpolate started with a grab that was several hours after YERO. I backed the time tag up until I didn't get that error and it cleared around YERO +2 minutes. Between YERO and YERO +2 the data was good.

Dan Adamo

From Susan's description, I'm thinking the OMP behavior is indeed reasonably consistent with what I saw in MPTGEN. She was OK until after 366/00:02:00, and I was OK until after 366/00:00:50. The diagnostic message was the same in both cases, "Input value is above interpolating range of table".

A key tidbit in relating the two occurrences of this message may be Darrin's observation that it's not in the MPTGEN User's Guide or SRS. To me, that means the common source must be some lower level library routine OMP and MPTGEN have in common. If we're really serious about flying with YERO, we need to get folks with deeper insight than we users have to track down what's happening in our software near and after midnight Dec 31.

Maybe it's just my recent experience with STS-116 secondary payload deploys, but IMHO this entire YERO exercise is diverting attention from where our STS-116-related efforts should be focused. The Program and DM are unwilling to pay for seamless year-to-year transitions as bona-fide requirements in our software. I know this because I've written multiple ARs on YERO effects for years now, and each has been closed due to permanent limitations.

We therefore need to stand down until January 2007 if we haven't launched by December 17. Anyone who feels differently should be supplying plenty of high-confidence rationale I have yet to hear.

RE: GENX Display problem

Tony Correll (MSOC)

There is good news and bad news on this.

The bad news is that the anomaly is inside the Gen/X RT library so it affects Gen/X Classic as well as the RTC. This means that some OST displays are affected as well. SMARTE is not affected, nor is OST CMD displays (they don't use floating point times).

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The good news for the RTC users is that they have 2 custom time format options that both work.

Custom #14 displays the time as 366:12:34:14
Custom #15 displays the time as 001:12:34:14

Neither is affected by this bug. So the TRAJ folks can identify those times they really think are important and change the formats for STS 116.

The fix will be applied in the next version of Gen/X and I will deliver a version 21 of the RTC when SPOC wants it.

Robert Burmeister

I'll be in touch with the FDO and NAV folks to determine the extent of how many of their displays are affected by this, and how we plan to fix it.

It's looking like we'll still fly STS-116 with RTC 20. RTC 21 will be dealt with at a later date.

FSW

Carlos Valrand

I was at the SAIL for the sim today and did not get to see you and the others at the MCC, although I could hear you and the others on the voice link. I was there from 9:00 AM until the completion of the BFS YERO procedure. All went well from the FSW point of view, and as far as I could tell, the MCC reboot went very well and was fairly quick. The observed behavior of GMT and MET in the onboard displays was as expected. The only oddities were test-specific issues: the unintended resetting of the switch for the GPC-1 re-IPL (that was redone so no harm done) and trouble with some uplinks (had to be re-done, but no harm done).

During the YERO SAIL/MMC test yesterday, Paul Relyea and I measured the GPC internal clock drift rate as 0.3647 seconds/hour. This was a snapshot at 15:18 MM:SS past YERO.

GNC

Jason Helms

During the YERO test after step 7 of Part 2 (GPC 1 IPL) IMU attitude RM did not appear to be functioning. In today's test, after the IPL the IMU attitude RM value appeared to be zero, which would have failed out two of the IMUs. This never happened. IMU RM was regained following the IMU alignment at step 25 and worked normally for the rest of the test. Currently, this is not thought to be a problem at all, it would take another failure in this configuration to be a problem,

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and we are only there for a short period of time. This also may be a feature of the IPL more than any affect from YERO, but GNC is still investigating this issue.

GPO

Tom Schmidt

10/25/06 STS-116 YERO Test Report Summary

- * Overall, no issues with supporting the STS-116 YERO procedures
- * GPS age of aiding value was 251 milliseconds while on good MTU clock. This value grew to larger values after the GPCs were forced to internal time. The estimated GPC clock drift rate based on this downlist value was approximately 0.93 milliseconds/minute (slowing down direction).
- * GPO WFCR 30 workstation was left up and running during and after the YERO event to monitor the onboard Nav state. This workstation used the “no-recycle day 366” traj server activity. It is highly desired to use this type of MCC workstation activity after the YERO event when the MCC and onboard are in the mixed config (day 1 versus day 366) to monitor onboard navigation errors. There should be no issues with using this activity if it is not connected to a command server and it is not used during the YERO event.
- * After the YERO event log-on, the MCC selected GPS source for trajectory/guidance use was changed from LRU #2 to the selected GPS source to monitor GPS versus onboard state vector comparisons.
- * The 116 SAIL test objective to uplink GPS age of aiding corrections via the DSM 398 command load was not performed due to command data rejections. This might have been due to timing differences between the MCC and SAIL. The command data rejections were observed when using the prime 116 mission workstation activity.
- * The first attempt to send up the RNP matrix to the PASS for YERO part 2 was rejected (command data reject), but the second attempt worked. GNC uplinked the years worth of seconds for the GPS SOP time adjustment as a deviation to the SAIL test procedure. All YERO part 2 and 3 uplinks were successful. No workstation application problems were noted.
- * It was stated that the MCC was about 5 seconds ahead of SAIL time.
- * GPS was processed in the PASS and the BFS in MM 301 before the deorbit burn.
- * No guidance or Nav issues were noted during the deorbit burn or entry. The SAIL plasma model is more conservative than what is expected for flight. Received “No Update GPS” fault message in PASS due to GPS FOMs greater

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than 5 for at least 5 minutes during plasma period. Also received "NAV EDIT TACAN" message due to SAIL TACAN model (late TACAN processing due to late TACAN range lock-on). Good KSC landing.

INCO

Doug Branham

During the YERO Test it was determined that "some" of the commands going to the SAIL were being DATA Rejected. It was determined that the Ground Command Server was ~ 4 seconds ahead of OI MTU time being received by OF1 MDM. In this condition, the S-Band COMSEC was receiving commands with the incorrect (future) ground time stamp. These commands would be rejected by COMSEC.

Background:

The onboard COMSEC receives MTU IRIG-B time (Day/Hour/Min/Ten Seconds) and updates this "time stamp" every ten seconds. Ground Commands sent from MCC are XORed with a ground generated IRIG-B time (Day/Hour/Min/Ten Seconds) and sent to the Orbiter. The onboard COMSEC XORs the onboard MTU time stamp with the MCC generated MCC command with XOR time stamp. If both times match, the ground command XORed back out and can be processed by the GPCs. If the ground time doesn't equal the onboard IRIG-B time, the Ground Command is compared to a 10 second previous MTU Time. Thus allowing ground commands to execute onboard if they are less than 20 seconds in the past.

Our MCC commands were clocking ~4 seconds fast, so I theorize that we were sending commands from MCC, prior to the onboard MTU IRIG – B from updating the "next 10 second" increment.

Example #1: If we sent a command at Ground generated GMT 001/00:20:01 down here in MCC, the Ground Generated IRIG-B time stamp will be 001/00:20:00. It is received onboard at 001/00:19:59 (remember the Orbiter is 4 seconds slower), which means the COMSEC still contains the "old" MTU IRIG – B time of 001/00:19:50. The Time Stamps don't match 001/00:20:00 <>001/00:19:50 (or the second 001/00:19:40). So the command is zeroized, and we down here in MCC get a data reject'ed command.

Example #2: If we sent a command at Ground generated GMT 001/00:20:05 down here in MCC, the Ground Generated IRIG-B time stamp will be 001/00:20:00. It is received onboard at 001/00:20:02 (remember the Orbiter is 4 seconds slower), COMSEC still contains the "old" MTU IRIG – B time of 001/00:20:00. In this case, we get "lucky" and the times stamps match allowing the Command to go to the GPCs.

I double checked command track history and low-and-behold all of the commands sent from the command server at the "1" second mark (01,11,21...51)

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Data Rejected and all the commands which weren't ground "time-tagged" at the "1" second mark worked. My theory seems to be true.

So in the end, I just waited for our Ground Generated time "seconds" mark to equal 5 or above and all those commands worked.

I forgot to add 1 last thing.

This commanding problem has NOTHING to do with YERO. It has to do with how our MCC sets up their time relative to the SAIL.

MER

Michael Wright (SSP MER Manager)

The MER is prepared to support YERO for STS-116 should it become necessary. The MER had no issues related to the YERO procedure during the October 25 test with SAIL.

Jeremy Battan (PASS FSW)

1) Backup (non-recycled) Server:

Since we (PASS) had two stations manning this simulation, we decided to have the primary station log in using the Primary STS-116 activity, while my station logged in using the backup "non-recycled" server activity. That way we could compare data streams for any differences, and see how they differed when the YERO event occurred.

The backup server was functional from Sim Start - *through* the YERO event - and was feeding me continuous data until I logged off that activity about 5 hours after YERO. I admit that the only useful application I had running was the DPS Overview, so I was not driving any computation-intensive Traj displays etc. The DPS Overview showed me all the data I needed during the YERO event (GPCs set to Internal Time, MTU rolling-over to day GMT 001), which was extremely useful since everyone else (being logged into the Primary-Server activity) were commanded to log off during that timeframe.

The only issue I had with the backup server was that it did not have any of the DPS "comps" running. As I understand it, the DPS computation programs run in the background and interpret the downlist stream to filter and merge certain inputs for output on some other DPS displays. Since the comps weren't running, the outputs were obviously unavailable. Some examples of this were: The DPS Onboard Fault Summary, the DPS SPECs display, the DPS Time display, and the MEDS Scratch Pad Line on the DPS Overview display.

The lack of "comps" did not adversely affect my YERO monitoring. I would even assume that the capability was present to activate these comps if anyone had asked, but at the time I figured everyone was busy enough following along with the procedures.

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2) ODRC YERO Gap

Following the YERO event, I went back and requested some ODRC data across the rollover timeframe. My request was from 2006_365/23:00:00 to 2007_001/02:00:00. I was pleased to see that JMÉWS correctly merged the two years and gave me one sequential set of data. I was disappointed to see a window of missing data from 365/23:58:55 to 001/00:16:29. I know we had good telemetry over this window, because I was seeing continuous data on my workstation from the Backup Server all the while. I was not aware that the ODRC data collection was to be recycled along with our MCC servers, or else I would have been taking a lot more real-time screenshots of my displays during YERO.

NAV

Carolyn Propst

It sounded like there was a conversation on the Flight Loop during the test regarding the secondary activity. I'm not sure I heard all the conversation, but I believe it started with one of the controllers asking why they were not able to watch the rollover event while we (Trajectory) were able to on the secondary activity. This then progressed into a conversation as to why the second activity should be out there and is it mandatory.

Here's my two cents ...

Nav did not request a secondary activity until it was clear that there would be an extended period (perhaps up to 10 hours) when the onboard and the ground timing would be out of sync. The request was not made to observe the rollover but to monitor the O/B during the extended out of sync timeframe. While a workaround for O/B monitoring was discovered during the test today, it is a manual workaround that is not an optimum solution. It was unclear to me from the conversation if the issue was that we (Trajectory) had a secondary activity that allowed us to observe the rollover and that others did not log on to (although there is nothing preventing anyone from logging onto this activity) or if the issue was that activity remained up during the YERO event.

I contend that, although not mandatory, the secondary activity is very highly desirable to maintain an awareness of the O/B Nav state. If needed and if the concern is that the activity was not recycled, we could log off the secondary activity at the YERO and get back on after the YERO event (still in 2006) and be able to maintain an awareness of the O/B health during the out of sync timeframe.

PGSC

Alan Currie

Robert Readinger, Alex Pena, and Sandra Castillo supported the PGSC YERO test in SAIL yesterday and have analyzed the data logged during the test. There

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were 3 anomalies noted and number 3 looks like the only substantial impact to us. We have the logged data out on our server, so we can do additional testing if necessary using playback data.

Oddball occurrence #1: Windecom MET was day 016 when SAIL went to run. About 20 mins into the test, the MET went to day 364 through the end of the year. TVServer 3.xx applies GMT and MET data as a set, but considers Windecom MET > 30 days to be invalid, so the GMT and MET time data received during this time period was not applied via TVServer 3.xx for use by Deorbit Manager. TVAServer 4.xx applies GMT and MET separately, and doesn't validate MET data. GMT and MET were applied via TVAServer for use by WorldMap.

Results: The MET of 364 is most likely do to bad sim data. Even with this bad MET value there was no operational issue for Deorbit Manager or WorldMap.

Oddball occurrence #2: At year end rollover, the Windecom GMT rolled to 001/00:00:00 as would be expected (no issues there), however the MET value also rolled to 000/00:00:00.

Results: The MET rollover may or may not be a sim data issue. If this does occur on orbit, the effect is that Deorbit Manager and WorldMap will display an invalid MET. The launch time is also recalculated from the MET and will also be incorrect on the Deorbit Manager and WorldMap displays. Deorbit Manager uses the launch data and calculated MET for its computations, so this may have an adverse affect on Deorbit Manager if this MET rollover actually does occur on orbit.

Oddball occurrence #3: The Windecom state vector time tag did not rollover at the end of the year, but went to day 366. TVServer 3.xx (for Deorbit Manager) noted this as bogus data displaying 2007/-01/23:59:59 and didn't apply the state vector. TVAServer 4.xx uses a SRTL (SpOC runtime library) routine to convert the time value received from Windecom. The GMT of 366 for a non-leap year is converted to 1 year 1 day by the routine. Thus the state vector time tag ends up being 2008/001:00:00 instead of 2007/001:00:00.

Results: If this is the true flight like scenario, the state vector data for Deorbit Manager will not be applied because of the 366+ day values (minimal impact). The state vector for WorldMap will be applied, but will be 1 year in the future. If we fly over the year end rollover, it is recommended that a work around be put in place to disable the telemetry feed for WorldMap and Deorbit Manager prior to the year end rollover. This can be done via the crew, or the ground can uplink data file changes to inhibit the telemetry requests for these applications.

I think 1 and 2 are explained as expected in what was done in the procedure for MET. I'm still a little worried about the MET rollover effect on Deorbit manager.

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We'll have to look at the data some more to determine if it went to day 1 with the IPL.

On number 3, it looks like we'll need some work to develop a procedure to have the OCA officer uplink some data files to disable looking at the telemetry feed after rollover because these two applications, as they currently sit for STS-116, do not handle the state vector time tag correctly. The loads have been built, and the laptops are being prepped for bench review.

In the bigger scheme of things, the PGSC's are crit 3 for enhanced crew situational awareness, I'm sure we could now develop some procedures and have the ability to test these procedures to make sure they would handle the rollover.

Carolyn

If we launch on Christmas, the Commander is going to be doing the YERO procedure while the others are doing EVA prep. Do you have enough information from this test to be able to evaluate that scenario?

Alan

I think that we do. The MET and GMT was captured in the ODRC, and we know now what effect that has on our software.

The PGSC's are crit 3, for enhanced crew situational awareness. DOUG and RSAD would be the primary applications supporting EVA and we don't have a concern with them.