



National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas 77058

STS-6 AIR/GROUND TRANSCRIPT
VOLUME ONE
PRELAUNCH THROUGH MET 1 DAY, 8 HOURS

Public Information Office/ AP3
Johnson Space Center
Houston, Texas

PAO Airports in the area have been informed that the radio frequency reached by the chase planes will be active prelaunch and asked to keep that channel clear of other traffic.

SPACECRAFT(garble)

PAO The NASA test conductor has asked safety and security to verify that all non-essential personnel have cleared the launch danger area, and has been assured that the close-out crews have cleared the road blocks. The purge of fuel cells used to generate electricity onboard the Orbiter has been completed. The booster test conductor has started the flow of gaseous nitrogen purge of the aft skirts of the Solid Rocket Boosters, this flow of inert gas insures that no explosive or flammable gases can accumulate in the bottom of the solid motors prior to the ignition. The countdown clock just about 35 seconds away from the final 10 minute built in hold, in our count. The flight crew has closed the vent valve on the crew cabin and cabin pressure has been verified. The comparison of the prime computer with the onboard computer has been completed, and that is satisfactory. All aerosurfaces and actuators on the orbiter are presently in the proper configuration for the auxillary power unit to start and hydraulic pressure to be applied. 5 seconds away from our hold, T-9 minutes and holding.

SPACECRAFT (garble)

PAO This is a 10 minute built in hold. The STS-6 mission is a mission of many firsts. It's the first flight of the Space Shuttle Orbiter Challenger, the first flight of the light weight external tanks, which carries the liquid hydrogen and liquid oxygen for the main engines on the Orbiter. Altogether, the weight savings are significant increasing the cargo care carrying capability, 20,000 pounds altogether has been saved compared with the last launch of the Columbia Orbiter. This is also the first use of the higher thrusts main engines on the Orbiter, they will be operating a 104%, rather than 100% of rate of thrust. Another first scheudeled for this flight will be the exiting of the crew compartment by Mission Specialists, Dr. Story Musgrave, and Donald Peterson, to spend 3 1/2 hours moving about the cargo bay in the cold vacuum of space. At this time, Launch Director, Al O'Hara speaking to the launch crew. Launch Director, Al O'Hara has wished God's blessing to the crew for a good launch and a good mission, and the crew has been tnankeed by the Commander for the STS crew, and also by Karol Bobko, who's considered sort of an honorary KSC member because of the many months he spent here at the Kennedy Space Center as a support astronaut prior to the first shuttle mission. Everything moving along. The countdown clock at T-9 minutes and holding. This is Shuttle Launch Control.

PAO This is Shuttle Launch Control, T-9 minutes, and

holding. Approximately 5 minutes remaining in this hold period, everything appears to be satisfactory as we proceed through the count, the NASA test director is conducting a status check to insure that we are ready to resume the count and go for launch. Following ignition of the solid motors in lift off, the vehicle will take approximately 7 seconds to clear the tower, at that point the shuttle velocity will be greater than 100 ft per second, and increases. When the velocity reaches 121 ft per second, the vehicle will begin to pitch over followed by a roll maneuver to align it properly with the flight azimuth, at 53 seconds into the flight, the vehicle will encounter the greatest structural loads on it. And the crew will reduce the main engine thrusts to keep the dynamic pressure below 58 pounds per square foot. This is a major mission for both NASA and the commercial community. The first flight of the Orbiter Challenger is also carrying the first of the tracking and data relay satellites. This is the first of three identical Spacecrafts planned to replace Earth bound tracking station, built by TRW for Space Comm, a company owned jointly by Western Union and the America Satellite Company. The TDRS satellite will be leased by NASA for a period of 10 years. Whereas the present ground tracking stations can provide coverage of low Earth Orbiting satellites and the space shuttle about 20 percent of the time. The TDRS network, will provide virtually 100 percent coverage.

END OF TAPE

PAO The tracking and data relay satellite is the largest and most advanced communication satellite ever launched, shaped something like a four-armed spider; it weighs 4,668 lb in orbit. The solar panels on two of those four legs measure 57 ft from tip to tip and the antenna legs on the opposite direction measure 42 ft across the antennas. Extending outward from the spacecraft body are arms which hold two 16-ft diameter antennas. These reflector-type antennas weigh only a few pounds despite their size and they're woven out of a metal molybdenum and plated with a very thin layer of gold to provide the electrical and thermal characteristics. This molybdenum mesh was woven on the same type of machines used to make women's stockings. Just about 2-1/2 min. away from picking up the countdown at the T-9 min. point. We have gone through a status check and everybody has assured the launch director that we are ready to resume the count and go for launch. The countdown clock at T-9 min. and holding. This is Shuttle Launch Control.

PAO This is Shuttle Launch Control. Just 30 sec away from coming out of the final built-in hold at the T-9 min. point in our countdown. Looking for a liftoff on time of STS-6, the 6th flight of the space shuttle and the first flight of the Orbiter Challenger at 1:30 p.m. Eastern Standard Time. The countdown clock about 5 sec away from picking up the count. We are holding the clock at the T-9 min. point while we check on the booster system. The NASA test director is in the process of checking with the booster test conductor to determine whether or not there is a problem. Okay. We have gotten the go to pick up the clock, and we will pick up in 10 sec at the T-9 min. point. Approximately 5 sec, 3, 2, 1. T-9 min. and counting. The launch events are now being controlled by the ground launch sequencer from now up to T-25 sec when they switch to the onboard redundant set launch sequencer. The ground launch sequencer is part of the launch processing system and operates by relaying commands to the Orbiter's onboard computers which then report back to the launch processing system when the commands have been executed. The primary job of the computers is to check that all of the launch commit criteria, such as propellant loads, temperatures, pressures, and other measurements are proper. The launch and recovery director has ordered the chase planes to take off. Coming up on the 8 min. point in the countdown. T-8 min. and counting. Everything proceeding smoothly towards an on time liftoff at 1:30. The liquid oxygen fill and drain valve in the external tank has been closed and topping of the tank completed. Liquid oxygen drainback has been started. This means that liquid oxygen is flowing through the main compulsion system and back to the large storage tank to cool the system down slowly to 270 deg below zero so they'll not be shocked by the torrent of super cold fluid. T-7 min., 27 sec and counting. At the T-7 min. point the crew access arm will retract and is in the process of retracting right now. This is the walkway used by the astronauts to get from the service structure to the Orbiter. If

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an emergency should arise, that tower can be put back in position within 15 sec. T-7 min. and counting. Like other things in the countdown today, we have been just slightly ahead of schedule as we go down towards a liftoff. T-6 min., 30 sec and counting. At the 6 min. point, the crew will perform the auxiliary power unit prestart which consists of positioning a number of switches and verifying that they are in the proper position, then throwing the three propellant isolation valve switches which allow the hydrazine fuel to start flowing from the tanks toward the APU's. Coming up on the 6 min. point. T-6 min. and counting. The pilot Karol Bobko has been asked to perform the APU prestart. T-5 min., 49 sec and counting.

END OF TAPE

PAO ... toward the APU's. Coming up on the 6 minute point. T minus 6 minutes and counting. The pilot Karol Bobko has been asked to perform the APU prestart. T minus 5 minutes, 49 seconds and counting.

SPACECRAFT T minus and 45 second mark.

PAO T minus 5 minutes, 40 seconds and counting. The flight recorders are on. The flight recorders provide measurements of the Shuttle system performance during the entire mission for a playback after landing. T minus 5 minutes, 25 seconds and counting. Everything going smoothly towards liftoff.

SPACECRAFT We have (garble) ready to start.

PAYCOM Thank you.

PAO And we have a go for APU start, coming up on the 5 minute point. T-5 minutes and counting,

PAYCOM Go for APU start.

PAO Go for APU start.

SPACECRAFT APU start. Mark.

PAO APU start is in work, The APUs are auxillary power units provide hydraulic power to move the aerosurfaces and main engines for steering. The astronauts have closed their visors. T-4 minutes 30 seconds and counting. The firing circuits for the solid rocket booster ignition and range safety destruct devices has been armed by a ground launch sequencer command, this is accomplished by a motor driven switch called an arm and safe device. The system is then inhibited to prevent premature ignition. T-4 minutes 5 seconds and counting. The main fuel valve heaters have been turned off, in preparation for engine start,

SPACECRAFT (garble) sequence four.

PAO The main engines on the Orbiter will actually be started at the T-6 point 8 second point, it takes 3 seconds for them to reach 90% thrust at which time the solid motor ignition sequence starts. T-3 minutes 40 seconds and counting. The elevons, speed brake and rutters are now being moved through a pre-programmed pattern to ensure that they are capable of doing their jobs during flights. T-3 minutes 27 seconds and counting. The shuttle is now on internal power, however, the fuel cells are still receiving some fuels from gound support equipment for another minute. T-3 minutes 13 seconds and counting, the profile checks of the aerosurfaces is complete and

verified, and the aerosurfaces are in launch position. Coming up on the 3 minute point. T-3 minutes and counting, the engine gimbal of movement check of the main engine's is under way. The liquid oxygen valve for filling the external tank is closed and pressurization has begun. T-2 minutes 45 seconds.

PAYCOM (garble) you can clear the caution and warning.

PAO The gaseous oxygen vent arm is being retracted. T-2 minutes 30 seconds and counting. The fuel cells ground supply of oxygen and hydrogen has been terminated and the vehicle now on it's onboard supply. The beanie cap, or gaseous oxygen vent on, carries away vapors from the oxygen tank while the tank is full on the pad.

SPACECRAFT (garble)

PAO Coming up on the 2 minute point in our countdown. The main engines have been moved to their start position, and the astronauts have cleared the caution and warning memory. T-1 minute 56 seconds, and the liquid hydrogen vent valve has been closed. Flight pressurization is underway. T-1 minute 35 seconds, at this point the computer automatically verifies the readiness of the main engine.

PAYCOM -1 minute, 30 seconds,

PAO T-1 minute 30 seconds, and counting, the liquid hydrogen tank is now reaching flight pressure in approximately 5 seconds from now. T-1 minute 20 seconds, and counting. The liquid hydrogen tank is at flight pressure. Coming up on the one minute point in our countdown. T-1 minute and counting. The firing system for the sound suppression water system is on. T-55 seconds, in the hydrogen ignitors under the orbiters engines have been armed.

END OF TAPE

PAO T-1 min., 20 sec and counting. The liquid hydrogen tank is at flight pressure. Coming up on the 1 min. point in our countdown, T-1 min. and counting. The firing system for the sound suppression water system is armed. T-55 sec and the hydrogen ignitors under the Orbiter's engines have been armed. These devices are used to insure any hydrogen flowing through the engines prior to engine ignition does not accumulate. T-40 sec and counting. We are just seconds away from switching command of the countdown to the onboard computer. T-30 sec and counting. We are go for auto sequence start. The hydraulic power units on the SRB's have started. T-20 sec and counting. T-15, 14, 13, 12, 11, 10, we are go for main engine ignition, 7, 6, we have main engine ignition, 4, 3, 2, 1, 0 and liftoff. Liftoff of the Orbiter Challenger and the 6th flight of the space shuttle. The Shuttle has cleared the tower.

SPACECRAFT Challenger is on the way and we've got a whole program.

CAPCOM Houston, copies Challenger.

PAO The period of maximum air dynamic pressure, 30 sec elapsed. Throttles in all 3 main engines coming down to 81 percent. Velocity 2,000 ft per sec. Altitude 3-1/2 miles. Downrange 2 miles. One min elapsed. Main engine throttles going back to 104 percent. Challenger is go at throttle up.

CAPCOM Challenger, you're go at throttle up.

SPACECRAFT Roger. Go at throttle up.

PAO Trajectory is slightly depressed. No problem. Flight dynamics officer reports.

CAPCOM Challenger, Houston. We see you're slightly depressed. No problem.

SPACECRAFT Okay Dick.

PAO Velocity 4100 ft per sec. Altitude 15 miles. Downrange 14 miles. Velocity 5100 ft per sec. 20 miles in altitude. Downrange 22 nautical miles. Standing by for solid rocket booster separation.

SPACECRAFT (garble) was really something. There's an awful lot of crud on the windows at SRB's SEP Dick.

CAPCOM Roger. We copy that.

CAPCOM Challenger, your first day's performance was nominal.

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SPACECRAFT Okay. Thank you.

PAO Guidance has converged. Velocity now 6000 ft per sec. Altitude 31 miles. Challenger is 46 miles downrange.

CAPCOM Challenger, you have 2 engine tal capability.

SPACECRAFT Two engine tal.

PAO Challenger now capable of a transatlantic abort to Dakar airport on Africa's west coast if one main engine fails. 3 min. elapsed time. Velocity 6800 ft per sec. The altitude's 39 miles. Challenger is 70 miles downrange. All 3 main engines still at 104 percent. Challenger is go at 3 min. 15 sec. Flight Director, Jay Green taking a status check at all positions prior to Challenger reaching negative return point. Velocity is 7800 ft per sec., 47 miles altitude.

CAPCOM Challenger, you're negative return.

SPACECRAFT Roger. Negative return.

PAO Challenger no longer able to return to the Kennedy Space Center. Challenger is 127 miles downrange in an altitude of 50 nautical miles, velocity 8700 ft per sec. 4 min., 25 sec elapsed. Velocity 9500 ft per sec. Altitude's 53-1/2 miles, 165 miles downrange. Challenger is still go all systems. All 3 main engines still at 104 percent.

END OF TAPE

PAO 4 minutes, 25 seconds elapsed. Velocity 9500 ft per second, altitudes 53 1/2 miles, 165 miles downrange. Challenger is still go all systems, all three main engines still at 104%. Velocity 10400 ft per second, altitude 55 miles downrange, 196 nautical miles. Standing by for press to MECO,

CAPCOM Challenger, press to MECO.

SPACECRAFT Press to MECO and normal thottles.

PAO That press to Main Engine Cut Off call tells Spacecraft Commander Paul Weitz the Challenger can now continue uphill if one main engine fails. Flight Director Jay Green polling all positions, all controllers reporting everything looks great. Five minutes 40 seconds.

CAPCOM Challenger, you have single engine TAL capability.

SPACECRAFT Single engine TAL.

PAO Challenger now capable of reaching Dakar airport if two main engines fail. Velocity 13900 ft per second, altitude is 58 nautical miles downrange, 321 nautical miles. Time for main engine cut off computed for 8 minutes, 20 seconds. Velocity 15000 ft per second, altitude's 58 nautical miles, downrange 364 nautical miles. 6 1/2 minutes elapsed time. Velocity up to 17000 ft per second, still at 58 nautical miles. Challenger at 433 nautical miles downrange. 7 minutes elapsed time.

CAPCOM Challenger, you're single engine press to MECO.

SPACECRAFT Single engine press, thank you.

PAO That call tells the crew to press on even if two main engines shut down early. Challenger's velocity nearing 20 thousand ft per second. 529 miles downrange, at an altitude of 58.1 nautical miles. Main engine cut off still computed for 8 minutes 20 seconds. 23,000 ft per second, altitude's 58 and 1/2 miles, downrange 629 nautical miles, 8 minutes.

SPACECRAFT Master alarm, (garble) Houston,

CAPCOM We copy.

PAO second. Cabin atmosphere master alarm. 25,000 ft per

SPACECRAFT MECO. We go to MECO.

CAPCOM atmosphere. Roger, we copy, and no problem with your cabin

PAO Nominal MECO.

SPACECRAFT (garble) Houston.

CAPCOM Roger.

PAO Houston confirms external tank separation.

SPACECRAFT We don't have 104 yet Houston.

CAPCOM Roger, we copy. Challenger, we need for you to switch aft bay one fan.

SPACECRAFT Okay, how about the Ops 104?

CAPCOM And Challenger, recommend manual pro to ops 104.

PAO OMS-1 will be 223 ft per second, burn time 2 minutes 26 seconds. Looking for an orbit of 153 by 50 nautical miles.

CAPCOM Go for nominal OMS-1, APU shutdown on time.

SPACECRAFT (garble) Houston,

PAO Ignition both engines. Good OMS burn, we are 30 seconds away from LOS through Bermuda. OMS burn continuing in good shape.

CAPCOM Challenger, Houston, we're 20 seconds to LOS, we see a good burn in progress, configure LOS, we'll talk with you at Dakar at 17.

SPACECRAFT Wilco.

END OF TAPE

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CAPCOM Challenger, Houston. We're 20 sec to LOS. We see a good burn in progress. Configure LOS. We'll talk with you at Dakar at 17.

SPACECRAFT Wilco.

PAO This is Shuttle Control. Bermuda has had loss of signal with Challenger. Next acquisition through Dakar in approximately 6 min.

PAO This is Shuttle Control. We have acquisition of signal through Dakar. 17 min. elapsed time.

CAPCOM Challenger, Houston with you through Dakar for about 6 min. Configure AOS and we're standing by for a gimble check.

SPACECRAFT Okay. Coming at you Dick. MPS power down complete. Starting in 3 MPS (garble).

CAPCOM Roger.

SPACECRAFT It was a good burn Dick.

CAPCOM Roger. We copy.

SPACECRAFT The only thing off nominal is due to the delay in getting into 104. We're not quite at attitude. We're probably 15 deg pitch Orbiter up to go when we lit.

CAPCOM Okay. We saw that down here.

SPACECRAFT If we take a concensus here Dick, we recommend this hartily for everybody.

CAPCOM That sounds like a familiar call.

SPACECRAFT Hey, before I forget, I might say that during OMS 1, the light was correct and I could look out window number 1, out my left window, and I could see a very heavy shower of what were some kind of particles that were coming forward. I think they're coming from back at the OMS engines. That spray pattern must just be tremendous back there.

CAPCOM Okay. We copy that.

PAO That report's from Challenger Commander P. J. Weitz. A preliminary look at Challenger's orbit shows 154 by 50 nautical miles. The Flight Dynamics Officer, Brad Sweet, has reported to Flight Director Jay Green that the OMS 2 burn will be nominal, 186 ft per sec. Burn time 1 min., 59 sec. That burn will circularize the orbit.

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CAPCOM Challenger, Houston. You've got a go for a nominal OMS 2. We'd like your targets as they're loaded. A word on your aft bay 1 fan. The reason we had you switch was we saw what appeared to be a stall caused probably by blockage and we'll probably have you'll look at that later.

SPACECRAFT Okay. It looks okay on that fan though.

CAPCOM We concur with that.

PAO This is Shuttle Control. OMS 2 scheduled for 20 min. from this time.

CAPCOM Challenger, Houston. We're 20 sec to LOS. Configure LOS. We'll have a short pass with you at Botswana at about 35.

SPACECRAFT Roger. At 35.

PAO Dakar has loss of signal. Next acquisition with Challenger through Botswana, about a 1 min. pass. Botswana AOS 9 min. from now.

END OF TAPE

PAO Dakar has loss of signal, next acquisition with Challenger, through Botswana about a 1 minute pass. Botswana AOS 9 minutes from now. At 25 minutes 30 seconds, mission elapsed time, this is shuttle control, Houston.

PAO This is shuttle control at mission elapsed time 34 minutes 11 seconds. We're standing by for acquisition through Botswana.

CAPCOM Challenger, Houston's with you through Botswana for about a minute.

CAPCOM Challenger, Houston with you through Botswana for 30 seconds.

SPACECRAFT Well, everything's going ticky boo, so far Dick.

CAPCOM Glad to hear that, we will be you next at Yarragadee at about 51, have a good burn.

SPACECRAFT Okay, we'll do our best. Thank you.

PAO Botswana has loss of signal, next acquisition through Yarragadee, Australia in 15 minutes. At 36 minutes 25 seconds Mission elapsed time, this is shuttle control, Houston.

PAO This is shuttle control at 51 minutes 24 seconds mission elapsed time. Standing by for acquisition through Yarragadee. Yarragadee is a UHF station, voice only. We will not be able to receive telemetry data until Challenger reaches Hawaii.

SPACECRAFT Roger, Houston, how do we read?

CAPCOM Well, we've got you loud and clear now, and we're standing by a burn report.

SPACECRAFT Okay, good burn .154 by 154 on the post burn gimbal check, on the secondary, on the left side sail to gimbal check, all others were okay. And also, stand by now. We had two messages at 44 minutes, well you can look at it the last (garble) the BSS helium press messages, we haven't had a chance to work on yet, we also had a couple SM 0 thermal evap messages that we haven't had time to get around to yet.

CAPCOM Okay, we copied your gimbal check, and the secondary left OMS failed and we don't have data on this pass, so any info you can give us that might help us, we'll press with.

SPACECRAFT Well, I'll tell you, it was near the end of the check, I did not copy down the gimbal angles, we did get annunciation, a class annunciation of the failure that had down arrows by both the pitch and yaw angles on the CRT.

CAPCOM Okay, we copy.

SPACECRAFT You ready to copy, Dick?

CAPCOM Rog. go ahead Story.

SPACECRAFT PCPC IU check out is complete, it was all normal, we got on orbiter power at 46 minutes, the only anomaly I saw was when I first approached the panel, the MDM GPC arrow light was on. However, during the CIU check out, it did clear.

CAPCOM Okay, we copied all that Story.

SPACECRAFT And we did get on orbiter power at 46 minutes.

CAPCOM We copy.

CAPCOM Challenger, Houston, I've got a switch check for you on L2.

SPACECRAFT We'll try it.

CAPCOM Roger, we'd like to ensure that you got the flash evap feed line heaters two of them to one.

SPACECRAFT No, we didn't.

END OF TAPE

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CAPCOM Challenger, Houston, I've got a switch check for you on L2.

SPACECRAFT We'll try it.

CAPCOM Roger, we'd like to ensure that you got the flash evap feed line heaters, two of them to 1.

SPACECRAFT Well, we didn't, I thought I did that somewhere in there, but I'll take a hit on that. We just got a master alarm no new light is showing, we had the MPS light and the hydraulic press light.

CAPCOM Okay, we copy.

CAPCOM Challenger, Houston, just an advisory, we feel that your master alarm that you got was probably due to your MPS center engine helium reg pressure that you were briefed on.

SPACECRAFT Okay, just wanted to make sure.

SPACECRAFT We're about to put the BFS to sleep here, Houston, and we noticed that at 54 minutes we got a BCE string one pass message on the BFS.

CAPCOM Okay, we copy.

SPACECRAFT And it has lost communication with string one, according to this (garble).

CAPCOM Roger, we copy Challenger.

SPACECRAFT That's about the time put 106 - there, where, take GPC 3 out.

CAPCOM Roger, we would like for you to try an I/O RESET, stand by. Challenger, we would like for you to try an I/O RESET to the BFS prior to taking it down. And we're about 20 seconds to LOS, we'll be with you at Hawaii at 1:17.

SPACECRAFT Okay, 17 to pass to I/O RESET, and reestablish communication, and we're ready to press on through the blocks, (garble) take the BFS down.

CAPCOM Roger, we concur.

PAO This is Shuttle Control. Challenger is out of range of Yarragadee. Next acquisition through Hawaii in 17 minutes 15 seconds. Challenger in a circular orbit of 154 nautical miles. Crew reporting a good OMS number two burn that circularized that orbit. The left orbital maneuvering system secondary GIMBAL failed it's check. We'll get more information

on that later, unable to look at data through Yarragadee. Mission Specialist, Story Musgrave reported he had put the IUS on orbiter power at 46 minutes elapsed time. At 1 hour 1 minute 15 seconds Mission Elapsed Time, this is Shuttle control, Houston.

PAO This is Shuttle Control at 1 hour 16 minutes Mission Elapsed Time. The Hawaii tracking station should lock on to Challenger in about 40 seconds. Payload bay door operations should be underway, or get underway shortly after acquisition, if they're not started already. That operation continuing through the United States pass. We'll stand by for AOS, at Hawaii.

CAPCOM Challenger, Houston, with you through Hawaii for 7 minutes.

SPACECRAFT Okay, Dick, we're chugging along. We're on page 1-9 of the post insertion book. Essentially on time, we're running a little behind in the (garble) but I don't see that'll last for long.

END OF TAPE

SPACECRAFT We're in page 1-9 of the post insertion book. Essentially on time. We're running a little behind in the (garble) but I don't see that'll last for long.

CAPCOM Okay. It sounds good and we're following along with you and we've got data on this pass.

SPACECRAFT Okay.

SPACECRAFT Also Houston, we probably are picking up trash in some of these fans. We had a high delta P in the AV Bay 3 fan. I switched fans and the delta P was a little higher so I'm back to the original (garble) fan bravo and we'll get to looking at those filters as soon as we can.

CAPCOM Okay. We copy.

SPACECRAFT And I guess you can see the delta P, it was indicated 4.35 when I got the alarm.

CAPCOM Roger.

SPACECRAFT Houston, MS2's got the lights on in the bay and payload looks in really good shape. Everything looks clean back there.

CAPCOM Roger. We copy.

CAPCOM Challenger, Houston. Just information. Your AV bay fan delta P is about where we expected it. We do have a TIMBU coming up to raise that limit a little bit, that was planned.

SPACECRAFT Roger, Houston. We understand.

CAPCOM Challenger, Houston. We're 20 sec to LOS. Configure LOS. We'll be with you next stateside at 1:28.

CAPCOM Disregard the LOS configuration call.

PAO This is Shuttle Control. Challenger is out of range at Hawaii. However, Buckhorn will pick up in just over 2 min. Payload bay door operation's not yet started. We'll stand by for acquisition through Buckhorn and the pass over the United States.

CAPCOM Challenger, Houston is with you stateside for about 17 min. and configure AOS if you're not already.

SPACECRAFT Yeah, we are and we're ready to open the doors Dick.

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CAPCOM Roger. We're standing by to watch.

SPACECRAFT Okay. In work.

CAPCOM And Challenger, at your convenience, we'd like at
GNC spec 1.

SPACECRAFT You got it. It's a nice sunny day on the west
coast today.

CAPCOM A little bit windy but sunny.

END OF TAPE

SPACECRAFT You got it? It's a nice sunny day on the West coast today.

CAPCOM A little bit windy, but sunny.

CAPCOM Challenger, Houston, I've got a switch check for MS2.

SPACECRAFT Okay, go ahead.

CAPCOM Roger, we'd like for him to confirm on ML26C, the supply H2O tank A press control valve to press, and that's in block 2 of his post insertion reconfiguration card.

SPACECRAFT Okay.

SPACECRAFT Okay, Dick, can that wait until after we record the latch operations on the cameras or do you want that done now?

CAPCOM That can wait, just like to see it before we go LOS stateside.

SPACECRAFT Okay.

CAPCOM And Challenger, Houston, we're through with the SM spec 1, and - correction, GMC spec 1, and would like an SM spec 1 now.

SPACECRAFT SM spec 1 is on CRT 2.

CAPCOM Thank you.

SPACECRAFT And I think those MPS things we reported earlier were the regs complete and down after I had closed the helium Isols.

CAPCOM Roger.

SPACECRAFT Okay, Dick, read up that switch in the position you wanted it in again.

CAPCOM Roger, on ML26C, supply H2O tank A press control valve to press.

SPACECRAFT Okay I got it Dick, and MS2 ..

CAPCOM Thank you Don.

SPACECRAFT (Garble) door is opening.

CAPCOM Roger.

CAPCOM Challenger, Houston, we're completed with the SM spec 1, request a SM spec 60.

SPACECRAFT You got it on CRT 2.

CAPCOM Thank you.

SPACECRAFT Houston, Challenger.

CAPCOM Go ahead.

SPACECRAFT What was our coast out point there, Dick? Where did we cross the coast just now? A couple minutes ago?

CAPCOM Stand by and I'll get that.

SPACECRAFT Okay, let me tell you why we're asking, because off to, well it we're nose North, so it's toward the aft south, there are dozens of tremendously large fires down there, at least they are sure making a lot of smoke blowing out over the Gulf.

CAPCOM Roger, we copy.

SPACECRAFT And Houston, after our burns, we show the oxidizer on our propellant quantity as being 37, on the left and 43 on the right. And the fuel 36 and 38.

CAPCOM Okay, we copy that, Bo, and we're looking at them.

SPACECRAFT Yes, it looks like that right oxidizer on the OMS may be a little behind.

CAPCOM We concur.

SPACECRAFT Houston, MS1.

CAPCOM Go ahead Story.

SPACECRAFT On the door, it's real even it's hard to single out which one is going to close first. But it looks like everyone of them is going to close just to the right of point A. In other words, horizontal line about 2.0 is where the contact of all the rollers is going to be. The best I can get for you.

CAPCOM Okay, Story, we're happy with that.

SPACECRAFT Something else, Dick. I think it's been reported before, but obviously there is a lot of little bits and pieces of trash, the (garble) washers, as a matter of fact, I'm looking at a button back here that came off somebody's coat, it looks like, must be about an inch in diameter, but all these things are

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slowly but inexcerptibly kinda of being drawn out in the gap
between the doors there.

CAPCOM Roger, we copy.

SPACECRAFT Starboard doors, all open and normal.

CAPCOM Roger, we copy.

END OF TAPE

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CAPCOM Roger, we copy.

SPACECRAFT Starboard doors full opened and normal.

CAPCOM Roger, we copy.

SPACECRAFT Houston, when's the pass we'll be able to show you any TV. We got a couple of things back on the OMS pods we'd like you to look at.

CAPCOM Standby, I'll get that info for you. Challenger, Houston, we're going to start working to set up for some TV at Hawaii on your next pass.

SPACECRAFT Okay. You're right, it's on the top of the pod, looking at it as a unit, Dick, that says that, you know, it's upper, it's on the starboard pod, I can't see the port one, you have a couple of good size pieces of things sticking out, I don't really know what they are. If I had to make a guess, I'd say they're probably pieces of gap filler up there, that's what it looks like.

CAPCOM Okay, we copy.

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SPACECRAFT However, it looks more substantial than that. It may be just some pieces of that new FRISI back there that's come loose.

CAPCOM Roger. Challenger, Houston, we're finished with your SM spec 60, you can have that back. We would like for you to accomplish an SM checkpoint at your convenience and also you have a go to do the air log resets to both SM and GNC.

SPACECRAFT Say that last again, Houston, after the aft entry point.

CAPCOM Roger, you have a go for the item 48 air log resets to both SM and GNC.

SPACECRAFT Roger, we understand.

CAPCOM Challenger, Houston, we're 20 seconds to LOS. A reminder that if you want to take a closer look, your binoculars are in alpha 16, also your entry REFSMATS are onboard. We'll talk with you next at Dakar at 152.

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SPACECRAFT Dakar at 152, thank you. We had the binoculars out. The doors, the total door operation was normal.

CAPCOM Roger, we copy.

PAO This is Shuttle Control. Bermuda has loss of signal. Both of Challenger's payload bay doors were opened as the spacecraft passed out of range of Bermuda. Commander Paul Weitz has reported seeing something sticking out of the OMS pods and at this time we plan a television pass over Merritt Island tracking station during the next continental United States pass. As Weitz crossed the coastline of the Gulf of Mexico he reported seeing large fires to the south and he reported that debris is starting to float out of the payload bay. Said he'd seen a coat button, what looked like a coat button. The television will be used to take a look at the OMS pods. Just at LOS the crew was reminded of which locker contained the binoculars in case they wanted to use those for a better look. Dakar is the next station with overlapping coverage through Ascension Island. That acquisition in about 3 minutes 15 seconds. At 1 hour 49 minutes 25 seconds this is Shuttle Control Houston.

END OF TAPE

PAO This is Shuttle Control at 1 hr, 52 min. mission elapsed time. Challenger coming up on acquisition through Dakar.

CAPCOM Challenger, Houston with you through Dakar and Ascension for 10 min.

SPACECRAFT Roger. We're trucking on.

CAPCOM Roger. Like to pass on the Control Center's go for orbit ops to you and also an advisory relative to ops recorder 1. We're doing some troubleshooting on that guy and in the meantime we're not recording any voice which could or could not be to your advantage.

SPACECRAFT Yeah. Okay.

CAPCOM And Challenger, additionally, we've revised the schedule for the TV and rather than at Hawaii, the next pass, it will be at MILA at about 3:12.

SPACECRAFT Okay. Looking at it Dick. What it looks like is part 2 panels of that insulation that's on the top part of the OMS, they look to be, I would guess, an inch thick. They're peeled back from the outboard sides. The outboard edges have come loose and have peeled back some and just to confirm it, the entire top portion of the thing is white and it looks like it is attached to a pink layer and a pink layer is the part that goes next to the vehicle. Yeah, as Bo points out, it's about the color of our TV which is probably what it is.

CAPCOM Okay. We copy that.

SPACECRAFT And also, something I don't remember hearing about before was about a foot and a half or so forward from the leading edge of the vertical fin, right in close to it, within 6 or 8 inches of it, it looks like we've built up some ice there, and it's a little tree-like, tree appearing thing of ice that I guess is 6, 7, 8 inches high and we'll show you that on the TV too if it's still there.

CAPCOM Okay.

SPACECRAFT Houston, yeah, you still there.

CAPCOM That's affirmative for another 5 min.

SPACECRAFT Come on Houston, Challenger. Are you there?

CAPCOM That's affirmative. How do you read?

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SPACECRAFT Oh, loud and clear. We thought you were lost here for some reason. Hey, I just did the star tracker self test and got 2 consecutive fails on the minus Z.

CAPCOM Okay. We copy that.

SPACECRAFT And I'm holding there. You want to go ahead and open the doors or do you want to standby for a little bit Dick?

CAPCOM Standby. We're discussing it now.

SPACECRAFT Okay, and for information, if it helps anyone, when I called up spec 22, if the shutter on the minus Y was open and the shutter on the minus Z was closed, and I did an item 16, 2 of them, and the shutter then went open and stayed open.

CAPCOM We copy.

SPACECRAFT And Houston, we just started the auto fuel cell purge a few minutes ago and it looks like fuel cell 1 is in purge. Maybe fuel cell 2 now.

CAPCOM Okay. We copy that Bo, and P.J., we would like for you to go ahead and give us another self test on the minus Z tracker.

SPACECRAFT Okay. Coming at you now. Okay. That's complete. We've got another self.

CAPCOM Okay. We copy and P.J., you got a go to turn the high load evap off and a go for vernier control.

SPACECRAFT Okay. Thank you. You guys are right on time today.

CAPCOM We try to please.

END OF TAPE

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SPACECRAFT Complete, wet go another sail.

SPACECRAFT Okay, we copy and PJ you got a go to turn to the high load evap off, and a go for vernier control.

SPACECRAFT Okay, thank you, you guys are right on time today.

CAPCOM We try to please. Challenger, Houston. You might get a water tank bravo message here shortly. You can disregard that, and you can press on with your star tracker door opening and procedures.

SPACECRAFT Okay, thank you.

SPACECRAFT Okay, star tracker doors are open, they open in 7 seconds.

CAPCOM Roger.

CAPCOM And Challenger, we're going LOS here, we'll be with you next at Botswana at 2:07.

SPACECRAFT Roger.

PAO This is shuttle control, Challenger out of range at Ascension, next acquisition through Botswana in 2 1/2 minutes. CAPCOM Dick Cubby, passed up the go for the orbital operations to Challenger's crew. And, Commander P. J. Weitz has now determined that the object sticking out of the OMS pod appear to be tiles, pieces of insulation. We'll take a look at that with the television over the Merritt Island tracking station, on the next revolution. He also reported ice near the vertical fin, a tree of ice 6 to 7 inches high. The -2 star tracker has failed a self test, but the -2 star tracker points straight up. And we passed up a report about the Ops 1 recorder which has been bulky and providing a problem the last few minutes. However, just after LOS the INCO, The Integrated Communications System Officer Al Pennington reported that the Ops 1 recorder has been reestablished and is now operating, he will continue to troubleshoot that, he suspects that it could be tape binding arm, or some problem like that, and he will continue to troubleshoot it. However, at this time, that recorder is operating. We're about 40 seconds away from acquisition through Botswana. Botswana is a UHF voice only station, no telemetry data. We'll stand by for acquisition there. Mission elapsed time is 2 hours 7 minutes. This is shuttle control Houston.

CAPCOM Challenger, Houston with you through Botswana for 7 minutes.

SPACECRAFT Roger, Houston. We've got a question, did you say that the new refsmat was up?

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CAPCOM That's affirmative, it is.

SPACECRAFT Okay, well we'll go ahead with that (garble) refsmat ops data at 2:05.

CAPCOM Roger, and an advisory for you, we do have voice recording back in the Ops, recorder 1 is running again, at least temporarily.

SPACECRAFT Okay. The IMU align is in work.

CAPCOM Roger.

CAPCOM Challenger, Houston, we're 30 seconds to LOS, We'll be with you next at Yarragadee at 2:27.

SPACECRAFT Rog.

PAO This is Shuttle Control, Botswana has loss of signal. Next station Yarragadee in just under 12 minutes. Challenger in a 154 nautical mile circular orbit, with an orbital period of 1 hour 30 minutes 22 seconds. At 2 hours 15 minutes mission elapsed time, this is shuttle control Houston.

END OF TAPE

PAO Challenger in a 154 nautical mile circular orbit with an orbital period of 1 hr, 30 min., 22 sec. At 2 hr, 15 min. mission elapsed time. This is Shuttle Control Houston.

PAO This is Shuttle Control at 2 hr, 27 min. mission elapsed time. Yarragadee will acquire Challenger in, should have acquisition now.

CAPCOM Challenger, Houston with you through Yarragadee for 7 min.

SPACECRAFT Roger. We're on time. After we did the - I want to alert high load nozzle temp is a little high on the evaporator heaters.

CAPCOM Roger. We copy.

SPACECRAFT And we can show the water quantity.

CAPCOM Roger.

APCOM Challenger, Houston. Relative to your high load nozzle temp high indications, we'd like for you to verify that high load duct heater's off.

SPACECRAFT That's affirmative. High load duct heater switch is in the, let me double check it, yeah it's in the off position.

CAPCOM Okay. Thank you.

CAPCOM And Challenger, Houston. We'll wait till we get to Guam and have data take a look at the high load nozzles.

SPACECRAFT Okay. It still continues to go up a little bit. It was about 145 when I when I looked at it before when it first came on and it's indicating about 151 now.

CAPCOM Okay, we copy that. Challenger, Houston. We're 30 seconds till LOS. We'll be with you next at Guam for a short pass at 2:41 and we have a second alignment attitude for you should your star tracker minus Z star tracker B failed and whenever you want a copy that after Guam we can give it to you.

PAO This is Shuttle Control. Yarragadee has Loss of Signal. Guam will pick up challenger in six and a half minutes. At 2 hours 35 minutes mission elapsed time. This is Shuttle Control Houston.

PAO This is Shuttle Control at 2 hours 41 minutes mission elapsed time. Standing by for acquisition through Guam. This will be a two and a half minute pass at Guam.

CAPCOM Challenger, Houston. With you through Guam for 2-1/2 minutes.

SPACECRAFT Okay. We're on time and we can even get ahead if you're ready to copy some very gross estimators of elevon positions.

CAPCOM Roger, we're ready. Go ahead.

SPACECRAFT Okay, it's symmetrical left and right, Dick. It looks like the outboards are up about 10 degrees and the inboards - it's hard to tell. They're either a trail or down some degrees some amounts like 5 to 10 degrees.

CAPCOM Okay, we copy that and be advised that I have the second alignment attitude for you as a backup in case we have trouble with the minus z star tracker and whenever you're ready to copy it I can pass it to you.

SPACECRAFT Okay, standby. (Garble) If I need any help I guess. Go ahead (garble) 4 dash 4 open.

CAPCOM Okay, the second attitude for the minus Y tracker for star 20 is roll 111.1, pitch 136.8, yaw 354.1.

SPACECRAFT Second attitude for the minus Y star 20 roll 111.1, pitch 136.8, yaw 354.1.

CAPCOM That's a good readback and if you should have to invoke the second attitude for a single startracker align they would like for you to continue with the +X COAS ...

END OF TAPE

CAPCOM1, pitch 136.8, yaw 354.1.

SPACECRAFT Second attitude minus y for star 20, roll 111.1, pitch 136.8, yaw 354.1.

CAPCOM That's a good readback and if you should have to invoke the second attitude for a single star tracker align they would like for you to continue with the +X COAS if your time permits. And Challenger, we're 20 seconds till LOS here at Guam. The orbit team should be with you in Hawaii at 2:52 and have a good deployment.

SPACECRAFT Okay, thank you, Dick. We enjoyed it. You guys did good work today.

CAPCOM Ya'll in the Challenger made it easy.

PAO This is Shuttle Control. Guam has Loss of Signal. Next acquisition through Hawaii in 7-1/2 minutes. The shift handover is underway here in Mission Control Center. Flight director Jay Green handing over to Flight director Harold Draughn of the orbit team. We estimate the change of shift news conference with Jay Green for 4:05 p.m., Central Standard Time in room 135 at the JSC News Center. Present estimate for the change of shift news conference 4:05 p.m., Central Standard Time room 135, JSC news center. At 2 hours 46 minutes mission elapsed time, this is Shuttle Control Houston.

CAPCOM Hello, Challenger, Houston with you the crystal team through Hawaii for 8 minutes. Challenger, Houston. Crystal team with you for 7-1/2 at Hawaii.

SPACECRAFT Houston, ready to go.

CAPCOM There you are. We got the crystal team here with you at Hawaii for 7 more minutes.

SPACECRAFT Roger, (garble) one's been calling you are we go for the IUS checkout early.

CAPCOM We need about another minute. We'll let you know here shortly.

SPACECRAFT Roger, understand 1 minute.

CAPCOM Okay, you got a go for a power transfer and you got a go for the checkout.

SPACECRAFT Roger, we understand go.

CAPCOM And if you could we'd like to SPEC 62 and an item 6.

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BUCKHORN You're loud and clear also. I may be ...

CAPCOM Roger. Buckhorn how do you read?

BUCKHORN I read you by-by. Standby for (garble)
modulation. Roger. Houston, 1, 2, 3.

SPACECRAFT Houston, can you receive TV now?

CAPCOM No sir, we're not configured yet. We'll do that
over Mila.

SPACECRAFT Okay, I've got a camera setup for you to look at
the - looks like some frizzy peeled coming up on the right oms
pod. We decided. And we have one that looks like a couple of
big chunks of ice, one right along side the vertical stabilizer
right at the base of the vertical stabilizer just looks like a
big chunk of ice in there.

CAPCOM Yeah, we were looking at some pictures of STS-2.
Looks like they had the same thing there. And Pete, where the TV
pass over Mila, we'd just like to get some good close up shots of
where you think that frizzy's peeled back on the oms pod. And
we're going to let you be primary for the camera select - take
your choice.

END OF TAPE

CAPCOM And Pete, for the TV pass over Mila, we'd just like to get some good close up shots where you think that frizzy's peeled back on the OMS pod. And we're going to let you be primary for this camera select, take your choice.

SPACECRAFT All right. Said you wanted a shot of the frizzy on the OMS pod?

CAPCOM That's affirm Don, and you have control of the cameras, whichever one you think would be the best.

SPACECRAFT Okay, and I think that's going to wind up being camera delta, I'll try to set it up now.

CAPCOM We copy.

CAPCOM And Story, the IUS checkout was good. And we got about 30 seconds to an LOS, we'll see you over the mainland in a couple of minutes, and we're ready to copy those times if you got them Story.

PAO This is shuttle mission control, we've had loss of signal through Hawaii station, reacquire again in about a minute and half over the main land.

SPACECRAFT Houston, MS1.

CAPCOM Go ahead.

SPACECRAFT We went to internal power 254, (garble) orbiter power 58.

CAPCOM Okay, we copy both of those.

PAO That last transmission occurred when we should of been out of reach from the ground station, in fact we did get pretty good voice. Mission Specialist Story Musgrave, downlinked the time that IUS went on internal power and went back to orbiter power. Harold Draughon Flight Director, and his crystal team of flight controllers assumed direction of the mission during the Hawaii pass. CAPCOM is now John McBride. Over that Hawaii pass, rather significant check of the IUS avionics was performed, setting up the boosters for the first attempt by the satellite control facility at Sunnyvale, California, to communicate directly with the stage which will be attempted through the ground station at Vandenberg Air Force Base, California. Coming up momentarily, we should have acquisition of signal again in just a few moments.

CAPCOM And Challenger, we're back with you through Buckhorn, for about 7 minutes.

SPACECRAFT (garble)

CAPCOM And Story you can go ahead and switch back over to 16 gigabytes now.

SPACECRAFT Saw it coming up, I'll do it now.

CAPCOM And we're going to go into a 2 minute keyhole for about 20 seconds, we'll be ready for some good TV over Mila.

CAPCOM And your S88 thermal messages the feed line and will work it with the TMBU.

SPACECRAFT Okay, thank you.

PAO This is Shuttle Mission Control, mission elapsed time, 3 hours 11 minutes. We will be configuring for some downlink television through the Mila ground station, and got pictures coming across now. And the camera used is the delta camera in the forward starboard corner of the payload bay. Looking back to the OMS pods to give the ground crew the opportunity to look at the thermal protection area back there, where the crew reported what it suspects to be frizzy of the felt reusable insulation peeled back, and we'll have voice contact momentarily.

CAPCOM And we're with you at Mila here, and we got a good TV picture, we can see the problem there.

SPACECRAFT Okay and Houston, Story.

CAPCOM Go ahead Story.

SPACECRAFT For the TDRS people as soon as I turned the payload interrogator on, shortly thereafter I did get a signal presence on the TDRS receiver B. I did not need to sweep B and after a sweep, I did not get an asterisk on A. Do you want me to go ahead and go on with just a signal presence on B?

CAPCOM Stand by, and I'll get right back to you.

CAPCOM And Pete, we're wondering if you can zoom in a little bit more on that right pod.

SPACECRAFT That's it for that camera John, that's as far in as it gets.

CAPCOM Okay, you want to give us a little short narration on what you think you see there?

SPACECRAFT Yes, those two things sticking up, look like to me, like pieces of material, normally that new insulation we have the

SPACECRAFT Roger Doger, how you doing John?

CAPCOM Doing just great, and we did copy the internal power transfer times.

SPACECRAFT Okay.

SPACECRAFT And that check was all normal, the command word was 000, John.

CAPCOM That sounds great, and it looked all nominal from the ground.

SPACECRAFT Are you ready for another phenomenon report, John?

CAPCOM Standing by.

SPACECRAFT Okay, once again, it's looks to me like a significant amount of ice built up around the edge of the nozzle on the center engine, we think that's where it is, I can't think anyplace else it'd be coming from, if you look back past the vertical fins you can see this significant build up of ice sticking up an ice fence back here. It looks to me, it must be on the engine bell.

CAPCOM We copy.

SPACECRAFT John, command (garble) enable is in RS and the direct checks.

CAPCOM We copy that Story.

CAPCOM And a direct check will be coming at you at 3:05.

SPACECRAFT Okay, we'll look for it.

SPACECRAFT And we see it here.

CAPCOM Alrighty. And we go into about a 2 minute keyhole at 3:09, and we'll pick up that Mila TV at 3:12 or so.

SPACECRAFT We're going back to hard line John. (garble)

CAPCOM Copy.

CAPCOM And Story, still some more good news, the IUS direct check was good.

SPACECRAFT Thanks, let us know when we're go for the item 6 on Spec 62.

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OMS pod, and they appear to be about 6 to 8 inches long, John.
And it looks to me like it's a wind cell spot, insulation,
probably it's hard to tell from this perspective, but maybe 6 to
8 inches wide, then it's been peeled up on the outboard edge.
They are still attached on the inboard, or up toward the top of
the pod. The thickness is about 1 inch, the bottom surface is
what we are principally looking at is pink, about the color of
our TV. And the rest of it is white.

CAPCOM Okay, that our TV is red, that does confirm one
thing.

CAPCOM Can you maybe tell how far back that strip goes,
PJ?

SPACECRAFT Well it's peeling up from the bottom, you mean how
far back it's located, or how much of it is peeled loose?

CAPCOM I guess, how long that piece is, from front to aft.

SPACECRAFT How long it is from front to aft, that's hard to
tell because of perspective, but I would guess 6 to 8 inches. It
looks like it was built in that width, whatever it is. And I
guess it flared to half of the way back on the pod. We cannot
see, the perspective is not allowing to see where it is loose.
You know, it's back over the horizon of the pod from us.

CAPCOM Okay, so you think it's peeled from the top and the
bottom and not from forward to aft?

SPACECRAFT That's right, I think it's peeled from outboard in
or from the bottom up.

CAPCOM Okay, that's what it looks like to us too.

SPACECRAFT John, for the TDRS people locked on to both A and B
receivers I have 4 asterisks.

CAPCOM That's good news Story.

CAPCOM And Story, we'd like for you to turn the modulation
off, wait 15 seconds and turn it back on.

SPACECRAFT (garble)

END OF TAPE

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CAPCOM I think P. J, did that a while back, Story, we got the PSP loaded.

SPACECRAFT He stole some from me huh?

CAPCOM And Story, you can go ahead and switch back over to 16 gigabytes now.

SPACECRAFT Saw it coming up, I'll do it now.

END OF TAPE

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SPACECRAFT (garble) I had 4, I had 3.

CAPCOM That's good news, Story. And Story, we'd like for you to turn the modulation off. Wait 15 seconds and turn it back on.

SPACECRAFT Affirmative, sure will before we get (garble). It's off John.

CAPCOM Okay, wait 15 seconds and back on.

SPACECRAFT Let me give you the entry there in case you missed it. When I turned the payload interrogator on, I immediately got a signal presence on B. I swept for the checklist for 90 seconds. I did not get an asterisk on A. I turned the mode ON, I then got 4 asterisks.

CAPCOM Okay, that's the way we copied it.

SPACECRAFT Right now, I only have an asterisk on single presence B and here I'll turn the mode ON. Mark to (garble). And mark 4 asterisks.

CAPCOM Okay, we copy that.

SPACECRAFT If you're not busy I'll give you some other data that you wanted on TDRS SPEC 200.

CAPCOM Okay, we got about 50 seconds here to LOS, go ahead.

SPACECRAFT On spacecraft (garble) 27.0, that's on orbiter (garble), the answer is 6.9. The batteries are not on of course, discussing a present command line. We did get a fault message on going to SPEC 200 as expected on the transmitter A ON. I guess the chamber wasn't up yet. The RCS isolation valve on normal, the RCS VED we did not get the message, I guess she got the (garbele) up, and the radio ordnance of course is normal.

CAPCOM Okay, we copy that. We're going to lose you in about 10 seconds. We just lost TV. We'll see you at Ascension at 3:32.

PAO This is Mission Control Houston at 3 hours 20 minutes in the Challenger's first flight. That completed a very significant pass in terms of payload preparations. The first part of that pass over the United States, the Vandenberg tracking station at Vandenberg Air Force Base, California verified its ability to communicate with the IUS here on upper stage and later on in that pass the payload operations control center at White Sands verified its ability to command the TDRS payloads officer. JJ Cardwell reported to flight director Harold Draughn

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that payload operations checkout to this point has gone nominally and that we're in good shape to proceed with subsequent checkouts. The payload interrogator that astronaut Story Musgrave made reference to is a device in the orbiter all communications with the IUS and the TDRS through the payloads - the Orbiter's payload interrogator which is the small transmitter in the payload bay that sends signals to the payload. There are no detailed displays for the TDRS or the IUS here in the Mission Control Center in Houston. So the verification of the commands to those instruments are relayed by the appropriate payload operations center through the payload officer here in Houston. We'll reacquire signal again in about 10 minutes. Challenger on its third orbit of the Earth, present mission elapsed time 3 hours 22 minutes, this is Shuttle Mission Control.

END OF TAPE

PAO This is Shuttle Mission Control, we'll pick up air to ground again in about a minute, there through Ascension Island. When Challenger comes within range of Ascension, the Ascension ground station will send commands to the Orbiter in S-Band where they'll be transferred to the TDRS by the small transmitter, the payload interrogator in the bay. The first test will be to verify basic TDRS ability to respond to commands, a second key test will be at about mission elapsed time 4 hours 15 minutes, when the ground station at Guam will attempt to broadcast signals to TDRS, routed through the, routed from the White Sands payload operations control center. The asterisks that Story Musgrave referred to earlier verify signal presence.

CAPCOM Challenger, we're back with you over Ascension for 6 minutes.

SPACECRAFT Okay, we're just going to COAS CAL, (garble) on two star trackers.

CAPCOM That's wonderful.

SPACECRAFT Okay John, we got four asterisks here, let me know when you want me to go back to command?

CAPCOM Okay, we'll let you know.

CAPCOM And Story, I'm sure you're aware that that's not the way we would expected that signal lock to occur but there's no impact as of now.

SPACECRAFT Say again John.

CAPCOM We're sure you're aware of the fact that the signal locked the way it went about, was not the way we had expected, but it is of no impact.

SPACECRAFT That's on the IUS.

CAPCOM On the TDRS.

SPACECRAFT Total lack of signal presence on A?

CAPCOM That's affirmative, we hadn't expected anything like that, but the way it ended up is no impact to the procedures.

SPACECRAFT Okay, but you still do wish us to sweep if we don't get it.

CAPCOM That's affirmative.

SPACECRAFT Okay, we got it.

CAPCOM Okay, Story, take the S-Band payload control to command.

SPACECRAFT Okay.

CAPCOM And we had a good PI check.

SPACECRAFT Outstanding.

CAPCOM And Story, the PI is off.

SPACECRAFT Thank you.

CAPCOM And Challenger, Houston.

SPACECRAFT Go ahead, John.

CAPCOM Disregard.

CAPCOM You got 30 seconds left here at Ascension, we'll see you down at Botswana at 3:42.

SPACECRAFT Okay.

PAO Shuttle Mission Control, at 3 hours 39 minutes, into the flight. Challenger now out of range at the Ascension Island station, we'll reacquire again in about 3 1/2 minutes through Botswana. Payloads Officer reported they had good check of the payload interrogator during that pass, as the Ascension station transmitted some commands to the TDRS in S-Band. The next significant TDRS check will occur at 4 hours 17 minutes into the flight when the tracking station at Guam will broadcast some commands to the TDRS from the White Sands payload control center. During that pass, Challenger Commander, Paul Weitz reported they performed a good alignment using both star trackers, there by alleviating the concern that the -2 star tracker, the upward looking star tracker that was suspect earlier is in fact working. The sweep that Story Musgrave inquired about during that pass relates to the procedure he goes through when he activates the TDRS satellite for the ground check.

END OF TAPE

PAO The sweep that Story Musgrave inquired about during that pass relates to the procedure he goes through when he activates the TDRS satellite for a ground check, he locks into the TDRS, looks for signal strength in command lock from the ground station. He does that to see whether or not the TDRS is receiving and he sweeps the interrogator frequency slightly to see if he can improve on signal strength. He earlier reported that as soon as he had activated the interrogator the asterisks appeared indicating that signal was already present. His question to the ground was, in the presence of an asterisk, do they want him to continue that sweep to see if he can improve with the locks, the strength of that signal and was advised to continue that sweep procedure. About a minute and a half till acquisition of signal, this is Shuttle Control, Houston.

CAPCOM John we're is back with you over Botswana for about 7 and a half minutes.

SPACECRAFT Alright, it's okay, the COAS CAL is complete, we've taken the star data, we haven't aligned the IMU's yet, we've maneuvering back to ZLV and universal pointing say's we'll be there at 3 hours 47 minutes, and we went out of ZLV per the CAP at 2 hours, 28 minutes.

CAPCOM Sounds great, keep on chugging.

SPACECRAFT Yeah, we'll get the IMU SPEC so you can look at it, you can say lets copy down some funny little numbers.

CAPCOM We got them already, we wouldn't have them here at Botswana anyway.

SPACECRAFT Oh, that's right, okay.

SPACECRAFT Understand you have them already anyway.

CAPCOM That's affirmative, we got them back over Ascension.

SPACECRAFT Houston, MS2 I think (garble) readings in preparation for photographing the payload elevation. And using 160th of a second as a time, and 400 film, it's requiring F-stops lower than I can set on the cameras. Like the highest F-stop I got is 1.4, the rest of them is down 0.7.

CAPCOM Let me work on that for you.

CAPCOM And Pete, we'd like for you, for this time, to try a F-stop of 130th, see what happens, 1 over 30.

SPACECRAFT Shutter of 1/30th and see what we get.

CAPCOM That's affirm.

SPACECRAFT Houston, using 1/30th shutter, I get an F-stop somewhere in between 1's and 2's.

CAPCOM We copy.

SPACECRAFT Use a camera (garble). Houston, I apologize, we were testing the fire alarms here when I dropped off here to keep from ringing the bell in your ears. I don't think either of our cameras will get that combination of settings. I don't think the 16-mm will go down to 1/30th and the 70-mm I don't believe will go down to S; well, I think the other lens will go down to S2.

CAPCOM We copy that, and we'll work it, we're going LOS here now and we'll see you up at Guam at 414.

SPACECRAFT Okay, I'll just get as much light on the film as I can, and hope they can push it.

CAPCOM And that's the right thing to do.

PAO This is Shuttle Mission Control at 3 hours 52 and a half minutes into the mission, next acquisition of signal will be through Guam in about 20 minutes. This also will be a significant pass in the TDRS checkout procedure as the Guam station will attempt to relay commands to TDRS from the Payload Operations Center at White Sands, New Mexico.

END OF TAPE

PAO This is Shuttle Mission Control, we're about a minute and a half away from acquisition of signal through Guam. This pass is going to be another important step in the checkout of the TDRS. The Payload Operations Center at White Sands, which will command TDRS while its on orbit is going to attempt to broadcast signals to TDRS through Guam tracking station and this portion of the test that will be performed during the Guam pass is to demonstrate that the communications system in the satellite is working properly. Since the satellite's totally managed from the ground and the controllers at White Sands have to be able to command it all the time, they'll send almost continuous commands to the TDRS once its on its own. So if these Guam checks raise any doubt about the communication system, the payload will then be suspect, so this Guam pass is vitally important and we have acquisition of signal and voice momentarily.

CAPCOM Challenger, we're back here with you on the UHF only in Guam for about 7 and a half minutes.

SPACECRAFT Okay John. I'm looking for the TDRS to red.

CAPCOM You've got a go for the primary actuated checkouts, Story.

SPACECRAFT Okay, and you want that done on time? We've reds on both TDRS receivers.

CAPCOM We copy that. You've got to go for that actuated checkout anytime you want to.

SPACECRAFT Well lets crank it up now.

CAPCOM Let's do that.

SPACECRAFT Okay Houston. You're doing some COAS to align results COASCAL.

CAPCOM You bet yeah, go ahead.

SPACECRAFT First (garble) update was 0.55. I thought I got a better one and dress that up by .10, then I got the best one of all, and it was .10 also and I think that took out probably most of the single so it was on the order of .55 total (garble).

CAPCOM We copy.

SPACECRAFT By if I'm to a point where it says turn the slashes up, the primary slashes up aft. If you agree with that, I'll go ahead and do it and I'm going to go start the aft controller checkout.

CAPCOM Okay P.J. you've got a go for both of those.

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CAPCOM You copy P.J.? You got a go for both of those?

SPACECRAFT Yes I got that, thank you.

CAPCOM And with regards to the star scan, everything will be nominal, star repair alpha.

SPACECRAFT Sounds good, thank you.

CAPCOM And P.J. we've been watching the OPS 1 recorder here for the last hour or so and its working nominally, and that means that we are recording voice now and we have been for awhile.

SPACECRAFT Houston, this is Challenger.

CAPCOM Go ahead.

SPACECRAFT When the folks down there get a chance, we'd appreciate if they could work up (garble) the prime and the longitude of the next notal crossing?

CAPCOM Okay we'll do that.

SPACECRAFT I have for your information, we appear to have lost the capability to zoom payload camera delta. The prime activated checkout is okay, have I got a go for engage?

CAPCOM You're go for engage.

END TAPE

SPACECRAFT ...primary actuator checkout is okay. Have I got a go for engage?

CAPCOM You're go for engage.

SPACECRAFT (garble) And, Houston, from what we can see, in the nose in the Orbiter, John, pieces, a couple of places where the (garble) appears to have come loose and scattered a little bit. But other than that, the front end that we can see looks in good shape.

CAPCOM That sounds good.

CAPCOM And had a good TDRS direct check.

SPACECRAFT Fantastic, we had a normal engage.

CAPCOM That's wonderful.

SPACECRAFT The time was 1 minute and 15 seconds.

SPACECRAFT John, MS1.

CAPCOM Go ahead Story.

SPACECRAFT I guess during sims, we never did find out what you'd like. We keep powering up the TV cameras and powering them down. Is that what you like us to do between all these runs, power them down?

CAPCOM And Story, it looks like to us you can go ahead and leave them powered up instead of powering them on and off.

SPACECRAFT Okay.

CAPCOM We sent up a new vector here at Guam, we're going to ask you to transfer that over Hawaii.

CAPCOM At about 10 seconds to LOS, we'll see you at Hawaii at 4 2 8.

SPACECRAFT Okay.

PAO Shuttle Mission Control. We've lost signal through the Guam station, reacquire in about 6 minutes through Hawaii. The TDRS checks, payload checks continue to go very well, that pass verified White Sands ability to transmit commands to the satellite through the Guam tracking station. That checkout went very quickly, and about midway through the pass over Guam, they were able to terminate those satellite checks and reconfigure the ground station for orbiter's support.

SPACECRAFT Time to do a star align, is that correct?

PAO The crew is advised that the OPS recorder, reported failed earlier, is now working nominally. The delta camera, the forward starboard payload bay camera, that showed us the OMS pods pictures earlier, was reported by Don Peterson to have no zoom capability and the INCO here in the Mission Control Center plans to later on in the flight try to see if he can command that camera to zoom independently. Mission Specialist, Story Musgrave was given a go ahead to perform checks on the actuators, that was scheduled for later in the timeline, but payload checkout is gone so well and is well ahead of schedule, that he was given go ahead to perform those actuator checks some 10 to 15 minutes earlier than called for in the summary timeline. Musgrave will power the actuators and the IUS tilt table, which supports the payload and he'll verify that the actuators worked properly both in the upward and downward drive modes. Later on in the mission, at about 8 hours and 35 minutes into the flight, the tilt table will be elevated to 29 degrees, which will be an interim position for the TDRS transmission tests. And the deployment angle of 59 degrees tilt will be actuated at about 9 hours 20 minutes into the flight. Challenger on its fourth orbit of the Earth, Challenger's systems continue to perform nominally, checkout of the TDRS and the IUS continue to go very well, in fact ahead of schedule. And we'll reacquire signal again in about 3 minutes to Hawaii. At Mission Elapsed Time, 4 hours and a half minutes to...

End of tape

PAO this is Shuttle Mission Control at 4 hours 37 minutes, we're about a minute away from reacquisition through the Buckhorn station and we'll have voice and data from Challenger, minutes, this is Mission Control Houston.

PAO Shuttle Mission Control, we're just moments away from acquisition of signal through Hawaii, plans are to transmit a state vector to the IUS guidance system since the Challenger's vector was recently updated they plan to have a new data to the error upper stage and that advisory will be passed to the crew by CAPCOM Jon McBride during this pass and we should have voice contact momentarily, at Mission Elapsed Time, 4 hours, 28 minutes.

CAPCOM Challenger, we're back with you over Hawaii for 8 minutes.

SPACECRAFT Roger.

CAPCOM An MSI, Houston.

SPACECRAFT Go ahead Jon.

CAPCOM Yes, Story, we've seen larger than expected errors in velocity and position on the IUS state vector. We've just sent up a state vector to the Orbiter, and we'd like for you to transfer that vector. Want you to stay in 16 kilobytes while you do it, and it's an item 1, followed by command 21.

SPACECRAFT I know that, and you're going to be mean, and not let me look at it aren't you?

CAPCOM You guessed it. And we want you to record the time, MET on that.

SPACECRAFT And have you sent up the Orbiter's STA, yet?

CAPCOM Yes, Story, it was updated at Guam, and it's ready whenever you are.

SPACECRAFT Here I go.

SPACECRAFT Jon, do you have any updates to any of the goodies in the deploy checklist for the attitude alignment? All the attitudes are good.

CAPCOM So far they're all good, we'll update you here shortly.

SPACECRAFT Okay.

CAPCOM And if somebody could, we need a GNC SPEC one.

SPACECRAFT You got it, CRT2.

CAPCOM Thank you, sir.

SPACECRAFT Aft controller checkout was normal in all respects.

CAPCOM That's just great.

SPACECRAFT Are you ready for the state vector time, Jon?

CAPCOM Go ahead.

SPACECRAFT 4:30 and 32 seconds.

CAPCOM We copy that, thank you.

SPACECRAFT We did not get the expected M1 (garble) GPC light on the first item 1 execute.

CAPCOM We copy that.

CAPCOM And we're through with the CRT, and you're go for the APU fuel, cool off there at 440.

SPACECRAFT Okay.

CAPCOM And if you want copy, I got the longitude of your ascending node on the next rev.

SPACECRAFT Okay, go ahead.

CAPCOM Okay, in degrees it's 105, 54 minutes, 38 seconds. That translates to 105.910556, and the time for that will be 054302.71.

SPACECRAFT Bo well may require that precision, but I don't.

SPACECRAFT Okay, I'm 5.9 degrees, is that east or west?

CAPCOM That's east, echo.

SPACECRAFT Okay, I'm 5.9 degrees east, that's 0543.

CAPCOM Roger, that.

CAPCOM And for the Navy, that's just about right over head Singapore.

SPACECRAFT Okay, thank you.

CAPCOM PJ ought to recognize that.

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CAPCOM Got about 10 seconds to LOS, we'll see you over the
mainland in about 2 minutes.

SPACECRAFT Roger.

End of tape.

PAO decided to translate a state vector to ...

CAPCOM About 10 seconds to LOS. We'll see you over the mainland in about 2 minutes.

SPACECRAFT Roger see you then.

PAO This is Shuttle Mission Control at 4 hours, 37 minutes. We're about a minute away from the acquisition through the Buckhorn station and we'll have voice and data from Challenger for about 6 and a half minutes during this upcoming pass.

CAPCOM Back with you over Buckhorn for about 7 minutes.

SPACECRAFT Roger. Houston, this is P.J.

CAPCOM Yes sir, go ahead.

SPACECRAFT Roger I just moved over here to do the MOR, post insertion of the check power softpack on, I need to advise you, the power softpack says off. The (garble) I read gray, and the power light is on white.

CAPCOM We copy.

SPACECRAFT I have not turned it off yet, I'll wait for you to tell me to do that, but I have a feeling its already off.

CAPCOM Let me check for you. And while we're waiting on that, let me give you the deploy time for the CRT timer.

SPACECRAFT Go ahead.

CAPCOM 100153

SPACECRAFT Lets have 100153?

CAPCOM That's correct, 100153. You're about 30 seconds here until we lose you at Buckhorn, we'll see you in about 4 minutes for a short pass over Mila. And just leave the MLR switches where they are for now Don.

SPACECRAFT Read you Jon, I got it. Got you Jon.

CAPCOM Roger.

PAO Shuttle Mission Control will reaquire again in about 3 minutes, mission elapsed time now 4 hours, 46 minutes. The updated state vector gives us a new deployment time, the new time for deployment the TDRS and the IUS is now mission elapsed time 10 hours, 1 minute, 53 seconds. The MLR switches that the

CAPCOM and the crew discussed reaction the experiment carry onboard the vehicle in the middeck and the flight control team panel. Looking some downlink data to determine whether any alteration need to be made to switch configurations. We'll have voice contact again in about 2 minutes. This is Mission Control Houston.

CAPCOM And we're back with you over Mila for about 2 and a half.

SPACECRAFT Okay Houston, we read you loud and clear. Did you decide what you wanted to do with the MLR?

CAPCOM Yes sir, first thing we'd like for you to do is look up on 014 and 015 in row Charlie and make sure those MLR circuit breakers are in.

SPACECRAFT Say again the location of the breakers.

CAPCOM Check row Charlie on 014 and 15 and make sure they're all in.

SPACECRAFT They're all in.

CAPCOM Okay go ahead and take the MLR switch to the off position.

SPACECRAFT Okay it'll take me about one minute, I got to go downstairs and get it.

CAPCOM Copy.

END TAPE

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SPACECRAFT Say again the location of the breakers.

CAPCOM The check row Charlie on 014 and 15, make sure the they're all in.

SPACECRAFT They're all in.

CAPCOM Okay, go ahead and take the MLR switch to the off position.

SPACECRAFT Okay, it'll take me about 1 minute, I got to go downstairs.

CAPCOM Copy.

CAPCOM About a minute to go here, we'll see you down at Ascension at 508.

SPACECRAFT I sure will.

SPACECRAFT Okay, Houston, I switched the MLR off, and the light went out and the malfunction telegram wouldn't barberpole and the (garble) remained of course in the off position.

CAPCOM We copy that.

SPACECRAFT We assume that all the attitudes, (garble) align, Jon.

PAO This is Shuttle Mission Control at 5 hours 6 and half minutes into the flight. We're about 2 minutes away from acquisition of signal through Ascension Island, we'll get some real time data from the vehicle. A few moments ago, the crew initiated the star scan maneuver, which is intended to let the interim upper stage update its inertial platform with its own star tracker. It's expected that the IUS will probably have pretty good alignment and not need the star scan. But with the IUS in the payload, Mission Control Team has the advantage of having the capability to try a star scan and see if the IUS scanner works properly. The Orbiter, right about now should be rolling about 20 degrees to its left. And the star scanner during that role will pick up two star pairs. And then the vehicle, the Orbiter will make about a 110 degree roll to the right, giving the star scanner the opportunity to look at those stars again and do a, verify its inertial navigation system's capability to track. We're just moments away from contact through Ascension Island at mission elapsed time, 5 hours, 9 minutes.

CAPCOM We're here at Ascension for about 2 and a half minutes.

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SPACECRAFT Okay, Jon, we've passed star (garble) twice, and we did not get a star update.

CAPCOM We copy.

SPACECRAFT And since not told, the only thing we did was that state vector transfer when you asked us to. We did not do a course align.

CAPCOM That's the way we wanted it.

SPACECRAFT Okay, we're moving right along to star 2.

CAPCOM Okay.

SPACECRAFT And Jon, we did get to 03 on sending command 14.

CAPCOM Copy.

SPACECRAFT And Jon, does anybody have any feel, I assume you don't, but if anybody has the feel whether we ought to do raster 1 or raster 2 next.

CAPCOM And we'd likely do raster 1 PJ, if you have to.

SPACECRAFT Okay, well we got to, we didn't get star 2 either.

CAPCOM Okay.

CAPCOM We're going LOS, we'll see you over Botswana at 518.

SPACECRAFT Okay, we don't need a star, we got a star raster 1.

CAPCOM We copy.

END OF TAPE

PAO This is Shuttle Mission Control in 6 and a half minutes we will pick up the air to ground again through Botswana, mission elapsed time is 5 hours, 12 minutes. This is Mission Control Houston just moments away from acquisition of signal through Botswana for about 7 minutes flight control team's going to do an attitude comparison, check the alinement of the Orbiter, make sure that the stars would have been visible during that star scan pass.

CAPCOM With you over Botswana for about 7 minutes

SPACECRAFT Okay Jon we completed the first scanning, got no stars at all. Interraster one, we missed the first star on pass one, but on starting pass 23 we picked up star one, we've got an OC sitting there.

CAPCOM We copy, that's good news. And Challenger, Houston, we have a note for you.

SPACECRAFT Okay go ahead.

CAPCOM P.J. sometime when you get a chance, maybe during one of the housekeeping tasks we'd like for you to do the cabin fan filter cleaning and see and report to us what you see in there and that's IFM checklist, Charlie-1.

SPACECRAFT Alright. We are not going to have time to do RASTER 2 on this night pass Jon.

CAPCOM We copy. And P.J. in conjunction with that fan filter cleaning we'd like for you also to inspect the IMU inlet filters.

SPACECRAFT Okay, we'll look over all the filters we can.

CAPCOM Thank you sir.

SPACECRAFT Jon, I'm sure you considering if we don't get a successful line on this one doing a course aline before we start another star aline.

CAPCOM And the plan right now Story is that if we don't get here we're not going to do anything else.

SPACECRAFT Okay we just got an OU.

CAPCOM We copy.

SPACECRAFT Still there Houston?

CAPCOM That affirm, got you for 2 and a half more minutes.

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SPACECRAFT Okay, we came out of the ZLV per the time line at, said 0458, universal pointing says this maneuver back ZLV will be complete at 0528.

CAPCOM Copy P.J.

SPACECRAFT And you did understand the OU, incomplete with star one only.

CAPCOM Yes sir we understand.

SPACECRAFT And we acquired star one, only on pass 23.

CAPCOM We copy that. Okay Story we're going to press on OPS normal, per the CAP and the checklist without the star scan.

SPACECRAFT Okay.

CAPCOM Got about 20 seconds now on LOS, long one, we'll see you up at Guam at 550.

SPACECRAFT Okay.

PAO This is Shuttle Mission Control, mission elapsed time 5 hours, 26 minutes and loss of signal has occurred through Botswana, we do not require again for about another 24 minutes until we pick up the Challenger as it flies over Guam.

END TAPE

PAO This is Shuttle Mission Control at 5 hours, 50 minutes. Challenger just about 15 seconds away from acquisition of signal.

CAPCOM Back with you at Guam for about 7 minutes.

SPACECRAFT Roger, read you loud and clear.

CAPCOM Read you the same.

SPACECRAFT The incident (garble), I was setting up cameras, and I bumped the band switch, it's a recorder power switch, I bumped it to off. I think it was in the PCM wide band enable position, we put it back there, but would you verify that that's okay?

CAPCOM Okay, let me check on it. Looks okay right now, Pete, we'll keep an eye on it.

SPACECRAFT Okay, let me know if you want it moved.

CAPCOM Wilco.

CAPCOM And Challenger, you still got the ice formation buds on the tail?

SPACECRAFT It's all gone.

CAPCOM Copy, we were wondering if you could tell us maybe which one of the vents or something, that was pulling around or collected around.

SPACECRAFT The ice on engine number 2 is gone, the ice formation that was at the root of the tail, and it's probably one of the APU water boilers or something like that, is still there.

CAPCOM You can't tell precisely maybe which vent that it is close to can you?

SPACECRAFT I'm sorry, Jon, say again, I didn't understand.

CAPCOM You can't tell with preciseness which vent that might be, can you?

SPACECRAFT No aspect on it, it's pretty flat, you know, we can't tell how far back it is.

CAPCOM Copy.

SPACECRAFT It's on the starboard side of the tail, and PJ thinks it's in the seventh row of tiles from the edge of the payload bay. He counted them.

CAPCOM Okay, that helps, thank you.

CAPCOM And Challenger, we're going to go ahead and turn on all the TV cameras in preparation for the Hawaii pass.

SPACECRAFT Cameras are on.

CAPCOM Got about 45 seconds to go here, we'll see you over at Hawaii at 604.

SPACECRAFT Hawaii at 604.

SPACECRAFT Okay, and we're setting up the cameras.

CAPCOM Sounds good, Don.

SPACECRAFT I don't think you're going to be able to see a whole bunch, because camera delta would give you your best view but we've lost the capability to zoom that, and it's kind of long range. But I put camera alpha on there, the tiles are actually so far back on the POD that they are way out of view on that camera, it's shielded by the front shoulder of the POD.

CAPCOM Okay, we copy that. We're going to try to do the zooming from down here.

SPACECRAFT (garble), Jon, I think that there's more than one ice formation back there. It looks like a couple of them that are about, the one I told you where it was, and another one about 4 rows of tile back behind that, after that one.

CAPCOM We copy.

SPACECRAFT Then there's even more ice behind that, it looks like a miniature snow drift layed up against the tile up against the base of the vertical fin.

CAPCOM We'll see you over Hawaii.

SPACECRAFT See you.

CAPCOM Looks like off the schematic, that's right where the water spray boilers vent.

SPACECRAFT That's what we can (garble)

PAO Shuttle Mission Control at 5 hours, 59 minutes. Loss of signal has occurred to Guam, we'll pick up Hawaii at about 5 and a half minutes. And during that Hawaii pass, we'll have some real time downlink television of the Challenger's payload bay, and the TDRS and the IUS. That again occurring over Hawaii at about 5 minutes. This is Shuttle Mission Control.
END OF TAPE

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PAO This is Shuttle Mission Control, about 30 seconds away from AOS at Hawaii, and some downlink TV. Mission Elapsed time 6 hours, 4 minutes.

CAPCOM Hello, we're back with you over Hawaii for about 7 and a half minutes.

SPACECRAFT Read you loud and clear.

CAPCOM And double check, you got the TV in the ground command. Okay, and we're zooming camera delta at this time. We can do it from the ground.

SPACECRAFT Okay, understand you can zoom it from the ground.

CAPCOM Looks like you've got a missile in your bay pointed right at you.

SPACECRAFT Right. Can you see anything on delta, Houston?

CAPCOM Yes sir, we're using delta now, we have good control of it.

SPACECRAFT I understand that, can you see the two pieces of thermal (garble) that's stuck up back there on the OMS POD, on the starboard side?

CAPCOM We're not zoomed in on it, but we did see when we were there.

SPACECRAFT Okay.

SPACECRAFT Houston, did you say you can zoom that camera?

CAPCOM That is affirmative.

SPACECRAFT Very good, maybe you can start sweeps here or something.

CAPCOM Looking at a great shot of the aft end of the IUS now.

SPACECRAFT What TV are you looking at?

CAPCOM We got bravo right now, looking right straight at you.

SPACECRAFT Okay.

CAPCOM And we're over on camera Charlie now, got a great picture.

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SPACECRAFT Okay, Houston, you can tell Rita that despite her best efforts, I'm still for it.

CAPCOM Okay, we'll relay that. Okay, we're looking right in the window at you.
See a lot of glare right in that window.

SPACECRAFT The only (garble) you can see a hand in the starboard window.

SPACECRAFT The glare is MS1.

CAPCOM Yes, we were just going to ask you to cover that up.

SPACECRAFT Say again.

SPACECRAFT (garble)

CAPCOM Good idea. Okay, we switched over to camera alpha, looking aft now. Okay, Pete, we're back on camera delta. Why don't you take control, see if you got a zoom capability. Go ahead and zoom it in as close as you can get.

SPACECRAFT Okay, what we got Jon is we can zoom in with that camera, but we cannot zoom out.

CAPCOM Okay, we copy that.

SPACECRAFT Okay, its zooming out, you must be doing that, I guess.

CAPCOM That's affirm, we're doing it. Okay, we're going to zoom it out and leave it there. That's where we want it for the deploy.

SPACECRAFT Okay.

SPACECRAFT Okay, we're going to see if we can zoom camera B, see if maybe it's in the control from us, or whether it's in a switch.

CAPCOM Okay, we're in bravo.

SPACECRAFT Okay, we can't zoom out, it appears to be a switch problem up there, Houston.

CAPCOM Copy that. Okay, we're zooming back out. And we got about 40 seconds to go here.

SPACECRAFT Okay.

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CAPCOM About 20 seconds to go, some good TV there, we hope to get you at Buckhorn in about 3 and half minutes for a short pass.

SPACECRAFT We copy.

END OF TAPE

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CAPCOM About 3 and a half minutes for short pass.

SPACECRAFT We copy.

CAPCOM And if you still read us here, we have zoomed all the cameras out and we're going to leave them that way for the deploy. And Challenger we have Buckhorn for about 2 minutes.

SPACECRAFT We read you

CAPCOM And if you didn't copy my last over Hawaii, we've got all the cameras zoomed out and we're going to leave them there for the deploy.

SPACECRAFT Roger we understand, leave them zoomed out for deploy.

CAPCOM Affirm. And Story, we're ready for 64 kilobytes.

SPACECRAFT Okay.

CAPCOM We got about 40 seconds to go for a long one, we'll see you down at Botswana at 654.

SPACECRAFT Roger, Botswana, see you then.

PAO Shuttle Mission Control, we've lost signal through Buckhorn. That was a very brief pass of just over a minute and low elevation of eight tenths of a degree above the horizon so accordingly it was very brief that downlink TV showing the payload bay, the crew was advised that the control team has elected to leave the TV cameras zoomed out in case the zoom mechanism fails Mission Control wants the cameras zoomed out for better view of the deployment so they'll be zoomed out and fixed at that position for the mission. And as the TV showed the Challenger is in a configuration with it's payload bay to the Earth. Shuttle Mission Control the Challenger with it's payload bay positioned toward the Earth as it has been through most of the predeployment activities, cause the TDRS system can't tolerate direct sunlight thermal conditions in the payload bay. Very extensive loss of signal period now for about another 35 minutes before we reacquire. The Challenger currently on its fifth orbit of the Earth. Mission elapsed time 6 hours, 20 minutes, this is Mission Control Houston.

PAO This is Shuttle Mission Control at 6 hours, 53 minutes, we're about a minute away from acquisition of signal through Botswana for a pass of about 7 minutes in duration.

CAPCOM Hello Challenger back with you over Botswana for about 6 and a half minutes.

SPACECRAFT Roger Houston, we hear you.

CAPCOM Got you the same, and Pete, a couple of words on the TV scenes for the deploy.

SPACECRAFT Do I need something to write on?

CAPCOM No what we, we changed our philosophy a little bit, we'd like for you to go ahead and set up a TV scenes per the TV checklist and if you should happen to zoom in a little bit too far let us know and we'll back it off for you again.

SPACECRAFT Okay, we'll go ahead and set them up the best we can according to the checklist, and then we'll talk with you about it.

CAPCOM Sounds like a good plan and over Hawaii next time we're going to send you up a teleprinter message so you might want to double check it's hooked up and your air to ground 2's off.

SPACECRAFT Houston.

CAPCOM Go ahead Story.

SPACECRAFT MS1 is on banana number 2.

CAPCOM I just finished my second one.

SPACECRAFT Houston if you're going to try and match him banana for banana you're going to be really sick by tomorrow.

CAPCOM Roger that.

SPACECRAFT How much longer is AOS.

CAPCOM We got about 5 more minutes.

SPACECRAFT Okay, 5 minutes.

CAPCOM That's here at Botswana then we've got a little gap and we'll have you for about 7 and a half more at Indian Ocean. Anybody had a chance to take a look at any of those filters yet?

SPACECRAFT PJ is going to talk to you in a minute, he looked at them.

CAPCOM Okay.

SPACECRAFT Yeah Jon, I looked at the cabin one cabin fan filter and it didn't look too bad. Just a light dusting of that same old blue powery lint-looking stuff, wherever it comes from,

and we thought we could get through the night alright. Then you'd probably clean it sometime tomorrow.

CAPCOM Sounds good.

SPACECRAFT Unless you have some indication that you think it ought to be cleaned then we'll be glad to go ahead and do it?

CAPCOM We'll talk about it and I'll let you know here shortly.

SPACECRAFT Okay.

CAPCOM And the word here right now is it looks okay the way it is.

SPACECRAFT Yes, it does but I wanted to pick up the motion of the loose stuff that's in the cabin with it and maybe get it later tonight or tomorrow morning, then we can take a look at it maybe on a daily basis and see how much we're picking up then.

CAPCOM Sounds like a good plan.

END OF TAPE

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is plus 37.7, allballs plus 13.5, burn data attitude is 334099011, 40 feet a second .1 seconds, MEGO -X plus 38.43, Y is allballs, Z is plus 11.26 put us at orbit of 177 by 155.

CAPCOM Your read back is correct. Now we're really running out of things to do.

SPACECRAFT That's all right.

CAPCOM And we've got about a minute to go here LOS to IOS. We were thinking about taking a couple of hours off and going to watch Phi Slamma Jamma play basketball.

SPACECRAFT (garble)

CAPCOM And your targets are onboard. 20 seconds to go, we'll see you at Guam at 727, 727 at Guam.

SPACECRAFT Okay, by the way, is this just integrated or joint also.

CAPCOM We hope its joint.

END OF TAPE

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SPACECRAFT Houston, we got the teleprinter configured and any time you'd like to send us a test message we'll let you know if we got it or not.

CAPCOM Okay, it'll be at Hawaii, Don.

SPACECRAFT Okay, thank you. We'll get a check in Hawaii, we'll be watching for you.

CAPCOM Okay, and it'll be your weather message.

SPACECRAFT I understand you'll just send us a weather message.

CAPCOM That's affirmative. We're gonna lose you here in about 20 seconds and pick you up in about another minute over IOS.

SPACECRAFT We're configured real time.

CAPCOM We're back with you over INDY for 7 more minutes.

SPACECRAFT Roger Houston (garble).

CAPCOM And Challenger, on the deploy page 1-5, the only that changes is the time.

SPACECRAFT Roger that Houston, the only changes in the deploy is the time.

CAPCOM That's affirm and I'm sure (garble) will give it to you.

SPACECRAFT One, there's 10:01:53 as I remember.

CAPCOM That's affirmative. And we've even got your separation pad if you want to take it now or wait until Guam.

SPACECRAFT PJ's gonna get it, he'll be with you in a minute.

CAPCOM Okay, we've got about 4 and a half minutes.

SPACECRAFT Okay, Jon. Ready to copy, go ahead

CAPCOM Okay, that's page 1-11 and it follows. Its both OMS, TV roll, 180, negative 0.5, negative 5.7, plus 5.7, 204128 TIG 0102053.0 TIG 7 plus 0037.7 allballs plus 013.5, attitude 334099011, delta V is a positive 40.0, TIG-0 is :21, MEGO plus 0038.43, allballs plus 011.26, HA 177, HP plus 155 got 2-1/2 minutes to read back.

SPACECRAFT Okay, OMS both 180, minus point 5, minus 5.7, plus 5.7, 204128, TIG is 10 hours, 20 minutes, 53.0 seconds, (garble)

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PAO Mission elapsed time, 7 hours, 10 minutes. We reacquire again in 17 minutes through Guam. This is Shuttle Mission Control.

CAPCOM Challenger with you over Guam for about 3 minutes.

SPACECRAFT Roger. I think we got the cameras all set up for TV 01 and I'll put the (garble) if you want to look at the cameras, you can do so.

SPACECRAFT And John, I'll be looking for a go for the tilt at 29.

CAPCOM We're checking our data now.

SPACECRAFT At your leisure time, we'd be curiously interested in the attitude that the IUS has after doing a star scan and only (garble) 1 1.

CAPCOM Story, I guess the best way to tell you is that it's not quite as good of course as a full star scan, but it's better than nothing. Things are looking alright. There are no changes to the GO, NO-GO chart, by the way.

SPACECRAFT Okay. I think there's, and no further alignments planned?

CAPCOM At this time, there are none, we're comparing some data that we took back over IOS to see how the state vectors diverging or converging.

SPACECRAFT Okay.

CAPCOM And Story, you got a go for tilt table raise.

SPACECRAFT Okay.

PAO This is Shuttle Mission Control at 7 hours, 30 minutes, we're passing through a brief keyhole in the Guam coverage. We'll reacquire again in about a half minute. That go for tilt table elevation was approval for MS Sotry Musgrave to elevate the tilt table to 29 degrees for its deployment checkout position.

CAPCOM And we're going to lose you in about 30 seconds. Pete we don't have any insight into the camera picture right now. What we could do for you if it doesn't look right to you, we can zoom it back out.

SPACECRAFT It's okay to us, so unless you get a camera pass and see something you don't like, we'll run them just like they are.

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CAPCOM Sounds good, and we'll see you over Hawaii at 739.

SPACECRAFT Thanks.

PAO Shuttle Mission Control. We'll reacquire in 7 and a half minutes over Hawaii.

CAPCOM Challenger, we're with you over Hawaii here for about 7 and a half minutes.

SPACECRAFT Okay Houston, how do you read the PLT.

CAPCOM Read you loud and clear.

SPACECRAFT Okay. One item is that we, we're getting a little cool, and so we took the cabin temperature control of, my guess intended at the 2/3rds position.

CAPCOM Copy. And if you would, could we get an SM SPEC 60?

SPACECRAFT Sure.

END OF TAPE.

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SPACECRAFT Okay, Houston, how do you read the PLT.

CAPCOM Read you loud and clear.

SPACECRAFT Okay. One item is that we, we're getting a little cool and so we took the cabin temperature control of, my guess, intended at the 2/3rds position.

CAPCOM Copy. And if you would, could we get an SM SPEC 60?

SPACECRAFT Certainly. (garble) CRT 4.

CAPCOM Thank you, and I got a note here on the IUS for you.

SPACECRAFT Houston. I got a lot of noise, I can hardly hear you,

CAPCOM We're sending up the teleprinter, make sure your air to ground 2 is off.

SPACECRAFT Understand.

CAPCOM And would you cycle through the TV cameras please, and see if you got one that's getting a little warm.

SPACECRAFT We just turned C off.

SPACECRAFT We just turned camera Charlie off, because we had a temperature on it.

CAPCOM Okay, we copy.

SPACECRAFT Get it back on when we get ready to use it again.

CAPCOM And some information for you on the IUS. It looks like that in the RIMU, the RM is downfaulted from 5 to 3 gyros.

SPACECRAFT Okay, and we know it can't get along with 3.

CAPCOM That's affirmative. And Challenger, when the time rolls around to do the OMS gimbal checks for the burn, we do not want you to do a secondary gimbal check on the left side.

SPACECRAFT Understand. No secondary gimbal check on the left OMS engine.

CAPCOM That is affirmative.

SPACECRAFT Houston, we need a little help finding some sunglasses, we can't locate them.

CAPCOM Okay, we'll look for them.

SPACECRAFT Thank you.

CAPCOM And your teleprinter message should be onboard.

SPACECRAFT Okay, I'll look at it.

CAPCOM And we're through with CRT 4.

SPACECRAFT Understand you're finished with CRT 4. I'm checking the teleprinter.

CAPCOM Roger that.

SPACECRAFT Okay, Houston we got a weather message, it looks like it ends at land 34.

CAPCOM That is correct. That is correct.

SPACECRAFT We're going over Hawaii, but it looks pretty cloudy.

CAPCOM And we're still looking for your sunglasses.

CAPCOM Have about 30 seconds to go, we'll see you down at Santiago at 8 0 8.

SPACECRAFT Roger.

PAO Mission elapsed time, 7 hours, 48 minutes. We'll reacquire signal again in 20 minutes through Santiago. During that pass, Mission Commander Paul Weitz advised that they had readjusted the cabin temperature upward. Downlink data indicates that temperature onboard Challenger is 77 degrees presently. And the crew has advised that 3 of the 5 gyros in the IUS alignment system are operating. This is Shuttle Mission Control. At Mission elapsed time, 8 hours, 8 minutes, we expect voice contact momentarily through Santiago, Chile, brief pass, just about a minute in length.

CAPCOM Challenger, with you for about 20 seconds, then we go into a minute keyhole here at Santiago.

SPACECRAFT Jon.

CAPCOM At about 10 more seconds, we go into a keyhole, and I'll see you about a minute after that.

SPACECRAFT Okay.

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PAO Very low pass, elevation of about 3 degrees, with
the horizon from the Santiago station.

END OF TAPE

PAO Very low pass, elevation of about 3 degrees with the horizon from the Santiago station.

CAPCOM And Challenger, we're back with you for about a minute, how do you read?

SPACECRAFT Loud and clear.

CAPCOM Okay, Pete I got some locations for sunglasses if you want to copy that.

SPACECRAFT Okay, go ahead.

CAPCOM Okay, CDR's are in MA16 Gulf. That's MA16 Gulf, PLT's are in MF43 Gulf, you're in MF71 Gulf, and Story should either have his, or they're in the flight data file container.

SPACECRAFT Okay, I copy that thank you.

CAPCOM You're welcome. And we got about 20 seconds to go here at Santiago, we'll see you at Botswana at 829.

PAO Those up positions called up by CAPCOM, Jon McBride were locker stowage areas on Challenger's mid deck. Assuming checkout continues to go nominally deployment of the TDRS will occur in about an hour and 15 minutes from now. Mission elapsed time is presently 8 hours, 11 minutes. And we will shortly be coming up on a significant series of milestones and the deployment of the TDRS. Mission elapsed time, 8 hours, 20 minutes, checkout activities will accelerate significantly as the crew tilts the table to 29 degrees and additional checks to the system are made prior to deployment. Reacquire signal again in about 17-1/2 minutes, this is Shuttle Mission Control. This is Shuttle Mission Control at 8 hours, 24 minutes. We'll acquire signal again in about 5 minutes through Botswana coming up on some significant checks of the payload. Right now the crew should be maneuvering the Orbiter to attitude to enable checks of the TDRS. Story Musgrave should soon receive go ahead to release the payload retention latches and elevate the IUS tilt table to 29 degrees, which of course is the interim position for TDRS transmission tests. And Musgrave will of course will also relock the payload interrogator back onto the TDRS frequency. Indian Ocean station will send a command to the TDRS by the S-band system to assure that it works. A new orbiter state vector will be transferred to the IUS, and IUS late checkout will be performed, where we again transfer the IUS to internal power and send self test commands to run avionics strings to the IUS. We're about 3 minutes away from a voice contact through Botswana, and about an hour and 35 minutes away from deployment, assuming nominal checkout operations. Mission elapsed time is 8 hours, 26 minutes, this is Mission Control, Houston.

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CAPCOM Challenger, with you at Botswana for 6 minutes.

SPACECRAFT Roger. TRDS done, on the way up, its moving well.

CAPCOM Sounds good.

SPACECRAFT Ascending at about 14 degrees, all nominal.

CAPCOM Great.

SPACECRAFT That is a big boost.

PAO This is Shuttle Mission Control. The crew verifying that the tilt table is presently elevating up to the 29 degree checkout position and that it was at their last report at about 14 degrees.

END OF TAPE

SPACECRAFT That is a big boost.

PAO This is Shuttle Mission Control, the crew verifying that the tilt table is presently elevating up to the 29 degree checkout position and that it, was at their last report at about 14 degrees.

SPACECRAFT Okay, we're at 29 degrees Jon and with 3 minutes and 35 seconds.

CAPCOM Copy, thank you sir.

SPACECRAFT Houston, MS1.

CAPCOM Go ahead Story.

SPACECRAFT Do you need another (garble) that item 6?

CAPCOM It still looks good Story, we don't think so.

SPACECRAFT Thank you. Houston MS1 (garble)

CAPCOM Go ahead. Go ahead Story

SPACECRAFT Jon powering up the PI I did get a signal presence on the C receiver do you want me to go ahead and sweep to try to get A in?

CAPCOM Yes sir we'd like for you to go ahead and sweep and try to get A.

SPACECRAFT Okay here we go.

CAPCOM We're going to lose you shortly, we'll see you over the Indian Ocean in a couple of minutes.

SPACECRAFT Okay Jon I've been sweeping for 40 seconds and no joy on A.

CAPCOM Copy that Story we're going to lose you shortly we'll see you over Indian Ocean in about a minute and a half.

SPACECRAFT A (garble) IOS, a minute and a half.

CAPCOM Roger, go ahead and apply modulation.

PAO This is Mission Control at 8 hours 36 minutes we'll we acquire again through Indian Ocean in about a minute. Astronaut Story, Musgrave reporting his functions in verifying the payload interrogator with a TDRS check and sweeping for signal strength. Voice contacting momentarily.

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CAPCOM Challenger, we're back with you over Indian Ocean for about 7 and a half minutes.

SPACECRAFT Roger, okay Jon we got 4 asterisks. I swepted for 90 seconds and never got the A signal presence when I went to MOD I got all 4 asterisks after 15 seconds.

CAPCOM We copy that, the vectors onboard and you got a go for internal power.

SPACECRAFT Okay.

CAPCOM And also you've got a go for the vector transfer Story.

SPACECRAFT Okay, we're picking it up on 318.

CAPCOM And Story just for information we have a bad intermitent data link here with the satellite. And MSI Houston?

SPACECRAFT Go ahead.

CAPCOM Yeah, Story at Guam we want you to delay the locking up the PI to the IUS until 9 plus 12, we want to try to command the RIMU.

SPACECRAFT Okay the state vector transfer was at 83930. Successful with a 4U.

CAPCOM Copy that and you copy the time on the PI locked to the IUS?

SPACECRAFT Is that at 912.

CAPCOM Yes sir, we want you to wait until 912 to lock it up.

SPACECRAFT Alright will do. Houston I wish you guys could see what we're looking at out the back window. Got a (garble) and a state vector transfer here goes command 35.

CAPCOM We copy and we wish we could see it.

SPACECRAFT Yes sir, we've got the IUS at 29 degrees against a bunch of little fleecy white clouds and the ocean and IUS is in shadow but everything else is in bright sunlight for you, that's nice.

CAPCOM I'm sure you're taking some nice pictures?

SPACECRAFT Running the VTR now. Internal power at 84121.

CAPCOM Copy.

SPACECRAFT ...and 10 is on enable, Jon.

CAPCOM Copy

SPACECRAFT (garble) 00

CAPCOM Say again you were cut out.

SPACECRAFT Internal check was success with a command word 00.

CAPCOM Copy that.

SPACECRAFT And Jon back on Orbiter power at 844 20 seconds.

CAPCOM Copy.

SPACECRAFT And I guess the reason you don't want us locking up the PI til 912 is cause that will interfere with your direct commanding the RM heaters on.

CAPCOM Not the heaters, we're trying to get those other two gyros, some checks on the gyros are in the RIMU.

SPACECRAFT Okay.

CAPCOM And we've got about 15 seconds to go here, we'll see you up at Guam at 906. It's our intention Story to try to bring those other two gyros back into the set with the commands.

SPACECRAFT Story, you'll be doing those through Guam, Jon?

CAPCOM Affirmative at GTS RTS.

END OF TAPE

CAPCOM That's affirmative at GTS RTS.

SPACECRAFT (garble) postdeploying that and the (garble)

PAO Shuttle Mission Control at 8 hours, 46 and a half minutes, had loss of signal, we'll acquire again in about 20 minutes through Guam. The Mission Specialist Story Musgrave advised during that pass to stay off of the payload interrogator until mission elapsed time 9 hours, 12 minutes, at which time he's scheduled to lock the interrogator onto the IUS transponder. They want him to stay off of the device for that period in order to enable the Air Force Satellite Control Facility at Sunnyvale, California to attempt to bring the other two gyros on line, although the IUS is slight ready with three gyros, they are going to attempt to bring the other two on line to enhance its reliability. Through that Guam tracking station, the Air Force's Satellite Control Facility will attempt direct command to the IUS through the Guam station. Assuming nominal operations, deployment will occur in 1 hour and 13 minutes from now. We are 18 minutes from reacquisition of signal. Mission elapsed time is 8 hours, 48 minutes, 30 seconds, this is Mission Control, Houston.

CAPCOM Challenger, Houston with you over Guam. And Story, verify that the PI is locked to the TDRS.

SPACECRAFT No, it isn't. When we went over the pass, I turned it off, let me lock it on now.

CAPCOM Okay.

SPACECRAFT Pull your lock down (garble)

CAPCOM That's affirm. Lock the PI to the TDRS.

CAPCOM And verify command path enable is RF.

SPACECRAFT Verified RF, modulation is on the PI. We've got a signal presence and command lock on the receiver.

CAPCOM Copy, we're coming with some commands.

END OF TAPE

PAO Shuttle Mission Control we'll reacquire signal again in 5 minutes to 5 and a half minutes through Hawaii. The payloads officer J.C. Conwell has advised Flight Director Harold Draughon that he successfully uplinked commands to the TDRS. Astronaut Story Musgrave verified that he saw command lock and signal presence in the system during the Guam pass and the payloads officer also verified that Sunnyvale successfully commanded the IUS during the Guam pass as well very short pass of less than 2 minutes duration through Guam, but then an awful lot of commands uplinked to the system during that time. We will acquire again in 4 minutes, almost 5 minutes through Hawaii. Mission elapsed time 9 hours, 10 minutes 40 seconds, this is Mission Control Houston. We're about a minute away from acquisition of signal through Hawaii about 7 minutes pass during which Sunnyvale is going to verify the configuration and status of the IUS and needs a quick turnaround from the vehicle here to enable the Flight Director to uplink attitude instruction to the crew so that they can get the proper attitude for a deployment GO/NO-GO at Santiago. Mission elapsed time 9 hours 15 minutes and voice contact should occur momentarily.

CAPCOM Challenger, with you over Hawaii with about 7 and a half minutes and I've got a slight update to the deploy time.

SPACECRAFT Go ahead.

CAPCOM Due deploy time, 1001 plus 58.

SPACECRAFT 10 hours, 1 minute, 58 seconds.

CAPCOM That's affirm Story and depending on the success of our TDRS check here, if its good we want you to be in the deploy attitude at Santiago, if its not of course then the TDRS check attitude.

SPACECRAFT We got you. The PI is locked up to the IUS, no sweep was required, we're setting at RF 16 kilobytes on the link switch, which they're locked.

CAPCOM Copy. And go ahead and get the RM heaters on.

SPACECRAFT Okay we will do that.

CAPCOM And Story, we may not get you the GO for the deploy here in Hawaii, it might have to wait until Santiago.

SPACECRAFT Okay.

CAPCOM If the TDRS check is good we want you to be ready to deploy or go for deploy at Santiago.

SPACECRAFT Okay

CAPCOM And if the TDRS check is good and you do not have COMM at Santiago, we want you to wait one rev, do not deploy.

SPACECRAFT If the TDRS check is not good in Santiago?

CAPCOM No what I'm saying is, if we have a good TDRS check in Hawaii but we haven't given you the go for deploy, we will give you one in Santiago, unless there is no COMM at Santiago, in that case we want you to stay in the deploy attitude for a rev, do not do anything irreversible.

SPACECRAFT Okay. The RM heaters are on at 9 they're going to give 17 and 30 seconds (garble).

CAPCOM We copy. Okay Story we've got a TDRS direct check, you could go to the deploy attitude but we will give you a expected go for deploy at Santiago.

SPACECRAFT And if we don't get to go at Santiago, we should stay in a deploy attitude?

CAPCOM That is correct, and do not pull the umbilicals, do not transfer power, and do not raise the table.

SPACECRAFT Until we hear from you at Santiago?

CAPCOM That's affirmative.

SPACECRAFT Okay. Which means then, we'll stop at the top of page 4-5?

CAPCOM That is correct.

SPACECRAFT We'll get everything done up to there.

CAPCOM That is correct.

END OF TAPE

SPACECRAFT Okay, everything is done up to there.

CAPCOM That is correct.

SPACECRAFT Okay.

CAPCOM And, Story, this go no-go decision is based upon the gyros in the RIMU.

SPACECRAFT Okay, that's the problem you're working.

CAPCOM Yes, we're looking at the data right now.

SPACECRAFT Okay.

CAPCOM Okay, we've got little less than a minute, we'll see you in the deploy attitude at Santiago and that'll be at 9:42.

SPACECRAFT Okay, and per the checklist I guess you want us to leave the S-band payload switch in panel.

CAPCOM That is affirm.

SPACECRAFT Okay.

CAPCOM And we'll see you in about 20 minutes.

SPACECRAFT (garble)

CAPCOM And some late news for you Story, we got a go for deploy, we have a go for deploy.

SPACECRAFT Okay, now we can still hold the umbilical to Santiago there.

CAPCOM No, go ahead and follow nominal procedures, you've got a go for deploy.

SPACECRAFT We'll pick up the (garble) at deploy minus 20 minutes then.

CAPCOM That is correct, and we'll see you down at Santiago

SPACECRAFT And thanks

CAPCOM Wow!

PAO Had loss of signal thru Hawaii at mission elapsed time 9 hours, 23 minutes. There's a significant expression of relief here in the control center with that go for deploy. We were waiting for some verification from Satellite Control

Facility that the gryos in the RMU was operational and flight worthy on the interim upper stage and Sunnyvale, the White Sands facility also uplinked verified its ability to uplink commands to TDRS during that Hawaii pass so the Challenger is now assuming a deploy attitude. We'll talk to them again at Santiago in about 18 minutes, This is Shuttle Mission Control. This is Shuttle Mission Control, mission elapsed time is 9 hours, 34 minutes to recap the sequence of events over the past 30 or so significant moments, minutes in preparation for the deploy. At mission elapsed time approximately 9 hours and 6 minutes, over Guam, about a 2 minute Acquisition of Signal period over Guam. The Air force Satellite Control Facility at Sunnyvale, CA, through the Guam station, transmitted commands to the IUS intending to bring online the two gryos which had been earlier believed failed. Those commands were successfully uplinked to the IUS during the Guam pass. At about mission elapsed time 9 hours and 15 minutes over Hawaii, satellite control facility then interrogated the IUS instructing the onboard software to restore redundancy management, which in effect means asking the interrogator to look at all 5 gryos to compare the data of that done the data agreed, indicating all 5 gryos were operational. Sunnyvale received that information from the IUS during the Hawaii pass, took a look at the data, determined that 5 gryos were in agreement and gave Mission Control a go for deploy. During that same period over the Hawaii pass White Sands attempted, and successfully attempted direct communications with the TDRS using Hawaii station. The successful checkout of the TDRS resulted in a go for deploy from the payload operations center at White Sands. Now with approval for deploy received...

END OF TAPE

PAO That same period over the Hawaii pass. White Sands attempted and successfully attempted direct communications with the TDRS using Hawaii station. The successful checkout of the TDRS resulted in a go for deploy from the Payload Operations Center at White Sands. Now with approval for deploy received, Commander Paul Weitz and Pilot Karol Bobko, will maneuver the Challenger into a payload deployment attitude. Spacecraft will be slightly upside down, that deployment attitude is based on IUS guidance needs. Challenger is going to be slightly upside down, the crew will be able to see the Earth out the overhead windows. The Orbiter will be in the slight roll to the right with the nose pointed into the velocity vector. Mission elapsed time is now 9 hours, 38 minutes, deployment is about 24 minutes away. Formal countdown for payload deployment begins at 20 minutes prior to the planned separation. Deploy time is now mission elapsed time, 10 hours, 1 minute, 58 seconds. Again, time for deployment, program time for deployment is, in mission elapsed time, 10 hours, 1 minute, 58 seconds; 10 hours, 1 minute, 58 seconds, 5 8 seconds. One activity, major activity that will be occurring at this point will be to transfer an orbiter state vector to the IUS once the payload, after it's been deployed. During deployment, Mission Commander Paul Weitz will be in the starboard aft station, flying the orbiter through the use of rotational and translational hand controllers located at that starboard aft station. He'll be there in order to maneuver Challenger out of the way of the IUS TDRS stack in case an improper deployment occurs. Mission Specialist Don Peterson will be in the aft crew station at the center position observing the operations. Story Musgrave will be in the port side of the aft crew station operating separation switches. Challenger pilot, Karol Bobko will be in the forward cockpit, managing the orbiter. The deployment is a manual operation, no automatic procedures involved. Story Musgrave will enable some pyro electrical buses and activate switches to effect the deployment. There are no commands sent by computer to affect deployment, they're all performed manually. We're about a minute and a half away from acquisition of signal, deployment's about 21 and a half minutes away. The countdown for deployment begins in a minute and a half, and we'll standby for voice contact with Challenger, and verification of some of the milestones associated with predeployment activities such as tilting the platform to the deployment attitude of 59 degrees. Mission elapsed time, 9 hours, 41 minutes. This is Mission Control, Houston.

CAPCOM Challenger, we're back with you over Santiago for 5 and a half minutes.

SPACECRAFT Roger, Houston. We're just picking up at -20 minutes.

CAPCOM That's super.

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CAPCOM And P.J., I got one switch I'd like for you to flip here, if you got time.

SPACECRAFT Yes sir, go ahead.

CAPCOM Over on L2, take the flash evap feedline heater B supply, put it in the number 2 position.

SPACECRAFT I see a break.

CAPCOM And we see an A getting a little bit high and we want to let B stabilize so we can get a look at it before sleep.

SPACECRAFT Alright.

END OF TAPE

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CAPCOM Over on L2, take the flash evap feedline heater B supply put it in the number 2 position.

SPACECRAFT I see a break.

CAPCOM And we see an A getting a little bit high, and we want to let B stabilize so we can get a look at it before sleep.

SPACECRAFT Alright.

SPACECRAFT Internal power on the IUS was at 943.

CAPCOM Copy.

SPACECRAFT TDRS to IUS batteries at 944.

CAPCOM Copy.

PAO Shuttle Mission Control, Story Musgrave has transferred the IUS to internal power, and transferred the TDRS from Orbiter power to the IUS batteries. Two umbilicals leading from Challenger into the payload will be released electrically, if they should fail to sever, however they'll be physically pulled out as that tilt table is elevated to the 59 degree deployment position, that'll occur about 6 minutes before separating, before deployment.

SPACECRAFT Doing the umbilical's, Houston.

CAPCOM Copy.

SPACECRAFT Umbilical's are released.

CAPCOM We copy.

PAO Both Mission Control and Story Musgrave verify the umbilical's have been severed. Minute and a half away from LOS.

SPACECRAFT We're on our way to 59.

CAPCOM Sounds great.

PAO Musgrave reporting the tilt table elevating.

CAPCOM We got about a minute to go here at Santiago. I'll check in with you at Ascension, just standby, we'll be with you about 2 minutes before deploy. And good luck.

SPACECRAFT Okay, thank you, Jon.

PAO This is Shuttle Mission Control, we're about 14 minutes away from deployment. Mission elapsed time is 9 hours,

48 minutes, we'll acquire signal again in 11 minutes through Ascension for a brief pass. Deployment is planned with the vehicle over the Central Atlantic in darkness, positioned in darkness so that the IUS, Interim Upper Stage's guidance system can look for stars without concern that they'll be bleached out by sunlight. The crew has a two minute window in which to deploy the payload. Delayed beyond two minutes, would dictate scrubbing the deployment to another orbit opportunity. Another deployment opportunity exists at mission elapsed time of 11 hours, 30 minutes. And still another opportunity the rev following that at mission elapsed time, 13 hours. This is Mission Control, mission elapsed time, 9 hours, 56 minutes, 50 seconds. We're about 2 and a half minutes away from acquisition of signal through Ascension Island and about 5 minutes away from deployment of the TDRS IUS. The duration of coverage through Ascension on this pass is just a little over 2 minutes. In fact, it looks as though according to the communications model that we're going to miss observing, miss communication with the crew by about 20 seconds for the deployment. But the INCO, the integrated communications systems officer Sandy Briscoe, is optimistically predicting that we'll retain voice contact with the crew through deployment, but it's going to be awfully close, if we're able to communicate with them at all. And if not the case and we can't talk to them, then I'll be contacting 16 minutes from now through the Indian Ocean

END OF TAPE

PAO ...its not the case and we can't talk to them, they'll be contacting 16 minutes from now through the Indian Ocean Station and let's see, crew again has a two minute window in which to deploy the payload within a minute of the deployment Mission Commander Paul Weitz is going to perform a reaction control system burn and nose Challenger down and away from the payload. Which should be hanging over Challenger's crew cabin at that point, that RCS burn would be about 2.2 foot per second. Burn (garble) should have voice contact momentarily and receive verification that the tilt table is in the deployment attitude of 59 degrees. Mission Elapsed Time is now 9 hours 59 minutes. About 30 seconds from deploy. The mission elapsed time is now 10 hours 2-1/2 minutes just at the tail end of that pass over Ascension when in fact the mission, the communications model indicated we should have had LOS, we were still receiving data and the payloads officer, J.J. Conwell and the Satellite Tracking Facility at Sunnyvale verified payload deployment on time. Now the Mission Control team has been advised that the IUS computers have entered the flight phase. We have Acquisition of Signal about 11 minutes through Indian Ocean station for a pass of 5-1/2 minutes in duration, but just to repeat, the Mission Control team has confirmed deployment of the TDRS IUS on time. Unofficially that deployment time would be at mission elapsed time 10 hours, 1 minute, 58 seconds, that is unofficial and we'll get verification from the crew when we get voice contact again through Indian Ocean station. Mission elapsed time 10 hours, 4 minutes, this is Mission Control Houston.

END OF TAPE

PAO Shuttle Mission Control at mission elapsed time, 10 hours, 6 and a half minutes. No confirmation of these events yet, but shortly after deployment there was nominally to have been a 2.2 foot per second burner reaction control system on Challenger to bring the nose of the vehicle down and away from the payload. The TDRS IUS ejection and springs was to eject the stack directly over the flight deck of Challenger at a rate of about 4/10ths of a foot per second. And their reaction control system burn was intended to improve the tolerance of the distance between the vehicle and the separating payload, IUS, the Inertial Upper Stage. The IUS then brings it's avionics capability into operation and is going to prepare to move TDRS into a geosynchronous orbit. Sunnyvale does not need to send any commands to the IUS for the rest of its flight. If it's performing nominally, that is. All the IUS functions are located, are loaded in the onboard software. About 10 minutes after deployment, which means just about 4 minutes from now, the hydrazine reaction control jets onboard the IUS will be commanded as part of the vehicle's preprogrammed sequence. In about 12 minutes after the separation from the Orbiter, the IUS reaction control jets will command the first thermal roll maneuver intended to keep the TDRS temperatures within limits. And we should receive verification of some of those events from Satellite Control Facility at Sunnyvale. Again, there are no detailed or dedicated IUS or TDRS displays here in Mission Control in Houston and the bulk of data we receive on those systems is what is relayed to us from those payload operations centers at those appropriate locations. We're about 5 minutes away from acquisition of signal through Indian Ocean station. Mission elapsed time, 10 hours, 9 minutes, this is Mission Control, Houston.

END OF TAPE

PAO Shuttle Mission Control, we're 2 minutes away from acquisition of signal through Indian Ocean station and the Flight Control team has been advised to expect some degradation of the signal received through Indian Ocean station since that station is dedicating some of its resources to tracking the payload deploy to IUS and TDRS. Deployment occurred almost 11 minutes ago which means by this time the hydroazine reaction control jets on the IUS should have been commanded as part of that vehicle's preprogrammed sequence, and we should get verification of that through Indian Ocean station data as well as some reaction from the crew on what that deployment looked like from their view. And in fact voice verification that it was a nominal deployment as it appeared to be through the residual data we got just before going out of site of the Ascension Island site tracking station. Challenger in its 8th orbit of the Earth, we expect voice contact with the crew again in about a half a minute, mission elapsed time is now 10 hours, 13 minutes, 41 seconds, this is Shuttle Mission Control.

CAPCOM Hello there, we're with you over Indian Ocean for 4 and a half minutes on the UHF and a reminder not to do the secondary check on that left OMS.

SPACECRAFT We won't do that, and it was a good deploy Jon.

CAPCOM That sounds great.

SPACECRAFT Jon that's really spectacular views of it over the overhead windows. When it first came in the sunlight it was tremendously light then we got it against the Earth.

CAPCOM Hope you've got some good TV for us tomorrow. A couple of quick notes, you can delete the water dump at 10 plus 45.

SPACECRAFT Understand, delete the water dump.

CAPCOM That's affirmative.

SPACECRAFT Okay.

CAPCOM And Story we're wondering if you've ever reacquired the TDRS data after deploy, IUS data?

SPACECRAFT Yes we did. I'll be right with you, my head's up over the front window.

CAPCOM Okay.

PAO This is Shuttle Mission Control, the IUS reaction control jets should by now have commanded the

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CAPCOM And Sunnyvale and White Sands sends you a special "at a boy".

SPACECRAFT Well we're all in this thing together. Thanks.

CAPCOM Roger. About a minute away from LOS, good luck with the burn, we'll see you up at Guam at 1039.

SPACECRAFT Okay, tilt table stowed on time.

CAPCOM Thank you.

PAO Shuttle Mission Control, the next major event we're expecting to hear now is in about 2 and a half minutes from now occurring about 19 minutes after...

SPACECRAFT Jon we're still locked on.

CAPCOM We copy. See you in about 20 minutes.

PAO Shuttle Mission Control to continue the next milestone coming up is just under 2 minutes away when we're going to have another OMS burn, 40 foot per second burn of the Orbiter maneuvering system intended to separate the Challenger from the payload and get it out of the way as the IUS sets itself up for its first burn which is 55 minutes after deployment. Nominally IUS is hydrazine reaction control system checks ..

END OF TAPE

PAO Just under 2 minutes away when we're going to have another OMS burn, 40 foot per second burn of the orbital maneuvering system, intended to separate the Challenger from the payload and get it out of the way as the IUS sets itself up for the first burn which occurs 55 minutes after deployment. By now the IUS's hydrazine reaction control system jets have been commanded as part of that vehicle's software program. We are 19 minutes from deployment and the IUS jets will have commanded the first thermal roll intended to keep the TDRS temperatures within its limits. That roll would be stopped and reversed by this time that event would have occurred 18 minutes after deployment. That OMS burn is going to occur in the blind here it occurs in about 20 seconds and we won't acquire signals from the vehicle again until 18 minutes from now. Mission elapsed time is 10 hours, 22 minutes, this is Shuttle Mission Control.

SPACECRAFT Well, we're all in this thing together.

PAO This is Shuttle Mission Control, mission elapsed time 10 hours, 38 minutes, 30 seconds. We're about a minute and a half away from contact through Guam on Challenger's 8th orbit of the Earth. Should get voice confirmation of the status of that OMS burn which occurred in the blind 19 minutes after the deployment. And we are presently about 18 minutes from the stage 1 burn of the IUS. Voice contact in about a half a minute, mission elapsed time 10 hours, 39 minutes. This is Shuttle Mission Control.

CAPCOM Challenger, we're with you a Guam for about 5 minutes.

SPACECRAFT Roger, Houston. And Jon, we're about to disengage primary actuator.

CAPCOM We copy that and Story, we're going to turn off the PSP so you gonna get an associated SM alert.

SPACECRAFT Okay, let me be sure you're in command. I just turned off the PI myself at 33. Okay, you're in command.

CAPCOM Copy. And also so you don't get any D-COMM fail alerts, we'd like you to zero the inputs to D-COMMS 1, 2 and 4.

SPACECRAFT I'll do it.

CAPCOM And do you have a quick burn report for us?

SPACECRAFT That was a good burn.

CAPCOM Sounds good, and PJ over on R1, I'd like to, over on R1, Bo, if you would, a couple of switches.

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SPACECRAFT Go ahead.

CAPCOM We would like to get the O2 and H2 tank 3 heaters alpha and bravo to the off position, that's 4 switches to the off position.

SPACECRAFT Okay, the tank 3 alpha and bravo both are off.

CAPCOM Roger that, and that's the O2 and the H2.

SPACECRAFT All 4 tank heater switches are off.

CAPCOM And one other note, our OPS recorders are full, we aren't going to be recording any more voice the rest of this day.

SPACECRAFT Okay.

CAPCOM And PJ we've got about a minute and a half here, I have a message here from the President that I would like to read you if you're ready.

SPACECRAFT Yes sir, you bet.

END OF TAPE

CAPCOM And PJ, we got about a minute and a half here. I have a message here from the President that I'd like to read you if you're ready.

SPACECRAFT Yes sir, you bet.

CAPCOM Okay, this was sent from the President to our director, Jerry Griffin, and I quote, "On behalf of the American People, I send astronauts, Paul Weitz, Karol Bobko, Story Musgrave, and Donald Peterson, our proudest congratulations on the launch of the Challenger. Today, you are among the few people of this planet who have crossed into a domain, experienced a dimension those of us here on Earth can barely imagine. You are no longer Earth bound. The Challenger is an appropriate name for your spacecraft because you are genuinely our Challengers. You and your ground crew are doing the future and the old ways of thinking that kept us looking to the Heavens rather than traveling to them. You symbolize just how high American's hopes can soar. May God bless you and bring you safely home to us again. Signed Ronald Reagan"

SPACECRAFT Well, we're very appreciative of that, Jon, and Mr. President, we appreciate it very much. Sure are proud to have the opportunity to do it.

CAPCOM And we're all proud of you here in Mission Control, of course, and we're going to lose you in about 20 seconds. See you for a short pass at Hawaii.

SPACECRAFT Roger.

CAPCOM That'll be about a minute or a minute and a half, and we'll see you at 10:53.

SPACECRAFT Okay. Jon, the primary actuator disengaged nominal and it bounced up 15 degrees.

CAPCOM We copy.

PAO This is Shuttle Mission Control, at 10 hours, 15 minutes into the flight. Deployment of the TDRS IUS occurred just about 48 minutes ago, which means in less than a minute from now the IUS TDRS will be approaching its Central Pacific motor ignition point and will maneuver into the proper attitude for the first stage motor burn. The burn occurs at 55 minutes after deployment, ignition time is roughly 8 minutes, 10 seconds from now. And that burn will be of 2 minutes, 33 seconds in duration. The Challenger is on its 8th orbit of the Earth. We should acquire signal in about 2 and a half minutes to Hawaii, very low pass over Hawaii, we'll only be in contact with the ground station for about a minute and a half and it's a low pass, maximum elevation is 1.3 degrees over the horizon during that

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Hawaii pass. And we'll have voice contact in about 2 and a half minutes. At 10 hours, 51 and a half minutes, this is Shuttle Mission Control.

CAPCOM Challenger, with you at Hawaii for about 1 minute.

SPACECRAFT Roger, Jon. What's the next AOS after Hawaii?

CAPCOM We'll see you down at Santiago at 11 17, 1117.

SPACECRAFT Okay, we'll be eagerly standing by for a burn report from the IUS.

CAPCOM You bet. And that goes in about 3 minutes.

SPACECRAFT Jon, the PCMMU is reloaded and closed out page 5-4 is complete.

CAPCOM We copy that, and one more note for you. Traditionally, things have gotten a little bit cooler at night, as you go to sleep, so you may want to turn that temp controller valve up now, or we'll remind you again before you go to sleep.

SPACECRAFT Okay, thank you.

CAPCOM PAYCOM recommends you do it anytime between now and 12 plus 30, go to full heat.

SPACECRAFT Yes, I think we'll try that. This is really a cool vehicle.

CAPCOM Okay.

END OF TAPE

CAPCOM We're going to lose you here shortly. The IUS is looking good and we're expecting a good burn here shortly, and I hope to have some information for you at Santiago.

SPACECRAFT Okay, thank you.

CAPCOM And before I go, how about checking for a TV camera over temp.

SPACECRAFT Wilco. Okay, we're working.

PAO Shuttle Mission Control, it'll be 22 minutes before we reacquire through Santiago. The first burn of the IUS stage is scheduled for 55 minutes after deployment. That is one minute from now. At this time, the IUS TDRS stack should be approximately crossing the equator in the middle of the Pacific. Onboard software will ignite the first stage for a burn of 2 minutes, 33 seconds. The stage 1 motor provides 62,000 pounds of thrust. This will place the IUS TDRS stack in a geosynchronous transfer orbit, resulting in a continuous climb to its ultimate 22,300 mile altitude. And we, of course, have no displays of that information here in Houston, and we'll be standing by for confirmation of this event from the Air Force's Satellite Control Facility at Sunnyvale, where the IUS payload operation center is located. Once again we'll be in an LOS period for about 20 minutes. Standing by for a next voice contact through Santiago, Chile. At 10 hours, 57 minutes, mission elapsed time, this is Mission Control, Houston. Payload's Officer, J. J. Cornwell has confirmed IUS ignition on time, at mission elapsed time, unofficially 10 minutes, 57 seconds. Make that 10 hours, 57 minutes of mission elapsed time for the stage one IUS burn. Mission Control, Houston. Sunnyvale has confirmed IUS burnout. This is Shuttle Mission Control at mission elapsed time of 11 hours, 16 minutes, coming up on acquisition of signal in about 2 minutes through Santiago, Chile. And CAPCOM Jon McBide will advise the crew of the data acquired on the first stage burn of the IUS. That burn didn't occur within site of any ground stations but the Air Force deployed 2 EC-135's (garble) instrumented aircraft, which were positioned so as to observe that burn and that data will be reported to the crew during this pass. It's meal time onboard Challenger, and the sleep period scheduled to begin in just under 2 hours from now, concluding what will have been a very long and active day for the Challenger crew. We'll expect voice contact here momentarily, this is Mission Control, Houston.

CAPCOM Challenger, we're with you over Santiago, for about 5 minutes.

SPACECRAFT Roger, Houston, loud and clear.

CAPCOM And if you would, we'd like an SM SPEC 1.

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CAPCOM And the IUS had a good SRM 1 burn, and it also had
RCS 1 burn...

END OF TAPE

SPACECRAFT Roger, Houston, loud and clear.

CAPCOM And if you would, we'd like an SM SPEC 1. And the IUS had a good SRM 1 burn and also had the RCS 1 burn was successful. The SRM 1 burn was a little bit short, but the RCS made up for it.

SPACECRAFT Fantastic Jon. You're making our day.

CAPCOM No, you're making ours.

SPACECRAFT While we're talking about that, I got a suggestion here.

CAPCOM Go ahead.

SPACECRAFT If you'd like, I've finished 4 bananas and dinner and I couldn't think about bed right now, I'd like to start the this (garble) OPS, lets check out the (garble) starting on flight supplement page 23.

CAPCOM We're talking about that now.

SPACECRAFT I've looked over, I don't see any system impact, we don't have to go through isolating the tank, cause we're just going to top it off anyway.

CAPCOM And while we're talking about that, we're wondering if you've got a good teleprinter message?

SPACECRAFT Don's going over to look right now. (garble) I understand we should have one. We did get the weather message Jon.

CAPCOM And understand it was nice and clear?

SPACECRAFT And that it really was.

CAPCOM Okay. And Story, go ahead and perform that EMU checkout.

SPACECRAFT Fantastic, give Armstrong and Gary and the GNC folks a call there, they were planning on it tomorrow.

CAPCOM We don't have them here with us now Story.

SPACECRAFT Okay.

CAPCOM We've got about a minute left here at Santiago, we'll see you over Ascension at 1132.

SPACECRAFT 1132, Roger. Okay Jon I'm starting on the SCU's

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(garble) in the airlock on page, flight supplement 23.

CAPCOM We copy.

PAO Mission elapsed time, 11 hours 31 minutes coming up momentarily on the acquisition of signal through Ascension Island, be in touch with the vehicle for about 8 minutes. We should have voice contact momentarily. This is Shuttle Mission Control.

CAPCOM And Challenger we're back with you for a long one here over Ascension, about 8 minutes.

SPACECRAFT Okay Jon.

CAPCOM And Challenger we're wondering if you're through with the TV for the day, if so, we'll go ahead and turn them off from down here. Challenger, Houston, we're wondering if you're through with the TV for the day, if so, we'll go ahead and turn them off from down here?

SPACECRAFT Houston we just went on VTR playback right now looking at the deploy. We'll get the (garble) cameras turned off up here. Come in Houston, MS1.

CAPCOM Go ahead.

SPACECRAFT The water charge on EMU1 is in progress.

CAPCOM Copy. How does the playback look?

SPACECRAFT It looks pretty good, except I think I forgot to turn off the data, and so we recorded some data on the film.

END OF TAPE

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SPACECRAFT (garble) change on EMU 1 is in progress.

CAPCOM Copy. How does the playback look?

SPACECRAFT Everything looks pretty good except I think I forgot to turn off the data, so we recorded some data on the film. We completed the (garble)

CAPCOM Copy.

SPACECRAFT So we got a good view of the umbilical sep that's the reel I'm working here, we got another reel that I really didn't have time to look at.

CAPCOM Okay. And we're looking forward to that in the morning. And Story we're wondering if you're topping off EMU number 1 or number 3.

SPACECRAFT I'm working on number one Jon, page flight supplement 23.

CAPCOM Okay that's the one we wanted you to work on.

SPACECRAFT Sure enough, number 3 got a full water charge as you know.

CAPCOM I guess you misread, or we misread you. e thought you said number 3 earlier?

SPACECRAFT No I said (garble) EMU ops but that happens to be recharging the water in EMU1.

CAPCOM Okay we're all in sync now.

SPACECRAFT (garble) Jon, the O2 pressure in EMU1 is 868.

CAPCOM Copy

SPACECRAFT Then I'll give you a time how long it takes it takes to get a full charge of water.

CAPCOM And we understand it might charge a little faster with the helmet off.

SPACECRAFT Yes. And Jon

CAPCOM Go ahead.

SPACECRAFT There's (garble) of the air lock side of the (garble), when lifted the hatch off it pulled out in place, it's very easy to push it back in and that may be normal but they want you to know.

CAPCOM And say that again Story.

SPACECRAFT There's (garble) rubber seal on the (garble) side of the inner hatch. When we pull the hatch over the seal it pulled out in places, out of its groove, and we just push it back in with our fingers?

CAPCOM Okay we copy now. And the Crystal Team is going to be leaving you here in about a minute and we're going to turn you over to the Amber guys. It's been a great day for the space program, we'll see you some time tomorrow, we appreciate it very much.

SPACECRAFT Thanks a whole bunch Jon it sure was a good day, you helped us out a bunch. But before you go I've got a water pressure of 17.1 and a gas pressure of 0 on EMU1 showing its fully charged.

CAPCOM Okay we copy that and we concur, we'll lose you in about 10 seconds then we'll see you tomorrow guys.

SPACECRAFT Okay and it only took 6 minutes to get there.

CAPCOM That's great. Adios. And by the way, the Ambers will see you at Guam at 1214.

SPACECRAFT Okay, 1214. Yes.

PAO Mission Control Houston. Mission elapsed time 12 hours 13...

END OF TAPE

PAO Mission Control Houston. Mission elapsed time 12 hours 13 minutes. We're about a minute away from reacquiring communication with the Challenger crew over the Guam station, that'll be about a 7 minute pass. There remains about one hour left in the crew wake period before they get put to bed for the night. Earlier just before our, the end of the last pass the Mission Specialist Story Musgrave reported that he was repairing some of the EVA equipment, getting some of that work out of the way ahead of time. The crew's been very good about keeping up with the schedule and has even been ahead in some cases. It was also reported a little earlier this evening that the IUS burn went well, and that everything was looking good with that system.

CAPCOM Challenger Houston with you through Guam for 7 minutes.

SPACECRAFT Roger Houston, we're just, we got the startrack and we're ready to do the IMU line, can you see all the numbers?

CAPCOM That's affirmative.

SPACECRAFT Okay then we won't copy them down, we'll just transfer the them. And Houston, MSI.

CAPCOM Go ahead Story.

SPACECRAFT I installed serial number 002 LiOH cartridge in the MU3, that's the bottom left to flight supplement 24.

CAPCOM Okay we copy that.

SPACECRAFT Okay, I'm starting on the SOP check, on the EMU number 3 on page flight supplement 24.

CAPCOM Roger.

SPACECRAFT Houston Challenger

CAPCOM Go ahead

SPACECRAFT Got some information, when we got to the a line attitude the Z star tracker shutter was brought open, it was closed, I did an item 16, opened it up manually. Did another item 16 and it stayed opened and you may or may not remember that we had to do that before the initial self test of the whole flight also. We did get good numbers as you could see.

CAPCOM Okay we copy and we agree.

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SPACECRAFT Also if we can, standby... if we can, I'm sorry I must admit that I can't find my sun glasses. See if they're supposed to be in my clothing locker. Outside of unrolling every article of clothing in there, I haven't done that yet, but I've groped around some but I can't find them. We're going to be going to sleep pretty soon, so I don't need them tonight but if tomorrow somebody could tell us where they are stowed in those lockers it would help us find them.

CAPCOM Okay we copy that, we've got some people here that will be glad to go and find where they're at.

SPACECRAFT Okay no rush. Houston MS1

CAPCOM Go ahead

SPACECRAFT EMU is 6000.

CAPCOM We copy

SPACECRAFT And EMU 3 SOP is reg at 3.6.

CAPCOM Copy Story.

SPACECRAFT O2 pressure is 869.

CAPCOM Roger. Challenger Houston, we're about one minute to LOS, a reminder that we would like to get the speaker box checked out at our next AOS which is Santiago, and we would like for you to get an SM check point on both mass memories prior to sleep.

SPACECRAFT Roger we copy.

CAPCOM And I could give you. P.J. I can tell you where your sun glasses should be if you'd like to copy that now, I'll give it to you at Santiago?

SPACECRAFT (garble)

CAPCOM Okay if you look in MA16 golf, and look in the large pocket of your stowed trousers, they should be there.

END OF TAPE

SPACECRAFT (garble)

CAPCOM Okay if you look in MA...

CAPCOM ...quif and look into the large pocket of your stowed trousers and they should be there. And we'll be with you at Santiago at 1253.

SPACECRAFT Roger. And Houston, do you have the EMU's support RMU's in there now?

CAPCOM That's affirmative.

PAO Mission Control Houston, 12 hours, 23 minutes, mission elapsed time, just passed out of range from the tracking station at Guam on orbit number 9. We have almost 30 minutes before we reacquire communication with the Challenger. Mission specialist Story Musgrave continues his procedures in charging up the EMUs, checking them out, so far the EVA console position here at Mission Control reports that the information that Musgrave has been reading back has been very good, that the equipment seems to be checking out just fine. At 12 hours 24 minutes mission elapsed time this is Mission Control Houston.

CAPCOM Challenger, Houston with you through Santiago for 6 minutes.

SPACECRAFT Houston, MS1.

CAPCOM Hello Story.

SPACECRAFT Hope you have these broken out, we did a total water charge on the EMU 1, I've completed a complete checkout on EMU 3 and I've got some numbers for you.

CAPCOM Okay we'll get those in a second. It would appear to us that you had to have bay one fan off when we came AOS and we were wondering if you could tell us what was happening there?

SPACECRAFT They were looking at how much limit was down in that area.

CAPCOM Okay we copy. And we take it that there was no problem then in that area?

SPACECRAFT No problem..

CAPCOM Okay and we're ready to copy your numbers Story. Challenger, Houston, Story we're standing by for your numbers. Challenger, Houston, how do you read? Challenger, Houston, how do you read? Challenger, Houston, we have about 2 minutes left on LOS, we are unable to read you at this time. Challenger

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Houston, we're one minute to LOS, next AOS will be at Ascension at 1308 and we thought we might have heard you try to transmit there just a few seconds ago.

SPACECRAFT Yes I'm calling you from the middeck on the speaker mike, do you read at all Dick?

CAPCOM Okay we've got you loud and clear now.

SPACECRAFT Okay read you loud and clear also.

CAPCOM Okay that's a good check. Just as we go LOS here we'd like to tell you that your state vector is good up to your next primary landing site, and there will be no message coming up relative to that.

SPACECRAFT (garble)

CAPCOM Negative Story, we didn't get your numbers at all. If you could give them to us first thing at Ascension, we'll copy them down then?

SPACECRAFT (garble)

END OF TAPE

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SPACECRAFT ... delta pressure was 869, (garble) to 25.

CAPCOM Okay, we've copied everything so far, Story.

SPACECRAFT (garble) range of 4.75, the water temperature decreases 16 to 46, the air pressure 14.2, water pressure 15.0, (garble) pressure is .9 on the gauge, .7 in the VCS. In rev the guage is 4.2 to (garble) is 4.2 in the leak checks (garble). The water pressure began leveling four, indicating we got a full charge of water.

CAPCOM Okay, that all sounds good, Story.

SPACECRAFT Okay, (garble) got far away through the EMU checkout. Houston, what messages should we have on our teleprinter other than the weather message we received much earlier?

CAPCOM That should be the only message you have onboard.

SPACECRAFT Okay, we got that one. Misunderstood one of your earlier transmits about messages.

CAPCOM Okay, I was just telling you your state vector is good up until your next PLS tomcrrrow, and we won't be sending a message relative to that.

SPACECRAFT (garble), thank you.

CAPCOM Story, relative to the DCM plug, we would like for you to restow that on EMU 3, at least we recommend that so that you don't lose track of where that guy is before Thursday.

SPACECRAFT Okay, I can sure do that, I've got it in the airlock bag now, I think your most EMU checkout. I got the equipment all in the airlock including the airlock bag.

CAPCOM Okay, that's fine, Story, if you want to leave it there.

SPACECRAFT Yes, it's in the bag, we can't possibly forget to have it in the airlock.

CAPCOM You're thinking along the same lines we were.

SPACECRAFT (garble)

CAPCOM Roger. We do have a question for whoever was checking the AV bay 1 fan filters. Our question was, we just wondered if they were able to check the filter, and if it required any cleaning? And Challenger, while ya'll are working up an answer to that, just wanted to advise you that we really

don't have much in summary for today other than letting you know that we are planning nominal flight day 2 for tomorrow. There shouldn't be many changes at all coming up. We do have a basketball score to pass on to you, the Phi Slamma Jamma met their match tonight at North Carolina State defeated the University of Houston, 54 to 52 in the NCAA championship.

SPACECRAFT Houston, say again who won?

CAPCOM North Carolina State.

SPACECRAFT Alright, Houston. That's the only bad news we've had all day.

CAPCOM And we can handle that.

SPACECRAFT I just went up there on the mid deck and practiced slam dunks.

CAPCOM Story, we're trying to follow you through the EMU checkout, if you could give us where you are in that procedure at this time, it would help us.

SPACECRAFT (garble)

CAPCOM And Challenger, we didn't copy your last transmission.

SPACECRAFT Houston, in connection with that AV bay fan, we haven't worked with the filter yet, we think you misunderstood what we were telling you.

CAPCOM Okay, I guess we did.

SPACECRAFT We haven't had time to go and look at that yet.

CAPCOM Okay, we copy. We'd only asked the question because we had thought we had seen the fan off

END OF TAPE

SPACECRAFT Okay, I guess we did. We haven't had a chance to go and look at that yet.

CAPCOM Okay, we copy, we had only asked the question because we thought we had seen the fan off in there and we were wondering if you had had a problem.

SPACECRAFT (garble) MS1.

CAPCOM Go ahead, Story.

SPACECRAFT All (garble) without the airlockbag in there (garble) priority with the (garble) two sets of configurations on the

CAPCOM Okay, we copy that, Story.

SPACECRAFT (garble) I think that's as far as we'll go, we will not have the EMU to (garble). Houston, on the AV fans, we did not look at the filters, (garble)

CAPCOM Okay, we're 30 seconds to LOS, and we copied that, Don, and understand about the AV bay fans.

SPACECRAFT (garble) let you people go home, thank you for coming in.

CAPCOM You get a big you're welcome from those guys and this will be our last COMM with you. We'll see you tomorrow morning at wake up.

SPACECRAFT Okay, Houston, thank you. (garble)

PAO Mission Control, Houston, 13 hours, 21 minutes, mission elapsed time. Crew of the Challenger is just about reaching the end of their very busy day today. And they have had their last communication with the people in Mission Control. CAPCOM reported that crew can expect a nominal day tomorrow as per the published flight plan. Apparently will be very little then to keep the planning team busy tonight here in Mission Control. There were very few anomalies that have not been resolved during the course of the day after a successful IUS TDRS deployment. Mission Specialist, Story Musgrave continued to make preparations for the EVA that will take place on Thursday. Moving ahead in the timeline and making those preparations, checking out of the equipment, getting that done early. While the crew is certainly still awake at this point, judging from their recent conversations, they are officially into the schedule sleep period. And they're due to begin their next day's activities in about 8 hours from now. 13 hours, 22 minutes, mission elapsed time, this is Mission Control, Houston. Mission Control, Houston, 14 hours, 32 minutes, mission elapsed time.

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Challenger is on the last portion of orbit number 10, passing over the edge of the range of the Santiago tracking station, as data comes down from the spacecraft to the ground controllers here in Mission Control. Everything still remains in good shape aboard the spacecraft. Crew is just in their scheduled sleep period by about an hour or so. The ground controller's monitoring this

END OF TAPE

PAO Crew is just in their scheduled sleep period by about an hour or so. The ground controllers monitoring the systems have noted that at about a half an hour or more ago they configured everything for sleep, turned off the things that needed to be turned off. At 14 hours 33 minutes, mission elapsed time this is Mission Control Houston.

PAO This is Mission Control Houston at 15 hours, 37 minutes mission elapsed time. Orbiter Challenger is on orbit number 11 and over the Pacific Ocean. Its at that time of the day when the orbital ground track is precessed westward not passing over very many ground stations, so we've had quite some time without communication with the spacecraft or receiving any data from it. Naturally the crew is asleep at this time, but we do continue to receive the data that is automatically relayed to the ground. It will still be at least another 45 minutes approximately before we pass over another station and we are able to data from that. (garble) last opportunity to observe, it appeared that everything was well aboard the spacecarft and that no major problems existed. Hopefully the crew is getting a good night's sleep for another ambitious day tomorrow. At 15 hours 38 minutes mission elapsed time this is Mission Control Houston.

PAO Mission Control Houston, 16 hours 26 minutes mission elapsed time, the Challenger is passing over the Dakar station at this time. Crew still has about 5 hours remaining in their sleep period, the Flight Controllers here in Mission Control are waiting the results of the second solid rocket motor burn of the IUS which would boost the tracking data relay satellite up into its geosynchronous orbit. That burn began about 10 minutes ago and we should shortly be hearing some word as to whether that burn was successful. 16 hours 27 minutes mission elapsed time, this is Mission Control Houston.

PAO Mission Control Houston, 16 hours 34 minutes mission elapsed time. Still waiting in Mission Control for confirmation of the results of that IUS burn, the final burn of the solid rocket motor, that is the burn of the second solid rocket motor. Some indication that shortly...

END OF TAPE

PAO Mission Control for confirmation of the results of that IUS burn. The final burn of the solid rocket motor, that is the burn of the second solid rocket motor. Some indication that shortly before that burn was initiated, at about mission elapsed time 16 hours, 18 minutes that there was a loss of data from the IUS TDRS. It is uncertain at this time as to what the cause of that was and what may be the result or the current status of that spacecraft. We'll keep you advised on that as we get further word. 16 hours, 35 minutes, mission elapsed time, this is Mission Control, Houston.

PAO Mission Control, Houston, 17 hours, mission elapsed time. Flight controllers here in Mission Control are still waiting for word on the status of the IUS and TDRS satellite. There's been several indications of problems with that that occurred before and after perhaps the second solid rocket motor burn. There are very few clues at this time, remote POCC at Sunnyvale is continuing to monitor that and troubleshoot that, try to determine what the current status is. We will keep you advised as anymore details become available, at 17 hours, 1 minute, mission elapsed time, this is Mission Control, Houston.

PAO Mission Control, Houston, 17 hours, 21 minutes, mission elapsed time. Troubleshooting efforts continue to determine the condition of the Inertial Upper Stage and the Tracking Data Relay Satellite, that experienced some problems about the time of the ignition of the second solid rocket motor, which would boost the system into geosynchronous orbit. There was a loss of data early on about that time. There have been other indications of problems, but it has been impossible to tell exactly the nature of the problem at this time, given that there is no data coming back from the IUS. 17 hours, 22 minutes, mission elapsed time, this is Mission Control, Houston.

PAO Mission Control, Houston, 17 hours, 37 minutes, mission elapsed time. We have an official statement from Colonel Lavorino and others working on the problems apparently afflicting the IUS TDRS combination. I'll read that statement to you now. During the firing of the second stage of the IUS to place the TDRS at geosynchronous orbit, apparent loss of control occurred and telemetry from both the IUS and TDRS was lost. Subsequently it has been determined that the TDRS IUS combination is most likely tumbling. Anomaly teams are at work to produce a plan to attempt to recover the spacecraft, further information will be released as it becomes available. This is Mission Control, Houston, at 17 hours, 38 minutes, mission elapsed time.

PAO Mission Control, Houston, 17 hours, 57 minutes, mission elapsed time

END OF TAPE

PAO Mission control Houston, 17 hours 57 minutes mission elapsed time. Repeating an earlier statement on the status of the IUS TDRS. During the final firing of the second stage of the IUS to place the TDRS in geosynchronous orbit, apparent loss of control occurred in telemetry from both the IUS and TDRS was lost. Subsequently, it has been determined that the TDRS IUS combination is most likely tumbling. Anomaly teams are at work to produce a plan to attempt to recover the Spacecraft. We'll have more on that as it becomes available to us here in Mission Control, 17 hours 58 minutes mission elapsed time, this is mission control Houston.

PAO Mission control Houston, 18 hours 25 minutes, mission elapsed time. Troubleshooting efforts continue with the IUS TDRS combination. The TDRS flight commanders attempting to send commands to stabilize the combination Spacecraft, which it does not appear there has been a separation of the two, limiting factor being battery life on the IUS in it's ability to take commands. Estimates are that that battery life is now expired, not yet known as to whether or not the commands to stabilize have been successful. Meanwhile, the Orbiter Challenger is on its 13th orbit. All systems are appearing nominal onboard the Orbiter. And the crew has more than 2 hours, almost 3 hours remaining in their scheduled sleep period. 18 hours 26 minutes mission elapsed time, this is mission control Houston.

PAO Mission Control Houston, 18 hours 30 minutes mission elapsed time. The team's attempting to recover the IUS TDRS combination, they indicated they have lost the downlink with the IUS. That would indicate that the batteries on the IUS which enable it to, which power it and enable it to take commands have expired, those batteries have gone dead and would indicate that it would be no longer possible to communicate, or indicate to command the IUS. We'll have further information for you as things become more clear. Meanwhile, the Orbiter Challenger continues to perform well. It's on orbit number 13, 18 hours 31 minutes mission elapsed time, this is mission control Houston.

END OF TAPE

PAO Mission control Houston, mission elapsed time 20 hours 43 minutes. The Challenger is on the last few miles of orbit number 14, and about to begin orbit number 15. Crew has about a half an hour remaining in their scheduled sleep period. Things have been relatively quiet onboard the orbiter this evening. Very few things came up to occupy the ground controllers time. Most of the time was spent in observing ground controllers at other remote locations in their attempts to regain control of the inertial upper stage in the Tracking Data Relay Satellite. That activity appears to have had some success. I'll read again the statement that was issued earlier this morning. That statement is, 'We believe the spacecraft has separated from the IUS. We have stabilized it, and have initiated deployment commands.' Further information will be released on it as it becomes available. At 20 hours 44 minutes mission elapsed time, this is mission control Houston.

PAO This is shuttle control at mission elapsed time 21 hours 10 minutes. A shift hand over is underway in the mission control center. Flight Director Randy Stone and his team being relieved by Flight Director Gary Cohen. Change of shift briefing estimated for 10:10 a.m. Central Standard Time, for the change of shift briefing in room 135 the JSC newscenter. Challenger's about 45 seconds away from acquisition through Dakar, on orbit number 15. Wake up time scheduled for 3 minutes 10 seconds, it will come during the Dakar pass, we'll stand by for AOS at Dakar.

(music)

END OF TAPE

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WAKE UP CALL (music -- "Cadets on Parade" and "The Air Force Song" by the United States Air Force Academy Band).

CAPCOM Good morning, Challenger.

SPACECRAFT Hi there.

CAPCOM Hope you guys enjoyed that. Anybody that served any time at the Blue Zoo might recognize that as "Cadets on Parade".

SPACECRAFT Did you just play some of that up to us?

CAPCOM Come on Story, you're breaking our heart.

SPACECRAFT Did you say I'm breaking up bad? Let me work on it.

CAPCOM And Challenger, Houston, we've got about 2 minutes to go in the Dakar pass. We have nothing for you. We're standing by.

SPACECRAFT Okay, and how are you reading MS1?

CAPCOM You're five by, Story.

SPACECRAFT Okay, we're waking up, cleaning up, getting breakfast, and you know, all things everybody else does at this time of the morning, or afternoon, whenever it is.

CAPCOM Roger that. And as I said we have nothing for you. If you want to talk over the messages any at Indian Ocean we'll be happy to do that.

SPACECRAFT What time is that?

CAPCOM We'll see you at Indian Ocean at 21:31.

SPACECRAFT Okay, about 14 minutes. You guys better standby this morning. We're going to come out the chute running hard.

CAPCOM We didn't know you'd stopped, Story. You all put on an amazing performance yesterday.

SPACECRAFT In between the CFES work I'll be doing some work on the suits.

CAPCOM Roger. And we're going LOS now. We'll see you at Indian Ocean.

SPACECRAFT Okeydoke.

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PAO This is Shuttle Control. Dakar has loss of signal. Next acquisition through the Indian Ocean station in just over 10 minutes. Capcom's on this shift are astronauts Dick Covey and Roy Bridges. Communicating with Story Musgrave on this Dakar pass was Roy Bridges. The wake up music was "Cadets on Parade" and "The Air Force Song" by the United States Air Force Academy Band. At 21 hours 21 minutes mission elapsed time this is Mission Control Houston.

END OF TAPE

PAO This is Shuttle Control. Dakar has loss of signal. Next acquisition through the Indian Ocean station in just over 10 minutes. CAPCOMS on this shift are astronauts Dick Covey and Roy Bridges. Communicating with Story Musgrave on this Dakar pass was Roy Bridges. The wake up music was Cadets on Parade and The Airforce Song by the United States Airforce Academy Band. At 21 hours, 21 minutes mission elapsed time this is Mission Control, Houston.

(garble)

PAO This is Shuttle Control at 21 hours, 30 minutes mission elapsed time. Standing by for acquisition through the Indian Ocean station.

CAPCOM Challenger, Houston with you at Indian Ocean for 9 minutes.

CAPCOM Challenger, Houston's with you at Indian Ocean for 8 and one half minutes.

CAPCOM Challenger, Houston. How do you read?

SPACECRAFT Loud and clear.

CAPCOM Okay, Story. We're with you over Indian Ocean for 7 and one half minutes. Standing by.

SPACECRAFT Okay, we did get into teleprinter and as soon as you get any update on how the TDRS is doing, we're terribly interested in that.

CAPCOM Well I do have some words. The situation has changed somewhat for the better in the last couple of hours so if you all are ready to listen I'll go over it with you.

SPACECRAFT Yea I'd sure like to hear.

CAPCOM Okay. The latest information is that we were able to successfully separate the IUS and the TDRSS. We are still working on the orbital parameters. We are not in a geosynchronous orbit and determining exactly our capability as far as orbit goes is still in work and I'll get back to you on that but the rest of the good news is that the TDRSS itself is in an inertial mode, stable. All of its panels and booms have been extended and locked. The power system is good. Solar rays are generating 6 amps and the batteries are up to snuff. We've got a good telemetry lock on the A&D and system is operating on its gyros stable, rates are zero. So, and also thermal situation is good on the TDRSS. So it's a lot better than what you read in your message.

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SPACECRAFT Okay it all sounds like how much RCS we got to use to get it where its got to go.

CAPCOM Yea, Story and we're looking into that now and we don't have an answer for you but we'll get back as soon as we do.

SPACECRAFT Yea, especially things like the state of the IUS when we turned it loose. In other words how we can (garble).

CAPCOM Story, of course we'll be looking into exactly what happened. We don't really have a story there for you...

END OF TAPE

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SPACECRAFT We have especially things like, the state of the IUS when we turned it loose, in other words how we contributed to its...

CAPCOM Story, of course, we'll be looking into exactly what happened, we don't really have a story there for you. We'll probably be talking alot about that post-flight.

SPACECRAFT Okay.

PAO This is shuttle control, change of shift news conference which will include an IUS status report, will begin momentarily in room 135 at the JSC newscenter.

CAPCOM Challenger, Houston, we're 20 seconds to LOS, see you at Yarragadee at 21:47.

SPACECRAFT Okey doke.

PAO This is shuttle control, the Indian Ocean station has loss of signal with Challenger, next acquisition through Yarragadee in 6 and 1/2 minutes. Crew was informed of the latest word on the TDRSS during this pass. At 21 hours 40 minutes mission elapsed time. This is shuttle control Houston.

PAO This is shuttle control at 21 hours 47 minutes mission elapsed time, shuttle approaching acquisition through Yarragadee.

CAPCOM Challenger, Houston's with you at Yarragadee and Orroral for 13 minutes.

SPACECRAFT Okay.

SPACECRAFT Hey Dick, this is Pete.

CAPCOM Challenger, Houston, did you call?

SPACECRAFT Yeah, Dick, this is Don Peterson, we're still interested in finding out why we didn't get the automatic pro on 104 yesterday, if anybody knows.

CAPCOM Stand by.

CAPCOM Don, Roy here, the best we can tell from looking at the data right now, looks like we could have interrupted the -Z translation slightly early, which prevented us from setting that flag and necessitated a manual pro to 104.

SPACECRAFT What do you think interrupted it?

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CAPCOM Well, we think maybe the plus X was just a little bit early.

SPACECRAFT Okay.

CAPCOM Challenger, Houston, we're 20 seconds LOS, we'll have a very short LOS period, we'll pick you up through Orroral here in about a minute.

CAPCOM Challenger, Houston's with you again through Orroral Valley for about 3 minutes.

CAPCOM Challenger, Houston's with you again through Orroral Valley for 3 minutes.

SPACECRAFT Okay, Houston.

END OF TAPE

CAPCOM Challenger, Houston's with you again through Orroral Valley for 3 minutes.

SPACECRAFT Okay Houston.

CAPCOM Challenger, Houston, is everybody on Comm yet?

SPACECRAFT Negative, there is only a couple of us, I think Story and I are the only ones on Comm right now.

CAPCOM Okay, well before we go LOS here over the Pacific we don't want to interrupt you too much, but I passed a few words onto Story regarding the improving situation with TDRSS. I've wanted to re-iterate that. We were all certainly impressed with your performance yesterday during the flight. Thought everything went really super, and we're all working our tails off down here to try to make sure this improving situation with TDRSS goes as far as we can, we know ya'll are anxious for information now, and we'll be providing it as it comes in.

SPACECRAFT Okay, thank you, yes we would like to hear that, and I guess also, we'd like to know a little more about exactly what the sequence of events was when you have time.

CAPCOM Roger.

CAPCOM Challenger, Houston, we're 30 seconds LOS, we'll be picking you up at Mila at 22:33, and for information we will be UHF only at Mila. We devoted part of the ground station resources to the TDRSS in an attempt to help them recover as much capability as possible.

SPACECRAFT Roger, I understand that, thank you.

PAO This is shuttle control, Challenger is out of range of the Orroral Valley station in Australia. Next acquisition through Merritt Island Florida, in 32 minutes. At 22 hours mission elapsed time, this is shuttle control Houston.

PAO This is shuttle control at 22 hours 32 minutes, mission elapsed time. Columbia is approaching acquisition through Merritt Island.

CAPCOM Challenger, Houston with you at Mila for 11 minutes.

SPACECRAFT (garble). Okay Houston, we're with you. And I'm just getting ready to look at that MLR malf, right now. And I was taking a quick look through your messages, I don't see a fuse pasted to the front of the cabinet there.

CAPCOM Okay, Don. It should be on top of the installation.

SPACECRAFT It is just a fuse that's velcroed onto something? Or is covered with something or what?

CAPCOM Stand by a second. Don, it's a little pocket that has three fuses in it, and if you're looking at the panel itself, there's on top of the, just above the power light, there is a caution message that reads 'May Exceed Safe Touch Temperature' okay, go up above that on the very top of that unit, and reach back about an inch, just behind the front lip there and you should feel a little pouch there with 3 fuses in it.

SPACECRAFT Well I'm looking, first of all, I started looking straight on at the power light, there is nothing written on here in the way of caution message, and there are no fuses on top of there that I can see. I'm going to keep looking.

CAPCOM Okay. The caution messages is on top of the panel, that contains the power light. What you want to do is go on top of the main unit, the power light panel actually sticks out in front of that installation by about an inch or two.

SPACECRAFT Okay, I see it now, if I, I think, if I can only get to it, you can only reach it with your fingers, and the thing is so narrow you can't get it out..

END OF TAPE

CAPCOM Go on top of the main unit. The pilot light panel actually sticks out in front of that installation by about an inch or two.

SPACECRAFT Okay, I see it. Now, if I can, I think, if I can only get to it. It's, you can only reach it with your fingers and the thing is so narrow you can't get it out of there.

CAPCOM Okay, we were worried about that.

SPACECRAFT You just about have to remove a locker to get the spare fuse in there.

CAPCOM Yes, we really have out foxed ourselves on that location, didn't we?

SPACECRAFT I've got one of those up in the IFM tool kit that I can reach anyway.

CAPCOM Okay, we'll look into that also.

SPACECRAFT Houston, if you're still around, I used the so called mechanical fingers in the IFM kit and it was barely small enough and large enough to reach in and get them, so I got the fuses now.

CAPCOM Okay, that's great. Challenger, Houston, Story you up on the comm ?

SPACECRAFT Yes Houston, sure am.

CAPCOM Story, we had a question regarding the inner hatch seals that were loose. Where was the seal located that came loose.? Was it on the hatch or on the airlock?

SPACECRAFT Between the two and it was this great big round rubber seal that goes all the way around it the circumference of the hatch. It just loosen up in the groove and we pushed it back in. It's a round rubber tube that fits in the groove that's on the airline side of the hatch.

CAPCOM Okay, that's good, that's what we wanted to know.

SPACECRAFT Okay, Houston, this is Pete I've got a mal 3.3A out and then I got a question or two for you.

CAPCOM Okay, we've got it out, go ahead.

SPACECRAFT Okay, I haven't yet checked all the panels to see if all the circuit breakers are in but I noticed when I get through doing all of that it says check all of the connectors secure and it says turn the DC utility power on and all of that and I presume you want to leave the MLR switch off?

CAPCOM That's affirmative.

SPACECRAFT Okay, when I get all of those things checked I'll get back to you, but as of right now, unless there's some change, we checked them yesterday, that's where they all were. We have a gray, I'm sorry, a barberpole mal talkback. The MLR power switch is off right now. Power talkback shows up. I'm going to run upstairs and check all the breakers.

CAPCOM Okay. Challenger, Houston, we're about 15 seconds LOS. We'll see you at Dakar in about 3 and half minutes.

SPACECRAFT Roger, Houston.

PAO This is Shuttle Control. Bermuda has loss of signal. Challenger will next be acquired through Dakar in 2 and a half minutes. Crew scheduled to begin breakfast about this time. At 22 hours 45 minutes mission elapsed time this is Shuttle Control Houston. This is Shuttle Control. Dakar has acquisition now.

CAPCOM Challenger, Houston's with you at Dakar for 8 and half minutes.

SPACECRAFT Okay, Houston.

CAPCOM Challenger, Houston, Pete when you're working that malf, one suggestion we have for you is to go ahead and cycle the circuit breakers

END OF TAPE

SPACECRAFT Okay Houston.

CAPCOM Challenger, Houston. Pete when you're working that Malf, one suggestion we have for you is to go ahead and cycle the circuit breakers and the switches.

SPACECRAFT Okay, I'm already at M0130 and I see that the DC utility power main B switch is off. But I'm not sure but what we turned it off last night when we were turning off lights, cause I don't think it was off yesterday, when we had the (garble) off. I'll go ahead and plan to turn it back on.

CAPCOM Okay, good.

SPACECRAFT Okay, Houston on MLR I have no (garble) all the different connectors and all the utility power is on. The only switch I found not in configuration was the one on M0130, and I think that's the one we changed last night.

CAPCOM Roger, and what's the status of the talk back now?

SPACECRAFT Still haven't turned the MLR power switch on, that was next step, are you ready for me to go ahead and do that?

CAPCOM No, we don't need to turn that on, but we would like a reading on the MLR talkback.

SPACECRAFT Okay. Did you copy that?

CAPCOM Negative, we didn't hear that, say again.

SPACECRAFT Sorry, you didn't copy, I said the power talkback now is on, and the malfunction talkback is nominal and the power light is still off.

CAPCOM Okay, well that sounds real good.

SPACECRAFT Okay, would you like me to turn the switch on, or do you want to wait awhile or what?

CAPCOM And Challenger, Houston, we'd like to wait and do that at the normal time in the CAP.

SPACECRAFT Okay, so should I just leave the switch off when we come to it in the CAP pick up the normal procedure?

CAPCOM That's affirmative. Good work.

SPACECRAFT Okay thank you, and I guess I don't understand, but I thought this had been off so long we might have done something bad to it.

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CAPCOM And the report here Pete, is no problem at all to MLR press on OPS, normal and we should get good results.

SPACECRAFT Very good, okay when I come to it in the CAP, I'll turn it on.

CAPCOM And Challenger, Houston, I've got a note for you, it needs some switches on panel R1, if anybody's close by.

SPACECRAFT Stand by one.

SPACECRAFT Go ahead, read them to me, and I'll pass them upstairs.

CAPCOM Okay, panel R1, we'd like to take the cryo O2 and H2 tank 3 heaters, all four of them to auto.

SPACECRAFT Okay I got cryo O2 and H2 tank 3 heaters to auto.

CAPCOM Okay, good and one other note for you, are you going to be doing the CFES ops today?

SPACECRAFT Story's going to be doing that.

CAPCOM Okay, when Story reviews the teleprinter message on the CFES cue card update, we'll want to make sure he understands that the change applies only for sample 2 today, and sample 5 tomorrow.

SPACECRAFT I got it. Just 2 today and 5 tomorrow.

CAPCOM That's affirm Story, and we're about 30 seconds LOS here, we'll see you at Indian Ocean at 2308.

SPACECRAFT Okay thank you. And for the CFES people I'll be picking up right after the rendezvous burn.

CAPCOM Roger that Story.

PAO This is shuttle control, Challenger's out of range at Dakar, next acquisition through the Indian Ocean station in 11 minutes. At 22 hours 57 minutes, mission elapsed time. This is shuttle control Houston.

END OF TAPE

SPACECRAFT Thank you. And for the CFES people, I'll be picking up right after rendezvous burn.

CAPCOM Roger that, Story.

PAO This is Shuttle Control. Challenger is out of range at Dakar. Next acquisition through the Indian Ocean station in 11 minutes. At 22 hours 57 minutes mission elapsed time this is Shuttle Control Houston. This is Shuttle Control at 23 hours 7 minutes mission elapsed time. Standing by for acquisition through the Indian Ocean station.

CAPCOM Challenger, Houston's with you through Indian Ocean for 5 minutes.

SPACECRAFT Okay. Roger, Houston, I understand Indian Ocean for 5 minutes.

CAPCOM Roger.

SPACECRAFT (garble) and P.J.?

CAPCOM Go ahead.

SPACECRAFT Go ahead, Houston.

CAPCOM Roger, we've had a little thing we'd like for you to check on. I know you are in the middle of a meal maybe but if you could spare somebody to look at panel L4 we'd appreciate checking a couple of breakers.

SPACECRAFT Let me see, at all three breakers our humidity separator bravo are up, and signal conditioner humidity separator is up.

CAPCOM Okay, well that's real good. That's what I wanted to ask you about. We noticed that humidity sep bravo dropped off to line, so we'll be getting back to you on that. We think you also got a couple of fault messages related an AC volts 3 message and a cabin message here a short time ago.

SPACECRAFT Yes, we were just getting ready to ask you about them, Roy.

CAPCOM One other thing. We'd like to ask you about, to think about, and possibly later on you can give us an info on. We noticed some O2 floating into the cabin for a short period of time shortly after get up this morning. About 2048 MET and there was a cabin O2 message generated as a result of that and we're just kind of curious if you noticed it or if you were doing anything at the time that might be related to that anomaly?

SPACECRAFT Yes, we got a mass of armour in that, Roy. It, I assume it was the peculiarity of the system that this (garble) reported when the first time it switched from N2 to O2 it would go up scale high and that's just what it wants. We got the management alarms. The cabin atmosphere light. O2 flow on the CRT was on scale high. And then it would, I watched it a little bit, and then it would come down and on the meter anyway, it's kind of sporadic or jumping between 2 and 3 pounds per hour. What it did, went up over a five and then dropped back below and tripped that limit again about 3 times before it finally settled out.

CAPCOM Okay, well that's good poop. And we'll analyze it and get back to you on that.

SPACECRAFT Yes, that is what I assumed it was and you know it took awhile. Karol thought the time was about 14 7 on the CRT.

CAPCOM Roger, well the reason we're a little concerned about it, P.J., is because the data we had showed that we were in an O2 cycle and we're not switching between cycles. So this looked a little different and if you could provide information on any other incidents that come up we'd appreciate it.

SPACECRAFT Okay, we'll watch it, but I wasn't aware of it at the time, Roy.

CAPCOM Okay.

SPACECRAFT Yes, I see we're pouring a little O2 right now.

CAPCOM And P.J., for your information, we're recording voice again.

SPACECRAFT Okay, thank you. What do you want us to do on this humidity separator, just standby till you call?

CAPCOM And Challenger, Houston, we're ready to turn on sep A.

SPACECRAFT Okay, B is off, A is on now.

CAPCOM Okay, thank you.

SPACECRAFT Everything isn't clear, Roy, there are 4 circuit breakers up, correct? Each phase is a separator itself and one is a single conditioner?

CAPCOM Roger, we copied that. And Challenger, Houston, we're about 20 seconds LOS here. We'll see you at Yarragadee at 2323.

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SPACECRAFT Okay.

PAO This is Shuttle Control. Challenger is out of range at the Indian Ocean station. Yarragadee is next in about 9 minutes. At 23 hours 14 minutes mission elapsed time this is Shuttle Control Houston. This is Shuttle Control at 23 hours 22 minutes mission elapsed time. Yarragadee will acquire Challenger in about 10 seconds.

CAPCOM Challenger, Houston, with you through Yarragadee for 8 minutes.

SPACECRAFT Say again, Houston, you were broken up.

CAPCOM Roger, Houston's with you through Yarragadee for 8 minutes.

SPACECRAFT Okay, that time we read you loud and clear.

CAPCOM Okay, you're 5 by. We got a little background noise in the comm lines this morning but overall the comm's been great.

END OF TAPE

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PAO We will acquire Challenger in about 10 seconds.

CAPCOM Challenger, Houston with you through Yarragadee for 8 minutes.

SPACECRAFT Say again Houston, you were broken up.

CAPCOM Roger. Houston's with you through Yarragadee for 8 minutes.

SPACECRAFT Okay, that time we read you loud and clear.

CAPCOM Okay, you're a five by. We got a little background noise in the comlines this morning but overall the coms have been great.

CAPCOM And Challenger, Houston, for your information we took a look at SEP humidity SEP alpha when you turned it on. It looked clean.

SPACECRAFT I understand the humidity SEP alpha looked clean.

CAPCOM Roger.

CAPCOM Challenger, Houston, with 30 seconds LOS. See you at Hawaii at 23 52.

SPACECRAFT 23 52 Hawaii.

PAO This is Shuttle Control. Yarragadee has loss of signal. Quiet pass as it's still the breakfast hour aboard the Challenger. Next acquisition through Hawaii in 20 minutes. At 23 hours, 32 minutes mission elapsed time this is Shuttle Control, Houston.

PAO This is Shuttle Control at 23 hours, 51 minutes mission elapsed time. Standing by for acquisition through Hawaii. Challenger has just started orbit number 17.

CAPCOM Challenger, Houston's with you at Hawaii for 3 minutes.

CAPCOM Challenger, Houston's with you at Hawaii for 2 minutes.

CAPCOM Challenger, Houston. How do you read?

CAPCOM Challenger, Houston's with you at Hawaii for a minute and a half.

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SPACECRAFT Yea, how do you read Houston.

CAPCOM Okay, you're 5 by now. We had a com configuration problem.

SPACECRAFT Yea, we read you okay. I just finished the star tracker self test the minus z failed again. Do you want to run it again quickly?

CAPCOM Stand by.

CAPCOM Challenger, Houston. We saw the data and want you to just press on OPS normal.

SPACECRAFT Okay, we'll do that and be advised as normal. The minus z shutter was closed and item 16 opened it item 16 again left it open and we got what is again normal, the pass on minus y failed minus z.

CAPCOM Roger, copy. Thank you.

SPACECRAFT Okay, we got an angle difference 91.4 error .01.

CAPCOM Roger.

CAPCOM And Challenger, Houston. That looks okay. We want to see the torquing angles first though and we'll get that over the states and we'll see you there at about on the hour.

SPACECRAFT Okay. Well we look and spec 21 is all balls, every number.

CAPCOM Roger, copy and understand it might take a few minutes for the torquing angles to come up correctly.

SPACECRAFT They just did that's why I didn't believe they were all balls.

CAPCOM Roger.

PAO This is Shuttle Control. Hawaii has loss of signal. Buckhorn will pick up Challenger in about 3 and one half minutes. Challenger's Commander P. J. Weitz is in the midst of an inertial measurement unit alinement, platform alinement.

PAO This is Shuttle Control at 1 day mission elapsed time. Standing by for acquisition through Buckhorn.

CAPCOM Challenger, Houston's with you over the states for 18 and one half minutes.

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SPACECRAFT Roger.

CAPCOM And PJ we see the angles. We like them. They've cleared the torque.

CAPCOM And Challenger, Houston, you have a new state vector onboard.

SPACECRAFT (garble)

CAPCOM Challenger, Houston. I have the onorbit RCS burn pad, page 10-18. You're ready to copy?

SPACECRAFT Standby one minute Roy.

CAPCOM You could use...

SPACECRAFT Roy, I copied on page 10-15 Roy.

END OF TAPE

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CAPCOM And Challenger, Houston, you have a new space vector cnbaord.

SPACECRAFT Copy.

CAPCOM Challenger, Houston, I have the on orbit RCS burn pad. Page 10-18 if you're ready to copy.

SPACECRAFT Stand by one minute Roy.

SPACECRAFT Ready, I copied on page 10-15, Roy?

CAPCOM That's no problem at all. I was going to just suggest that you might pick the first one.

SPACECRAFT Okay, go ahead.

CAPCOM Okay, check -X, TV roll, all balls, weight 202, 160, TIG 1 day, 00:44:28.0. Peg 7 targets not applicable, post burn attitude and in attitude time not applicable, burn attitude, roll 205.6, 271.2, 347.4, Delta V total, 3.0, TIGO :10 TIGO X 2.86, all balls .91, Target 177 + 153, over.

SPACECRAFT Okay, it's going to be a -X RCS burn, TV roll is 000, the weight is 202 160, TIG is 1 day, 0 hours: 44 minutes: 28 seconds even. The burn attitude will be 205.6, 271.2, 347.4, delta V total 3 feet a second, 10 second burn time, TIGO X -2.86, and Z is .91, with the (garble) orbit 177 by 153.

CAPCOM Good read back. Okay, ready for the OMS burn on page 9-5 when you're ready.

SPACECRAFT Okay, copy.

CAPCOM Okay, check OMS both, TV roll 180, -.5, -5.7, +5.7, 202, 082, TIG 1 day, 01 hours:30:46.0, over.

SPACECRAFT Okay, that part of it is 2 engine OMS burn, TV roll 180 to gimble turns are a -.5, -5.7, +5.7, weight is 202, 082, TIG is 1 day 1 hour 30 minutes 46 seconds.

CAPCOM Okay, good read back. Stand by we're in a hand over, we'll be back with you in just a second.

SPACECRAFT Okay.

CAPCOM Okay, ready to go. Target peg 7, -43.0, all balls, -0.6, burn attitude 197, 242, 337. Delta V total 43.0, TIGO :23, TIGO X +41.27, all balls, Z has plus 12.09, apogee 153 + 152, over.

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SPACECRAFT Okay, the resultant attitude should be 197, 242, 337, you gave me the sevens, peg 7 targets, -43.0, all balls, -0.6, then the attitude, delta V total 43 ft a second, 23 second burn, the burn components X

END OF TAPE

SPACECRAFT Well, you gave me the targets. Peg 7 targets. Minus 43.0, all balls, minus 0.6 then the attitude. Delta V total is 43 feet a second, 23 second burn. The burn components X + 41.27.

CAPCOM Challenger, Houston.

PAO Challenger is between stations. Buckhorn's had LOS. Mila will pick up momentarily.

CAPCOM Challenger, Houston. Challenger, Houston, how do you read, over.

MILA Got a voice Houston contact. Ground 2.

GROUND 2 Loud and clear.

MILA Okay, Mila, Houston. Mila COMTEC Houston, enter ground 2.

COMTEC Mila, COMTEC.

MILA Roger, you're 5 by, okay go remote.

COMTEC We're remote at this time.

MILA Roger.

CAPCOM Challenger, Houston, how do you read?

SPACECRAFT Hear you loud and clear. You must have lost it. Did you get the read back?

CAPCOM I lost you after you read vigo X, if you could give us everything after that.

SPACECRAFT Okay, vigo X, 41.27. Y is all balls. Z is press 12.09. Orbit of 153 by 152.

CAPCOM Okay, that was a good readback, PJ, and I've got a flight note for you on the OMS rendezvous burn, the second one.

SPACECRAFT Yes, go ahead.

CAPCOM Okay, we've got a contingency plan prepared in case either one of the engines should fail on you, either prior to or during the burn. And just to summarize the plan basically. We'll just do the burn to optimize our orbit for deorbit problems considerations. What we would like for you to do if this happens to you, is to shut down and wave off 1 rev and we'll reach you up a new pad.

SPACECRAFT Well, that sounds most reasonable.

CAPCOM Thank you.

SPACECRAFT We can handle those alright. If you got a spare minute you might pass to Dick Richards that during the COADS cal yesterday, I very carefully located the COAD murfing bracket and had no problem putting it up there and that apparently this cal went alright.

CAPCOM Okay, good. Sure be happy to hear that.

SPACECRAFT You might also have some folks thinking about it. You know after these burns we get a little time, Roy, turn the presleep check (garble) and we could not get a satisfactory check on the flight deck speaker unit.

CAPCOM Roger, copy that.

SPACECRAFT And we set it up per the orbit checklist for presleep and you guys apparently never heard us and we never heard you come in on it. Also, we'd like you to think about powering down the UHF tonight. Not very often, but 3 or 4 times during the night as we did get those spurrious UHF transmissions that I guess mainly the guys on STS-3 heard.

CAPCOM Okay, we copy that and we'll think about it.

SPACECRAFT Alright.

CAPCOM And, PJ, one other note on the rendezvous burn, the OMS burn. Because of the problem on the left OMS secondary TVC when you do your gimbal check, just do it on the primary on the left OMS.

SPACECRAFT Oh yes, I wanted to ask you about that. You do want to check the secondary on the right side. So that means you get two checks on the primary on the left, is that the way you want to do it?

CAPCOM Standby.

SPACECRAFT And Roy, you guys got a problem with us going through RCS burn attitude right now?

CAPCOM We'll check on that and let me answer your previous question. Whatever is most convenient for you on the left OMS check. You can do two primary checks, it's fine with us.

SPACECRAFT Okay.

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CAPCOM Challenger, Houston, you've got a go to maneuver to attitude. Challenger, Houston, PJ, a reminder star trackers back to their track mode when you have a chance.

SPACECRAFT Oh, yes, thank you.

CAPCOM Challenger, Houston, have a switch for you on panel R12 if anybody is close by.

SPACECRAFT Yes, we can get that, go ahead.

CAPCOM Okay, we'd like to take the supply H2O tank bravo inlet to close.

SPACECRAFT Okay, that's complete.

END OF TAPE

CAPCOM Challenger, Houston. Have a switch for you on panel R12 if anybody's close by.

SPACECRAFT Yea, we can get that. Go ahead.

CAPCOM Okay, we'd like to take the supply H2O tank bravo inlet to close.

SPACECRAFT Okay, that's complete.

CAPCOM Okay, we're going to start topping off tanks Charlie and Delta.

SPACECRAFT I understand.

CAPCOM Challenger, Houston. We're 15 seconds to LOS. We'll see you at Dakar at 2-4.

SPACECRAFT Roger.

PAO This is Shuttle Control. Bermuda has loss of signal. CAPCOM Roy Bridges has passed up information to Challenger on the first 2 maneuvers in a phantom rendezvous exercise that Challenger will be conducting over the next several days. Consists of a series of phasing maneuvers. Simulating a rendezvous with another vehicle in orbit. First maneuver is reaction control system burn at 1 day, 44 hours, 28 minutes that's about 23 and one half minutes from now. Three feet per second of change in velocity. A burn time of 10 seconds. Predicted resulting orbit of 177 by 153 nautical miles. That will be followed at 1 day, 30 minutes, 46 seconds with a burn of both OMS engines for duration of 23 seconds, a delta-V of 43 feet per second. Resulting orbit of 153 by 152 nautical miles. Challenger's current orbit is 177 by 154 nautical miles and the orbital period is 1 hour, 30 minutes, 48 seconds. Challenger's about a minute and 15 seconds away from Dakar. We'll stand by for acquisition there. There's slight overlapping coverage through Ascension on this pass.

CAPCOM Challenger, Houston, with you through Dakar and Ascension for 11 minutes.

SPACECRAFT 11 minutes, Wow! Houston, MS2.

CAPCOM Go ahead.

SPACECRAFT Roger, getting ready to take an air sample and I've got air sample bottles 2, 3 and 4. There's no number 1 that I can find and it's space in the storage tray here is empty. Is that correct?

CAPCOM Stand by.

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SPACECRAFT Houston, MS2. Rather than wait I'm going to go ahead and use sample bottle number 2 to take this sample. I'll note the sample number 1 on the side of bottle on the first sample and I'll note the sample timeframe.

CAPCOM That sounds good to us.

SPACECRAFT Houston, Challenger, you still there?

CAPCOM Affirmative.

SPACECRAFT Okay. A couple incidentals. Some more stuff. We're going to get pictures of it today for just in case it changes between now and the time we get back. By the forward windows on the west side between windows 2 and 3, I can see what looks to be two ends, it almost looks Roy like there was a piece of say nylon or beta cloth or rope almost that looks like it was filling a gap or something in there and that's pulled out, broken in two and it's been frayed and that there are busted ends of it sticking out at the bottom part of the window and on the upper part of the window. It's essentially the same thing over...

END OF TAPE

SPACECRAFT I can see what looks to be the 2 ends, it almost looks more like there was a piece of nylon or beta cloth or rope almost it looks like that was filling a gap or something in there and that's pulled out, broken in two and it's been frayed, and there are twisted ends of it sticking out at the bottom part of the window and on the upper part of the window. And essentially the same thing over on Bo's side, between windows 5 and 6.

CAPCOM Okay copy.

CAPCOM Challenger, Houston, 30 seconds to LOS, see you at Botswana at 42.

SPACECRAFT Okay.

PAO This is shuttle control, Ascension has loss of signal. Next acquisition through Botswana in 6 1/2 minutes. The phasing maneuver number 1, the RCS burn should occur during that Botswana pass. That burn about 8 minutes 53 seconds from this time. At 1 day 35 minutes, mission elapsed time, this is shuttle control Houston.

PAO This is shuttle control, Botswana will be reacquiring Challenger momentarily.

CAPCOM Challenger, Houston's with you at Botswana for 5 minutes and we're just standing by while you do your burn.

SPACECRAFT Yes, we're waiting to watch the four thrusters flare in the dark. They are really something Roy.

CAPCOM Roger.

SPACECRAFT The amazing thing to me is they are in fact discrete. I mean they are either all on or all off, and there is no build up and no tail off to those things either.

CAPCOM Sure looking forward to seeing that myself.

SPACECRAFT Well, like I said yesterday, everybody oughta.

SPACECRAFT What kind of residuals you want on this Roy? Were you looking for a couple tenths?

CAPCOM Looking for two tenths.

SPACECRAFT Okay.

SPACECRAFT Okay, we got residuals X -02Y, +01 and Z +.12.

CAPCOM Roger.

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CAPCOM Challenger, Houston, we copy those residuals and we'll see you at Yarragadee at 59.

SPACECRAFT Okay, and do you care when we go to the next burn attitudes, Roy?

CAPCOM Stand by.

CAPCOM Challenger, Houston, you can go to burn attitude at your call.

SPACECRAFT Okay, thank you.

PAO This is shuttle control. Challenger's out of range at Botswana. Next station Yarragadee in about 13 1/2 minutes. The next phasing maneuver is the OMS burn in about 41 minutes 20 seconds from now. That maneuver will be performed while Challenger is in contact through the Hawaii station. At 1 day 49 minutes mission elapsed time, this is shuttle control Houston.

PAO This is shuttle control, at 1 day 59 minutes mission elapsed time, standing by for acquisition through Yarragadee.

CAPCOM Houston with you through Yarragadee for 8 1/2 minutes.

SPACECRAFT Roger Houston.

END OF TAPE

PAO This is Shuttle Control with 1 day, 59 minutes mission elapsed time. Standing by for acquisition through Yarragadee.

CAPCOM With you at Yarragadee for 8 and a half minutes.

SPACECRAFT Roger, Houston.

CAPCOM Challenger, Houston. If you guys are not tied up right now and since you've been running so far ahead of the time line today. I wanted to mention that. We've got a couple of flight notes for you before you do your heater reconfig and your ECLSS redundant component checkout which will be coming up next hour. If you want to hear about those this pass let us know otherwise we'll hold them till we're over the states.

SPACECRAFT Stand by let me get PJ on. Why don't you just hold those and he'll be up before too long, he'll be with you.

CAPCOM Okay, fine. We'll just hold them until you give us a call.

CAPCOM Challenger, Houston, we're 20 seconds LOS. See you at Hawaii at 1 hour and 26 minutes MET.

SPACECRAFT It's up to you then, Houston.

PAO This is Shuttle Control. Challenger is out of range at Yarragadee. Next station Hawaii in 17 minutes. The number 2 phasing maneuver, the OMS burns, scheduled for 22 and a half minutes from now during that Hawaii pass. At 1 day, 1 hour, 8 minutes mission elapsed time this is Shuttle Control, Houston.

PAO This is Shuttle Control at 1 day, 1 hour, 25 minutes mission elapsed time. Shuttle coming up on acquisition through Hawaii.

CAPCOM Challenger, Houston, with you at Hawaii for 8 minutes.

SPACECRAFT Roger, Houston, read you loud and clear.

CAPCOM Roger, you same and we're standing by.

SPACECRAFT Okay, we're in attitude and we're waiting for about 4 minutes to pick up the TDRS.

CAPCOM Roger.

SPACECRAFT Houston, Challenger.

CAPCOM Roger, go ahead.

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SPACECRAFT Yea, we don't need the answer now obviously about the teleprinter, folks. We got message 9 alpha which is the empty weather. And then we got about 2 feet of nothing but diamonds mainly. This little symbol and diamond on a (garble) with occasional other symbols and letters thrown in. We just wondered if that was some kind of test you were doing or if you thought you were sending us something intelligible.

CAPCOM Roger. Understand 2 feet worth of diamonds out of the teleprinter and we'll check on that.

SPACECRAFT Okay, and that was after message 9a came in.

CAPCOM Roger, we'll check and get back to you after your burn on that.

SPACECRAFT Okay, it's no rush.

PAO This is Shuttle Control. Challenger is in burn attitude. The OMS burn that constitutes the second phasing maneuver in this phantom rendezvous exercise scheduled for 3 minutes, 15 seconds from this time.

CAPCOM And Challenger, Houston, we're ready anytime you are for the gimbal check.

SPACECRAFT Okay.

SPACECRAFT Okay, you surprised us with that call but it's coming at you now.

CAPCOM Roger.

PAO This is Shuttle Control. Challenger's current orbit is 177 by 153 nautical miles. We're looking for 153 by 152 nautical miles after this OMS burn.

PAO At ignition on both engines, both looked good.

SPACECRAFT Now where do you want the residuals to go on this burn Houston. We got three pins and x.

END OF TAPE

PAO Had ignition on both engines. They both looked good.

SPACECRAFT Now, where do you want the residuals checked on this burn, Houston? We got 3 10ths and X.

CAPCOM Roger, Challenger, 3 10ths is good and no term required.

SPACECRAFT Okay, thank you. You want another primary gimbal check Houston?

CAPCOM Standby. And Challenger, Houston, that's affirmative. We'd like to see another one, please.

SPACECRAFT Alright, it's coming at you.

CAPCOM Challenger, Houston, 10 seconds to LOS. We'll see you over the states in 1 + 35.

SPACECRAFT Okay.

PAO Challenger is out of range at Hawaii headed toward Buckhorn. Buckhorn acquisition in a minute and a half. Good OMS burn for the number two phasing maneuver. We'll look at the resulting orbit from data over the Buckhorn and Mila stations. Mission elapsed time is 1 day 1 hour 34 minutes. We'll standby for Buckhorn acquisition.

CAPCOM Challenger, Houston, with you over the states for 19 minutes.

SPACECRAFT Roger, Story's ready to start the CFES. Do you have any preferences as to which flash evap we use?

CAPCOM Stand by. And Challenger, Houston, you can start the CFES operations and recommend you use FES A.

SPACECRAFT Okay. Good work. Going to FES A and interchange it to payload.

CAPCOM Roger, and I've got a couple of notes for you on the orbit OPS checklist when you're ready to copy.

SPACECRAFT Standby. Okay, go ahead.

CAPCOM Roger, concerning the ECLSS redundant component checkout. On page 5-8 of the orbit OPS checklist.

SPACECRAFT Standby. Okay, I got it.

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CAPCOM Roger, at the top of that page, do not switch fans in aft bay 1 and do not switch humidity separators due to the failures.

SPACECRAFT Understand.

CAPCOM Next on page 6-6 when you're ready.

SPACECRAFT Okay, go ahead.

CAPCOM Roger, for a heater config, page 6-6 third line. Change to read L2 flash evap feedline heater A supply 2. Reason, of course, is the B heater is already in 2.

SPACECRAFT Yes, understand.

CAPCOM And that's all we have for the orbit OPS for now.

SPACECRAFT Okay.

CAPCOM Challenger, Houston, we're coming up on a 10 second keyhole. I'll check back in with you when we're out of it.

SPACECRAFT Okay, this one is into the CFES.

CAPCOM Roger.

PAO This is Shuttle Control. Mission specialist, Story Musgrave, is activating the continuous flow electrophoresis system aboard Challenger at this time.

CAPCOM Challenger, Houston, we're out of the keyhole.

END OF TAPE

CAPCOM Challenger, Houston, we're out of the keyhole

SPACECRAFT Roger Houston.

SPACECRAFT Houston, Challenger.

CAPCOM Go ahead.

SPACECRAFT Yes, it looks a little cloudy down there today, are you getting any rain?

CAPCOM Stand by, I haven't looked out the window in several hours, I'll have to check.

SPACECRAFT Okay.

CAPCOM And I hear that it is drizzly outside.

SPACECRAFT Well it looks like it ought to be.

CAPCOM And Challenger, Houston, a note for Story on the CFES.

SPACECRAFT Go ahead, he's busy, I'll take it.

CAPCOM Roger, we passed a note a little while ago, referring to our teleprinter message first thing this morning. Referring to recording T13 and T14 temperatures. We told you that that message only applied to samples 2 and 5, and that was incorrect, we need to take those T13 and T14 temperatures as written in the message, during the activation section just prior to set MET, and the only part of that message that applies to samples 2 and 5 is item 2B on the message.

SPACECRAFT Okay. the message applies to everything, to all the ones, and the only part except 2 and 5, the part that applies to them is what?

CAPCOM Item 2 bravo on the teleprinter, basically what we want to do is record T13 and T14 three times today, once during activation once half way through sample two, and once at the end of the day just prior to the V12 valve close.

SPACECRAFT Okay, I understand you want 3 samples on the parameters, you listed one at activation, and one at the middle and one at shut down.

CAPCOM That's affirmative.

SPACECRAFT Okay, we'll do that.

CAPCOM Challenger, Houston, 30 seconds to LOS, we'll see you at Ascension at 2 + 03.

SPACECRAFT Roger, Houston.

SPACECRAFT And (garble) I've got a status check on the (garble).

CAPCOM Roger, copy.

SPACECRAFT I know you didn't want those temperatures run, but I got them anyway, T13 is 4.5 and 14 is 5.1.

CAPCOM Roger, copy, thank you.

PAO This is shuttle control, Challenger is out of range at Bermuda headed for acquisition to Ascension in 8 1/2 minutes. Challenger's current orbit based on limited tracking since that OMS maneuver, is 153 by 152 nautical miles, with an orbital period of 1 hour 30 minutes 17 seconds. At 1 day 1 hour 55 minutes mission elapsed time, this is shuttle control, Houston.

PAO This is shuttle control, at 1 day 2 hours 3 minutes mission elapsed time. Challenger coming up on acquisition through Ascension Island.

CAPCOM Challenger, Houston with you at Ascension for 8 minutes.

SPACECRAFT Read you loud and clear.

CAPCOM Roger, read you loud and clear the same, and we're standing by.

SPACECRAFT Got some words for you on the CFES.

CAPCOM Ready to copy.

SPACECRAFT The MET we got started was 1 day 1 hour and 50 minutes.

CAPCOM Roger Story, copy 1 1 50.

SPACECRAFT Okay, and at 2 minutes we got a record film message and the numbers were QC to 00.

CAPCOM Roger.

END OF TAPE

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CAPCOM Roger, Story copy 1150.

SPACECRAFT Okay and a few minutes ago we got a record film message and the numbers were EC00.

CAPCOM Roger.

SPACECRAFT Everything else has been nominal.

CAPCOM Roger.

CAPCOM Challenger, Houston. 30 seconds to go. We'll see you at Botswana at 2 plus 14.

SPACECRAFT Okay, got another range parameter for CFES, Brian MET 208, DP4 and it's equal to 13.9.

CAPCOM Roger, say again the parameter please.

SPACECRAFT DP4, delta p 4. Pressure between the anode and the cathode

CAPCOM Roger.

PAO This is Shuttle Control. Ascension has lost signal. Next station Botswana in 2 and one half minutes. Story Musgrave continuing the continuous flow electrophoresis system operations. And Paul Weitz setting up the day/night optical survey of lightning experiment equipment. The first nozzle opportunity coming toward the tail end of this orbit in the vicinity of Australia and Indonesia. Will stand by for acquisition through Botswana in about a minute and a half.

CAPCOM Challenger, Houston, with you at Botswana for 8 minutes.

SPACECRAFT Roger.

SPACECRAFT Okay, and I called up some other DP's for you. Are you ready to copy?

CAPCOM Ready to copy.

SPACECRAFT DP1 = 6.8, 2 = 8.5, 3.1.

CAPCOM Roger, Story you were cut out on that last DP if you could repeat.

SPACECRAFT DP3 is 3.1.

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CAPCOM Roger, copy. There's a lot of background noise where you're standing and I guess we're not catching everything you say the first time.

SPACECRAFT Is this better over here?

CAPCOM That's a lot better.

SPACECRAFT Maybe EMI's on my machine there.

CAPCOM Okay.

SPACECRAFT Until I hear otherwise I'm pressing on.

CAPCOM And Challenger, Houston, Story those numbers look good. Delta P 4 should probably come down in the next 30 minutes. You can keep an eye on that for us. And we'd like you to read flow 2 display for us.

CAPCOM And Challenger, Houston, that message you got before on rec fill message. ECHO Charlie 00 means the electro flow meter number 2 is not recording and if you could read for us now the flow 2 disp.

SPACECRAFT Okay. Flow 2 is 43.

CAPCOM Roger, copy.

SPACECRAFT Houston, this is CDR. I noticed on SPEC 66 the humidity SEP A has a down arrow by it, an asterisk for the down arrow.

CAPCOM Roger, we'll talk about that and get right back to you.

SPACECRAFT Okay.

END OF TAPE

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SPACECRAFT Houston, this is CDR. I noticed on Spec 66 the humidity SEP A has a down arrow by it, an asterisk for the down arrow.

CAPCOM Roger, we'll talk about that and get right back to you.

SPACECRAFT Okay.

CAPCOM And Challenger, Houston, PJ the signal conditioner circuit breaker that popped earlier has caused us to lose that data.

SPACECRAFT Yea, I thought of that as you were getting back to me. Thank you.

CAPCOM Challenger, Houston. 30 seconds to LOS. We'll see you at Yarragadee at 2 plus 35.

SPACECRAFT Roger, see you then.

PAO This is Shuttle Control. Botswana has loss of signal. Next station Yarragadee in 12 and a half minutes. At 1 day, 2 hours, 23 minutes mission elapsed time, this is Shuttle Control, Houston.

PAO This is Shuttle Control at 1 day, 2 hours, 35 minutes mission elapsed time. Challenger is about 30 seconds away from acquisition through Yarragadee.

CAPCOM Challenger, Houston, with you at Yarragadee for 5 minutes.

CAPCOM Challenger, Houston, with you at Yarragadee for 5 minutes.

CAPCOM Challenger, Houston, we've got a line problem on the ground. No requirement for you to do anything right now. It's our problem.

CAPCOM Challenger, Houston, with you for another minute at Yarragadee.

PAO This is Shuttle Control...

SPACECRAFT Did you hear me Brian when I said DP4 was down to 9.

CAPCOM And Challenger, Houston, Story we haven't heard anything until just now. Your last transmission. Could you say again please.

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SPACECRAFT DP4 is down to 9. We're coming into sunrise.

CAPCOM Roger.

CAPCOM And Challenger, Houston, 30 seconds to LOS. We'll try again at Guam at 2 plus 47.

PAO This is Shuttle Control. Yarragadee has loss of signal. Challenger going into sunrise. A long toward the end of the eighteenth orbit at LOS there. Communications problem during this pass was between here and Yarragadee. The downlink from the Challenger was reaching the tracking station but it was not being relayed to the Mission Control Center. Guam is the next station in 5 and one half minutes. Challenger will start it's nineteenth orbit shortly after acquisition at Guam. At 1 day, 2 hours, 42 minutes mission elapsed time, this is Shuttle Control, Houston.

PAO This is Shuttle Control. We have acquisition through Guam.

CAPCOM Challenger, Houston, with you at Guam for 6 minutes.

SPACECRAFT Roger, Houston.

CAPCOM And Challenger, Houston, when you got a second I've got a switch for you on panel A7L.

SPACECRAFT Go ahead.

CAPCOM Panel A7 Lima adds strain gage on. The MAD System is cooling down faster than we expected and we need that power on to keep the MAD's temperature above its lower limit.

SPACECRAFT Okay, strain gage is o.k.

SPACECRAFT Houston, Challenger.

CAPCOM Go ahead.

SPACECRAFT Yea if we have the opportunity, can the playback of the Hawaii and stateside pass, but maybe we'll give you some live TV of those pieces of what looked like gap filler at the forward windows.

CAPCOM Okay, we'll look forward to that and you can expect from me to give you a ten second to go call for that 2 minute gap we're going to have between Hawaii and the states to give you some warning of when you need to shut it off and we'll call back again when we come over the states for you to turn it back on again.

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SPACECRAFT Okay, we got that.

END OF TAPE

CAPCOM Okay, we'll look forward to that, and you can expect for me to give you 10 seconds to go call for that 2 minute gap we're going to have between Hawaii and the States to give you some warning when you need to shut it off and then we'll call back again when you come over the states for you to turn it back on again.

SPACECRAFT Okay, we got that.

CAPCOM Challenger, Houston.

SPACECRAFT Go ahead.

CAPCOM Roger, we'd like to recommend as first priority the VTR dump, and then after that, the live TV, we don't have any S-Band over Ascension on this next pass. It'll be UHF only.

SPACECRAFT Okay.

CAPCOM Challenger, Houston, 20 seconds to LOS, and we're looking forward to your TV dump at 3 + 00, over Hawaii.

SPACECRAFT Okay. And we got in the (garble) at -2.753, we got photo one.

CAPCOM Roger, copy, Story.

SPACECRAFT (garble)

PAO This is shuttle control, Guam has loss of signal. Hawaii will pick up Challenger in 6 minutes, 20 seconds. During that pass, we'll have television, video tape recording, recorded dump of the TDRSS deployment, that television will continue through Goldstone and Merritt Island on this Orbit. And following the VTR dump the crew intends to downlink live television out the forward windows, attempting to show the material they described some time ago, that they can see sticking out near the windows there. Described as a nylon or beta cloth looking material. At 1 day 2 hours 55 minutes, mission elapsed time, this is shuttle control Houston.

PAO This is shuttle control at 1 day 3 hours mission elapsed time, standing by for acquisition and television through Hawaii.

CAPCOM Challenger, Houston with you at Hawaii for 8 minutes, and before we get TV dump, we're going to need panel A7 TV control switch in command.

SPACECRAFT Okay, we're ready whenever you are Houston.

CAPCOM Roger, we're ready for the dump.

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SPACECRAFT Okay Houston, we're going to start with the release of the umbilical and take you all the way through the deployment.

CAPCOM Roger.

SPACECRAFT Should be getting the picture now.

CAPCOM Roger, we got a good picture.

CAPCOM And Challenger, Houston, we're looking at a good picture of the raised tilt table with the moon in the background.

SPACECRAFT Okay.

SPACECRAFT We're going to fast forward a little bit here Brian.

CAPCOM Okay.

END OF TAPE

PAO And we have a good picture of the tilt teddy boy and the solid rocket motor.

SPACECRAFT Check.

PAO The Capcom during this pass is Brian O'Conner.

CAPCOM Okay guys, that's it for the TV on the deploy. What we thought we would do now is take a handheld camera and show you the middeck and Story's running the CFES down there and I think Mr. Weitz could prepare a meal for you.

PAO Okay, we've got only 40 seconds to go to LOS if you want to wait til the (garble) to do that and then we will give you a go. We have to set up for it. And, uh, (garble) look good in that deploy. Really looked down here.

SPACECRAFT Give me a call when you are ready.

CAPCOM Wilco.

PAO This is Shuttle Control. Hawaii has loss of signal. Buckhorn will pick up Challenger in a minute and a half. Shortly there after, Goldstone will acquire. We will resume television at Goldstone, carried on through Merritt Island. It appears that in addition to out the window we will get television of the middeck including Musgrave at the CFES, experiment and pilot, Bo Bobko, preparing the crew's second meal of the day.

CAPCOM Challenger, Houston, with you at Buckhorn for 8 minutes.

SPACECRAFT Okay, uh, we got the camera here in the middeck now and we will be ready to carry your Dr. Musgrave working the CFES.

CAPCOM Roger.

CAPCOM And Challenger, Houston uh, as soon as we get S-band we will let you know for the TV.

CAPCOM And Challenger, Houston, we're picking up a good TV picture.

SPACECRAFT (garble), Hope you could see the last sample flow there, right? (garble) Can you see your sample in the CFES, Brian?

CAPCOM That's affirmative, uh, if it's in the upper third or in the left third as you're looking at it, we've got a line there.

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SPACECRAFT That's exactly. We are clearing the column right now. That's the last of the sample. We will be introducing a new sample for collection in a little while here. We'll show you how we take pictures of that.

CAPCOM Okay.

SPACECRAFT Mount the camera up here and adjust the SSOP to get about (garble).

CAPCOM And Challenger, Houston, we've lost voice, Story.

SPACECRAFT What we are doing is injecting samples at the bottom here, an electrical field across the column here separates these particles out according to their charge. From a neutral point right here (garble).

Houston, Is that picture right side up to you now?

CAPCOM That's affirmative.

SPACECRAFT Okay.

PAO We were just getting ready to ask you for a quarter aileron roll there and you did it on your own.

SPACECRAFT Okay, Here are some of the other kinds of things that we do here. Here's the place that we enter the sample. If we eat here all the time, we are going to show them some of that stuff out the window so they can see those cups and things too.

CAPCOM Okay.

SPACECRAFT (garble), we entered a sample right in here. The sample is injected down here in different ports here and is carried up with the carrier there.

CAPCOM And Challenger, Houston. We've got 2 and a half minutes before 2 minutes break in COM if you want to switch cameras now or later.

SPACECRAFT Yeah.

END OF TAPE

CAPCOM And Challenger, Houston, we've got 2 1/2 minutes before a 2 minute break in Comm, if you want to switch cameras now or later.

SPACECRAFT Okay, we'll give you the front window stuff after this gap Brian.

CAPCOM Okay.

SPACECRAFT The two exit ports at the end which we inserted correct (garble) 200 different compartments depending upon the separation that is achieved here.

SPACECRAFT (garble) around the corner here, with the experiment control module is here, the (garble) that we used to store the samples is right here, this is for running the collectors (garble) this experiment is all in there. Here's the light we used to take the pictures.

CAPCOM Roger Story, we see that, and it looks like you guys have a real tight ship down there, there's not too much stuff floating around.

SPACECRAFT Well we moved the whole (garble) for this series of events, Brian.

CAPCOM Oh, I see.

SPACECRAFT I hate to say we cleaned it up for you.

SPACECRAFT Don's going to bring the camera up on the flight deck, we'll set up the next pass.

CAPCOM Roger, we're just now losing signal, and we'll see you in two minutes.

SPACECRAFT Okay.

CAPCOM And Challenger, Houston, while we're waiting for the S-Band maybe Story could read the delta P four for us again.

SPACECRAFT It's up to 17.9 now.

CAPCOM Roger.

CAPCOM Challenger, Houston, we're getting a good picture top side and Story if you could verify that delta p four is 17.9.

SPACECRAFT That's verified, and right now it's 17.4, (garble).

CAPCOM Roger.

SPACECRAFT Okay Brian, this is looking out window 6, and the gap filler there is at the leading edge of window 6, between windows 5 and 6. It looks like it's pulled out of the gap and come loose and those two pieces are just held together by it looks like one small dark colored thread.

CAPCOM Okay, that's coming through real good, we cannot see the thread but we do see those two pieces of white gap fillers sticking out.

SPACECRAFT Is that any better, or worse?

CAPCOM That got a little bit worse.

SPACECRAFT Okay.

SPACECRAFT Well let's see, it's getting dark, let me let Don try to shift over to look out window 2. And this is the piece that was between windows 2 and 3, I don't know how well you're going to be able to see it, because there's a lot of crud on window 2 on the leading edge about the forward 2 or 3 inches.

SPACECRAFT This one looks like it pulled out much in the same manner, but separated and there's a little stumpy part down at the bottom of the window, and it probably isn't too close, Don can't get the camera close enough to show you the top part.

CAPCOM Okay, we see the stumpy part down at the bottom, the Earth's horizon is so bright, that that's causing a contrast problem for us, but we can see it.

SPACECRAFT Okay, we figured that.

SPACECRAFT Okay, if you got a couple minutes, Don can pull back and I'll show you our nice and neat front of the bus.

CAPCOM Okay, and that last few seconds there the contrast problem there kinda went away the horizon disappeared and we could see real well.

SPACECRAFT Okay. I assume it's going to be there when we get back, just in case it's not I thought you might be interested in somebody looking at that.

CAPCOM Roger.

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SPACECRAFT Okay, you can tell what this is Brian, looking at the port side and we're just going to scan across there, but this is the office, this is where we do our business, and that's what we got it set up to do.

CAPCOM Well, it looks real shipshape.

SPACECRAFT Well, we try, we try to keep it neat.

CAPCOM And we got a picture of the CDR but no sound.

SPACECRAFT What about the transmit? I say a little warm coffee, Story fixed awhile ago, I tell you it isn't right when here the coffee sure cools in a hurry.

CAPCOM Roger that.

SPACECRAFT Brian, I got your got a bunch more numbers for you.

CAPCOM Roger, ready to copy.

SPACECRAFT Delta P I is 10.5

END OF TAPE

SPACECRAFT got some more numbers for you.

CAPCOM Roger, ready to copy.

SPACECRAFT Delta P1 is 10.5, 2 is 10.7, 3 is 5.8.

CAPCOM Okay Story and we have 50 seconds to go on this pass.

SPACECRAFT Okay and I'm coming up on block gage photo 3.

CAPCOM Roger, and that 50 second call was for a keyhole.

SPACECRAFT Okay.

SPACECRAFT (garble)

CAPCOM And Challenger, Houston, the TV picture's gone away, about 10 seconds to a keyhole and we'll call you when we're back out of it.

SPACECRAFT Okay, frankly we know a lot more to show you right now Brian.

CAPCOM Okay.

CAPCOM And Challenger, Houston. Story, if you've got the time could you read us 2 readings. We need RPM 3 and again we'd like to see Delta P4.

SPACECRAFT (garble). You were cut out by intercom. Say again.

CAPCOM Roger, say RPM 3 and Delta P4.

SPACECRAFT RPM 3 is 1789. Delta P4 is 17.8.

CAPCOM Roger, copy.

CAPCOM And Challenger, Houston, we're out of the keyhole with about a minute to go.

SPACECRAFT Okay. Oh and we just realized something. We're not getting the word tones anymore Brian. I got the master lines when we did that ECLS redundancy check but I just happened to notice a class three message sitting there that was 23 minutes old and we'll troubleshoot it from this end but any suggestions you might have would be appreciated.

CAPCOM Roger.

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CAPCOM Challenger, Houston. 30 seconds to LOS. We'll see you at Ascension, UHF only.

SPACECRAFT Okay.

CAPCOM And we'll hope to have some words on the alarms for you at that time and that'll be at about 3 plus 40.

SPACECRAFT Yea, we'll check it out with something here Brian. It may be that that was done a playback and we got confused as to what was on that playback and what we were hearing here.

CAPCOM Roger.

SPACECRAFT It may be a non-problem. I'll let you know when we get AOS.

CAPCOM Roger, understand.

PAO This is Shuttle Control. Challenger has passed out of range of the Merritt Island station headed down over South America toward Ascension Island which will be the next station in 13 minutes. During this pass over Goldstone and Mila we saw live television from the mid decks. Saw Story Musgrave at the continuous flow electrophoresis device and the camera moved to the flight deck, out the forward windows to show us where some of the gap filler had pulled out near window number 6 and between windows 2 and 3. And then a shot of Commander P. J. Weitz enjoying some coffee. Challenger is on orbit number 19 at 1 day, 3 hours, 28 minutes mission elapsed time. This is Shuttle Control, Houston.

END OF TAPE

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SPACECRAFT (garble)

CAPCOM Okay.

(PAUSE)

PAO This is Shttle Control, 1 day, 3 hours, 39 minutes mission elapsed time. Challenger coming up on acquisition through Ascension Island.

CAPCOM Challenger, Houston. With you UHF only, Ascension, for 6 minutes.

SPACECRAFT Roger, Brian. Okay Brian, I'm sampling the sample entrance on the sample 1.

CAPCOM Roger, Story.

CAPCOM And Challenger Houston, for Story on CFES.

END OF TAPE

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CAPCOM And Challenger, Houston for Story on CFES.

SPACECRAFT Hang on there, I'm in the process of photographing.

CAPCOM Roger.

SPACECRAFT Houston, if you have time, is there any further word on the status of the TDRSS and IUS?

SPACECRAFT Okay go ahead Brian.

CAPCOM Roger, we need right away to reduce the rpm for pump 2. Need to make an operating parameter change to reduce the flow and pressure on cathode electrode loop, pump 2, make the following 2 address changes. Ready to copy?

SPACECRAFT (garble). Go ahead.

CAPCOM Roger, address number 1550, change to read 000. Address number 1551 change to read 026. This will get rpm 2 down to 1600, and disregard the out of range light that you'll get once you've done that.

SPACECRAFT Okay, change address 1550 to 000, and 1551 to 026.

CAPCOM That's affirm and we need you to do that right away.

SPACECRAFT I'll do it right away.

SPACECRAFT Oh, say, Brian?

CAPCOM Go ahead.

SPACECRAFT Yes, that was a false alarm on those tones, we tested it on with the time tone and the tone works fine.

CAPCOM Roger understand, and understand that was related to the VTR playback.

SPACECRAFT Well, I was just saying that you know there were several tones on the audio portion of the VTR playback at deploy and I think it probably occurred about the same time and we just assumed it was another one of those PDI decom alerts.

CAPCOM Roger, understand.

CAPCOM And Challenger, Houston, we still don't have any updates other than what we passed a couple of hours ago on the TDRSS, the TDRSS folks are working on a plan to get it to the proper orbit and we haven't heard how that's coming along for quite awhile now.

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SPACECRAFT Okay, thanks.

CAPCOM And Challenger, Houston, 20 seconds to LOS see you
at Botswana at 3 + 50.

SPACECRAFT (garble).

END OF TAPE

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SPACECRAFT (garble) Houston I got those address changes 1550 to 000. I found 1551 was already 0.

CAPCOM And Story, Houston in the blind copied 1550 to triple zero and 1551 was already at 026.

PAO This is Shuttle Control. Challenger moved out of range at Ascension. Botswana will pick up the spacecraft in about 3 minutes. We'll stand by for acquisition there. Mission elapsed time 1 day, 3 hours, 47 minutes.

CAPCOM Challenger, Houston, with you at Botswana for 7 minutes.

SPACECRAFT Houston, we've got those addresses. Change 1550. The original was 220 and changes to 000. 1551 - I'd change it to a 026 but the original value is a 026. Make that a 345.

CAPCOM Roger, copy Story.

CAPCOM And Challenger, Houston, when you've got a minute to look back on page flight supplement 7-7 and read down to us the MET for the PRM we'd appreciate it.

SPACECRAFT Yea, we hadn't, frankly we hadn't got to that yet Brian.

CAPCOM Okay.

SPACECRAFT I'm out looking for some thunderstorms while Bo is putting the meal together and we'll get the PRM when we get back in at daylight.

CAPCOM Roger, copy that.

SPACECRAFT Brian, are you still there?

CAPCOM That's afirm.

SPACECRAFT I see loads of small bubbles less than a millimeter in both the anode and the cathode chambers, but I don't see any in the carriers at all.

CAPCOM Roger copy.

SPACECRAFT (garble)

CAPCOM And Challenger, Houston, P.J. we didn't copy that last. Say again.

SPACECRAFT Houston, he's in the middle of (garble) nozzle right now. Can I help you?

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CAPCOM Roger. We heard someone call out an MET just a second ago. We didn't copy the whole MET or what it was for.

SPACECRAFT PJ was recording it on tape. He may have hit the wrong button.

CAPCOM Okay.

SPACECRAFT Houston, MS1.

CAPCOM This is Houston. Go ahead.

CAPCOM And MS1, Houston. Go ahead.

SPACECRAFT Yea, the leading edge of the sample we're separating is right at the 70 degree mark. It's spread out somewhere between 55 and 70 at the collector plate.

CAPCOM Roger.

END OF TAPE

CAPCOM And MS1, Houston. Go ahead.

SPACECRAFT Yea, the leading edge of the sample we're separating is right at the 70 degree mark. It's spread out somewhere between 55 and 70 at the collector plate.

CAPCOM Roger.

SPACECRAFT Does not appear to be a homogenous sample.

CAPCOM Roger.

SPACECRAFT (garble)

CAPCOM Challenger, Houston. 20 seconds to LOS. We'll see you at Guam at 4 plus 22.

PAO This is Shuttle Control. Botswana has loss of signal. Next acquisition is through Guam. Challenger misses the Australian tracking stations on this orbit. Guam acquisition in 22 and a half minutes at 1 day, 3 hours, 59 minutes mission elapsed time. This is Shuttle Control, Houston.

PAO This is Shuttle Control at 1 day, 4 hours, 21 minutes mission elapsed time. The Guam tracking station will lock on to Challenger in about 15 seconds.

CAPCOM Challenger, Houston, with you at Guam for 8 minutes.

SPACECRAFT Okay, Houston's on.

CAPCOM And Challenger, Houston, we've got three notes for you when you're ready.

SPACECRAFT Okay.

CAPCOM The first note will have to do with an IFM that we want you to do this afternoon and then we just need some data from CFES and MET for MLR.

SPACECRAFT Houston, CDR. Are you ready to call me some times?

CAPCOM And CDR, Houston, say again.

SPACECRAFT Yea, I got some times for you on the PRM and HRM Brian if you're ready to copy.

CAPCOM Roger, ready to copy.

SPACECRAFT The PRM was at 4 hours and 5 minutes. HRM was initialized at 4 hours and 7 minutes. The initial background

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count was pretty close to 4500. Data take was started at 4 hours and 9 minutes.

CAPCOM Roger, copy all.

SPACECRAFT And Houston, we've got the MLR activated at day 1, 0358.

CAPCOM Roger copy.

SPACECRAFT And it appears to be running normally now.

CAPCOM Okay.

SPACECRAFT Houston, MS1.

CAPCOM Go ahead.

SPACECRAFT Just finished getting sample 1 in the collector tray. It's in the flush now at 4:23 about a minute ago. That air recorder filter CA008.

CAPCOM And Challenger, Houston, we had trouble with Story's last. If he could read slowly the numbers he passed to us.

SPACECRAFT Okay, at 4:23 MET got a recorder fill Charlie 800.

CAPCOM Roger, copy. There's a loud background noise and we just can't, weren't getting all that.

SPACECRAFT Okay, and sample 1 did get in the collector tray normally.

CAPCOM Roger, copy.

CAPCOM And Challenger, Houston, we've got an IFM we'd like you to write down when you're ready.

SPACECRAFT (garble)

END OF TAPE

CAPCOM When you're ready.

SPACECRAFT Okay, stand by 1.

SPACECRAFT Okay, Houston, go ahead.

CAPCOM Roger, we think there may be some debris in some of the filters, new vehicle and all. And we'd like you to go down and clean the cabin fan and IMU fan filters. And if it's reasonable for you to do so, we'd also like you to take pictures of those filters before cleaning them off. And your references are IFM checklist page charlie -1 for the cabin fan filter, and for IMU fan filters, page India -1, and we would recommend according to the flight plan here, MS2 looks like it might be reasonable to start work at about 1 day 5 hours on that.

SPACECRAFT Okay.

CAPCOM Challenger, Houston, if Story could read us some more parameters, we'd like delta P 1, 2, 3, and 4 and rpm 3, so we can see how that pump 2 is doing.

SPACECRAFT Okay, here we go.

SPACECRAFT (garble) on the Dp's, dp4, -.1 dp3 -.9, dp2, .5, I think I took it. dpl -1.2, rpm 01592.

CAPCOM And Story if you could give us rpm 3 please.

SPACECRAFT Okay. 1718 rpm 3.

CAPCOM And Challenger, Houston. Story, those numbers look good, it looked like that job you did with 1550 worked.

SPACECRAFT Okay, you want a T13 and 14 now, while we're here?

CAPCOM And Story go ahead, we're ready to copy.

SPACECRAFT T13 is 4.5 T14 is 5.5.

CAPCOM Roger copy those.

CAPCOM Challenger, Houston, 25 seconds to LOS. next will be Hawaii at 4 + 36.

PAO This is shuttle control. Guam has loss of signal, Hawaii will pick up Challenger in 5 1/2 minutes. At 1 day 4 hours 31 minutes mission elapsed time. This is shuttle control Houston.

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PAO This is shuttle control at 1 day 4 hours 36 minutes, mission elapsed time. Standing by for acquisition through Hawaii. Challenger is on orbit number 20.

CAPCOM Challenger, Houston with you at Hawaii for 7 minutes.

SPACECRAFT Okay Houston.

CAPCOM And Challenger from Houston, we're just standing by this pass.

SPACECRAFT Okay.

END OF TAPE

PAO This is Shuttle Control. This is meal time aboard Challenger for Weitz, Bobko and Peterson. Musgrave still working with the CFES.

CAPCOM 30 seconds to LOS. We'll see you over the states at 4:46.

SPACECRAFT Roger. And Houston, we just got a recorder filled BC00.

CAPCOM Understand. Bravo Charlie 00.

SPACECRAFT (garble)

PAO Hawaii has loss of signal now. Buckhorn will pick up Challenger in about 2 minutes. Musgrave scheduled to start his second meal of the day in about 10 minutes after he finishes this current CFES run. Mission elapsed time 1 day, 4 hours 44 minutes. We'll stand by for acquisition of Challenger through Buckhorn.

CAPCOM Challenger, Houston. Standing by over the states for 6 minutes.

SPACECRAFT Roger, Houston.

CAPCOM Challenger, Houston, with a small change to the CAP when you're ready to copy.

SPACECRAFT Go ahead.

CAPCOM Roger, on page 4-26 of the CAP.

SPACECRAFT Go ahead.

CAPCOM Like to change the MLR status check from 0500 to 0533.

SPACECRAFT Okay, understand. Slip it a few minutes because we got it started late.

CAPCOM That's afirm.

SPACECRAFT I copy G0533 first status check.

CAPCOM That's afirm.

CAPCOM Challenger, Houston. 40 second to LOS. You'll be talking next to the orbit team at Botswana at 5 plus 26 and we've enjoyed working with you today.

SPACECRAFT (garble) Thanks a bunch.

PAO This is Shuttle Control. Buckhorn has loss of signal. The next tracking station to see Challenger will be Botswana in 34 minutes. Here in the Mission Control Center a shift handover will begin shortly. We're estimating the change-of-shift news conference with off going Flight Director Gary Coen for 6 pm central standard time in room 135, JSC News Center. Change-of-shift briefing 6 pm central standard time. At 1 day, 4 hours, 53 minutes mission elapsed time this is Shuttle Control, Houston.

PAO This is Mission Control, Houston. 30 seconds away from acquisition of Challenger through the voice relay station at Botswana. Currently Challenger's orbit measures 152.8 by 151.8 nautical miles for the period of 1 hour and 30 minutes and 15 seconds. Should have acquisition at this time at Botswana.

END OF TAPE

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PAO ...nautical miles for the period of 1 hour, 30 minutes and 15 seconds. Should have acquisition at this time at Botswana.

CAPCOM Hello Challenger, you've got the Crystal Team with you here over Botswana for about 7 minutes.

SPACECRAFT (garble) I think this is ... Hello John, read you loud and clear.

CAPCOM And you guys sound good.

CAPCOM And Challenger, if you would, would you verify that the payload primary main C power is still on?

SPACECRAFT Standby, I'll look.

SPACECRAFT Primary payload main C shows on.

CAPCOM Okay, thank you. We got a data hit that said it was off.

SPACECRAFT Houston, MS1.

CAPCOM Go ahead Story.

SPACECRAFT John, I'm on a C fuse card at (garble).

CAPCOM And I can't read you Story. Don's in the background there. He's louder than you are.

SPACECRAFT We'll have to wait.

SPACECRAFT John, I'm on the second page at the very top of it. Sample 2, got started that at 5:28.

CAPCOM Okay, we copy.

SPACECRAFT And I'm opening at the B12 valve as expected the pump light goes forward and starts a sample coming. The sample I saw, the first three or four inches of that was clearly a red sample. I expected a clear sample and after the red sample about three or four inches of red sample and no more sample was visible even though the sample pump is still going forward. I wonder if that was normal to see you know the first part of a clear sample come out red.

CAPCOM Let me check on it and I'll get back to you.

CAPCOM Okay, we got about 30 seconds to go here Story. We think that is a small residual from sample number 1.

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SPACECRAFT Okay. Reversing on the pump and all I would have thought would have cleaned that out of the lines.

CAPCOM Yea it sounds like it should have but they still think it's a residual. We'll see you in about 3 more minutes over IOS.

SPACECRAFT Okay we just finished the MLR status check and it checked okay.

CAPCOM Thank you sir.

SPACECRAFT And I also see the line leading to the (garble) record and it also is filled with red material.

CAPCOM Copy that.

PAO Mission Control, Houston. Loss of signal at Botswana. A brief gap of some 3 or 4 minutes until reacquisition through Indian Ocean station. On the last leg of orbit number 20 of Challenger's first flight.

CAPCOM Challenger, with you over Indian Ocean for about a minute and a half.

SPACECRAFT Okay, Houston.

SPACECRAFT (garble) Houston, we just finished cleaning the IMU fans. We found quite a bit of debris on all the filters there. And it looks like metal filings. We got that all cleaned off pretty well but we're having a bad time trying to close this overhead door. We, there's 2 screws, we can't get them lined up with the holes. We put about as much pressure on the doors as we think we ought to... We finally got one of them fastened a little bit and that's where we stand now.

CAPCOM We copy that. And understand there were metal filings in there?

SPACECRAFT Yes there were, metal filings, there was a small thumb tack. What looks like some thread, but mostly a lot of metal filings and dust.

CAPCOM Okay, we copy Don. We're about 10 seconds to an LOS here.

SPACECRAFT Okay, we're having trouble closing the doors. Can anybody come up with a good idea to help us line these screws up with the holes. That will help.

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CAPCOM Okay, we'll think that over and we'll see you at
Guam at 558.

END OF TAPE

SPACECRAFT We're having trouble closing the doors. Can someone come up with a good idea to help us line these screws up with the holes, that'll help.

CAPCOM Okay, we'll think that over. And we'll see you at Guam at 558. And Don if you're still with me, tell me which item you found that was again?

SPACECRAFT Okay, all three of the filters, they're all in a single box up there and it's all three of them and they're all covered with lint and metal filings. So I guess it's all three we're having trouble with.

CAPCOM Okay, copy now.

SPACECRAFT We just want to be sure that you understand that they all work through a common (garble) hose.

CAPCOM Yes, we understand that now.

SPACECRAFT Okay.

PAO Mission Control, Houston, here. Loss of signal at Indian Ocean station. 17 minutes away from reacquisition through Guam in the Western Pacific. Beginning of orbit 21. This is Mission Control, Houston.

PAO This is Mission Control, Houston. Less than a minute away from reacquisition of Challenger through Guam in the Western Pacific. Challenger's three fuel cells are currently producing 14.8 kilowatts of power. The activities during the current flight plan for today. Cabin pressure at 14.7 which is standard (garble).

SPACECRAFT Hello Houston.

CAPCOM Hello.

SPACECRAFT We just finished cleaning the cabin fan filters. We found all kinds of junk on them. A whole bunch of screws, bolts and some washers and quite a bit of felt and we wrapped it all in scotch tape and saved it for you. There is also a lot of blue lint on these filters.

CAPCOM Okay, which filters did you just clean?

SPACECRAFT The cabin fan filters.

CAPCOM Okay, we copy. And we hope you're getting some pictures of that stuff.

SPACECRAFT There's pictures of the stuff on the IMU filters

but we couldn't, there's no way to get a camera down in there where you have to go to clean these and we pulled one out and when we pulled it out a lot of debris started flying around the cabin and we got the vacuum cleaner on it right away. We didn't have time to make any pictures.

CAPCOM Okay, we copy that. And we're wondering, do you anticipate anymore EMU/EVA activity associated things today. If not we'll release our EVA folks here.

SPACECRAFT Yes, we'll do a little more but we won't need them, Jon. It'll be just configuration and getting things going in the right place and all. Won't be any (garble) checkout.

CAPCOM Okay, we copy. And one quick advisory. Cur Ascension passes today may or may not have data. But we should have UHF voice.

SPACECRAFT Okay.

CAPCOM Have you deactivated the TPR?

SPACECRAFT (garble) that is on.

CAPCOM Okay, we may send you a teleprinter message in the next site or two.

SPACECRAFT Okay. We leave the TPR up all the time now.

CAPCOM Copy.

CAPCOM And Don or Story, if you get a chance why don't you check the CFES fan and see what that thing's got in it.

SPACECRAFT Doing fine, I cleaned them before I got started this morning.

CAPCOM Did it have the same blue stuff in it?

END OF TAPE

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SPACECRAFT ...I cleaned them before that started this morning.

CAPCOM Did it have the same blue stuff in it?

SPACECRAFT Primarily yes, but the stowage (garble) mods are not only had that, (garble) some celophane on top of it, was, are real important to put it up.

CAPCOM Copy.

SPACECRAFT It's hard to see that one, it's around the corner and covered by the shade filters.

CAPCOM And we presume you're getting set up for a good TV pass at Hawaii.

SPACECRAFT Roger, we'll be there. Jon, I got some T14s and T13s for you.

CAPCOM Go ahead.

SPACECRAFT T13, 4.5; T14, 5.1.

CAPCOM Okay, we copy. We got about 40 seconds left here at Guam, we'll see you over at Hawaii at 6 + 1 2.

SPACECRAFT Okay, I copy.

PAO This is Mission Control, Houston. Loss of signal at Guam, 7 minutes until reacquisition through Hawaii at which time a live TV downlink will be fed from Challenger. And at 6:55 Central Standard Time, Robert E. Smylie, NASA Associate Administrator for Space Tracking and Data System, NASA Headquarters will give a briefing on the current outlook for the Tracking Data Relay Satellite recovery. That will be in building 2, room 135, the newscenter briefing room at Johnson Space Center. That again is at 6:55 Central Standard Time. Hawaii in 6 minutes, and we'll be back at that time. Mission Control, Houston. Coming up on reacquisition through Hawaii, standing by for live TV pass from Challenger.

CAPCOM And Challenger, Houston with you at Hawaii for about 6 minutes. And Bo, we've noticed in the crew activity plan that you're activating the GAS, the Getaway Specials, and the NOSL. So why don't you explain to us earthbound mortals a little bit about what you're doing. And you better do it good because Diane's up here behind us, watching.

SPACECRAFT I see. Alright as you can probably see right now, I've got part of the TV cameras set up over by the pilot station, and it's shooting from the forward right to left rear part of the cabin. How's the picture?

CAPCOM Looks pretty good, it's a little bit dark.

SPACECRAFT I'm not sure that I can help that much. In any case, I'm just about ready to get the GAS canister from the Air Force Academy going here, we're going to take a look at it with the TV picture, the TV camera that's outside, the one that's just on the other side of the bulkhead here, and I'll give you a look as well.

CAPCOM Sounds good.

SPACECRAFT What you see now, of course, is where we launched the TDRS and IUS from yesterday. And the (garble) canister is on the right-hand side, and I'll bring you a picture over so you can get these on (garble). There were three of them, there is the Japanese (garble) which is investigating the production of snowflakes, in orbit. And then the Park Seed Company canister which is going to be looking at the space environment's effect on seeds. The middle one is from the Air Force Academy, and that has a dozen different experiments on it, there's a metal beam joiner, where they're going to try to join metals in space, (garble) alloy, alpha metal, a crystal purification, a micro-organism development, and a (garble) experiment. The Cadets at the Air Force Academy took some time to get ready for this flight on the Shuttle

END OF TAPE

SPACECRAFT . . . purification, a microorganism development, and an electroplating experiment. The cadets at the Air Force Academy had to work on these for quite sometime to get them ready for this flight on the Shuttle. I show you how we turned them out. I'll bring you back into the cabin here.

CAPCOM We got people down here waving, go Falcon flags.

SPACECRAFT When you get back in the cabin, you might be able to see the water I have up here.

CAPCOM Okay, we got a good picture in the cabin now. And we got about 5 more minutes left here.

SPACECRAFT Okay. This is a little encoder, which is used to turn on the GAS experiments. It's a common encoder and it's used for all the GAS experiments, but there's a code which is used to address each. The Air Force Academy experiment has two relays in it, and I'll call up the first and turn it on. Shows now that it is (garble) and I'm going to turn it (garble).

CAPCOM Don't make any mistakes.

SPACECRAFT And 0 0 does show that it is hot now, so it should be running.

CAPCOM That's good news.

SPACECRAFT And 01 shows that its switched from latent to hot so it should be running at this time as well.

CAPCOM Okay, we copy.

SPACECRAFT It looks like those GAS canisters are in fact, up and running. I hope they get good results on them, I think it's a great opportunity for a lot of people, and especially for the students to be able to look at the environment of space and see how it affects all sorts of different items. As long as I've gotten the GAS canisters turned on, if we've still got a couple more minutes, I can show you underwater small experiments we have onboard, and at is the NOSL experiment.

CAPCOM We're all standing by, we got about 3 more minutes.

SPACECRAFT Okay.

CAPCOM And we got a good picture.

SPACECRAFT Okay. NOSL is a rather simple experiment. It's an experiment to take photographs of thunderstorms and lightning from the advantage we have here in space. And what it consists of is a detector which will detect the electrical in light

activity. And just a normal 16-mm camera that has been used in many of test programs before. When we go over places like central Africa or South America, where there are likely to be thunderstorms at this time of the year, we point the camera at the thunderstorms and point the cameras and take pictures. We also have associated with this, recorders, so we can record our comments. People are very interested in this because they can see how lightning propagates from one thunderstorm to another or may encompass a whole area. Something that's very difficult to appreciate from the ground, even from a high point in the aircraft. The view this morning over Africa will be more as the mission goes on. We've got a limited number of masses and you know it's not always, do you find the thunderstorms when you want them. But we've seen some lightning as we've been flying around, I think we should be able to get some good NOSL photographs on this flight.

CAPCOM That sounds good Bo, and we appreciate the explanation of your experiments.

SPACECRAFT Yes sir.

CAPCOM I got one switch you can flip back there for us while you're back in that area, on R12. We need to supply H2O tank bravo inlet to the open position.

SPACECRAFT Standby, while I tie the NOSL camera down.

CAPCOM Alright, we got about a minute and a half left. Got a good look at the GAS canisters now in the payload bay.

SPACECRAFT Okay, what switch please.

CAPCOM Okay, on R12 the supply H2O tank bravo inlet, we need to get that open, and assure the talkback open.

SPACECRAFT Okay, tank bravo inlet is open and talkback is open.

CAPCOM Thank you sir, I got about 40 more seconds to go. Thanks for the excellent TV coverage, we'll see you down at Botswana at 701.

SPACECRAFT We'll be looking for you then.

CAPCOM Still got good TV.

SPACECRAFT You can see the Earth up there just above the tail of the orbiter.

CAPCOM We see that. And we'll be sending you a teleprinter message probably at the next IOS station.

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SPACECRAFT We'll be looking for it.

END OF TAPE

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CAPCOM Still got good TV.

SPACECRAFT You see the Earth up there, just above the tail of the Orbiter.

CAPCOM We see that and we'll be sending you a teleprinter message probably at the next IUS station.

SPACECRAFT We'll be looking for it.

PAO This is Mission Control Houston, loss of signal at Hawaii, next station Botswana in 41 minutes to repeat again the announcement of the briefing on the tracking data relay satellite situation at 6:55 Central Time in the Johnson Space Center News Room, room 135, building 2; Robert E. Smylie, NASA Associate Administrator for the Space Tracking and Data Systems. This is Mission Control Houston at day 1, 6 hours, 20 minutes.

CAPCOM Challenger, we're with you over Botswana for about 6 and a half minutes.

SPACECRAFT P.J. just finished a NOSL pass and we're getting ready to have move onto a few new things.

CAPCOM Copy.

SPACECRAFT Story's recovering from a collector plate stuck up in autostop.

CAPCOM Copy.

SPACECRAFT In the film, you want me to go ahead and do the collector (garble) now and go ahead and process run number 3.

CAPCOM I'm working on an answer now.

SPACECRAFT Okay I've got collector number 2 now, the seal plates up and I'm starting out with V12 closed. Also had an out-of-range, I'll read that one to you.

CAPCOM Go ahead.

SPACECRAFT Are you ready?

CAPCOM Yes sir, go ahead.

SPACECRAFT In about 6:40 MET in sequence I as soon instantaneously it was going command continue and the collector plate going up, I got a out-of-range value and a P1 was equal to zero. RPM 1 was 542 and the flow was 18. Did not get an autostop then.

CAPCOM Copy

SPACECRAFT But the collector did not come down by its self. I went into the MAL command and it came right down immediately. I moved the collect or reposition the seat plate (garble)

SPACECRAFT P.J. there's lightning right in front of us coming this way.

CAPCOM Understand your decision now the V12 valve closed.

SPACECRAFT That's where I am in the collectors stuckup procedure. I've got the autostop light on, I got a message to turn system power off. I'm waiting for you at the V12 valve close.

CAPCOM Okay we copy all that and I'll get you an answer shortly. We got about a minute to go and I've got something we need for you to do real urgently on SM SPEC 1. Do you copy, let me know if you've got an SM SPEC 1 up. Challenger, Houston.

SPACECRAFT Negative, sorry I was doing something else. What did you say?

CAPCOM We need for you to type in some address work on SM SPEC 1 if you could.

SPACECRAFT Okay, hang on just one minute, I'll get it.

END OF TAPE

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CAPCOM We need for you to type in some address work on SM SPEC 1 if you could.

SPACECRAFT Okay, hang on just a second, I'll get it.

CAPCOM And Challenger, we're with you over Indian Ocean for 8 minutes.

SPACECRAFT Okay Houston, you got your SPEC 1 I don't know if you copied that last time or not.

CAPCOM Yes, we went LOS there, we had intended to have you change addresses for us so we could regain our command capability, the MOCR went down for awhile, but we got things restored. Story, we would like for you to continue with the CFES MAL.

SPACECRAFT Okay.

CAPCOM And we're going to send you up a teleprinter message here shortly.

SPACECRAFT Okay (garble).

CAPCOM Copy. And when you get that onboard take a look at it and see if you got any questions. And we will not need your SM SPEC 1 on the CRT if you want to use it.

SPACECRAFT Okay.

CAPCOM And Challenger, Houston. I got a note here for you on the startrackers. And Challenger we got about 2-1/2 more minutes here at Indian Ocean. I got a word here from my GNC on your startracker shutter problems.

SPACECRAFT Say again

CAPCOM Got a quick note here on your earlier experience on startracker shutter problems. And I got some words on that.

SPACECRAFT Startracker shut open problem.

CAPCOM Okay, the word I got here that the startracker shutter problems were caused by target suppression and there's no need for you to force the shutter open for acquiring any more star data. As soon as the startracker sees a NAV star, it will automatically stop the target suppression and it will be cleared and it will automatically open the shutter.

SPACECRAFT Okay, it was caused by target suppression and your saying it should function normally and we shouldn't worry about it.

CAPCOM That's affirm. There's no need to force the shutter open. It will open automatically when it sees a NAV star.

SPACECRAFT Okay, thank you.

CAPCOM And Story, when you get a system's status display, we'd like to see what P1, RPM1, and Flow 1 are.

SPACECRAFT 10-4, Jon.

CAPCOM Okay, go ahead. We got 20 seconds.

SPACECRAFT P1 is .1, RPM1 is (garble), what else did you want?

CAPCOM Okay, I copied the P1, we did not copy the RPM1 or the Flow 1. We still copy, Story we need RPM . . .

SPACECRAFT Anything else?

CAPCOM We still need RPM 1 and Flow 1. And if we do not get you here we'll see you at Guam at 7:36.

PAO Mission Control Houston. Loss of signal at Indian Ocean Station, 17 minutes away from reacquisition at Guam. A little bit of difficulty there picking up Story Musgrave, and understanding over the breakup in his voice transmission of some numbers he was reading back to the spacecraft communicator. Returning at Guam in some 16 minutes at day 1, 7 hours, 19 minutes elapsed time, Mission Control Houston.

END OF TAPE

PAO At day 1, 7 hours, 19 minutes, elapsed time,
Mission Control, Houston.

CAPCOM Challenger, with you over at Guam here for about 2
or 3 minutes.

SPACECRAFT Roger, read you loud and clear.

CAPCOM And Story, we never did really get a good copy on
that P1, RPM 1 and flow 1 if you could repeat them for us.

SPACECRAFT (garble) Okay. Which ones would you like to have?

CAPCOM We'll take the old set or a present status,
whatever you got.

SPACECRAFT Which one would you like?

CAPCOM Ideally, we'd like both.

SPACECRAFT Okay, P1 is closed to 0, .2 now, flow 1 is 18, RPM
1.

CAPCOM And say again the RPM 1, we did not copy.

SPACECRAFT 544.

CAPCOM Okay, got you that time.

SPACECRAFT I can (garble) are now lined down two, radio
(garble), and got back into the flush old sample part. I also
got an out-of-range (garble), which it was, (garble) GP4 was
equal to 14.4 (garble). I have now got a 48 (garble) is above
(garble).

CAPCOM Okay, we copy that. And Story one question for
you, when you got the auto stop and the collector stuck up, was
the FSM collector door closed or open?

SPACECRAFT It was closed, both latches were in. Only one
latch was attached, whichever one did you (garble).

CAPCOM We copy.

SPACECRAFT I just got another one on the read now. Pressure 1
is now (garble), I think we'll need both.

CAPCOM And repeat that last one, Story, you're being over-
ridden by a background noise.

SPACECRAFT (garble) out-of-range pressure 1 equals 0.

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CAPCOM Copy. We're approaching LOS here at Guam, and I'll talk to you at Hawaii at 7:27. Just talked to the folks here on the land line, Guam, and they say a special hello to you.

SPACECRAFT Okay, and do you want me to continue just what I'm doing here?

SPACECRAFT Okay, Story, the best thing I guess to tell you is to kind of hang in there until we talk to you at Hawaii and we'll have a plan.

SPACECRAFT Okay.

PAO This is Mission Control, Houston. Loss of signal at Guam early on orbit number 22 for Challenger. Next station Hawaii in some 6 minutes. Mission Specialist Story Musgrave continuing to troubleshoot the apparent problem with the Continuous Flow Electrophoresis System, or CFES. We'll be back in 5 and a half minutes at Hawaii. Mission Control, Houston, at 1 day, 7 hours, 41 minutes.

END OF TAPE

CAPCOM Challenger we're back with you over Hawaii for almost 8 minutes. And MSI, Houston. MSI, Houston.

SPACECRAFT Houston he's off the line right now, this is Don could I take a message for him?

CAPCOM Yes Don, you can. We want him to press on with what he's doing here with the CFES but when he powered down a while back to conduct that MAL he erased the software, we need to go back and reset that RPM for pump number 2 and I'm ready to give you the address.

SPACECRAFT I'm in the middle of a camera inspection, he's putting his COMM back on he'll be with you in a couple of minutes to do that.

CAPCOM Okay, I'm standing by.

SPACECRAFT Ready, okay Jon you want me to do (garble)

CAPCOM That's affirmative.

SPACECRAFT Okay. (garble) bounce right up to the top of the bay and take up the (garble)

CAPCOM Yes sir, that's what we want you to do, and if you experience the same problem on 3 with one single latch just press on like you did this time.

SPACECRAFT Say that one again?

CAPCOM And if the collectors get stuck up again like it did on 2, press on with what you just did.

SPACECRAFT Okay, (garble) latch you don't get that microswitch which I didn't even know was in that door.

CAPCOM We copy. And Challenger, for your information we're going to go ahead and power down the TV systems from the ground.

SPACECRAFT Okay

CAPCOM And Pete, did you get the teleprinter message we sent you?

SPACECRAFT Standby, I haven't looked at it yet. We received it Houston.

CAPCOM Okay I'm going to turn you over to Dr. Garner for the rest of the evening. I'll talk to you tomorrow.

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SPACECRAFT Okay thanks a bunch, talk to you later. That message is the one about the oil flick, right?

CAPCOM That's affirm.

SPACECRAFT (garble)

CAPCOM Roger, copy.

SPACECRAFT And it's associated with SPEC out-of-range.

CAPCOM Roger we copy. Challenger, Houston, we're about 30 seconds to LOS, we'll see you at Santiago at 8 plus 15.

SPACECRAFT Roger and...

PAO This is Mission Control Houston, loss of signal at Hawaii, next station Santiago in 18 minutes. Meanwhile on the TDRS satellite situation NASA, Space Communications Company and TRW engineers at White Sands are continuing to monitor the Tracking Data and Relay Satellite. NASA Program Director Robert O. Allor says the satellite is in a stable and safe condition and operating properly in its present configuration. With solar arrays pointing towards the Sun the TDRS is getting sufficient electrical power. Full deployment of the single access antenna is expected tonight. Orbital adjustments for the satellite's hydrazines thruster system is expected to be...

END OF TAPE



National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas 77058

STS-6 AIR/GROUND TRANSCRIPT

VOLUME TWO

MET ONE DAY, 8 HOURS THROUGH MET THREE DAYS, 6 HOURS

Public Information Office/ Ar
Johnson Space Center
Houston, Texas

PAO ...safe condition and operating properly in its present configuration. With solar arrays pointing toward the Sun the TDRS is getting sufficient electrical power. Full deployment of the single access antenna is expected tonight. Orbital adjustments for the satellites hydrazine thruster system is expected to begin within 24 to 48 hours. The satellite is presently in the 21,800 by 13,900 statute mile orbit. It is drifting around the Earth about once each 3 days. Acquisition at Santiago in 17 and a half minutes at which time we shall return. This is Mission Control Houston.

CAPCOM Challenger, Houston, with you at Santiago for 4 and a half.

SPACECRAFT MS1 has got 10 minutes more of section G, threshold sample.

CAPCOM Roger we copy, and I've got some words on the TDRS if you all are interested.

SPACECRAFT Please go ahead.

CAPCOM Roger, it looks like we had a problem during the SRM 2 burn, problem with the IUS. We did finally get the TDRS separated from the IUS and got all its antennas and everything deployed fine, the TDRS is operating properly, nominally. It's in a off-nominal orbit however, it's about 22,000 by 13,500 statute mile orbit and they're just about to finish getting the 16-foot antennas out and deployed. They're looking at using the RCS onboard fuel to get up to geosync and they're looking at that problem, it looks like they'll be able to do it and we'll have a good TDRS here for us for the future missions.

SPACECRAFT We copy. (garble) was it a problem in lodging the gyros or guidance?

CAPCOM We don't know exactly what the problem was yet. They're still looking at that.

SPACECRAFT Okay.

CAPCOM And Challenger you've got to go to maneuver to the ICOS attitude. And you could use NORMS if you need it to get there.

SPACECRAFT (garble) attitude.

CAPCOM Roger, and if you need to use NORMS to get there on time you're go ahead for that.

SPACECRAFT Roger. We copy. (garble)

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CAPCOM Roger this is Guy.

SPACECRAFT Okay lets hear it.

CAPCOM Challenger, Houston, we're about 20 seconds to LOS, we'll see you at Botswana at 8 plus 37.

SPACECRAFT We're supposed to be there at 8....

PAO Mission Control Houston, loss of signal at Santiago, Botswana in 17 minutes. The situation with the TDRS spacecraft as it's known at this point was passed up to the crew during the Santiago pass. Challenger now midway through its 22 orbit and we shall return in 17 minutes for Botswana, Mission Control Houston, day 1, 8 hours, 20 minutes.

END OF TAPE

PAO Mission Control Houston.

CAPCOM Challenger, Houston, with you for a little more than a minute over at Botswana.

SPACECRAFT Roger, Houston, read you loud and clear.

CAPCOM Roger, and I just wanted to make sure you understood the problem we had with the satellite was an IUS problem during SRM 2. It was definitely not a crew problem and you're to be congratulated on the outstanding job that y'all did.

SPACECRAFT Okay, thank you.

CAPCOM We got about 30 seconds left here. We'll see you over IOS at 8+45, and we'll have a weather message for you on the teleprinter then.

SPACECRAFT Roger, and we have sample number 3 being processed.

CAPCOM Roger, we copy Story. Challenger, Houston, with you at Indian Ocean for 7-1/2 minutes. Challenger, Houston, with you at Indian Ocean for 7 minutes.

SPACECRAFT Houston, read you loud and clear.

CAPCOM Roger, and I have a CAP change for you when you're ready.

SPACECRAFT Say that again, please.

CAPCOM Rog, I've got a change to the CAP at 11 hours for you when you're ready.

SPACECRAFT Go ahead.

CAPCOM Roger. On page 4-32, there at 11 hours PRM OPS and HRM OPS, says we turn that on late this morning and we'd like to slip that to turning it off down on the next page at 12+05, just prior to sleep so we can get 8 hours on it.

SPACECRAFT (garble), Houston, MS1

CAPCOM Go ahead, Story.

SPACECRAFT (garble) got good lights on all the EMU's. One of the EVA cup checklists, the strap broke of the metal part of it (garble) Did you get me Houston?

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CAPCOM And Story, you're cutting out. We copy a good
lights on both the EMU's

END OF TAPE

CAPCOM And Story, you're cutting out, we copy good lights on both the EMUs.

SPACECRAFT Camera 4, four of the EMU batteries are bad. I was able to find 4 good ones. Until we do, we have good lights on both sides, on both EMUs.

CAPCOM Roger, I copy that time. And did you guys copy the message on moving the PRM OPS and HRM OPS, turning them off, slipping them for an hour and 5 minutes?

SPACECRAFT No, you better give us that again, you were cut off by interference here, we're going to (garble)

CAPCOM Rog. The PRM OPS and HRM OPS scheduled for Bo at 1 day and 11 hours, we need to slip that to 12 hours and 5 minutes, that's just prior to sleep, so that we can get a full 8 hours on those experiments.

SPACECRAFT Okay, the PRM, HRM OPS are slipped to 4 hours and 5 minutes.

CAPCOM Roger, that.

SPACECRAFT And also one of the EVA (garble) was broken, the shaft came off the middle part, we'll have to work a fix for that.

CAPCOM Roger, we copy that. Challenger, Houston.

SPACECRAFT Go ahead.

CAPCOM Rog, when you're finished with the ICOS check, you can go back to -ZLV, we're going to cancel the IMU alignment for tonight.

SPACECRAFT Okay, thank you.

CAPCOM And Challenger, Houston, I'd like to know if you got our teleprinter message 11, weather update.

SPACECRAFT Standby one Houston. Houston, could you verify that you wanted us back into zero vertical (garble) that we get back there now.

CAPCOM Rog, want you to go to -ZLV when you're finished with the ICOS.

SPACECRAFT I understand. Okay, Houston, we're going to look for your teleprinter message in just a minute. We have received weather message number 1.

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CAPCOM Roger, thank you, we weren't sure that it got up or not. We got about 20 seconds to LOS, we'll see you for a short pass at Guam at 9 + 14.

SPACECRAFT Copy.

PAO Mission Control, Houston, loss of signal at Indian Ocean station, 19 minutes until reacquisition at Guam, as the crew workday winds down. The spacecraft communicator passed up to the crew, congratulations on deploying the TDRS satellite. Apparently to head off any worries by the crew that perhaps their deployment procedure had something to do with malfunction of the upper stage, and he assured them that it was an upper stage failure and nothing to do with the deployment. Meanwhile, the flight control team here is watching some playbacks of onboard television that they had not had the opportunity to see before, in these longer LOS times between stations. 1 day, 8 hours, 55 minutes into the flight of Challenger, this is Mission Control, Houston.

END OF TAPE

PAO and weather update to Challenger, this is Mission Control Houston. This is Mission Control Houston, 30 seconds away from acquisition at Guam for a rather brief pass of a minute and 18 seconds. Low elevation angle of 2.3 degrees at Guam.

CAPCOM Challenger, Houston, with you at Guam for 1 minute.

SPACECRAFT Okay.

CAPCOM Challenger Houston about 20 seconds to LOS we'll see you at Hawaii at 9 plus 23.

SPACECRAFT Okay.

PAO Mission Control Houston, loss of signal at Guam. Hawaii in 7 minutes. Crew of Challenger preparing now for their evening meal. Winding down today's activities, we'll return in at Hawaii, 1 day 9 hours, 15 minutes, this is Mission Control Houston. This is Mission Control Houston, acquisition in the next 10 seconds at Hawaii, the final pass of the evening, nearing midway point on orbit 23.

CAPCOM Challenger, Houston, with you in Hawaii for 6 minutes.

SPACECRAFT Okay

CAPCOM Challenger, Houston, we're 20 seconds to LOS we'll see you at Santiago at 9 plus 50.

SPACECRAFT Okay.

PAO Mission Control Houston, loss of signal at Hawaii, 19 minutes until reacquisition at Santiago, Chile. The crew not very talkative on these last couple of passes apparently on the basis of the propriety of not talking while one's mouth is full. Day 1, 9 hours 30 minutes, this is Mission Control Houston. This is Mission Control Houston we have acquisition at Santiago about 40 seconds ahead of predicted time.

CAPCOM Challenger, Houston, with you over Santiago for about 5 minutes.

SPACECRAFT Roger Houston. We're doing some (garble) right now.

END OF TAPE

CAPCOM ...for about 5 minutes.

SPACECRAFT Roger Houston. We're doing some (garble) right now.

CAPCOM Challenger, Houston. I've got a note for Story on the CFES.

SPACECRAFT Standby one, he'll be with you in a minute. Or I'll pass it to him if you want to give it to me.

CAPCOM Okay, you can take this Don. When you're finished with sample 3, and you get down to remove collector step Gulf, we'd like you to go ahead and do step Gulf, but do not wait for the 20 minutes. We're trying to conserve the buffer that we used during the malfunction troubleshooting earlier. And what that means is when you go up to step kilo before the 20 minutes expires, you'll have to enter a command end, and then you'll also have to hit enter, since the 20 minutes hasn't expired, then you continue with the closeout.

SPACECRAFT Okay, I got it, I'll pass it along.

CAPCOM Thanks. Challenger, Houston, for your information, we're going to stop recording voice for the rest of the day.

SPACECRAFT (garble) at photo 5, Houston.

CAPCOM Roger, copy, Story. Challenger, Houston, since we're not recording voice anymore we'd like you to, on panel A1, turn the audio controller voice record channels 1 and 2 to off.

SPACECRAFT Okay.

CAPCOM Challenger, Houston, 30 seconds to LOS, Ascension will be a UHF pass only now, they're using the S-band for the TDRS, and we'll see you there at 10 + 04.

SPACECRAFT Okay. The go ahead to break number 3 now.

CAPCOM Copy.

PAO Mission Control, Houston. Loss of signal at Santiago, Ascension Island in about 8 minutes. We'll return at that time, this is Mission Control, Houston. This is Mission Control, Houston, about 30 seconds away from acquisition again through Ascension Island. After Ascension, the next station would be Guam at some 42 minutes later. As the spacecraft gets onto the backside of these late-night orbits, the station contacts are few and far between.

CAPCOM Challenger, Houston, with you over Ascension for

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about 6 minutes.

SPACECRAFT Okay, number 3 is still being collected.

CAPCOM Roger, we copy, Story.

SPACECRAFT About 6, 4 minutes on it. We have Colonel Peterson doing the cleaning the WCS.

CAPCOM Roger, we copy.

SPACECRAFT Moral support from a distance.

CAPCOM Challenger, Houston, I've got some presleep switch changes for you.

SPACECRAFT (garble)

CAPCOM And on panel R1, you can turn the cryo 02 and H2 tank 3 heaters A and B, all four of them off.

SPACECRAFT You want that now?

CAPCOM At your convenience.

SPACECRAFT I'll get them right now. You want to call them off again.

CAPCOM The cryo 02 tank 3 heaters A and B off, and H2 tank 3 heaters A and B off.

SPACECRAFT Okay, that's all the heaters then, both those two and H2 tanks 3 off, correct?

CAPCOM That's correct. And I got another switch down MO10W for you

END OF TAPE

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CAPCOM ...in both the O2 and H2 tanks 3, correct?

SPACECRAFT That's correct.

CAPCOM And we got another switch down MO10W for you.

SPACECRAFT Go ahead Houston, I'll get it.

CAPCOM We're on MO10W like the O2, system 1 reg inlet valve to close.

SPACECRAFT O2 reg inlet system 1 closed.

CAPCOM Roger, and when you get to the supply water dump there for Bo at a little before 11 hours, we'd like him to dump tank Bravo to 20 percent.

SPACECRAFT Roger, Bravo to 20 percent.

CAPCOM Roger, that's correct, and how was the temperature last night?

SPACECRAFT Probably get 4 different answers, but for me it was very comfortable. (garble)

CAPCOM Roger we copy, thank you.

SPACECRAFT Hey Guy, I understand that we are not going to do an IMU align tonight at all, is that correct?

CAPCOM That affirmative sir, IMU's are looking great and we don't need one.

SPACECRAFT I know that, but I still didn't think you'd satisfy G&N and let those guys agree to that.

CAPCOM Roger, we were wondering what the leading vote thought of the temperature last night, the 101 percent vote.

SPACECRAFT (Laugh) yes, no it was quite comfortable, it was generally cooler on the flight deck than it is in the mid deck, for a couple of three different reasons. (garble) sleeping in the (garble) I was quite comfortable.

CAPCOM Roger we copy and we're about to go LOS here and we'll see you up at Guam at 10 plus 47.

SPACECRAFT See you then. He doesn't get a 101 percent, he gets 3.1.

CAPCOM Copy.

PAO This is Mission Control Houston, loss of signal at Ascension Island, 35 minutes across Africa and Asia until reacquisition at Guam in the western Pacific. At the start of orbit 24, we'll return at that time. At day 1, 10 hours, 12 minutes mission elapsed time Mission Control Houston. This is Mission Control Houston, 40 seconds away from acquisition through Guam.

CAPCOM Challenger, Houston, with you through Guam for 6 minutes.

SPACECRAFT Roger Houston, thank you. And the CFES is closed down.

CAPCOM Roger we copy Story, and I've got a couple of more presleep switch changes for you.

SPACECRAFT Standby one.

CAPCOM I've got one on R2 and another on A7.

SPACECRAFT Okay, Peterson will get the one on R2 and I'll get the one on A7.

CAPCOM Okay, panel A7A2 we'd like the MADS strain gage to PCN enable.

SPACECRAFT You got it.

CAPCOM And on panel R2 we'd like all three hydraulic circ pumps to GPC in case we have to do anything with them during the night.

SPACECRAFT Okay I'll get that.

CAPCOM And reference your request to turn off the UHF for sleep tonight, if you want to do that we'd like for you to use the UHF mode switch on panel 06 so that we can monitor the switch position on telemetry.

SPACECRAFT Okay

CAPCOM And we'd like for you to leave that on until after our next Ascension pass just before you go to bed at 11:50 because that'll be a UHF only pass for us although we won't be talking to you probably.

SPACECRAFT Okay I understand, if we're going to turn the UHF off do it on the overhead panel so you can monitor the switch and don't do it prior to the next Ascension pass.

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CAPCOM Roger that pass is at 11:50 and we'd like to know
if you use the bypass...

END OF TAPE

SPACECRAFT ...next Ascension pass.

CAPCOM Roger, that pass is at 11:50 and we would like to know if you use the bypass valve there for temperature controls, you left that in full hot for today, or if you changed it.

SPACECRAFT (garble) temperature control valve, Houston.

CAPCOM Roger, we were just curious if you left it in full hot for today's mission or if you changed it back from your setting at full hot for last night.

SPACECRAFT I think we changed it back to something like 2/3rds the way over to full cold, but ...(garble). Bo did it and he's off the loop right now, we can tell you later.

CAPCOM Okay then. We're just curious. Don't forget to turn it back to full hot for sleep tonight.

SPACECRAFT Okay, we can go look now if you want to know for sure.

CAPCOM It's not a big deal.

SPACECRAFT Okay, I think PJ's gonna go down and look, we'll let you know in a minute. (garble). Houston, it's on 2/3rds cold and it's been there since postsleep.

CAPCOM Roger, thank you. Challenger, Houston. Did you ever get the door reattached when you were cleaning out the IMU fan filters?

SPACECRAFT Negative, we never refastened that door. It's still fastened partially with one of the screws, the other screw's not seated at all.

CAPCOM Roger, copy, thanks.

SPACECRAFT Been busy doing a lot of other things, we just never got back to it, we'll try it again tomorrow.

CAPCOM Understand. Challenger, Houston. We're about 30 seconds to LOS, the Crystal team will be signing off for the evening. Amber boys will get you in the morning at nominal wake-up time.

SPACECRAFT Okay, this will be the last time we'll be hearing from you then?

CAPCOM That's affirm, we'll be standing by, have a good sleep.

SPACECRAFT Thanks alot, you too.

CAPCOM And Challenger, Houston. One last note your onboard vector is good until tomorrow.

SPACECRAFT Okay.

PAO This is Mission Control Houston, loss of signal at Guam. Probably the last voice conversation between the control center and the crew of Challenger for the evening. As the crew prepares their presleep activities, wrapping up the day's work. And unless we're whelmed over with needs by the news media for a change of shift briefing at 1:30 or 2:00 in the morning or it likely won't have one with off-going Flight Director Harold Draughon At 1 day, 10 hours 54 minutes, this is Mission Control Houston. This is Mission Control Houston. Crew aboard Challenger preparing for their sleep period beginning in less than an hour. Midway through orbit number 24. Any newsmen that really insist on a Flight Director press conference on a fairly noneventful 9 hour shift need to let us know they're alive, awake by calling the newsroom to insist on that press conference. Otherwise we're certainly considering on not having it at 2 a.m. At 1 day 11 hours into the maiden flight of the Orbiter Challenger, this is Mission Control Houston.

END OF TAPE

PAO This is Mission Control, Houston, 1 day, 13 hours, 17 minutes, mission elapsed time. Orbiter Challenger is just about to cross the equator beginning orbit number 26. It is currently within range of the tracking station at Ascension Island. Crew is in their scheduled sleep period, although recent indications at a pass over Santiago are that they had not configured for sleep, that is they still had some of the CRT displays on, and that the UHF communications were still turned on, as the spacecraft passed over Santiago and data was returned to the ground automatically. Flight controllers here in Mission Control observe that all systems appear to be in good shape on the spacecraft. Just recently had a handover between the two flight control teams. Flight Director Randy Stone is now onboard with the Amber Team. Challenger is in a 153 by 152 nautical mile orbit, has a good vector and all systems seem to be in good shape tonight. We're expecting a fairly quiet night. 1 day, 13 hours, 18 minutes, mission elapsed time, this is Mission Control, Houston. Mission Control, Houston, 1 day, 13 hours, 30 minutes, mission elapsed time. Just a reminder that that press conference with the off-going Flight Director Harold Draughon that had been scheduled for 2 a.m. was cancelled. This is Mission Control. Mission Control, Houston, 1 day, 15 hours, 30 minutes, mission elapsed time. Orbiter Challenger is in its 27th orbit. Everything continues to be very quiet here at Mission Control this evening. Flight Planners have made a few updates to tomorrow's activities for the crew, and the astronauts have about 4 and a half hours remaining in their scheduled sleep period. 1 day, 15 hours, 30 minutes, mission elapsed time, this is Mission Control, Houston.

END OF TAPE

PAO Mission Control Houston, 1 day, 16 hours, 35 minutes mission elapsed time. Orbiter Challenger is on its 28th orbit of the Earth, it's passing within range of the tracking station in Dakar. Systems onboard the spacecraft continue to function normally and the crew has about 3 and a half hours remaining in their sleep period. At 1 day, 16 hours, 36 minutes, mission elapsed time, this is Mission Control Houston. Mission Control Houston, 1 day, 17 hours, 32 minutes mission elapsed time. Spaceship Challenger on orbit number 28 over the Pacific Ocean. The crew has about 2 and a half hours remaining in their sleep period. Flight Controllers here in Mission Control are putting the finishing touches on the teleprinter message that will be sent up to the crew shortly. The number of items checking out the spacecraft today. Mission Specialists will be preparing their equipment for the space walk to take place on Thursday and there'll be some considerable work with the continuous flow electrophoresis system and other experiments onboard. There will be an additional portion of the rendezvous phasing that will take place also today. At 1 day, 17 hours, 33 minutes mission elapsed time, this is Mission Control Houston. Mission Control Houston, 1 day, 18 hours, 6 minutes, mission elapsed time. The Challenger is just passing within range of the Dakar tracking station, data being returned to the ground indicates that all systems onboard the spacecraft are operating normally at the present time. Most of the planning activities for today have been completed here in Mission Control and the crew should be waking up in less than 2 hours. 1 day, 18 hours, 6 minutes, mission elapsed time this is Mission Control Houston.

END OF TAPE

PAO Mission Control Houston, 1 day 19 hours 16 minutes, mission elapsed time. Shuttle orbiter Challenger about to start orbit number 30 out over the Pacific Ocean at the present time. The crew has about 45 minutes in their scheduled sleep period remaining. And it's about another 12 minutes before we get to see data again as the Spacecraft passes over some of the tracking stations based in the Continental United States.

PAO Mission Control Houston, 1 day 19 hours 47 minutes, mission elapsed time. Orbiter Challenger is about to pass out of range at the Madrid tracking station on orbit number 30. Indications coming back from the Spacecraft by way of the data being relayed to the ground that the crew is awake, there are only a few minutes remaining in their scheduled sleep period, we'll probably hear the wake up music when they pass over the Indian Ocean station in about 11 minutes.

PAO Mission Control Houston, 1 day 19 hours 59 minutes mission elapsed time, standing by for acquisition of signal with Challenger crew over the Indian Ocean station.

END OF TAPE

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CAPCOM Morning Challenger. This is Houston. How do you read?

SPACECRAFT Read you loud and clear, Houston. How me?

CAPCOM Loud and clear.

PAO Mission Control, Houston. 1 day, 20 hours, 7 minutes mission elapsed time. That wake up music played to the crew was "Teach Me Tiger" by April Stevens. Still within range of the Indian Ocean tracking station for about another minute. This is Mission Control, Houston.

CAPCOM Challenger, this is Houston. We're 30 seconds LOS. Talk to you again over Yarragadee at 20:16.

SPACECRAFT Okay, see you then.

END OF TAPE

CAPCOM Challenger, this is Houston with you through Yarragadee for 8 minutes.

SPACECRAFT Morning Houston.

CAPCOM Challenger, this is Houston.

SPACECRAFT Go ahead Houston.

CAPCOM The next two Orroral passes we will be giving up for TDRSS use, over.

SPACECRAFT Say again Houston, please.

CAPCOM The next passes over Orroral Valley will not be transmitting. We are giving them over to TDRSS for their use.

SPACECRAFT Okay. Morning Houston.

CAPCOM Houston, go ahead.

SPACECRAFT For your information, apparently just before beddie- bye last night, as we had two more of those, we think they were probably the O2 flow high alerts, if ya'll can see the smoke from the, let me look at the time a minute. At last night, 11 hours and 46, 47 minutes in cabin O2 which we suspect was those little spikes of O2 flow high. We did not see it. They were gone by the time we got to it.

CAPCOM Challenger, Houston, we copy that PJ and we also saw those last night. We were wondering if you could correlate those alarms to any activities you were doing?

SPACECRAFT No, as a matter of fact even now while I was talking to you we got cabin N2 which apparently some high spikes.

CAPCOM PJ, this is Houston, and while you got that alarm we were on an N2 cycle and so it's to be expected.

SPACECRAFT Okay, still there, (garble) a minute.

CAPCOM Challenger, Houston, go ahead.

SPACECRAFT Something is going from max flow. We just got cabin N2 and it was flowing in at max. It would almost blow you out of the waste management compartment.

CAPCOM Roger, we copy that.

SPACECRAFT Right now I secured the 14.7 cabin pressure in my reg. Cabin pressure is indicated to be 14.8. We'll go back and

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look at that in a little bit after you guys have time to think about it. I'm not sure, Mary, if there's any activity that's associated with it. But you know, we're at 3 for 3 now and it's associated with either presleep or post sleep and I sure can't figure out what it would be.

CAPCOM Roger, PJ, we copy, and we are trying to get Orroral Valley back so we can work this problem with you a little longer.

SPACECRAFT Okay. A couple of more words if you're ready. On the Persian Gulf site, the last time. We got a good look at it. There's visual, no indication that I can see - no, if there's any oil slick out there it's not discernable I think in eye. We did get a couple three pictures of it and they may show something but unless I'm not looking for the right thing, I sure couldn't see any indication of it.

CAPCOM Roger, PJ, and we copy that and thanks for looking.

SPACECRAFT I'm going to leave that cabin reg secured for now, you know, we got good PP02 and good cabin press until we hear from you little later.

END OF TAPE

SPACECRAFT Okay, I want to leave that cabin reg secured for now. You know we got good PPO2 and good cabin press and until we here from you a little later, after we get the morning's activities underway and squared away.

CAPCOM Challenger, this is Houston and we concur with your action.

CAPCOM Challenger, Houston, we're 10 seconds LOS. Talk to you again through Mila at 1:21.

PAO Mission Control, Houston. 1 day, 20 hours, 24 minutes mission elapsed time. Orbiter Challenger is passing out of range of the Yarragadee tracking station. About to enter the range of the Orroral tracking station. We may or may not have communication at that time. The people working with the Tracking Data Relay Satellite had asked for use of that station. During that last pass Commander Paul Weitz was discussing with the ground their observation of, of the extra inputs or perhaps high level inputs for very brief periods of time of the pressure regulating system in the cabin for the oxygen and nitrogen. Everything is within normal limits but there seems to be a couple of unusual instances where there were for very minute periods of time higher than normal flows and these appear to be associated either with the pre-sleep periods or post-sleep activities they are observing that now to see if they can correlate, make any associations between those periods of time and these, these somewhat abnormal flows of the oxygen and nitrogen pressure regulating systems. At 1 day, 20 hours, 25 minutes this is Mission Control, Houston.

PAO This is Shuttle Control. Challenger is, has been acquired by the Merritt Island tracking station. We'll stand by.

PAO A handover is taking place in the Mission Control Center. Flight Director Cary Coen relieving Flight Director Randy Stone.

CAPCOM Challenger, Houston. Ascent entry team with you this morning for 11 minutes over the states and we've got the PAD for you.

SPACECRAFT Okay. Good morning Brian. How are you?

CAPCOM Just great sir. How about you?

SPACECRAFT Well, fine, except the world's oldest space team did not need oh about at 20:47, at 20:47 were greeted by a friendly PPDT. By the time I got top side, I glanced at the meter. It was reading about minus .03. I called up Spec 66 and by the time it came up everything was normal and looked back at the meter and it was reading 0 again. That's about all the

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insite I can give you except at the time the WCS was in use which I know shouldn't have any bearing but we're kind of groping and I was ready to copy the PAD.

CAPCOM Roger that. We copy all and we're looking at data here. Meanwhile I'll read the PAD to you. Page 10-15 when you're ready.

SPACECRAFT Go ahead.

CAPCOM Target data interconnect - none, minus x burn. RCS select, TV roll 180. Weight 201040. TIG 1/21:15 - -

END OF TAPE

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CAPCOM Target data, interconnect none, -X burn, RCS select TV roll, 180, weight 201040, TIG 1/21:15:

SPACECRAFT Wait a minute Brian, would you please?

SPACECRAFT We had a noise that's making it difficult to copy, which was on UHF, when I made that last call to you it went away, so go ahead, continue with the pad.

CAPCOM Roger, I'll start with TIG 1/21:15:00.0, (garble) 7 targets, -1.0, all balls, all balls. Burn data 331.7, 107.0, 1.2, delta v total 1.0 00:03 VGO X -0.95, all balls, +0.30, Targets 153 +151, post burn attitude n/a, read back.

SPACECRAFT Roger, the first one I missed was what kind of burn is this a plus X?

CAPCOM That's a negative, it's a -X.

SPACECRAFT -X, okay RCS select, 180 201040, 1 day 21, 15 00.0, 1.0 all balls, all balls, 331.7, 107.0, 1.2, 1.0 00:03 0.95, and that's -0.95, all balls +0.33 153 151, and the rest is n/a.

CAPCOM Roger, I have two corrections Bo, item 19 delta VX is a minus 1.0, and on the V go V go Z is +0.30, over.

SPACECRAFT Roger 19 is -1.0, and V go Z is +0.30.

CAPCOM That's a good read back.

CAPCOM And Challenger, Houston, Bo, we didn't get any UHF downlink when you were talking there, can you verify your comm panel in TR UHF?

SPACECRAFT Yes, it CDR, that noise came back again Brian, so I reached over and turned his off while he was copying, so he could copy it.

CAPCOM Roger, I understand.

PAO This is shuttle control, CAPCOMs on this shift are Roy Bridges and Brian O'Conner, O'Conner has been communicating with the crew during this pass.

SPACECRAFT Houston, we're going to have to use a normal jet to get the attitude in time.

CAPCOM Roger, I understand.

CAPCOM Challenger, Houston.

SPACECRAFT Go ahead.

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CAPCOM Roger, we see an attitude other than what we read you on the pad here, that you are maneuvering to.

SPACECRAFT Yes, thank you Brian. Okay, I know I loaded it in, I did. I think I just forgot to execute it. But I didn't see it sitting on the scratch pad line.

CAPCOM Roger, and we see the right attitude in there now, and see you maneuvering towards it. And if you get the attitude a little bit late that's not going to hurt anything, you can delay the TIG a little bit.

SPACECRAFT We'll get it off on time.

CAPCOM Roger.

CAPCOM Challenger, Houston, 20 seconds to LOS, your configuration looks good to us and have a good burn. We'll see you at Dakar in about 5 minutes.

SPACECRAFT Okay, we're still getting that noise on UHF, apparently when you transmit Brian.

CAPCOM Roger.

END OF TAPE

PAO This is Shuttle Control. Bermuda has loss of signal. Challenger is maneuvering to the attitude for the third rendezvous phasing maneuver. The third maneuver in this phantom rendezvous series, that they conducted over a several day period. The ignition time for this burn, 1 day 21 hours 15 minutes. About 2 minutes from this time it will be a retrograde RCS burn, a delta V of 1 foot per second. A burn time of 3 seconds. The resultant orbit expected to be 153 by 151. It will not perturb the orbit much from the current number. Dakar is the next station in 2 and half minutes. At 1 day 21 hours 13 minutes mission elapsed time this is Shuttle Control Houston. This is Shuttle Control at 1 day 21 hours 15 minutes. Challenger is about 20 seconds away from acquisition through Dakar.

CAPCOM Challenger, Houston, with you at Dakar for 7 minutes.

SPACECRAFT Roger, standby Bryan. And the residuals were -.12 -.01 and + .13.

CAPCOM Roger, copy.

SPACECRAFT Okay, Houston, we're working a problem right now. We, for your information, on the water supply system in the cabin we have already hooked up the water hose that was stowed in the window shade holder, and have been using that for utility purposes. And now Don and Story just discovered just a few minutes ago, we're not getting water out of the dispenser any more, but we are getting it out of that hose. So it may be a plugged needle and we'll go ahead and change out the needle and see if that helps it any. We'll keep you posted.

CAPCOM Roger, copy.

SPACECRAFT And verify you want us to go back to ZLV now, Bryan?

CAPCOM Standby for attitude information. We're talking about whether or not to send you to IMU align now or the ZLV.

SPACECRAFT Okay. We'll just sit here and drift.

CAPCOM And Challenger, Houston, recommend you go ahead and go to the IMU align attitude as per the CAP, page 439.

SPACECRAFT Okay, we'll do that, thank you.

CAPCOM Challenger, Houston.

SPACECRAFT Go ahead.

CAPCOM Roger, we're still trying to put together this N2 message that we got earlier over Yarragadee. Could you tell us what it was that stopped the N2 flow out of the WCS?

SPACECRAFT Yes sir, when I moved cabin 14.7 cabin reg bravo to off.

CAPCOM Roger, copy.

SPACECRAFT Old Story was trying to brush his hair, that stuff coming out of that panel kept blowing the brush right out of his hand.

CAPCOM Roger, I guess that didn't make much difference, did it?

SPACECRAFT Well, he looks wild and wooly.

CAPCOM And Challenger, Houston, PJ, we've been looking at this UHF noise problem and how's it been sounding on this pass?

SPACECRAFT It's been good on this pass, Bryan, I'd forgotten about it till you just asked about it.

CAPCOM Roger.

SPACECRAFT And just for information. Back on that nitrogen flow thing. It appeared to be a demand by the regulator that it sounded, I've never been there around that panel when the regulators are flowing max, but it sure sounded like it was to me and it was really making a very loud noise and was flowing through the reg. And when I turned the reg off, as I say, then the flow stopped. And we'd had two master alarms before then with no indication that I could see on the flow meter up on the panel, on the N2 flow. So I don't know when it started, or what's happened.

CAPCOM Roger, copy.

END OF TAPE

CAPCOM Roger, copy.

CAPCOM Challenger, Houston, if you get a jet alarm L2D fuel, no action required, and we're going LOS, we'll see you at IOS at 2135.

SPACECRAFT Okay, what's wrong with the jet? Any quick words?

CAPCOM Roger, we see a slight temperature decrease on it.

SPACECRAFT Okay.

CAPCOM We're looking at it, it might be a small leak.

PAO This is shuttle control, Dakar has loss of signal. Indian Ocean station is next in about 10-1/2 minutes. Continuing to troubleshoot the unexpected brief surges of oxygen and nitrogen into the cabin. Trying to pinpoint what's causing that. And just at LOS, the crew was advised that there may be a small leak in one of the RCS jets, the L2D jet. Seeing a slight decrease in temperature which could trigger a master alarm aboard Challenger, they were advised to ignore the alarm. That jet will automatically deselect itself, if that is the case. At 1 day 21 hours 25 minutes, mission elapsed time, this is Shuttle Control, Houston.

Houston contact center, contact ground 2, any contact center, contact UHF.

Contact, I read you.

Roger, any (garble) has configured (garble)

Roger, thank you.

PAO This is shuttle control, at 1 day 21 hours 35 minutes, mission elapsed time. Standing by for acquisition through the Indian Ocean station.

CAPCOM Challenger, Houston with you at IOS for 8 minutes, we have no UHF this pass.

SPACECRAFT Roger, read you loud and clear. And Houston, we got a water (garble) stopped up meter, we replaced it.

CAPCOM Roger.

SPACECRAFT Houston, we're going to save the old meter for somebody to look at. We're going to wrap it up in a paper and tag it and put in the return to Houston bag.

CAPCOM Roger that, and we got our UHF back.

SPACECRAFT Okay.

CAPCOM Challenger, Houston. We see that we've got a fail on L2D for a very small leak. We're going to continue looking at that. No action required.

SPACECRAFT (Garble).

CAPCOM And Challenger, Houston. Say again your last please.

SPACECRAFT You had said we might get a failure on that leak, and we did just it, as we were already from your last pass.

CAPCOM Roger. And Challenger, Houston. If it's convenient for you, you can go ahead and align platforms, we see the torquing angles.

SPACECRAFT These, ones - started right after those that were started tht we just got. I guess (garble) are they satisfactory?.

CAPCOM That's affirm. They are satisfactory.

END OF TAPE

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SPACECRAFT Okay.

CAPCOM Challenger, Houston. We see that we've got a fail on L2D for a very small leak. We're going to continue looking at that. No action required.

SPACECRAFT (Garble).

CAPCOM And Challenger, Houston. Say again your last please.

SPACECRAFT You had said we might get a failure on that leak, and we did just it, as we were already from your last pass.

CAPCOM Roger. And Challenger, Houston. If it's convenient for you, you can go ahead and align platforms, we see the torquing angles.

SPACECRAFT These, ones - started right after those that were started tht we just got. I guess (garble) are they satisfactory?.

CAPCOM That's affirm. They are satisfactory.

END OF TAPE

CAPCOM That's affirm, they're satisfactory.

SPACECRAFT I take it back, Brian, looking ahead I see there's other (garble) we are going to go get it.

CAPCOM Roger, concur.

SPACECRAFT Okay, (garble) we all aligned.

CAPCOM Roger. Challenger, Houston, 30 seconds to LOS. We'll see you at Yarragadee at 2151 and we see the trackers back in track, the IMU's aligned, and we've got the numbers, no need for a read down.

SPACECRAFT Roger, and we'll go ahead and (garble) back to ZLV nose first.

CAPCOM Roger, concur.

PAO This is Shuttle Control. Challenger is out of range at the Indian Ocean station. Next acquisition through Yarragadee in 7 and half minutes. All four crewmen scheduled for breakfast now for the next hour. At 1 day 21 hours 43 minutes mission elapsed time this is Shuttle Control Houston. This is Shuttle Control at 1 day 21 hours 50 minutes mission elapsed time. Challenger about to be acquired through Yarragadee.

CAPCOM Challenger, Houston with you at Yarragadee. Standing by for 8 minutes.

SPACECRAFT Okay. Roger, we just got back into ZLV, nose first. What's the (garble) check just leave it deselected?

CAPCOM Roger, we'd like to leave that jet deselected.

SPACECRAFT Houston, on the MI wire. You sent us up a message and you gave us the new times for some of the MLR operations, the post deactivation, but you didn't change all the times. Do you mean to slip everything a half hour?

CAPCOM Roger, we'll have to take a look at the message, but that's exactly what we want to do.

SPACECRAFT Okay.

CAPCOM And Challenger, Houston, Don, this half hour slip, we're only talking about today's MLR activities, that doesn't affect deorbit day.

SPACECRAFT Understand, but you want everything that's in the CAP today slipped a half hour?

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CAPCOM That's affirmative.

PAYCOM Houston, COM control.

CAPCOM Challenger, Houston, 30 seconds to LOS. We will not have an orbital pass this time. We'll see you at the states at 22 + 29.

SPACECRAFT 22 29. About half hour from now. See you then.

PAO This is Shuttle Control. Yarragade has loss of signal. Next acquisition will be through Buckhorn in California in 29 and half minutes. At 1 day 21 hours 59 minutes mission elapsed time this is Shuttle Control Houston. This is Shuttle Control at 1 day 22 hours 28 minutes mission elapsed time. Buckhorn will lock on to Challenger in about 30 seconds.

END OF TAPE

PAO This is Shuttle Control at 1 day, 22 hours, 28 minutes mission elapsed time. Buckhorn will lock on to Challenger in about 30 seconds.

CAPCOM Challenger, Houston. With you over the States for 12 minutes. And we have a NOSL opportunity to talk to you about.

SPACECRAFT Go ahead.

CAPCOM Roger, in about 3 or 4 minutes when you're passing over the Gulf of Mexico there's a real good line of thunderstorms. You'll see them on this pass and also on the next pass orbit 33 and thought you'd like to know in case you can get up to that NOSL and take pictures.

SPACECRAFT Thank you.

CAPCOM Recommended speed for the camera would be one one thousandth and FSTOP 16.

SPACECRAFT Okay. PJ. MS1.

CAPCOM Challenger, Houston. In about 10 seconds we'll have a 1 minute key hole. I'll check back in.

SPACECRAFT Roger.

CAPCOM Challenger, Houston. We're back with you at Mila.

SPACECRAFT Okay, Houston. We're just trying our CFES.

CAPCOM Roger, understand.

SPACECRAFT And Houston, it's pretty cloudy. I don't recognize anything here. Can you tell me about where we are? In relationship to that line of storms.

CAPCOM Stand by we'll give you a mark.

CAPCOM And Challenger, Houston, you have just entered the Gulf of Mexico area and you can start filming anytime now.

CAPCOM Challenger, Houston. Right now you're just south of the New Orleans area.

SPACECRAFT Houston, MS1.

CAPCOM Go ahead.

SPACECRAFT Brian, you got any water (garble) water dump numbers for me?

CAPCOM Roger, we'd like you to dump tank bravo to 35%.

SPACECRAFT Bravo to 35 and when I tried to fill some air sample bottles, sample number 3, the bottle was not evacuated. I heard no air blowing into the bottle. I tried number 4 and it was not evacuated either.

CAPCOM Roger, copy.

SPACECRAFT And I did have the caps off the nozzles.

CAPCOM Roger, understand Story.

SPACECRAFT CO2 absorber replacements have been done.

CAPCOM Roger.

CAPCOM And Challenger, Houston. Got a question about the WCS filter yesterday afternoon when you're ready.

SPACECRAFT You know I don't think we looked at the WCS filter yesterday. I don't think we did either.

CAPCOM Okay, well we were just wondering about it judging by the debris we saw on the TV floating around the cabin and the fact that the fan filters had so much junk on them we were wondering that when you get around to looking at that WCS filter what you see on it.

SPACECRAFT Okay. It'll take us a while.

CAPCOM And Challenger, Houston. If you can't see the ground, we see you over the east coast of Florida now and that's the end of the NOSL opportunity.

SPACECRAFT I did see the ground, myself, from about the point where we asked you which was just a little, a little west of New Orleans along the Gulf Coast until after Florida.

CAPCOM Okay, very good.

CAPCOM Challenger, Houston. We see the supply water crossover valve open. Recommend we, that you go ahead and close that. We don't need that for the water dump.

SPACECRAFT I got it.

CAPCOM Roger.

END OF TAPE

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SPACECRAFT Yes, what data do you need on the PRM and the HRM esterday Brian?

CAPCOM Roger, PRM step 2, HRM test 2. We just need the METs.

SPACECRAFT Yes, I know, we're working on a two orbit ops check list, let me look, I'll be right back with you in a minute.

CAPCOM Roger.

SPACECRAFT Okay, we're real late getting to them closing them off. The PRM data take one was at day 1 13 hours 30 minutes, and HRM data take on test 2 was 1 day 13 hours 33 minutes.

CAPCOM Roger copy that for PRM.

SPACECRAFT How about the HRM, did you get that too?

CAPCOM Roger, I understand that second number you gave me was for HRM?

SPACECRAFT Yes sir, that 1330 was the PRM and 3 minutes later at 1333 we did the HRM.

CAPCOM Roger copy.

CAPCOM Challenger, Houston for Don, when you've got a chance, we'd like a read out on CFES poppa 1 parameter.

SPACECRAFT I understand the pressure P1?

CAPCOM That's affirmative.

SPACECRAFT (garble).

SPACECRAFT Bryan, pressure 1 is 1.6.

CAPCOM Roger copy.

CAPCOM Challenger, Houston, approaching LOS we'll see you at Yarragadee at 2326.

CAPCOM And Challenger, correction on that, we'll see you at IOS at 2313.

SPACECRAFT Roger.

END OF TAPE

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CAPCOM Challenger, Houston, about to go LOS, we'll see you at Dakar at 2250.

SPACECRAFT Okay, Bryan, and I just activated the CFES I changed the address 1550 to all balls, and when I did I got an operator call and an out of range and I think that goes with changing the pump speed, but you might have them check it.

CAPCOM Roger, we'll check.

PAO This is shuttle control. Bermuda has loss of signal.

CAPCOM Challenger, Houston, that operator call out of range is expected on that change.

SPACECRAFT Roger, Just what I figured.

PAO Now Bermuda does have LOS. Mission Specialist Don Peterson activating the continuous flow of the electrophoresis experiment as Challenger went LOS at Bermuda. And the optical survey of lightning experiment was conducted over a good part of the Gulf of Mexico during this pass. A line of thunderstorms in the Gulf today. Dakar is next in about a minute and 50 seconds, we'll stand by for Dakar at 1 day 22 hours 49 minutes, mission elapsed time.

CAPCOM Challenger, Houston with you at Dakar for 9 minutes.

SPACECRAFT Roger, Houston.

CAPCOM And Challenger, we're just standing by this pass.

SPACECRAFT Houston, in regard to CFES, the number that came up on rpm 2 was 1587.

CAPCOM Roger copy.

SPACECRAFT Houston, the PRM ops 12247, the HRM 12250.

CAPCOM Roger copy, Bo, and if you can could you read us the METs from yesterday afternoon? PRM step 2, and HRM test 2, we never got those METs yesterday.

SPACECRAFT Stand by.

SPACECRAFT Houston, Challenger.

CAPCOM Go ahead.

PAO This is Shuttle Control. Challenger has moved out of range of Dakar on its 32 orbit. Next acquisition through the Indian Ocean station in just over 13 minutes. At 1 day 23 hours mission elapsed time this is Shuttle Control Houston.

SPACECRAFT Houston, Challenger, you with us?

CAPCOM Roger, go ahead, we've got a real short pass, you're at IOS for a little less than 2 minutes.

SPACECRAFT Okay, I'm just going to talk to GP first. Put our fuel cells (garble). (garble) yes. Houston, MS 1.

CAPCOM Go ahead.

SPACECRAFT I'm doing the (garble) condition in G00721. The batteries did not perform up to par. I changed out with the new batteries in there, they did not need it. I knew this was a training (garble) they told me the original unit would be fixed. I'm going to go ahead and do the recording anyway.

CAPCOM Roger.

SPACECRAFT The other problem in the procedure, it says connect the (garble) plug to line (garble) panel. It really needs a less (garble) if i'm going to do that. (Garble) page 72.

CAPCOM Okay, we're on page 72, we didn't copy your statement on that page though.

SPACECRAFT Okay, the battery check says (garble) indicator now on green (garble) film recorder's not operational. I quickly added (garble). The batteries do not indicate operational. I changed those out and put two new batteries in and got the same result. I think that's a problem with the recorder. It says connect the headset to the align unit in the left panel it won't fit in the (garble) so I've got it in the left (grable) position.

CAPCOM Roger.

SPACECRAFT I'll press ahead and do it and you can let them know if they want it done another way so I can do it again.

CAPCOM Okay, and Challenger we'd like you to stop the water dump.

SPACECRAFT Okay, I'll get after that now.

PAO This is Shuttle Control. Challenger out of range at the Indian Ocean station. Next acquisition through Yarragadee

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in 8 minutes 15 seconds. At 1 day 23 hours 18 minutes mission elapsed time this is Shuttle Control Houston.

CAPCOM Challenger, Houston, standing by at Yarragadee for 8 minutes.

SPACECRAFT Roger, Houston. Houston for your information I got some strange looking parameters on CFES. Story tells me they were strange yesterday. If you'd like I can read you some of them.

CAPCOM Roger, Don, there's a lot of background noise. If you could read them slowly we'd appreciate it.

SPACECRAFT Okay, right now, for example, I'm in the zero voltage phase and I'm looking at an amp reading of a 0.4. Power supplies are 28 volt, A supply is reading 29.4, the B supply is reading 28.3. Looking at delta pressures DP1 is negative .4, EP2 is a positive .3, DP3 is a negative .1.

END OF TAPE

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SPACECRAFT Pressure 1, I already read to you. I'll give you a few more of those. Pressure 2 is 3.3, P3 is 3.2, P4 is 4.4, P5 is 5.0 and P6 is 11.9.

CAPCOM Roger, copy all, Don.

CAPCOM And Challenger, Houston. Don, could you give us a delta P4 please?

SPACECRAFT Okay, Brian, I'll look it up.

SPACECRAFT Brian, DP4 is 1.1.

CAPCOM Roger.

CAPCOM And Challenger, Houston. Don, for your information, those numbers look pretty good to us. You should go ahead and press on.

SPACECRAFT Okay, I was pressing on. Just wanted you to know about them.

CAPCOM Roger.

CAPCOM Challenger, Houston. 20 seconds from a long LOS. See you at Hawaii at 23:52.

PAO This is Shuttle Control.

CAPCOM Challenger, Houston. Signing off. We'll see you at Hawaii at 23:52.

PAO Challenger is out over central Australia out of range at Yarragadee. Does not come within Orroral's range on this orbit. Hawaii will pick up the spacecraft in 17 and a half minutes. At 1 day, 23 hours, 35 minutes mission elapsed time this is Shuttle Control, Houston.

PAO This is Shuttle Control at 1 day, 23 hours, 52 minutes mission elapsed time. Challenger approaching acquisition through Hawaii.

CAPCOM Challenger, Houston, with you at Hawaii for 7 minutes.

SPACECRAFT Okay, Brian, and on the CFES, when the sample 4 first started airing it looked like the stream was going to diffuse pretty badly but after a couple of minutes it settled down and it's making a really clean, well defined stream all the way up to the top of the column now. I'm just about ready to take some pictures.

CAPCOM Well, that's great news Don.

SPACECRAFT Houston, MS1.

CAPCOM Go ahead.

SPACECRAFT The voice recognition is complete and I'm into the EMU checkout.

CAPCOM Roger.

SPACECRAFT If you can get Armstrong, O'Neil, EMU and those folks in pretty soon. I'm finished in this area (garble) OPS totally on day 1 as you remember.

CAPCOM Roger, remember that.

CAPCOM Challenger, Houston. Story, we're calling the EMU guys to come on over here and they'll be available in a few minutes to answer any questions or ask you some questions as time goes on.

SPACECRAFT Okay, it's mostly configuration stuff.

CAPCOM Roger.

CAPCOM Challenger, Houston. 20 seconds to LOS. We'll see you over the States in about 3 minutes.

SPACECRAFT Say again Brian.

CAPCOM Roger, we're going LOS and we'll see you over the States in 3 minutes.

SPACECRAFT All right.

PAO This is Shuttle Control. Hawaii has loss of signal. Buckhorn will pick up Challenger in about 2 and a half minutes. Story Musgrave reporting over Hawaii that he was starting the EMU checkout, the spacesuit checkout. He's about 5 and a half hours early with that operation.

END OF TAPE

PAO Story Musgrave reporting over Hawaii that he was starting the EMU checkout the space suit checkout. He's about 5 1/2 hours early with that operation. We'll stand by for this pass over the Continental United States on orbit number 33.

CAPCOM Challenger, Houston, standing by for 20 minutes over the States.

SPACECRAFT Thanks Brian, copy that.

CAPCOM And the weather for revs 35 and 40 is going up on this pass.

SPACECRAFT Okay thank you, stand by one.

SPACECRAFT Houston, MS1

CAPCOM Go ahead.

SPACECRAFT Brian, the bag is designed to cover the third EMU I can't get it on, I can't uncover the (garble) and (garble) ways to open with that bag no matter how hard I try, it just won't do it.

CAPCOM Roger, we'll talk about it here.

CAPCOM Challenger, Houston, for Story.

SPACECRAFT Go ahead.

CAPCOM Roger, we understand there was also problems in one g getting that bag on there, if you could just secure it on there the best you can, it's not a big deal.

SPACECRAFT Yes, the only reason I was concerned was I know there's active Lioh cartridge in there, and I wanted to seal off the neckring (garble). But no way to do it.

CAPCOM Roger.

CAPCOM Challenger, Houston for Story.

SPACECRAFT Go ahead.

SPACECRAFT And Story, we were not aware that there is an active Lioh cartridge in there, unless you put one in there.

SPACECRAFT Yes, you have to put one in there for the (garble) EMU ops. And I called down the serial number last night.

CAPCOM Okay.

SPACECRAFT As you know that check requires buttoning the whole thing up putting an LCC in there and doing the pressurization check 1.6 to 4.3 and (garble) checking the fan also which was good.

CAPCOM Roger.

CAPCOM Challenger Houston, with a note for anyone for up near the PLT seat.

SPACECRAFT Stand by one Brian, and I'll take it for you.

CAPCOM Roger.

SPACECRAFT Okay, voice it up.

CAPCOM Roger, we need to see the boiler controller power heater switches to bravo.

SPACECRAFT Say again, you want which boiler controller power heater to bravo?

CAPCOM That's all three of them bravo as per their CAP page 4-1.

SPACECRAFT Okay, we're going to do all three of them to bravo.

CAPCOM That's affirmative.

SPACECRAFT Houston Challenger.

CAPCOM Go ahead.

SPACECRAFT Okay, you got that buzz back in the UHF, I think Brian, give me a short count will you please?

CAPCOM Roger, short count follows, 1, 2, 3, 4, 5,

SPACECRAFT That's good.

CAPCOM 5, 4, 3, 2, 1.

SPACECRAFT Yeah. It's back again when you transmit. Looks like a pretty day in Florida. Interestingly for what it's worth a nice sunny day, and you see the (garble) very clearly about the only runway you can't see is the shuttle landing strip.

CAPCOM Roger that.

END OF TAPE

CAPCOM Roger that. Challenger, Houston, can you describe in words what kind of noise you're hearing on the UHF?

SPACECRAFT Well, I call it a buzz, high pitch buzz. Don called it a high pitch howl, it is ultimately high frequency, moderate level, and it's there all the time. It doesn't seem to change in intensity or warble or waver or anything.

CAPCOM Okay, thank you.

SPACECRAFT (Garble)

CAPCOM Go ahead.

SPACECRAFT Okay, I'm ready now. I got a couple of, Houston, I got a couple. Any more ideas on our TCS situation? Also, Brian, we going to cancel page 4-43 and at now 4-42, would you please?

CAPCOM We're on 4-42 right now.

SPACECRAFT Yes, trying to correlate the note there in the middle. It says cycle the flash evap off during the mid-morrow tests and then as I look over on 4-43, where it appears you do that DPL I don't quite off the top of my head understand the note. And there is no rush on a reply, just when you get a chance just let me know what I should do.

CAPCOM Roger, we'll talk about that and try to get back to you real quick.

SPACECRAFT Okay. And Houston, are you still there?

CAPCOM Roger, go ahead.

SPACECRAFT One of the questions about - during the FCS checkout during that live TV pass, are you going to get it just at Mila?

CAPCOM Standby.

SPACECRAFT Again, all I want to know is information. Your input it says in the - early in the Cap it does say live at Mila. My only question is Mila the only station where you're going to be looking at TV?

CAPCOM That's affirmative, only Mila.

SPACECRAFT Okay, super, thank you.

CAPCOM Challenger, Houston, we're going LOS. We'll see you over Dakar about 5 minutes.

SPACECRAFT Roger. Thank you.

PAO This is Shuttle Control. Challenger has flown beyond the range of Bermuda. Dakar is next in about 4 minutes. Story Musgrave reporting during this pass that he had unstowed the spare EMU but he's unable to get the upper hard torso into the bag that's used after unstowing. He was told there's been difficulty in doing that even in lg and that it was no big deal, not to worry about it. And Paul Weitz reported noisy UHF reception when Challenger is over Florida, described the noise as a high pitch buzz. Dakar now about 3 minutes away. At 2 days 24 minutes mission elapsed time this is Shuttle Control Houston.

CAPCOM Challenger, Houston with you at Dakar for 5 minutes.

SPACECRAFT (garble) 2, bow.

CAPCOM And Challenger, we'll be Dakar and Ascension this pass solid for 11 minutes and I've got an answer for PJ's question on the DTO761.

SPACECRAFT Standby one, he'll be with you in a minute, and while you're waiting for him. I have an out of range parameter on the CFES, temperature B is reading minus 0.9, I've logged it and go on and continuing.

CAPCOM Roger, copy.

END OF TAPE

CAPCOM Challenger, Houston. Question for Story.

SPACECRAFT He's being a subject at a high cost production movie of MLR operations right now Brian. Is it pressing? I can relay.

CAPCOM It's not pressing. We just wanted an update with, from him on his EMU checkout and how he was going to do that with donning or not donning. He can get to us at any time on that.

SPACECRAFT Yea, okay. Are you talking about later on today? We intend to don.

CAPCOM Okay.

SPACECRAFT And go ahead with your comments on that note in the CAP under DTO.

CAPCOM Roger, PJ on page 4-42 the note applies to the orbit OPS check list, page 7-11. We're, you've go some pen and inks in your book on that page. It does not apply to the next page 4-43. There's another part of that DTO, but this note does not apply to the CAP page 4-43.

SPACECRAFT Yea, okay. Well I'm not sure if we did or not. That's part of what was confusing me. So the procedure that's spelled out in the CAP on 4-43 does not need that note.

CAPCOM That's correct. The note only applies to the orbit OPS checklist 7-11.

SPACECRAFT Yea, that's part of the reason we put it in the checklist. Thank you Brian.

CAPCOM Roger.

SPACECRAFT The MLI's deactivated, Brian.

CAPCOM Roger.

SPACECRAFT (garble)

CAPCOM Challenger, Houston, for Don.

SPACECRAFT Go ahead Brian.

CAPCOM Roger. Say again the name of that temperature that was minus 0 decimal 9.

SPACECRAFT (garble) a TMB temperature bravo.

CAPCOM Roger.

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CAPCOM And Challenger, Houston, Don could it be that that temperature is temperature 8 rather than bravo.

SPACECRAFT Sure, it's possible.

CAPCOM Roger.

CAPCOM Challenger, Houston, for Don. If you can we'd like a temperature 9 as well.

SPACECRAFT Got it. Okay Brian. Temperature 9 is a positive 4.1.

CAPCOM Roger, thank you.

CAPCOM Challenger, Houston. For anyone who is up near the aft facing windows or has looked out those windows recently, we're wondering if that ice tree back on the APU pan on the starboard side of the fin is still there.

SPACECRAFT Well, let me look through the binochs Brian. It has gradually been desicating over the last few days. Let me look. I think it's gone but let me make sure. Double meaning.

CAPCOM Yea, that's what I thought you meant.

SPACECRAFT So long as you understand. That's the main purpose of communication, right?

CAPCOM Roger, I was going to ask you to look at the window not at the WCS.

SPACECRAFT Yea, no those three vents are all clean and I can now see the three stream vents there. The one that had the biggest Christmas tree was the most forward most one. And as I said before the aft most one. The center one had one also and then the aft most one, it's kind of piled up. There's a pretty one at the base of the vertical fin where it gets fatter and it was kind of piled up like a snow drift right against that part where it bulges out.

CAPCOM Roger, copy.

SPACECRAFT But it's all gone now and I think we reported, but I'm not sure, that the large amount of ice, icicles that were on the, around the lip of the center main engine nozzle, they were mostly gone 90 percent of it at least by the evening of launch day.

CAPCOM Roger.

CAPCOM Challenger, Houston. Preferred APU for FCS

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checkout is APU number 2.

SPACECRAFT Okay, APU 2.

END OF TAPE

CAPCOM Challenger Houston, preferred APU for FCS checkout is APU 2.

SPACECRAFT Okay, APU 2.

SPACECRAFT And Brian, just for the CFES guy's information, I'm watching the flow as it progresses up the (garble) and up the column and it's about oh roughly half way up now, and it is extremely spread by the time it gets up there. It's probably on the order of a half inch wide, or something on that order, and it looks like two separate towers of material now.

CAPCOM Roger copy. And we're 20 seconds from LOS, we'll see you at Botswana at 00 + 43.

SPACECRAFT Roger doger.

PAO This is shuttle control. Challenger out of range at Ascension Island. Botswana next in about 4 1/2 minutes. Commander Paul Weitz reporting that the ice tree that was at the base of the vertical stabilizer is now gone. He was informed that Auxillary Power Unit number 2 will be the one to be selected for operation during the Flight Control System checkout. It comes up later today. Don Peterson continuing the CFES work, and Story Musgrave who had reached a point in his timeline where he had nothing to do and started preliminary portions of the EMU checkout. About 5 1/2 hours early. We would expect though, that the major portion of that checkout including donning the suits will occur at or about the regular time which is 2 days 5 hours 25 minutes. Because, that checkout at that time requires three crewman, Bobko, Peterson, and Musgrave. And Bobko and Peterson are occupied with other duties up until that time. Challenger 2 1/2 minutes away from Botswana at 2 days 40 minutes, mission elapsed time. This is shuttle control Houston.

CAPCOM Challenger Houston with you at Botswana for 6 minutes, and I've got a note for Story.

SPACECRAFT Go ahead.

CAPCOM Roger, Story, reference to the head eye tracking DTO this afternoon for 2 plus 30, we'd like you to hold off doing that until we get back to you, we missed a channel of data yesterday, and we're coming up with some possible fixes to try to get it where we can get all the data today. And we'll let you know how that comes out.

SPACECRAFT Okay, there's a 15 minute (garble).

SPACECRAFT I got some data for the EMU folks, if they've come in.

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CAPCOM Roger, we're listening.

SPACECRAFT (garble)

SPACECRAFT Page 5, supplement 6. Both EMUs SOPs are 6100, EMU 1 SOP 3.5, 2, 3.6. Prior to opening orbiter valve, one had 873 pounds, (garble) 879. I did call in yesterday, four of the EMU light batteries did not work, and four of them did work, so I've got good lights on all helmets right now.

CAPCOM Roger copy.

SPACECRAFT One other thing was that a strap broke off the metal on one of the cuff checklist we'll be working a fix for that.

CAPCOM Roger.

SPACECRAFT Brian, can you copy something for me?

CAPCOM Roger copy.

SPACECRAFT Okay on the CFES I got 0045, I got a record filled message and the code with it is foxtrot 000.

END OF TAPE

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SPACECRAFT Okay, on the CFES I got that 0 0 4 5, I got a record filled message and the code with it is fox trot 0 0 0.

CAPCOM Roger, we'll get back to you.

SPACECRAFT Okay.

CAPCOM Challenger, Houston, 30 seconds to LOS. See you over Yarragadee at 1 plus 02 and for Don, you should press on with that CFES, no action required based on the record filled message.

SPACECRAFT Okay, that's what I'm doing. And Brian, is Yarragadee an S-band site?

CAPCOM Negative.

SPACECRAFT When's the next S-band site?

CAPCOM It will be Hawaii, 38 minutes from now.

SPACECRAFT Okay, mine checked - I'll give you an EMU comm check at that time. To clarify what I just said so the CFES people will understand, I never stopped the process - it's been going on while you were looking at that.

CAPCOM Roger, understand.

PAO This is Shuttle Control. Botswana has loss of signal. Next acquisition through Yarragadee in 11 and half minutes. Story Musgrave reporting that just at LOS that he might want to check out the communication links on the EMU's during the next Hawaii pass in about 30 minutes. At 2 days 51 minutes mission elapsed time this is Shuttle Control Houston. This is Shuttle Control, 2 days 1 hour 2 minutes mission elapsed time. Yarragadee has acquisition.

CAPCOM Challenger, Houston's with you at Yarragadee for 6 and half minutes.

SPACECRAFT Roger, Houston.

CAPCOM Challenger, Houston, note on the EMU comm check question that Story had.

SPACECRAFT Go ahead.

CAPCOM Roger, Story, it appears to us that you all can do this comm check at your convenience. We'd probably suggest that you do it over the Pacific prior to getting into the FCS checkout if that's convenient with all of you?

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SPACECRAFT No, as a matter of fact, Roy, what we'd like to do is go ahead and start the FCS checkout now.

CAPCOM Roger, that was a little surprise, we'll have to talk about it.

SPACECRAFT Both (garble) on the headsets, Roy. Houston, Challenger, you ready to copy the elevon positions?

CAPCOM Roger.

SPACECRAFT Well, they haven't changed since launch day. It looks like the outboards are up and as near as we can tell 10 degrees and inboards down 5 to 10 degrees. But like I say the significant thing to me anyway is as far as we can tell they have not changed in the last two days or so.

CAPCOM Roger, copy. Challenger, Houston, PJ, concerning when to start the FCS checkout, what we would prefer is that you do the APU prestart and be ready at Hawaii AOS for us to give you a go for the APU start.

SPACECRAFT Okay, that will be fine. We're in work now on page 7-8 orbit OPS checklist.

CAPCOM Roger.

END OF TAPE

SPACECRAFT Houston, MS1.

CAPCOM Go ahead.

SPACECRAFT Spare EMU ops is complete, the EMU checkout was complete to the comm check on flight supplement 7 and I'll leave it here for now, until we both get involved.

CAPCOM Roger.

CAPCOM Challenger, Houston, we're 30 seconds to LOS, we'll see you at Hawaii at 128.

SPACECRAFT Roger.

PAO This is shuttle control. Challenger out of range with Yarragadee, next acquisition through Hawaii in 17 minutes. Story Musgrave advising mission control that he has terminated his EMU checkout activities having accomplished all that one person can, and that he will now wait until Don Peterson is available so that both of them can continue with the checkout. Paul Weitz and Bo Bobko getting set up and ready for Flight Control System checkout. They'll be ready to power up the APU number 2 APU at Hawaii. MCC did not want that power up before Hawaii acquisition, so that telemetry would be available to observe it. At 2 days 1 hour 11 minutes mission elapsed time, this is shuttle control Houston.

PAO This is shuttle control at 2 days 1 hour 26 minutes. Hawaii has acquisition of Challenger.

CAPCOM Challenger, Houston's with you through Hawaii for 8 minutes.

SPACECRAFT Okay, we're ready to start the APUs.

CAPCOM Roger, stand by.

SPACECRAFT The APU that is, number 2.

CAPCOM Roger.

SPACECRAFT If you'd like, I can open the fuel tank valve.

CAPCOM Challenger Houston, you have a go for APU start.

SPACECRAFT Okay. It's in work. Gray talkback.

CAPCOM Challenger Houston, APU looks good.

SPACECRAFT Flash evap is off now.

CAPCOM Roger.

SPACECRAFT And Brian, when you get a chance I got a couple of more CFES items for you.

CAPCOM Roger, Don stand by a second.

SPACECRAFT Okay.

SPACECRAFT (garble) drive started Houston.

CAPCOM Copy.

SPACECRAFT Well we did not as you can probably see get any down arrows.

CAPCOM Roger, copy.

SPACECRAFT We feel like we're ready for APU shutdown.

CAPCOM Roger, stand by.

CAPCOM Challenger, Houston you're go for APU shutown, that was a real good test.

SPACECRAFT Everytime we did the item on that and checked the actuator it says that we (garble) RCS firing for informaton, Roy?

CAPCOM Roger, an RCS firing each time.

SPACECRAFT Yes, that's affirm.

END OF TAPE

CAPCOM Challenger, Houston. Don, sorry to put you off. We got about a minute and 20 left if you want to give me the CFES info.

SPACECRAFT Okay. I'll give it to you quickly. I had an out-of-range on parameter 401. It was reading 009, that's a positive 009. That occurred at 01:27. I cleared that message and then I got record filled message at about 01:28 and the record filled read ECHO 400.

CAPCOM Roger. We copy at a range of 401 plus 009 and record filled ECHO 400.

SPACECRAFT That's right and the parameter was FLO, F L O, FLO 1 that read 009.

CAPCOM Roger.

CAPCOM And Challenger, Houston, we're about 10 seconds LOS. We'll be picking you up here at Buckhorn at 38.

SPACECRAFT Roger, Roy.

PAO This is Shuttle Control. Hawaii has loss of signal. Buckhorn will pick up Challenger in about a minute and a half. We expect television at the Merritt Island, Florida, station acquisition on this pass. TV of flight control checkout. That flight control system checkout underway now. We'll stand by for Buckhorn.

CAPCOM Challenger, Houston's with you at Buckhorn for 8 minutes.

SPACECRAFT Okay.

CAPCOM Challenger, Houston. I have a request for CFES.

SPACECRAFT Go ahead.

CAPCOM Okay, Don we'd like to have you read out a few other parameters. We'd like to get another reading on FLO 1. We'd also like RPM 1 and PAPA 1. Over.

SPACECRAFT Okay. FLO 1, RPM 1 and PAPA 1.

CAPCOM Roger.

PAO This is Shuttle Control. The CAPCOM now is Roy Bridges.

SPACECRAFT Okay, Brian. If you're ready to copy I've got the 3 parameters for you.

CAPCOM Ready to copy.

SPACECRAFT It's FLO 1 is on 064, RPM 1 is 1794, and P 1, PAPA 1 is 2.00.

CAPCOM Copy.

CAPCOM Challenger, Houston. Don those readings are nominal so I guess everything's okay for the time being.

SPACECRAFT Okay.

PAO This is Shuttle Control. The Guidance Navigation and Control Officer reports that no problems have been noted so far in this flight control system checkout.

CAPCOM Challenge, Houston. We're going to go through about a 15 second key hole. We'll see you at Mila at about 15.

SPACECRAFT Okay, we'll be sending TV when we come over the hill.

CAPCOM Roger.

CAPCOM Challenger, Houston's with you at Mila. We have a TV picture and still dropping out of line a little bit. Let it stabilize. Okay. That looks good. And no voice, Challenger.

SPACECRAFT (garble) How's that, Roy. You read us okay.

CAPCOM Okay, read you 5 by now and we have a clear picture.

SPACECRAFT Very good. Where are we, Bo? Left panel (garble) going right. Next left, next, (garble) trail. What do you want? Up first? And then down. (garble) Swing to the right, right, now left. Okay. Left.

END OF TAPE

SPACECRAFT Okay, check (garble), left, (garble), we got an (garble) tonight. Pitch up, down. Okay (garble) S2 and 7, 4 3 7, 4 3 7 yes, look at this, PCP (garble) speedbrake (garble), okay, forward, (garble) you still have to do a body flap, okay, up, up, by the Roy on the rudder pedals we did not meet the specs in the book. We missed the rudder pedal numbers by 1 percent but nevertheless they were not greater than 91. A couple of them had 90, a couple of them had 91.

CAPCOM Okay, we copy.

SPACECRAFT Okay, is that (garble) RHC, (garble) to the right of RHC, that's 26, 27, and 28, okay, (garble) go ahead, which is first? Now I'm looking at my pants, pitch down, 192 we got it, pitch up, hey you got it, left, 492, you got it. Roll right, it's alright, (garble) off, up to 188.

CAPCOM Challenger, Houston, the pictures fairly dark now, okay, that's coming back up, that's okay.

SPACECRAFT Alright, did you get the job both (garble) please, no, we're doing it right now, okay, okay reselect them, items 26, 7 and 8, that's the last item of info, (garble) item 28, okay, now try trip, go trip, out there, up, up to the right, okay what else? Trip switches, panel switches, roll, okay, there we go, let me try it again, I missed the channel there for a minute here Houston, I had to push pretty hard to get the second ones, push normally, that's alright, okay, alright pitch and yaw, okay, okay the (garble) complete. (garble) is on, mode go into test, weee works anyway, minus, okay mine's complete, okay mine's complete, okay back to norm, alright, I need an item one which is there, and we - below item 4, there we go, now go over there and check the table. Well it should be all 20's and 2's, Bo. Right. Except for a 200 that's thrown in here every now and then. Look the glideslope bug is off just like it is in the simulator. Attitude, range. Well we'll let the ground call it. When do you want to go down to see dawn in the middeck with the CFES Houston?

CAPCOM Standby.

SPACECRAFT You just give us a call when you want us to switch Roy. IGSI is more than it picked down Bo, right slope is handy here.

CAPCOM PJ, Houston, we're ready for a switch to the middeck.

SPACECRAFT Okay, coming at you. Very, very minus but very low open. Well, mine is a little more than that.

CAPCOM Okay, we've got a good picture on the middeck.

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SPACECRAFT (Garble) not quite 20,000 feet per second. Roy, you want us to go off of VOX now up on the flight deck?

CAPCOM Affirmative. And middeck you can pick up with the comm.

SPACECRAFT Okay, what I'm doing right now is getting close down to taking a photo here about 4 minutes away. The photograph will be entrance of sample 5 into the flow column in the CFES here. Going down there there's not a whole lot to do except wait for it.

END OF TAPE

CAPCOM On the middeck you can pick up with the Comm.

SPACECRAFT Okay, what I'm doing right now is getting close down to taking a photo here, about 4 minutes away, a photograph of the entrance of sample 5 into the flow column in the CFES here.

SPACECRAFT Between now and then, there's not a whole lot to do but wait for it. We've got camera set up and except for a few out of range (garble) CFES is running pretty well today. I don't imagine you can see the control module, it is stuck in over here behind where we have the food heater. And probably also on TV you can't really see the flow, but right now we're flowing a sample, it has three column on it. (Garble) in the bottom of this column and they are separated by an inch and a half each. And if they flow to the top in this particular case they (garble) considerably, they are not quite to the top of the column yet. But the right one (garble) to the right hand edge and the left one will be almost out to the center by the time they get to the top of the flow.

CAPCOM Okay, we're about to lose your picture Don, and thank you for your explanation.

SPACECRAFT Roger that.

SPACECRAFT Houston, Challenger, for the Ops folks, I guess they, we know it's a problem but also on the checkout on the lock number, Roy, we're getting a overriding of characters up there, in the (garble) by the orbiter symbol.

CAPCOM Roger.

CAPCOM And Challenger, Houston, we're approaching LOS, recheck and make sure you did the right panel yaw trim, we don't think you checked that.

SPACECRAFT Okay, we think we did, but we'll try it anyway, no, Bo says I'm wrong.

CAPCOM Okay, and see you at Ascension at 07.

SPACECRAFT Okay, thanks for the catch. And it checked good.

CAPCOM Roger.

PAO This is shuttle control, Merritt Island had loss of signal. Challenger will next be picked up by the Ascension Island station in 12 minutes. Live television during this Mila pass of commander Paul Weitz, on the left, and Pilot Bo Bobko conducting a portion of the Flight Control System check, and switched down to the middeck where Mission Specialist Don

Peterson is operating the continuous flow of electrophoresis system. At 2 days 1 hour 55 minutes, mission elapsed time, this is shuttle control Houston.

PAO This is shuttle control at 2 days 2 hours 6 minutes, mission elapsed time. Challenger's coming up on acquisition through Ascension.

CAPCOM Challenger, Houston's with you through Ascension for 6 1/2 minutes.

SPACECRAFT Roger Houston, we're in the middle of the vent model determination Roy.

CAPCOM Roger.

SPACECRAFT We started 35 seconds ago.

CAPCOM Copy.

SPACECRAFT Okay, and you're fading some, do you still read us Houston?

CAPCOM Yes, you're loud and clear.

SPACECRAFT For your information, as near as I can tell out the window Roy, the elevons are back to the position they were before.

CAPCOM Okay, copy.

CAPCOM Challenger Houston.

SPACECRAFT Yes, go ahead Roy.

CAPCOM Yes, all of our data down here on FCS checkout part one really looks great, of course we'll be getting some playback and continue to look at the part two awhile, but everything looks fairly good so far no problems. I do have a couple of questions on that, when you can spare some time, probably Botswana would be a good time.

SPACECRAFT Okay, that'll be fine, and if we have enough time I'd like to a comment about the page 7-11 of the Ops checklist.

CAPCOM Okay, we'll be ready to talk to you on that at Botswana. One cleanup item on the APUs on panel R2, we need the water boiler power heater 1 and 3 from bravo to alpha.

SPACECRAFT Okay, going to alpha now.

END OF TAPE

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CAPCOM And we're 20 seconds LOS. We'll see you at Botswana in 4 minutes.

SPACECRAFT Roger Houston.

PAO This is Shuttle Control. Challenger is out of range at Ascension. Will be picked up by Botswana in about 2 and half minutes. We'll standby for acquisition there. Mission elapsed time 2 days 2 hours 14 minutes.

CAPCOM Challenger, Houston's with you at Botswana for 7 and half minutes.

SPACECRAFT Okay, Roy, let me tell you what I did on page 4-43.

CAPCOM Okay, we're ready.

SPACECRAFT We did the DPO the first time but I moved the wrong switch. The first time I did it I moved the, what's it called Bo, it's labeled MAD TCF, and I turned it to on, when I went to turn it back to command I double checked the nomenclatures, so I turned it to command, and then moved the wideband ACIP PCM to on and redid the three minutes of free drift and then picked up from there. I hope that doesn't foul anybody up.

CAPCOM Okay, we copy that.

SPACECRAFT Then I guess looking back on the vent model part of the STS checkout I cannot now say with 100 percent certainty as to which of those two switches I moved then.

CAPCOM Okay, we understand.

SPACECRAFT Okay, go ahead with your question.

CAPCOM Okay, we had a question regarding your comment on the glideslope.

SPACECRAFT noted on the HSI. That is the second digit of the primary miles shows zero when all the flags are down. (garble) flag.

CAPCOM Roger understand, second digit of the primary mile shows zero when all the flags are down.

SPACECRAFT You know, there are four flags like the 3,000 miles, you read 3 0 0 0, when the flags are down you read all flags.

CAPCOM Right.

SPACECRAFT (garble) the second digit when the flags are down.

CAPCOM Okay. And Challenger, Houston, question I had was on your comment PJ on the glideslope bug being off like in the simulator. Could you give us a little more on that?

SPACECRAFT Yes sir, on the load test, on the CDR's HSI, the glideslope deviation bug is supposed to be down one tic, one mark, and I would guess it was down about 1.2 or 1.3.

CAPCOM Okay, understand. And also, we had a query regarding the override on the HUD that you reported. Was the - did the override show up when you were doing the low value test?

SPACECRAFT That's affirmative.

CAPCOM Okay, we have some information on that. It turns out that when you do the HUD self test that we put a value into the mach number slot and once that's set in there it won't go away unless we cycle the power on the HUD.

SPACECRAFT Well, but you know, what's supposed to be in there looking at the picture on page 7-23 is mach 20, 20.0, and it looks like overwritten on that in the second and third character slot discounting the point 0's where the two zeroes are and then 20.0, it looks like it's flickering between 19 and a 20. I'm not making this clear but can you follow that. Instead of 20.0 where the two zeroes are in the background overwriting it you can see flickering between 19 and 20.

CAPCOM Roger, we copy that and we agree we've got some cleanup to do on the book.

SPACECRAFT That's alright, Roy, I was just, we know that some conditions in flight it overwrites and I just didn't know if it was supposed to on the test or not.

CAPCOM Rog, and we copy that, and we thank you. The HUD is fine and we just have some cleanup to do on how we do the test.

SPACECRAFT Okay. Roy, the voice recognition has been done three times, the MLR is post deactivation and I'm going to pick up on the - -

END OF TAPE

CAPCOM Rog then, we copy that and we thank you. The HUD is fine and we just have some cleanup to do on how we do the test.

SPACECRAFT HUD, okay.

SPACECRAFT Roy, the voice recognition has been done 3 times. The MLR is both activation and I'm going to pick up on the microbial screening.

CAPCOM Roger. Copy.

SPACECRAFT Any words on our PCS status, Roy?

CAPCOM Okay. Standby a second.

SPACECRAFT No rush. We're just getting curious as to what's going on both with that and I know you will as soon as you find out, but we are still anxious to hear about how the old TDRSS is doing.

CAPCOM Well while we're talking about PCS, by the way the PCS workaroud is in works still and we don't anticipate any big problems there, but let me tall you a little bit more about TDRSS. There's been a lot of discussion on the airways down here and everything is positive. All the TDRSS experts think they have a good bird. They think they have enough propellant to boost it to the proper orbit and to conduct operations throughout the planned 10-year life. So it looks like everything's a go with TDRSS. Of course, the whole plan will require 10 days to 2 weeks to complete and we won't really know everything until the end of that, but it looks great.

CAPCOM And did ya'll copy those words on the TDRSS?

CAPCOM Challenger, Houston. We're about 30 seconds LOS. We'll talk to you about PCS status, or try to at Yarragadee when we pick you up there about 02:40.

SPACECRAFT Roger.

PAO This is Shuttle Control. Botswana has loss of signal. Next station is Yarragadee in 14 minutes. CAPCOM Roy Bridges passed up an update on the Tracking and Data Relay Satellite to the crew on this Botswana pass. At 2 days, 2 hours, 26 minutes mission elapsed time, this is Shuttle Control, Houston.

PAO This is Shuttle Control at 2 days, 2 hours, 39 minutes mission elapsed time. Challenger is approaching a short pass at Yarragadee.

CAPCOM Challenger, Houston's with you through Yarragadee for 1-1/2 minutes.

SPACECRAFT Roger.

CAPCOM And P.J., I got a word for you on your PCS status. We got not long to talk about it but I do have quick words for you.

SPACECRAFT Okay. Go ahead. Before we start, how about at your convenience sometime, nothing pressing, we'd like to have a PMC some time today.

CAPCOM Roger that. We'll work on it and talk to you about it at Guam. On the PCS, the theory is right now, this regulator has a low demand and a high demand portion, the 14.7 cabin reg, and when it trips and wants to go to the high demand portion for a few seconds and to regulate the cabin pressure, we're postulating that it goes to full flow and stays there for a while and we don't understand why. Also, we don't understand why we've only seen it during the pre or post sleep and right now we're working on a plan for manual management of the PCS. We do not have approval to do that yet and there may be more discussion of that later today. Over.

SPACECRAFT Okay. We could handle that. Any theories at all on that TPDP we had this morning?

CAPCOM That was the WCS and we're going LOS. We'll pick you up at Guam at 49. Over.

SPACECRAFT Okay.

END OF TAPE

PAO This is shuttle control. Yarragadee has lost lock with Challenger. Next station is Guam in 6 1/2 minutes. During this pass, Challenger's commander Paul Weitz notified Mission Control that he would like to have a private medical conference sometime today. The time for that is not yet established. At 2 days 2 hours 43 minutes mission elapsed time, this is shuttle control Houston.

PAO This is shuttle control at 2 days 2 hours 48 minutes mission elapsed time, standing by for acquisition through Guam.

CAPCOM Challenger, Houston's with you through Guam for 7 1/2 minutes.

SPACECRAFT Roger, Houston.

CAPCOM And Challenger, Houston, a note for you PJ, on the vent model determination data.

SPACECRAFT Yes.

CAPCOM Okay, INCO saw the proper configuration at Ascension after you reconfigure things and over Hawaii in the earlier tests, he commanded from the ground the proper configuration, so we believe we recovered all that data.

SPACECRAFT Good old INCO, tell him thanks a heap.

CAPCOM Okay, he's listening in and appreciates that. and a follow up on the GSI question, glideslope question. When you did the high test, was it also off by the same amount as when you did the low test?

SPACECRAFT Well, it's hard to say. No, it wasn't off much, if anything it was a little closer, it was very close to normal on the high test.

CAPCOM Okay, good we copy that. And for Bo, on the HSI primary miles, he reported the second digit did not have a flag down on it, still showed a zero. Was it second from the left or right?

SPACECRAFT Second from the left. It was 112.

CAPCOM Okay, in the 100ths digit, we copy.

SPACECRAFT That's about all we're collected, second digit from the left.

CAPCOM Copy.

CAPCOM And also, Challenger, we have set up a PMC for Hawaii, and AOS will be at 03 after the hour.

SPACECRAFT Roger.

CAPCOM And finally, I have a note for Story regarding the EOG test today.

SPACECRAFT Okay.

CAPCOM Okay Story, last night, the clearer up, we did get good EOG data. However, one of the channels was missing and today before you do that test what we would like for you to do is to demate and remate the OPS cable between the control box and the MS outlet. The other cable between the signal conditioner and the PS outlet work fine, and we do not want to bother the connections on that one, over.

SPACECRAFT Okay, we always have to take that connection down, otherwise we just don't have enough slack in it, and it runs a straight line from the aft station to the seat.

CAPCOM Okay, but if you didn't demate it from the signal conditioner don't do that, you can just leave it.

SPACECRAFT That one there, yes, we leave that one intact.

CAPCOM Okay, and also confirm that you have a fixation light on during the head turns.

SPACECRAFT Yes we do.

CAPCOM Okay, that's all we have on that.

SPACECRAFT Okay.

SPACECRAFT And you did know Roy that we ran 3 people last night.

CAPCOM Say again Story.

SPACECRAFT We ran 3 people, Peterson, Weitz and Musgrave.

CAPCOM Okay copy.

CAPCOM Challenger, Houston, Paul did you all copy all the notes on the TDRSS?

SPACECRAFT No, as a matter of fact we had hardly any of them Roy.

CAPCOM Roger, you didn't hear my comments over last pass?

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SPACECRAFT No sir, we sure didn't.

CAPCOM Okay, well what I said was that the TDRSS team is still working on the details of their plan to boost their vehicle to geosync, however, they have done enough homework on that, that they think they have enough propellant to boost at their proper orbit and to conduct operations throughout the planned 10 year life. And the vehicle is in good shape right now.

SPACECRAFT Okay, that sounds super.

CAPCOM And they don't have a lot of thrusts in their little rocket engines so they will be performing the speed over the next ten days to two weeks so we won't know the end of the story until you guys get back, but everybody's very encouraged down here.

SPACECRAFT Well that sounds good.

END OF TAPE

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CAPCOM Challenger, Houston, we are 15 seconds LOS. Hawaii is next at 03.03. And you'll have your PMC there, Over.

SPACECRAFT Roger.

PAO This is shuttle control. Guam has loss of signal. Challenger is now on its 35th orbit. Hawaii is the next station in 5 1/2 minutes and the private medical conference has been scheduled for that station. We'll come up prior to Hawaii AOS in case that conference is concluded before the end of the pass and we get normal air to ground sometime during that pass. At 2 days, 2 hours, 58 minutes mission elapsed time. This is Shuttle Control, Houston.

PAO This is Shuttle Control at 2 days, 3 hours, 2 minutes mission elapsed time. Hawaii has acquisition of signal. We're processing telemetry from that station. We'll stand by for any air-ground that may occur after the private medical conference.

CAPCOM Challenger, Houston's with you for the remainder of the pass, 2 and 1/2 minutes.

SPACECRAFT Roger.

CAPCOM And we are standing by.

SPACECRAFT Houston, for your information about 5 minutes, I'll be wrapping CFES up and all the rest of the day, I think we're okay.

CAPCOM Roger, we copy that and it sounds good.

SPACECRAFT Microbial sampling is done.

PAO Roger, copy, Story.

SPACECRAFT How is the weather in Houston, now?

CAPCOM Well, it's been cloudy and cool today, had a little drizzle this morning.

SPACECRAFT Very well. We were just looking for Hawaii and could'nt find it under a cloud but it looks like we're going (garble) and its cloudy anyhow.

CAPCOM Well, generally the area between here and north of strip has been bad the last couple of days. We've had a very slow moving storm over in the New Mexico-West Texas area that's dumped quite a bit of snow on the ground.

SPACECRAFT Snow?

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CAPCOM Yes sir, in fact we had an accumulation at Northrup of 1 inch last night.

SPACECRAFT My goodness.

CAPCOM And Challenger, Houston, we're about 30 seconds LOS, pick you up over Buckhorn in about 3 minutes.

SPACECRAFT Roger.

PAO This is shuttle control. Hawaii has loss of signal. Buckhorn next in less than a minute, we'll stand by at 2 days, 3 hours, 11 minutes mission elapsed time.

CAPCOM Challenger, Houston's with you through Buckhorn for 7 and 1/2 minutes.

SPACECRAFT Roger.

CAPCOM Challenger, Houston, 30 seconds LOS. We'll see you at Mila at 2.3.

PAO This is Shuttle Control. Challenger has moved out of range at Buckhorn, moving down across Mexico, down toward Central America. Track on this 35th orbit is not carried across the Gulf of Mexico, it comes down through Central America, South America. Merritt Island Station will get some coverage of Challenger though in approximately 2 minutes. We'll stand by for that.

END OF TAPE

CAPCOM Challenger, Houston's with you at Mila for 3 minutes.

SPACECRAFT Houston, read you loud and clear.

CAPCOM Roger, you're five by and we're standing by.

PAO This is Shuttle Control. Merritt Island has loss of signal with Challenger. Next acquisition Ascension in 15 minutes. At 2 days 3 hours 27 minutes mission elapsed time this is Shuttle Control Houston. This is Shuttle Control at 2 days 3 hours 35 minutes mission elapsed time. The flight surgeon on this ship, Dr. T. E. Lefton, has determined that there is no mission impact as a result of the private medical conference he conducted with the crew over Hawaii on this orbit number 35. No mission impact. This is Shuttle Control. This is Shuttle Control. There has been a request from the News Center for a spelling of the flight surgeon's name. The initials are T as in Tom, E as in Edward, Lefton, L E F T O N. His initials are T and E, Lefton, L E F T O N.

CAPCOM Challenger, Houston's with you at Ascension for five minutes.

SPACECRAFT Roger Houston.

CAPCOM And Challenger, Houston, I've got a switch for you on panel A7L if somebody is close by.

SPACECRAFT I'll get it in one minute. Go ahead on the A7.

CAPCOM Okay, we'd like to have the MADS strain gage to on. We've got a -MADS is that's kind of cold again. We need to heat it up.

SPACECRAFT Okay, strain gage to PCM, enable is to on.

CAPCOM That's affirm, thank you. And also, a question. We would like to know the start time for the EOG test that you started back over Hawaii. It'll help us on finding the data on the playback.

SPACECRAFT Very close to 30 after to the hour, we just finished the second one. The first one was on Weitz's, and the second one on Bobko.

CAPCOM Okay.

SPACECRAFT And we did every connection.

CAPCOM Roger.

SPACECRAFT Houston, are we clear to turn off this APU fuel pump yet?

CAPCOM Standby. And Challenger, Houston, we'd like to leave the APU cooling on for awhile.

SPACECRAFT Okay, I just asked because I was sitting here in the seat.

CAPCOM Yes, no problem. And Story, one note for you.

SPACECRAFT Go ahead.

CAPCOM Preflight you discussed a supplemental CFES test with the experimenters and we would prefer to not do that test.

SPACECRAFT You talking about none for today or not ever?

CAPCOM We don't want to do it during the flight.

SPACECRAFT We will not be doing it on STS-6?

CAPCOM That's affirmative. We do not want to do it during your flight.

SPACECRAFT Okay, then all the cue cards and books and everything we (garble) yet, we haven't (garble) it so we go back to (garble) to the return to Houston bag.

CAPCOM Okay, we concur. And PJ, I have some words for you regarding the FCS checkout.

SPACECRAFT He's not on but I can take them, go ahead.

CAPCOM Okay, basically just some good words based on looking through the data for FCS part 2. We did not uncover any new anomalies other than the three that you all reported. Basically the problem with the rudder being less than 91, we saw 90.5 down here so we do not think that's going to be a problem. We're going to go back and look at some data overnight with more granularity but we think that that's going to be okay. The only other two anomalies you reported are the PLT--

END OF TAPE

CAPCOM Okay, basically just some good words based on looking through the data for FCS part II. We did not uncover any new anomalies other than the 3 that you all reported. Basically the problem with the rudder, being less than 91, we saw 90.5 down here so we do not think that's going to be a problem. We are going to go back and look at some data over night with more granularity but we think that that's going to be okay. The only other 2 anomalies ya'll reported are the PLTHSI's primary miles and the CDI's glide slope bug and we think ya'll understand those and should not be a big problem. Over.

SPACECRAFT Roger, we concur.

CAPCOM Challenger, Houston, we are 15 seconds LOS. We'll see you at Botswana at 5:30.

SPACECRAFT Okay, Houston.

PAO This is Shuttle Control, Ascension has lost lock with Challenger. Botswana is next and just over 3 minutes. We'll stand by for pass at 2 days, 3 hours, 50 minutes mission elapsed time.

PAO This is Shuttle Control at 2 days, 3 hours, 52 minutes mission elapsed time. The shuttle is coming up on acquisition through Botswana.

CAPCOM Challenger, Houston's with you at Botswana for 7 minutes.

SPACECRAFT Roger, Houston, read you loud and clear.

SPACECRAFT We're going to be running (garble), on Peterson right now.

CAPCOM Okay good, Story.

SPACECRAFT If I can hold him in the chair.

CAPCOM And, wanted to tell you that we'll give you a call when to turn off the fuel pump valve cooling. It's still a little bit too warm to turn off.

CAPCOM Those on the com, I got a question for you.

SPACECRAFT Go ahead.

CAPCOM Yeah, if you are upstairs, you might take a look at your HSI again and now that you have got the DDU powered off, see if you have got a flag in the 2nd digit slot on the primary miles.

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SPACECRAFT (garble) still has a zero.

CAPCOM Okay still a zero, thank you.

CAPCOM Challenger, Houston, we're 30 seconds to LOS.
We'll see you over Guam at 25 during the S-band antenna test.

PAO This is Shuttle Control, Botswana has loss of signal. Next acquisition, Guam in 24 minutes. A team handover will occur prior to Guam acquisition. Flight director, Gary Cohen handing over to Flight director, Harold Draughon. The change of shift news conference with Flight director, Cohen, is scheduled for 5:30 p.m., central-standard time in room 135 at the JSC news center. Change of shift news conference, 5:30 p.m., central-standard time. At 2 days, 4 hours, 1 minute mission elapsed time. This is Shuttle Control, Houston.

END OF TAPE

CAPCOM Hello Challenger. You got the crystal team with you here over Guam.

CAPCOM Good afternoon Challenger. Crystal team with you over Guam for seven and a half minutes.

SPACECRAFT Hidi, where've you been?

CAPCOM We all went home and took a nap.

SPACECRAFT Well, here we are, rolling our little hearts out for you guys.

CAPCOM Yeah, we see that.

SPACECRAFT Well, this ain't the most comfortable (garble) in the world. If the RCS folks can take a quick look at it and see if we can stop it between Guam and Hawaii, I'd appreciate it.

CAPCOM Okay, we'll check on that.

SPACECRAFT All right, thank you John.

SPACECRAFT Hey John.

CAPCOM Yes sir.

SPACECRAFT We ran four (garble) starting around 3:30 and the order was Weitz, Bobko, Peterson, and Musgrave. And as soon as anyone can we'd like them to look at that to be sure the stuff we're running is worthwhile.

CAPCOM Okay.

SPACECRAFT (Garble) interesting observation during this roll maneuvering that we're all in about x axis. Everytime it turns up this attitude it has never has done it yet with a single jet firing. It's either got a pretty good lock on the roll rate and it just bang bang, fires 2 jets in a row, 1 in pitch and 1 in yaw whenever it needs a correction.

CAPCOM Copy that. We're looking at the CAP. It looks like you're scheduled for a meal while you're doing this thing too.

SPACECRAFT I'm not sure anyone wants to try one while you're doing it though.

SPACECRAFT Yeah, we're doing just that. Nice free ride down here.

CAPCOM Roger that. Okay, PJ, no problem in stopping the

roll after Guam LOS and that will be about 4:32. I'll give you a call on it and be back in that roll attitude at 4:38 when we pick you up at Hawaii.

SPACECRAFT Okay, we'll be there by 4:38. And John, I got an observation that you might make note of it (garble) folks in the office. You ready to copy or just listen?

CAPCOM Yes sir, go ahead.

SPACECRAFT On the ball we yawed out about 90 degrees which you know that attitude computation gets squirrly in there when you are right at 90. And as you kinda drift either side of the deadband or the 90 degrees yaw you get very close to it or the thing goes - the calculation goes on unstable, I guess because you're trying to divide by zero. The ball just freezes up and it doesn't give you any other indication, just stops rotating until you move - apparently backout of the yaw angle where it starts calculating a roll angle again and then it just whirls on around and catches up in attitude and I don't ever remember seeing that in SMS.

CAPCOM Okay, we copy that. You got any idea how far out you have to yaw before it catches up or starts to spin?

SPACECRAFT It's not very far at all.

CAPCOM Okay. And Story, on the EOG, we're getting good traces but the timing signal is not very good. You might want to check that connection.

SPACECRAFT You mean when I press the little mark between eyes open and close?

CAPCOM Trying to get an answer on that for you Story and PJ, GNC said that's the way they would expect that to work.

SPACECRAFT Okay, and it may be implemented in the simulator that way. I'm just saying I don't remember seeing it in the simulator. When you think about it, I guess that's the way I'd expect to see it work too.

CAPCOM Roger that. And PJ we got about 45 seconds to go here. You can stop the roll at the LOS and we'll be picking you up about 39er so start it back up again about 38. And in place of some of the EMU stuff that we've already done later on today about 7 or 7 and a half hours. We're looking at maybe MPS vacuum inert.

SPACECRAFT Okay, we copy.

END OF TAPE

CAPCOM MPS vacuum inert.

SPACECRAFT Okay. We copy.

CAPCOM If you're still there. This upcoming Brazil pass should give you some great chances to use the NOSL over southern Brazil.

SPACECRAFT Okay, we'll give it a whack.

PAO This is Mission Control Houston. Loss of signal in Guam. 5 minutes now until reacquisition to at Hawaii of Challenger. Spacecraft communicator John McBride passed up to the crew advice that perhaps the night/day optical survey of lighting experiment or NOSL might have some targets of opportunity in southern Brazil on this upcoming orbit. Hawaii upcoming in little over 4 minutes. This is Mission Control Houston. This is Mission Control Houston. 30 seconds from reacquisition of Challenger through the tracking station at Hawaii. About 1/4th of the way through orbit number 36.

CAPCOM And we're back with you over Hawaii for a little over 7 minutes.

SPACECRAFT Okay, folks decided they liked it so much they never did stop to roll.

CAPCOM Alright! And if Story's listening, tell him that timing signal I was referring to with regard to the EOG was the pushbutton timing signal.

SPACECRAFT Okay, I was pushing it every time my eyes blink closed.

CAPCOM Okay, we did get good traces and Doc thinks he can reconstruct everything with what he's got.

SPACECRAFT Okay. John, this is really a spectacular view. We're going to try put the view out over the tail on one of the TCPC's and record some of it.

CAPCOM That's great. Hey, PJ, I got you a final go here for the APU fuel cool off.

SPACECRAFT Okay.

CAPCOM And PJ, how would you feel about giving us some live TV coverage on the next Hawaii pass. You'll be doing sort of the same thing.

SPACECRAFT Oh, yes, you bet.

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CAPCOM Okay, we'll start working toward that.

SPACECRAFT Okay, and we'll do that event (garble) about 4 hours there on the APU's.

CAPCOM That's affirmative. You got a go to do that. And Story, you got time to answer a question about the EMU batteries?

SPACECRAFT Sure do.

CAPCOM Did you check all 12 of those things or just the first four or what?

SPACECRAFT I checked 8 batteries, 4 of them were good, and 4 of them were not good. That's on EMU lights.

CAPCOM Yes, we understand that, but the other four you have not checked?

SPACECRAFT Not yet.

CAPCOM Okay, that's all we need to know. And Story, did you come up with a fix on that cuff checklist clip?

SPACECRAFT (garble) today cause we couldn't (garble) today. I'll get after it tonight.

CAPCOM Our EVA folks will be anxious to hear a little bit more about that, I think, if you could tell them. We've got a couple of minutes to go here.

SPACECRAFT Wear the watchband that's covered by the velcro, and you soldered it onto the metal. That's where it broke off.

CAPCOM Okay, that helps. Got about a minute to go here, we'll see you over Buckhorn at 4 4 9.

SPACECRAFT Okay.

END OF TAPE

CAPCOM And one last word before we go, the CFES folks passed me note here and they certainly are appreciative of everything that you've done during the last 2 days with their experiment. They feel like they've got some good sample returns.

SPACECRAFT Well, Bo and Don worked hard on it, they tried their best.

SPACECRAFT Yes, we sure did that Jon, hope it turns out.

CAPCOM And we feel confident that it will. See you shortly.

SPACECRAFT Okay.

PAO Mission Control Houston. LOS at Hawaii. Reacquisition through the Buckhorn station in approximately 49 seconds, no 1 minute and 33 seconds. Prior to that we should have some tracking, then voice through Vandenberg.

CAPCOM We're back with you at Buckhorn for about 3 and half minutes.

SPACECRAFT Roger. Going back to (garble).

CAPCOM Copy. And we need some comm configurations please on Al and Charlie 3.

SPACECRAFT All right, Jon.

CAPCOM Okay on Al, FM antenna switch pause 2 seconds, or pause going to GPC for 2 seconds.

SPACECRAFT You mean C3?

CAPCOM C3 is already done. We need the one back on Al now.

SPACECRAFT Okay.

CAPCOM That's the FM antenna to GPC.

SPACECRAFT You got it. Houston, you still there?

CAPCOM Yes sir. About another minute.

SPACECRAFT Do you know which lenses the want to use on the 35mm cameras for the EVA?

CAPCOM Okay, I'll check. If I don't get you an answer here, I'll get it for you by the time we get down to Botswana at 5:28 and thunderstorms over Brazil might look good this time.

SPACECRAFT Okay, we're looking for them. We're ready.

PAO This is mission control Houston. Loss of signal at Buckhorn. Thirty-four minutes away from Botswana voice relay station and hopefully the crew will report on whether they were successful in spotting any of the thunderstorms in Brazil which are targets for the NOSL experiment. Also an inquiry from the crew on which lenses to put on the 35mm cameras for Thursday's EVA. Getting the equipment all sorted out and ready for tomorrow's spacewalk in the cargo bay. Returning in 33 minutes at Botswana. This is Mission Control Houston.

CAPCOM Challenger, with you over Botswana for 7 minutes.

SPACECRAFT Roger, Houston. Think we got some lightning on that last pass. It was impossible to see a storm flash and get over there so we would wait until we saw an area in front of us, just turn the camera on, and let the ground track carry the lightning storms through the field-of-view.

CAPCOM Okay, we copy that. Sometime before you go to sleep tonight, the NOSL folks would like a readout on how much film you've used.

SPACECRAFT Okay, I think 3 magazines.

CAPCOM Okay, confirm that sometime for us before you go to bed tonight.

SPACECRAFT Yes, all right.

SPACECRAFT I can (garble).

SPACECRAFT And Houston, MSI.

CAPCOM Go ahead. Go ahead Story.

SPACECRAFT EMU checkout is complete except for the COMM check through flight supplement -7. We're starting to get our LCD (garble).

CAPCOM Okay, we copy that. And regarding the TV pass over Hawaii, that's pretty much your ballgame so use anything you want to.

SPACECRAFT Roger. We can finally set it up, we'll tell you when we get there I guess.

CAPCOM Okay, we of course, would like to see some of that over the tail stuff that you were talking about with anything inside that you would like to show us, we'd be interested in that too.

SPACECRAFT Correct.

CAPCCM And Don, the word is use a 35mm lens on the 35mm camera.

SPACECRAFT Okay, gotcha.

CAPCOM And PJ or Bo, if you're listening, for the hot fire coming up later on, we want you to reselect L2 dog.

SPACECRAFT I understand, reselect L2 dog.

CAPCOM And reset the RM. That's on SPEC 23.

END OF TAPE

CAPCOM And Don, the word is use a 35mm lens on the 35mm camera.

SPACECRAFT Okay, got you.

CAPCOM And P.J. or Bo, if your're listening, for the hot fire coming up later on. We want you to reselect L2 dog.

SPACECRAFT Roger, understand, reselect L2 dog.

CAPCOM And reset the RM, that's on SPEC 23.

SPACECRAFT Roger.

CAPCOM And I think we gave you notice a little bit earlier, somebody did, that we're going to uplink you some manual PCS control procedures and we're going to do that on the TPR sometime over IOS here in about 10 minutes. And Challenger, Houston, you copy, we're going to uplink your PCS manual procedures over IOS?

SPACECRAFT PCS (garble) procedure, roger.

CAPCOM And basically in Air Force fighter terminology, we're just going pump up the cabin real high and then close everything off tonight.

SPACECRAFT Understand.

CAPCOM Got a minute to LOS here at Botswana, we'll go through a minute and a half keyhole and see you at IOS at 5:37.

SPACECRAFT Okay 5:37 at the Indian Ocean station.

CAPCOM And Challenger we're back with you over Indian Ocean for 6 minutes.

SPACECRAFT Roger, and we hear the little teleprinter cranking away.

CAPCOM Okay doke, give her a good look over when you get it, see if you got any questions. And Bo, you know if anybody had any luck in getting that IMU panel access cover back on?

SPACECRAFT Nobody has really tried yet. We figured that we might be checking that filter in the next couple of days, so we didn't push it in yet.

CAPCOM Okay, we copy.

SPACECRAFT (garble) Houston.

CAPCOM And say again.

SPACECRAFT About that cover, it sways up and when you swing it down, it swings down so that the part that swings out is forwarded and swings down toward the aft. But it looks like portside of it is shifted over a little bit, so that it doesn't fit quite up into the holes that were there before. So when it's (garble), I guess we'll try to spring unless you're back into shape. P.J. just said he thought it might be too tough to do that. Right now, the holes don't line up with the suit.

CAPCOM Okay, we copy that. And when it comes time to finally secure that thing tightly, you might want to drag out the large slot screwdriver and the prybar, which is stowed there, and see if you can't line it up with some of them.

SPACECRAFT Well we tried that, Jon, but there really isn't any plate to pry against. You know, the stuff around it is more fragile than that door is itself.

CAPCOM I think maybe we were thinking maybe you could use that screwdriver to help line up the two holes.

SPACECRAFT Yes, well we'll try. Jon, there aren't two holes, the screw is attached to one of the holes. There is only one you can see, and you're working blind into the other one.

CAPCOM Okay, and anyway we got word that even if you only get it fastened with one fastener, it should be sufficient for the entry loads.

SPACECRAFT Yes, we agree, we'd like to not have it (garble) on entry. So we'll give it our best shot.

CAPCOM Roger, that.

SPACECRAFT (garble) the entire thing will be a mass of gray tape.

CAPCOM Copy.

SPACECRAFT And Jon, MS1 and 2 will be going off COMM here to get in their suits pretty shortly.

CAPCOM Okay.

SPACECRAFT The COMM check which we will get once we get in the suits and finished up right there from the (garble) cue card.

END OF TAPE

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CAPCOM Yes, I came in a little early and worked on that.

SPACECRAFT Okay.

CAPCOM No, we'll give credit to our ECOM for that. He did a good job. And in preparation for our TV pass, we need the downlink enable back on A7.

SPACECRAFT Okay, we'll get it. Jon, is camera, the payload bay camera delta the only color machine we got out there?

CAPCOM Let me check.

SPACECRAFT That's what our cue cards showed. So I just wanted to verify.

CAPCOM Okay, delta's a wide angle, but they're all color.

SPACECRAFT Well, that's why I was confused, because our cue card indicates, infers that only delta is color. Okay. And Alpha, bravo, and charlie are all have got the same lenses though...

END OF TAPE

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SPACECRAFT I see there will be a mass of gray tape.

CAPCOM Copy.

SPACECRAFT And Jon, MS1 and 2 will be going off COMM here to get in their suits pretty shortly.

CAPCOM Okay.

SPACECRAFT (garbled) COMM check which we'll get once we get in the suits as we finish (garble) cue card. Reading Flight Supplement page 8.

CAPCOM Okay, we copy. And we've got about 40 seconds to go here at Indian Ocean. We'll see you up at Guam at 6:01, and we'll be interested in the results of your COMM checks, Story.

PAO This is Mission Control Houston, loss of signal at Indian Ocean Station, Guam in 17 minutes. Flight crew apparently way ahead of their schedule on the checkout of the spacesuits and the equipment as part of the spacesuits, except for a few minor details. On the upcoming Hawaii pass, the crew is planning to turn on the television cameras for live depiction of the S-band antenna pattern test, the second one today, in which the spacecraft will be rotating at 2 degrees per second, which computes out to be 1 revolution every 3 minutes. The S-band antennas on the spacecraft will alternately be blocked by the spacecraft and affect the signal strength as well as the TV picture, so we're likely to see the TV come and go. They reported that they may have recorded some lightning during this previous pass over Brazil with the NOSL experiment equipment. We'll return in 16 minutes at Guam. This is Mission Control Houston at day 2, 5 hours, 45 minutes. This is Mission Control Houston, we have acquisition at Guam for about the next 5 minutes.

CAPCOM And Challenger, we're back with you over Guam for about 5 minutes.

SPACECRAFT Roger. Jon, I looked over the message on the manual cabin (garble) management, and correct me if I'm wrong, it looks like we're going to set system 1 up for flow nitrogen, and we'll flow oxygen through system 2, we'll pump it up until we get the 16th PSI on oxygen first, we'll let it go at that. If we get to 3.4 on the PPO2 before we get the 16th PSI, then we'll secure the O2 flow and bring in the N2 and then go with that for the night. Is that about it.

CAPCOM That's it exactly.

SPACECRAFT Okay. And that's a good message, whoever wrote it. A tip of the topper to them.

CAPCOM Well bravo and delta are wide angle.

SPACECRAFT Okay Jon, my TV experts are getting ready to EVA and any other switches have to be set up at the CDR command close to the handle before we get to Hawaii? Anything on A1 has to be changed.

CAPCOM Dr. Briscoe says everything's a go and we'll see you you over in Hawaii in about 6 minutes.

SPACECRAFT Right.

CAPCOM And make that 7 minutes.

SPACECRAFT Okay.

PAO Mission Control, Houston. Loss of signal at Guam. Reacquisition at Hawaii in about 7 minutes. Second run of S-band antenna pattern test with live television upcoming over Hawaii on this 37th orbit of Challenger's first flight. Day 2, 6 hours, 8 minutes, Mission Control, Houston. This is Mission Control Houston, we should reacquisition at Hawaii momentarily.

CAPCOM And Challenger we got a good TV picture. We'll be with you in Hawaii for about 7 and a half more minutes, looks great.

SPACECRAFT Yes looks good out the window too. Don says just remind you, this is a Geritol gang's version of a victory roll.

CAPCOM We copy. Sort of like a typical Air Force break too, isn't it?

SPACECRAFT Yes sir, you bet. And Jon, the crewmen are in the suits without the helmets right now.

CAPCOM We copy. That's a great picture P.J.

SPACECRAFT Oh you guys could get it further back than we can, can't you. That's a lot better.

CAPCOM That is.

SPACECRAFT (garble) look at those two flaps on that starboard OMS POD when the Sun shines on the bottom side up about now there Jon. I guess they don't show up too well.

CAPCOM It looks like we're too far back here, why don't you explain to us about the tether wire there, the slide wire?

SPACECRAFT Yes that's the slide wire that runs down the side of the vehicle. There's one on either side, those there for

safety purposes until we demonstrate that we have a functioning system both in our procedures and in the equipment that is the suits and mobility aids that we're goint to use, so that each crewman or a crewman as they go down the length of the vehicle, we typically go along the edge of the door there, the locks are on, and we have a safety tether on it and this slide wire enables us to view with relative ease, along still maintaining this safety pivot to the vehicle without having to unhook it and hook it up.

CAPCOM Thank you sir.

SPACECRAFT Sure thing. We can see on the inside of the cargo bay there, the inside center portion of the vent doors that we use to control the pressure in the cargo bay during ascent and entry, and of course the large canisters in the foreground are those Getaway Specials that Bo told you about yesterday.

CAPCOM Roger that.

SPACECRAFT The circular structure, which you haven't seen much of there in the aft end of the cargo bay, is the Airborne Supporting Equipment (ASE), that was used to carry up the IUS, the Interim Upper Stage, and the TDRS Satellite. And this equipment will be going back to Boeing, and to be used again very shortly, if not on STS 8, two flights from now.

CAPCOM And we copy that. And INCO is wondering, the want you to confirm that you can not zoom back out.

SPACECRAFT Well we try alot, you want me to try on that camera?

CAPCOM Yes, why don't you zoom it in and then see if you can bring it back out and we'll try it if you can't.

END OF TAPE

CAPCOM Yes, why don't you zoom it in and then see if you can bring it back out, and we'll try it if you can't.

SPACECRAFT (garble). We had some thrusters, aft thrusters on the left POD fired it.

CAPCOM I didn't see it, maybe somebody else did.

SPACECRAFT Well now it's working okay, Jon. It's just something that's almost like a dirty or intermittent contact. We just had to play with it to get it to work.

CAPCOM Roger, that.

SPACECRAFT And if you want to, I don't know how well they show up in the color, right along with the EVA, you can see the series of handrails that are yellow color that go down along each launcher on (garble). You got a double barrel blast one thruster in each POD fire that time. And you go hand over hand along those handrails that are colored yellow, so that if the EVA crewman can distinguish them from that predominantly white parts of the vehicle, and you go down one longeron, up across the aft bulkhead. God knows back there you see one goes up from each camera crossing up and down and back up the other longeron.

CAPCOM Yes sir, we can see those very clearly. Next time over the top, if you got a chance, why don't you pan down to the Earth for us.

SPACECRAFT Okay.

CAPCOM And we heard some comments that if it's this good tomorrow with the TV, it's going to be real exciting for that EVA.

SPACECRAFT Oh yes, we're looking forward to it. And we need (garble). And Jon, would this be a good time to check EVA COMM?

CAPCOM We would prefer that you do that LOS, Story.

SPACECRAFT Okay.

CAPCOM And we got about another minute and 39 seconds to go here at Hawaii. And just for your information, P.J., we're losing the antennas lock while you're over the top.

SPACECRAFT Okay.

CAPCOM Okay, we're starting to get video again. We got about 40 seconds to go.

SPACECRAFT Okay.

CAPCOM Looks like we can see the big island, Hawaii.

SPACECRAFT I don't know, you probably see it better, that might be just clouds. There's a fairly good look at the sun glare there, we're just about looking into where the sun reflects off the ocean. Folks are very interested in that phenomenon, we've been trying to get some good pictures for some people who are (garble) many features surface and subsurface in the ocean by looking into the sun glitter.

CAPCOM That's some great pictures there, P.J., thank you. We're going LOS, and we'll see you down at Botswana at 7:03.

SPACECRAFT (garble)

CAPCOM Thank you. See you in about 41 minutes.

PAO This is Mission Control, Houston, loss of signal at Hawaii. Live television from the Challenger's television cameras during the S-band antenna pattern test, in which the spacecraft was in a roll of some 2 degrees per second rate. And going over the top, the antennas were apparently blocked and caused loss of television downlink. It was described by the crew of Challenger as being the Geritol gang's version of a victory roll. Next station in 40 minutes will be the Botswana relay station, southend of the continent of Africa, at which time we shall return. This is Mission Control, Houston, 2 days, 6 hours, 24 minutes.

END OF TAPE

PAO This is Mission Control Houston. Slightly over a minute away from reacquisition at Botswana, voice relay station. Meanwhile a report on the TDRS Satellite. It remains in a stable condition according to flight controllers at the ground terminal at White Sands, New Mexico. NASA TDRS Program Director Robert Aller said that a roll thruster problem earlier today is being analyzed but it has not been determined if this problem will have any impact on the implementation of the orbital adjustment plan. Aller and Space Flight Director George Harris will take part in the 11:15 am Central Time Change of Shift Briefing on Thursday. Its good to have acquisition momentarily at Botswana.

CAPCOM Challenger, Houston with you at Botswana for 6 minutes.

SPACECRAFT Okay, Hi there. A new voice on the loop.

CAPCOM Roger, that. And we'd like for you to add the MPS vacuum inert procedure out of the Orbit/Ops checklist at, whenever your convenience. FAO has recommended the time of about 7 hours and 40 minutes.

SPACECRAFT 7:40, MPS vacuum inerting, okay.

CAPCOM Roger, the reason we're doing this PJ, is to, KSC would like us to make sure we got those MP'd to expedite the turnaround.

SPACECRAFT Yes, we cut each other out Guy, say again please.

CAPCOM Yes, the reason we're doing this, adding it back in is to, KSC wants us to do this, help expedite the turnaround.

SPACECRAFT Okay. Don and Story are cleaning up now after climbing out of the suits. Story is doing to SB checks for that (garble) suits. The pressure checks were good, and the COMM checks were good.

CAPCOM Roger, sounds good.

SPACECRAFT RCS hot fire is complete. I hadn't done that in the simulator in awhile, and that's a prime opportunity to type in the wrong number or something, but I think I got them all correct. I got no unexpected results.

CAPCOM Roger, we copy.

SPACECRAFT And Houston, Story's backup on COMM and checked out the EMU 3 and 1 and 2 was totally normal.

CAPCOM Sounds great.

SPACECRAFT We're just topping off the batteries now, and that'll be it.

CAPCOM Roger, copy. We're all looking forward to tomorrow. I'm sure you are.

SPACECRAFT You bet!

CAPCOM Challenger, Houston. We'd like you to take the hydraulic circ pumps, all 3 of them to GPC when you get a chance.

SPACECRAFT Okay, we'll do that now, Guy.

CAPCOM Thank you, and that will be for the sleep period tonight.

SPACECRAFT Yes sir.

CAPCOM Challenger, Houston. We're about 20 seconds to LOS, we'll see you over IOS in another couple of minutes.

SPACECRAFT Roger.

CAPCOM Challenger, Houston with you through Indian Ocean.

SPACECRAFT Roger.

CAPCOM Story and Don, I've got a note here for you on checking the EMU light batteries when you get a chance.

SPACECRAFT Go ahead.

CAPCOM Rog, first of all we'd like you to check the remaining 4 batteries to make sure they're good. And then following that, any bad batteries you find failed, including the 4 you found failed yesterday, we'd like you to put them back into the EMU light and cycle the switch on and off several times. That may recover the batteries.

SPACECRAFT Okay, I did that already, but I'll do a little bit more.

CAPCOM Okay, you did cycle the switch several times on the bad ones you found the other day?

SPACECRAFT Yes, I sure did. I decided I'd do one light, the other light, 2 lights, and about a glimmer of a light came on (garble) check them out before I do that.....

END OF TAPE

CAPCOM Okay, Story. Well that sounds good then, we would still like you to check the remaining 4 batteries that you haven't looked at yet.

SPACECRAFT Okay. Refresh my memory where they are.

CAPCOM Standby. And Story they're behind, they're in your EVA storage locker, MA23 Romeo, behind the work table. Standby on that.

SPACECRAFT I knew that's where about 4 of them were.

CAPCOM Make that MD80R.

SPACECRAFT Okay. Houston, Challenger.

CAPCOM Go ahead, Challenger.

SPACECRAFT Yes, we could look it up, but since CFES is shut down, we've got all the cue cards and checklists put away, and I notice here, we still have the flash evap on and a flow through the payload heat exchanger. Is that right for now, or should we back the flash evap off through the interchanger?

CAPCOM Roger, Challenger, you can go ahead and reconfigure for a normal OPS.

SPACECRAFT Okay, we must have missed it somewhere, thank you.

CAPCOM Challenger, Houston. For your information, we'll be running a TV pass on the payload bay over Hawaii again this time, but no action required on your part. All our switches are okay.

SPACECRAFT Okay.

CAPCOM Challenger, Houston, 30 seconds to LOS, we may get you at Guam at 7 + 41, for a short one, if not we'll see you at Hawaii at 7 + 50.

SPACECRAFT See you then.

PAO This is Mission Control. Loss of signal at Indian Ocean Station, preceded by Botswana voice relay station. Challenger crew reported that the EMU checkout, that is the Extravehicular Mobility Unit, checkout the 2 spacesuits, in other words is complete, way ahead of schedule. And the reaction control system hot fire test is also complete. In the upcoming Hawaii pass this orbit, the communications controller here in Mission Control will control the cameras aboard Challenger, will command the cameras to give us another live picture from space over Hawaii. Next station in approximately 18 minutes will be

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Guam in the western Pacific. This is Mission Control at 2 days,
7 hours, 22 minutes.

END OF TAPE

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CAPCOM Challenger, Houston, with you over Guam for about 20 seconds, see you in Hawaii at 7 plus 50.

SPACECRAFT Okay see you then. You still with us Houston?

CAPCOM Roger Story, go ahead.

SPACECRAFT (garble) those EMU light batteries, how long do you want me to (garble) the ones that won't work?

CAPCOM What we want Story, is multiple cyclings on and off.

SPACECRAFT Then if I do 5 or 6 cyclings is that enough?

CAPCOM Roger, that'll be plenty.

SPACECRAFT (garble)

PAO This is Mission Control Houston. They should be in acquisition momentarily through the Hawaii tracking station. Lee Briscoe here in Mission Control, the Integration Communications Systems Officer or INCO, is controlling the cameras in Challenger's payload bay and are now getting a picture relayed through the Hawaii station.

CAPCOM With you over Hawaii for 8 minutes and I got some good pictures from camera Charlie.

SPACECRAFT Copy Houston. (garble) EMU lights that don't work I cycled them at least 10 times, the lights will either come on bright the first time or not at all, and I got the serial numbers of the ones that don't work for you. All (garble) and put them in (garble) 2.

CAPCOM Roger copy Story, and how many of them total did not work?

SPACECRAFT 4 did not work, I was not able to locate 12, I located 11 batteries. 4 out of the 11 didn't work.

CAPCOM We copy.

SPACECRAFT You want the numbers?

CAPCOM Negative, we can get that postflight Story, thank you. And we've got some good pictures of, looking up the slide wire from the backend towards the forward there on the starboard side and we can see the tilt table elevation numbers.

SPACECRAFT You're gonna see some additional stuff out there tomorrow.

CAPCOM You bet. And the picture is breaking up here a little bit right now because of the COMM checks we're running during the roll. And Challenger we're trying to peek in the windows there at you, but it looks awfully dark inside.

SPACECRAFT I'm glad you can't see me right now.

CAPCOM Copy. We have switched the camera delta there on the forward part of the starboard side and we can see the tool box right at the bottom of our picture and the GAS canisters, and looking back to the backend of the POD side with the Earth rolling around behind you. We're getting a good picture down the portside of the vehicle now from the aft camera and looking in the area there around the tilt table you guys will be playing around in tomorrow.

SPACECRAFT (garble)

CAPCOM Challenger, Houston with 15 seconds to LOS, we'll see you at Santiago at 8 plus 16 and looking forward to seeing some guys filling up that big empty cargo bay tomorrow.

SPACECRAFT We'll be there.

PAO This is Mission Control Houston, loss of signal at Hawaii, 17 minutes away from acquisition through Santiago. Sort of a cook's tour of the payload bay there using the various remotely controlled cameras. INCO here in the Control Center, Lee Briscoe controlling the cameras from his console here, doing all the...

END OF TAPE

PAO This is Mission Control Houston. Loss of signal at Hawaii 17 minutes away from acquisition at Santiago. Sort of a cook's tour of the payload bay using the various remotely controlled cameras. INCO here in the control center, Lee Briscoe controlling the cameras from his console here. Doing all the pan, tilt and zoom, and looking at the various equipment in the payload bay, the most notable of which is the cradle for the now departed IUS and TDRS Satellite. Pretty good rehearsal for the EVA tomorrow where the payload bay will have a population of 2. Sixteen minutes away from Santiago, midway through orbit number 38 for Challenger at day 2, 8 hours, this is Mission Control Houston. This is Mission Control Houston, Santiago, Chile tracking station should acquire Challenger momentarily.

CAPCOM Challenger, Houston with you at Santiago, for 7-1/2.

SPACECRAFT Read you loud and clear. Houston, (garble)

CAPCOM We copy. Challenger, Houston, 30 seconds to LOS. We'll see you at Indian Ocean at 8 + 48.

SPACECRAFT See you then.

PAO Mission Control Houston, loss of signal at Santiago, Indian Ocean Station in 25 minutes. The crew in their evening meal period. Not very talkative. Winding down the second day in space. 25 minutes away from Indian Ocean station, day 2, 8 hours, 23 minutes, Mission Control Houston. This is Mission Control Houston, Indian Ocean Station in about 25 seconds, final pass of the evening for that station. We do have acquisition at this time.

CAPCOM Challenger, Houston with you at Indian Ocean for 6 minutes.

SPACECRAFT Roger, Houston, read you loud and clear.

CAPCOM Here I've got a few presleep notes here, if you're ready to listen.

SPACECRAFT Do we have to copy these down?

CAPCOM Negative, the first one is to cancel the IMU alinement again tonight, looks like they are really looking good.

SPACECRAFT Roger, we copy that.

CAPCOM And with that in mind you can go ahead and go to your -ZLV nose first attitude at your convenience, the attitudes are there in the CAP, at 9 + 45.

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SPACECRAFT Roger, PJ said he already had a couple of alarms set to remind him to do the IMU align, so he's not sure he wants to cancel it, but I think we can talk him into it. Okay, and ZLV anytime we like.

CAPCOM That's right, go into nose-first, as opposed to your nose-north you are now. You should have a weather message coming up here at Indian Ocean as well, and we're wondering if you had a final count on the number of NOSL film magazines you used.

SPACECRAFT Okay, Houston. We're going to go nose-first now, so that at the window point of view it's a whole lot better than at nose-north attitude.

CAPCOM Understand, that's fine with us.

END OF TAPE

CAPCOM Understand, that's fine with us.

SPACECRAFT Used 3 and a half NOSL magazines.

CAPCOM Roger, we copy, 3 and a half magazines used. And we'd like you, before we get to Hawaii to perform the manual cabin atmosphere management message we sent up, teleprinter message number 19, so we can look at the configuration over Hawaii. And the other things in the CAP here, presleep, the supply water dump at 9 + 45, we'd like you to dump tank bravo to 20 percent. And during your presleep, don't forget to put the cabin temperature controller valve to full heat.

SPACECRAFT Okay, roger. Tank bravo to 20 percent, you'd like us to set up before we get Hawaii (garble), and we'll go to a full hot.

CAPCOM Roger.

SPACECRAFT Okay, Guy, you still there?

CAPCOM Affirmative, we still have 3 minutes left.

SPACECRAFT Okay, we just finished inspecting IMU fans, and filters, and the cabin fan filters. IMU fan filters were really dirty, we got some pictures of them and cleaned them. The cabin fan filters aren't too bad. So we just went ahead and cleaned them, they just had a little fuzz on them.

CAPCOM We copy. And we understand that's why you got that cabin fan message.

SPACECRAFT Oh, yes sir.

CAPCOM Challenger, we've got 1 minute to LOS. I've got some good words on the TDRS Satellite, if you're interested?

SPACECRAFT Yes, go ahead.

CAPCOM Well, first of all, they want to wait till you guys get back here before they do their RCS thrust and the geosync, that should occur on Sunday. And they've got plenty of RCS fuel onboard to do that with and still have the RCS for a good lifetime of the satellite itself. They've also got the 4.9 meter single-access antennas are now fully deployed, so it's all deployed and working good.

SPACECRAFT Roger.

CAPCOM And we're 10 seconds to LOS, see you up over Guam at 9 + 14.

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SPACECRAFT Roger. (garble)

CAPCOM We did not copy that.

PAO Mission Control, Houston, LOS at Indian Ocean station, Guam in 19 minutes. Spacecraft Communicator, Guy Gardner, passed up to the crew the information that the thrusting with the Tracking Data Relay Satellite, hydrazine thrusters to get on up to geosynchronous orbit will begin this coming Sunday after the crew has returned. Orbit 39 just beginning for Challenger. 18 minutes away from reacquisition at Guam, Mission Control, Houston. This is Mission Control, Houston, acquisition at Guam in about 40 seconds.

END OF TAPE

PAO This is Mission Control Houston. Acquisition at Guam in about 40 seconds. Flight Director here in Mission Control has asked his people to check all the systems for the final time here at Guam for the sleep period, all spacecraft systems.

CAPCOM Challenger, Houston, here with you at Guam for 4 minutes.

SPACECRAFT Roger Houston, read you loud and clear.

CAPCOM Challenger, Houston, we were wondering if you ever got your flight deck speaker to work?

SPACECRAFT Hold on now, we'll go down and see. I'm pretty sure it does because I think we heard some of those UHF transmissions. Lets try it, over.

CAPCOM Roger, we copy. Challenger, Houston, I've got a brief summary of our forecast weather for Friday, Saturday and Sunday if you're ready.

SPACECRAFT One moment. Go ahead.

CAPCOM Roger. Looks like Edwards will be good for all three days, Friday, Saturday and Sunday. The Cape should be good for Friday and Saturday, but we've got a low over Northrup that'll be passing through there on Friday and Saturday, so Northrup will be down Friday and Saturday but should be good on Sunday, but the Cape should start going bad on Sunday due to that weather.

SPACECRAFT Roger I copy.

CAPCOM Challenger, Houston, we need the water tank bravo inlet back to open, there's no need to close it.

SPACECRAFT Got it.

CAPCOM Challenger, Houston, 15 seconds to LOS we'll see you at Hawaii at 9 plus 27.

SPACECRAFT 9 plus 27 at Hawaii.

PAO This is Mission Control Houston, loss of signal at Guam. Final Hawaii pass starts in 7 minutes. Spacecraft communicator Guy Gordon gave the crew a nutshell of the weather outlook for Friday, Saturday and Sunday at the three stateside landing locations. Crew winding down the day's activity preparing for a sleep period to begin in less than an hour. Returning in 6 minutes at Hawaii, Mission Control Houston. Mission Control Houston, we have acquisition at Hawaii. Fairly brief pass of some 4 minutes.

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CAPCOM Challenger, Houston, with you over Hawaii for 3 minutes.

SPACECRAFT Okay. Roger Houston, read you loud and clear.

CAPCOM Roger.

SPACECRAFT Hello Houston, CDR.

CAPCOM CDR, Houston.

SPACECRAFT Okay I've got a couple of notes on HRM and PRM which were just completed. If you would, go to the orbit OPS checklist, page 7-4.

CAPCOM Okay we're ready.

SPACECRAFT Okay in step 1, the set up, one of the last things you do there, see it says press and hold the HP button?

CAPCOM Roger.

SPACECRAFT The last two times I've done that Guy, I had to do that twice in order to meet those criteria. In other words, for the display to get up above 4,000 within 20 seconds.

CAPCOM Roger we copy we're looking at it.

SPACECRAFT Okay and the time I did the one to see then was 0919 and I got a word on the PRM also, that was done at about 0950. When I take the readings, all the readings had the colon indicated on that LCD display, which apparently means the batteries are going bad. I guess this is our last scheduled data tape (garble) if they want me to replace the batteries and take another set of readings I don't mind.

END OF TAPE

CAPCOM Okay we're ready.

SPACECRAFT Okay, in step 1, the set up, one of the last things you do there, it says press and hold the HP button.

CAPCOM Roger.

SPACECRAFT The last two times I've done that, Guy, I've had to do that twice in order to meet those criteria. In other words for the display to get above 4,000 within 20 seconds.

CAPCOM Roger, we copy, we're looking at it.

SPACECRAFT Okay. And the time I did the one to see then was 0919 and I got a word on the PRM also. That was done at about, 9:15. When I took the readings, all the readings had the colon indicated on that LCD display, which apparently means the batteries are going bad. I guess this is our last scheduled data take. So, if they want to replace the batteries and take another set of readings, I don't mind.

CAPCOM Okay, we'll check on that for you.

SPACECRAFT Okay, we don't need an answer now, just check it out whenever you get a chance.

CAPCOM Wilco. And we're 10 seconds to LOS, we'll see you at Santiago at 9 + 52.

SPACECRAFT Yes, also, it doesn't look like we're going to make 15 psi on this reg.

CAPCOM We concur, that's probably all you'll get before sleep, you can go ahead and secure it.

SPACECRAFT Okay, we'll finish the meal first and then I'll go ahead and pick up on that message 19 or whatever it was, and set up for sleep.

CAPCOM Roger, copy. And you got the go to change those batteries for the PRM if you'd like.

PAO Mission Control, Houston, LOS Hawaii for the final time this evening, Santiago in 21 minutes, which will likely be the final voice pass of the evening as the crew goes into their presleep activities. At day 2, 9 hours, 31 minutes, this is Mission Control, Houston. This is Mission Control, Houston, still 16 minutes away from Santiago, Chile. The handover from this team of flight controllers to the relieving team will begin at 11:30 central and be complete by 12:30, which means that off-going Flight Director Harold Draughon's change-of-shift press conference would be around 1 a.m. Central Time, 2 a.m. Eastern

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Time. If there are any news people out there alive and awake who want to have a change-of-shift press conference they should speak now or forever hold their peace. Otherwise we likely will not hold one to an empty room. 15 minutes away from Santiago, returning at that time, this is Mission Control, Houston.

CAPCOM Challenger, Houston, with you at Santiago for 6 minutes.

SPACECRAFT Okay. Okay.

CAPCOM Rog, and a couple of presleep things here. I'd like you on panel alpha 7 alpha 2 to turn the MAD strain guage to PCM enable.

SPACECRAFT Okay, I'll be there in just a second. Okay, say the switch again please.

CAPCOM Rog, the MAD strain guage, put it up to PCM enable.

SPACECRAFT That's done.

CAPCOM Okay, and on the PRM OPS, looks like P.J.'s diagnosis was correct, the batteries did run dead and we're not sure we got all of the second data take. What we'd like for you to do is change the batteries out and do step 1 again and we'll let it run overnight and we'll take another data tape in the morning post to wake up.

SPACECRAFT What was that part now, the PRM (garble)

CAPCOM That's the PRM OPS, do a section 1 tonight and then we'll close it out with the data take tomorrow morning step 2.

END OF TAPE

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SPACECRAFT Say the switch again please.

CAPCOM Rog, the MAD strain gage, put it up to PCM enable.

SPACECRAFT That's done

CAPCOM Okay, and on the PRM OPS, it looks like PJ's diagnosis was correct. The batteries did run dead and we're not sure we got all of the second data take. What we'd like for you to do is change the batteries out and do step 1 again and we'll let it run overnight and we'll take another data tape in the morning, post to wake up.

SPACECRAFT Which one was that for now, the PRM or the HRM?

CAPCOM That's the PRM OPS, do a section 1 tonight and then we'll close it out with the data take tomorrow morning in step 2.

SPACECRAFT Roger, we've got that.

CAPCOM And Challenger, for your information, we'll be going no voice record here at Santiago.

SPACECRAFT Roger, and be advised we're going to turn the UHF off tonight, so we're not bothered by the transmissions over Asia.

CAPCOM Roger, we copy and we've got about 4 minutes left in this pass and after this we'll leave you alone and let you get to sleep.

SPACECRAFT Wonderful!

CAPCOM One last switch, I hope, is down on MO10W, we'd like you to put the 14.7 cabin reg inlet system 2 to close.

SPACECRAFT Okay. Did you get that?

SPACECRAFT I'll get it. That was 14.7, system 2 inlet to close, right?

CAPCOM Yes, 14.7 cabin reg inlet system 2 to close. Challenger, Houston, we're 30 seconds to LOS, the amber team will be waking you up in the morning, and the crystal team will be back on for the EVA tomorrow.

SPACECRAFT Look for you then, good night!

CAPCOM Roger, Goodnight.

SPACECRAFT Thanks a bunch!

PAO This is Mission Control Houston, loss of signal at Santiago for the final pass of the evening. Crew now goes into an 11-hour sleep period, including presleep preparations and starting tomorrow, the 2 mission specialists will go into their EVA prep cycle, and go out into the payload bay. Again, if there are any live newsmen, or awake newsmen, newsmen, newspeople out there, speak now or forever hold your peace if you want a midnight or 1 a.m. press conference with the off-going Flight Director, Harold Draughon. Day 2, 9 hours 59 minutes, this is Mission Control Houston.

CAPCOM Challenger, Houston.

SPACECRAFT Hi there.

CAPCOM Rog, sorry to bother you, we're seeing a high flow in PCS system 2, we're wondering if you opened up the cabin reg again.

SPACECRAFT (garble), that's a yes.

CAPCOM Sleep tight.

END OF TAPE

PAO Mission Control Houston, one final exchange there between the spacecraft communicator Guy Gardner and the crew aboard Challenger. It seems the ECOM here at Mission Control noticed a higher flow rate on telemetry and oxygen into the cabin. And like Big Brother was watching, it turns out the crew had turned the regulator on to boost the flow rate a bit higher. So now they're finally finishing up their days activity and settling in for 11 hours of sleep and this is the third and final call for any live, or awake newsmen who want a change of shift press conference. Going once, going twice, gone. No press conference. This is Mission Control Houston, 2 days, 10 hours, 10 minutes. This is Mission Control Houston, 2 days, 11 hours, 31-1/2 minutes. Challenger now passing over the ground station at Santiago, Chile on its 41 orbit of the Earth and downlinked data continues to affirm that onboard systems are performing nominally, crew is just over an hour into its sleep period. About a minute remaining in this pass and the Mission Control team here assuring Flight Director Randy Stone, everything's nominal aboard Challenger. This is Shuttle Mission Control.

END OF TAPE

PAO This is Shuttle Mission Control, 2 days, 12 hours, 24 minutes. Challenger now passing over the tracking station at uam, giving the flight Control team the opportunity to look at some downlink data. Systems checks reveal nominal performance on Challenger, vehicle's on its 41st orbit of the Earth, and just slightly more than 6 hours remaining in the sleep period. This is Shuttle Mission Control.

CAPCOM Challenger, Houston, how do you read? Challenger, Challenger, Houston. Challenger, Challenger, Houston. Challenger, Challenger, Houston. Challenger, Houston, in the blind, request FES feedline heater B supply to 1.

SPACECRAFT Go, Houston.

CAPCOM Challenger, Houston, we would like for you to get your FES feedline heater B supply to 1. We have an apparent failure in the number 2.

SPACECRAFT Yes, I saw that awhile ago. It seems to me, we switched away from 1 once before bedtime, I figured if it was important enough, you'd give us a call.

CAPCOM That's affirm. We switched originally because I was maintaining a little high, but with 2 failing we do want to go back to 1.

PAO This is Mission Control, Houston, at 2 days, 13 hours, 9 minutes. That call to Challenger initiated at Santiago because data indicated failure of the heater which warms the feedline to the Flash Evaporator System. Planning team ECOM, Jerry Pleger reported to the Flight Director, Randy Stone, that the downlink data indicated temperature dropping to an extent which caused concern sufficient to warrant waking the crew and instructing them to transfer that heater, or switch from heater number 2, which was apparently failed, to heater number 1. Mission Commander Paul Weitz acknowledged that call and made the switch and we'll look forward to acquisition of signal at Dakar in about 7 minutes to look again at the data and affirm that the heater change was affected and see how the new temperatures look. At mission elapsed time, 2 days, 13 hours, 11 hours, this is Mission Control, Houston.

END OF TAPE

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PAO Mission elapsed time is 2 days, 13 hours, 26 minutes, Challenger's now over Dakar, downlink data coming. Challenger indicates all systems are performing nominally, problem identified earlier by ECOM Jerry Pleger is resolved. looked again at those temperatures during this Dakar pass observed that the line temperature during the flash evaporator is rising again, presently it's up to the flash evaporator number 2 to about 47 causing suspicion that the heater, selected heat Santiago pass the crew was awakened and advised that, advised the problem of heater failure and instructed to deselect heater number 2 and select heater number 1. This Dakar pass verified that the function has been performed and the temperature's coming back up. At mission elapsed time, 2 days, 13 hours, 26 minutes this is Mission Control Houston.

END OF TAPE

PAO Mission elapsed time is 2 days, 13 hours, 25 minutes, Challenger's now over Dakar, downlink data coming from Challenger indicates all systems are performing nominally, the problem identified earlier by ECOM Jerry Pleger is resolved. He looked again at those temperatures during this Dakar pass and has observed that the line temperature to the flash evaporator system is rising again, presently it's up to 61 degrees, it had fallen to about 47 causing suspicion that the heater, selected heater number 2 to the flash evaporator line had failed. Over the Santiago pass the crew was awakened and advised that, advised of the problem of heater failure and instructed to deselect heater number 2 and select heater number 1. This Dakar pass verifies that the function has been performed and the temperature's coming back up. At mission elapsed time, 2 days, 13 hours, 26 minutes this is Mission Control Houston.

END OF TAPE

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PAO This is Shuttle Mission Control at 2 days, 16 hours 46 minutes, Challenger just over flew the ground station at Dakar and got a clean bill of health from all the Flight Controllers based on the downlinked telemetry data. About 2 hours remaining in the crew's sleep period. At 2 days, 16 hours 47 minutes this is Shuttle Mission Control. At 2 days, 17 hours 47 minutes Challenger on it 45th orbit of the Earth. About 8 minutes away from acquisition of signal through the Bermuda station which will be the first time in about an hour since we've been in contact with the vehicle and have had an opportunity to look at the dowlink data. About 52 minutes remaining in the sleep period and the Mission Control team will also be looking to see if any of the crew are up and around and if any of the indicators onboard the vehicle suggests it. Maybe somebody has turned on CRT's or activated the galley, or done any of the other housekeeping activities associated with getting ready for the day. So we'll look forward to a kind of advisory when we establish contact with Challenger in about 7 minutes. This is Shuttle Mission Control.

END OF TAPE

PAO ...reestablish contact with Challenger in about 7 minutes. This is Shuttle Mission Control. This is Mission Control, Houston, 2 days, 18 hours, 3 minutes. We've completed that pass over Bermuda. Mission Control Team has looked at the data, all stations report normal operations. Onboard Challenger, no indications that the crew is awake or active at this point, 36 minutes remaining in the sleep period. This is Shuttle Mission Control. This is Mission Control, Houston, 2 days, 18 hours, 49 minutes. We expect the wake up call to go up to Challenger in a few minutes as the vehicle goes over Orroral. The sleep period expired a short while ago, but no wake up call went up because Challenger was configured only for S-band transmission and there was no S-band capability over the Yarragadee tracking station. So Orroral will be our first opportunity to talk to Challenger in S-band. At least some of the crew members appear to be awake, there were indications...

END OF TAPE

PAO This is Mission Control, Houston, 2 days, 18 hours, 49 minutes. We expect the wakeup call to go up to Challenger in a few minutes as the vehicle goes over Orroral. The sleep period expired a short while ago but no wakeup call went up because Challenger was configured only for S-band transmission and there was no S-band capability over the Yarragadee tracking station. So, Orroral will be our first opportunity to talk to Challenger in S-band. At least some of the crewmembers appear to be awake. There were indications earlier during the Indian Ocean pass that there was some activity in the waste containment facility onboard, so at least one of the crewmembers was up. And we'll have a signal through Orroral shortly and we'll expect the wakeup call for today's activities. Mission elapsed time, 2 days, 18 hours, 50 minutes. This is Mission Control, Houston.

CAPCOM Wakeup call.

CAPCOM Good morning F Troop. I hope the Commander appreciated that song.

CAPCOM Challenger, Houston. We're about 40 seconds to LOS here at Orroral and we'll be with you next at Mila at 19:27.

PAO This is Mission Control, Houston. No downlink voice from Challenger during that pass but the ECOM advises that his data shows the food warmers turned on, that there's some activity on the cathode ray tubes onboard Challenger and that the waste containment's waste management facility is being used onboard, so the crew is clearly up and around. We will expect voice contact through Mila station in about 30 minutes. Mission elapsed time, 2 days, 18 hours, 58 minutes. This is Mission Control, Houston.

END OF TAPE

PAO In fact, through Mila station in about 30 minutes mission elapsed time. 2 days, 18 hours, 58 minutes. This is Mission Control, Houston.

PAO This is Shuttle Mission Control. We're about 25 minutes away from acquisition of signal and orbit number 46. The wake up call this morning was the theme from F-Troop, former TV program. The significance of that being referring to this crew as the F-crew for the purposes of training documents the crews have been listed alphabetically. A-crew was the STS-1 crew - John Young, Bob Crippen. B-crew was the STS-2 crew - Dick Truly and Joe Engle. Of course, now up to STS-6. This is the F-crew and in a jocular vein they refer to themselves not as the F-crew but the F-Troop and accordingly the significance of this mornings wake up call. Mission elapsed time - 2 days, 19 hours, 4 minutes. This is Shuttle Mission Control.

CAPCOM Challenger, Houston, with you at through Mila and Bermuda for about 11 minutes.

SPACECRAFT Okay, Dick.

CAPCOM And Challenger, Houston. I have a few notes to read to you to go along with your teleprinter messages this morning when you all are ready to copy.

SPACECRAFT I'll try to get you somebody. Go ahead Dick.

CAPCOM Okay. The first one is relative to our PCS configuration. Prior to your EVA, we want to reestablish a nominal type system and put it in automatic control and we would like for you to do that using orbit ops checklist page 5-6 with system 2 and just some notes that you'll still get the high N2-O2 flow and DPDT messages that occur nominally during airlock depress, repress.

SPACECRAFT Okay.

CAPCOM And you all can go ahead at your convenience to reconfigure to that automatic control.

SPACECRAFT Okay.

CAPCOM Okay. The second message is relative to the star tracker self test associated with the IMU alignment at 21:10. On that we want to just add the note that we would like for you to do the star tracker self test in the align attitude and you do not have to be over a site to do that self test. Just do it on your own. We'll evaluate the data post-flight.

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SPACECRAFT Okay.

CAPCOM Okay, the third note is for the water supply dump. On page 458 of the CAP at 21:50 the, want you to dump the b tank to 30 percent and that should take about 48 minutes.

SPACECRAFT Okay.

CAPCOM And I've got one other item, Story, and it's relative to PRM OPS and we just wanted to get a verification that data take 2 on the PRM OPS was completed and we also like to get the start time of the PRM OPS in the presleep activity.

SPACECRAFT The second part of that was not done last night, Dick, the PRM OPS. We're going to do that this morning, right.

CAPCOM That's affirmative and that was just a reminder...

END OF TAPE

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SPACECRAFT The second part of that was not done last night Dick, the PRM ops. We're going to do that this morning, right?

CAPCOM That's affirmative and that was just a reminder to ya'll to get that data take.

SPACECRAFT Okay, now to P.J.

SPACECRAFT (Garble).

SPACECRAFT The PRM is completed Dick.

CAPCOM Okay. We copy Story, and when ya'll get a chance we would like to know the start time, MET start time of that data take, or of that step 1 for that action.

SPACECRAFT He'll get it to you.

CAPCOM Okay. We copy and we're about 30 seconds to LOS here at Bermuda. We are without data at this time. We should have it back when we get to Dakar and we will be with you at Dakar at 19:43.

SPACECRAFT Okay, and I'm working on page 2-2 of the EVA of our crew prep.

CAPCOM Okay. We copy and we'll stay with you.

CAPCOM Challenger, Houston with you through Dakar for 6 minutes.

SPACECRAFT Roger, Houston. Okay, you ready for some time on the PRM last night Dick?

CAPCOM That's affirmative and be advised that we're still negative data and probably won't have any data on this Dakar pass.

SPACECRAFT Okay. We'll try to manage, the PRM was, step 1 was at 2 days, 10 hours even. Step 3 was at 2 days, 19 hours, 36 minutes.

CAPCOM Okay. We copy that and with the completion of PRM ops, I have a note for you from the RME Team. They want to thank all the crew for their outstanding performance during all of the PRM and HRM 3 ops.

SPACECRAFT Well, I guess if all the procedures were as simple and instructions written as clearly, everything would be a piece of cake.

SPACECRAFT Hey, what in heaven's name kind of weather are they having out around El Paso?

CAPCOM Well, it's the hundred year weather, I guess. Supposedly they got 10 inches of snow in El Paso yesterday. We heard that report and of course, the weather is staying bad at Northrup all through today.

SPACECRAFT That's not supposed to happen in April. It's not snowing in Houston yet is it?

CAPCOM Not yet but it's not very much like winter, or rather spring out there either.

SPACECRAFT Sure like to take a short pass back down the line Dick. I'm truly impressed with the way this vehicle's performed and I think it's a real tribute to how much we've learned in the previous flights and that Rockwell's learning how to build them and KSC's learning how to test them and launch them and we're learning how to operate them.

CAPCOM Well, we couldn't agree more P.J. Those of us here on the planning shift have certainly benefitted from the Challenger's performance so far.

SPACECRAFT Yes as have we all.

PAO This is Shuttle Mission Control at 2 days, 19 hours, 47 minutes. The MOC mission operations computer here in building 30 is temporarily down and the team's not receiving data accordingly. The Challenger crew is reading down times of activities for recording by hand. With the MOC down, the plot board presently is not working nor updating the Challenger's position and there is no capability to record downlink data from the vehicle. Ground control officer expects the computer will be back online momentarily. This is Shuttle Mission Control.

CAPCOM Challenger, we're 30 seconds to LOS here at Dakar. We'll be with you next at Indian Ocean at about 20:02 and we're still without data.

SPACECRAFT Roger.

END OF TAPE

CAPCOM Challenger, we're 30 seconds to LOS here at Dakar. We'll be with you next at Indian Ocean at about 20 02 and we're still without data.

SPACECRAFT Roger.

PAO This is Shuttle Mission Control. MOC, the mission operations computer in building 30 is back on line. And the control team's in the process of restoring this data displays and the data absent from the two passes missed, those being Bermuda and Dakar, is not lost. The data was recorded at those stations and will be played back to the control center as soon as there is an opportunity to do so after these displays have been restored. We'll have contact with the Indian Ocean station in a few more minutes. Mission elapsed time 2 days 19 hours 55 minutes this is Mission Control Houston.

CAPCOM Challenger, Houston, with you through Indian Ocean for 7 and half minutes and we have data again.

SPACECRAFT Roger that, Houston. We're getting the cabin all cleaned up and getting on the inflight maintenance procedure. Second that. PJ is just starting and he's just checking it out and we are setting up for an EVA clip.

CAPCOM Okay, we understand all that.

SPACECRAFT Dick, what time is it in Houston now?

CAPCOM It's a little after 8:30 in the morning.

SPACECRAFT Okay. Houston, are you still there?

CAPCOM That's affirmative. We're with you for another four minutes through Indian Ocean.

SPACECRAFT Houston, Challenger.

CAPCOM Challenger, Houston, go ahead.

SPACECRAFT Okay, Dick, I've been looking over that procedure, and also scouting the territory, for this (garble) 40 minutes or up to clean the PEU and PDU filters. Some light in CR inspection they certainly need it and I can by looking through all the panels L8 and R9 I can see water 2 of the filters and they have the same blue lint, you know, that stuff that was on the CPES on STS-4 all over them. And I think they probably do need cleaning. It's my intent, and verify this, that I (garble) so I think I can get the forward DDU filters for the coverstool through the holes in a closeout panel without taking those 36

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screws out and I may not get it all out but I think that we can probably get it satisfactory. I'll see how it turns out but I'll try almost anything to keep from getting 36, taking out 36 screws and bending it down.

CAPCOM Challenger, Houston, we copy that and we agree with your recommendation to try and clean them as well as you can through the hole. We would like to know if you can see any of the filter screens through those holes?

SPACECRAFT Yes, I think I can. Yes I get forward. It looks like a mesh like you just want to open one edge of the black box that's the DDU open and just put a wire mesh over it. That's the filter, right?

CAPCOM That's affirmative, and my question to clarify it was whether or not you could actually see any of the filters, the mesh structure or if you, it was totally covered with the lint?

SPACECRAFT Oh, no, I can see the screen through it, Dick, it's not totally covered. I would guess that in the forward ones looked fairly worse than the ones back here. Probably, they might get more air flow up there but I'd say they're probably, oh on the order of sixty percent coverage than the ones, the only ones back here in the access holes, they're probably 30 to 40 percent covered with that lint.

CAPCOM Okay, we copy that.

END OF TAPE

SPACECRAFT ...60 percent covered in the ones, the other ones back here in the access holes are probably 30 to 40 percent covered with that lint.

CAPCOM Okay. We copy that.

CAPCOM Challenger, Houston. We're about 30 seconds to LOS and PJ, relative to the cleaning there, we would like for you to just go ahead and clean them as best you feel you can without moving the closeout panels. We feel that that probably would be adequate to get us by to the end of mission.

SPACECRAFT Roger, I copy. I'll pass it along.

CAPCOM We'll be with you next at Yarragadee at 20:18.

SPACECRAFT Roger.

PAO Shuttle Mission Control at 2 days, 20 hours, 11 minutes. We've had loss of signal through Indian Ocean station. We'll reacquire again in about 7 minutes having voice only through Yarragadee. That discussion pertained to filters in the DEU system. The DEU is the display electronics unit. And it has cooling air directed around it to prevent overheating and filters are installed in that cooling system in order to keep contaminants out of the unit. Those filters are, have been the cause of, of concern in as much no one wants them clogged with debris so the crew took a look at it to determine that there was still mesh or some of the filter material visible and flight control team determines that the cleaning isn't that critical at this juncture. Mission elapsed time 2 days, 20 hours, 12 minutes. This is Mission Control, Houston.

CAPCOM Challenger, Houston with you through Yarragadee for 8 minutes.

CAPCOM Go ahead Challenger.

SPACECRAFT Yea, I feel that there's no time constraint to getting on this EVA. If we just plug thoroughly and methodically through the checklist and you're ready to go out early I'm assuming that you guys will be amenable to giving us a go to do that.

CAPCOM PJ, the only constraint we can see right now would be site coverage and making sure we didn't have a long LOS at wrong time. So, we'd like to at least be able to plan around that.

SPACECRAFT Okay. (Garble)

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CAPCOM Challenger, were you calling?

SPACECRAFT Negative.

CAPCOM Challenger, Houston. We're 30 seconds to a short LOS between Yarragadee and Orroral and we'll have about a 3 minute pass Orroral after that.

SPACECRAFT Okay, (garble).

PAO This is Shuttle Mission Control. We'll pick up signal again at Orroral momentarily. EVA Systems Officer Terry Neil has reported to the Flight Director that the crew appears to be well ahead of schedule as expected. They're moving along on the EVA preps more gingerly than the timeline log for they appear to be about an hour ahead of schedule. If they maintain that pace, the EVA would probably occur 1 hour ahead of as it is timed which would put the Challenger over Mila Ground Station there and give us the opportunity to have downlink TV at the crew egress point. That again is pretty much later in the day so...

CAPCOM Challenger, Houston back with you through Orroral for 3 minutes.

SPACECRAFT Loud and clear.

CAPCOM Okay. And PJ, I've got some words for you relative to pressing on with the EVA activities.

SPACECRAFT (Garble).

CAPCOM Okay. Looking at the site coverage, it appears that if you all can go about an hour earlier that we would have good TV coverage of the airlock egress and if you all want to shoot for that as a goal, press on.

SPACECRAFT Okay, we'll plod along and if we get ready to pre-breathe an hour early we'll go ahead and do so and let you know.

CAPCOM Okay, sounds like a good plan.

END OF TAPE

CAPCOM ...to go, press on.

SPACECRAFT Okay. We'll plod along and if we get ready to prebreathe an hour early, we'll go ahead and do so and let you know.

CAPCOM Okay. Sounds like a good plan.

CAPCOM Challenger, we're 30 seconds to LOS. This will be a long one. We'll be with you next at Mila at 21:02.

SPACECRAFT Mila at 21:02.

PAO This is Shuttle Mission Control. It'll be about 30 minutes before we establish contact with Challenger again through the ground station at Mila. Flight Director, Harold Draughon and members of his Crystal Flight Control Team have begun to arrive in the Mission Control Center and are now beginning to tag up and prepare for handover. Mission elapsed time 2 days, 20 hours, 31 minutes. This is Shuttle Mission Control.

PAO This is Shuttle Mission Control, 2 days, 21 hours, 2 minutes. Voice contact momentarily through Mila.

CAPCOM Challenger, Houston with you through Mila and Bermuda for 12 minutes.

SPACECRAFT Okay Houston.

SPACECRAFT Hey Dick, I'd like to talk about a couple of things for tomorrow while your planners are still on there.

CAPCOM Okay. We're ready to listen.

SPACECRAFT Well, basically, I would still like to, obviously would be glad to do anything that is beneficial to the space program, as I'm sure you're aware; however, we have got some things that aren't scheduled we would like to get done. One of them is, I would like to make a pretty good photographic survey of the windows on the vehicle so that we can tell, hopefully, you know, if we can see any difference between what's on there now and what we get after we land, and to think of a little bit what that may necessitate. I think I can get them best by backlighting or to having the sun shining through it without shafting into the camera and that may necessitate a little yaw out of the ZLV to get good window coverage. It probably won't but it might and I would just like you to think about it tonight when you guys are working and see what you think of that, if we've got enough gas to do that tomorrow. And also, we've got some other documentaries, photo documentaries of inside the vehicle we'd like to get done.

CAPCOM Okay. We copy that and we'll look at it and have answers for you.

SPACECRAFT Okay. An interesting thing on the, it's hard to tell on these triple pane windows. Let me call my manufacturing expert, Col. Bobko in a minute.

SPACECRAFT Okay. We agree. Right or wrong, we're stowing down together. On the inside of the outer pane on all our windows on the lower part, it almost looks like there's little spots of frost starting to form on them down there and I don't remember people talking about that before.

CAPCOM Okay. We understand what you're saying and we'll see if we can find out anything from previous experiences for you.

SPACECRAFT Hey, that's all right. Just general interest. I'm saying, you know that's one of the things I'd like to get because I'm sure that isn't going to survive. But also, there's some stuff it looks like on the aft window and the payload bay window on the port side. It looks like there may be some frost or some sort of material on the inside of the outer pane there too and it's not on the one on the starboard side.

CAPCOM Okay. We copy.

CAPCOM And P.J., we can go ahead and tell you that there's no problem in yawing out of ZLV if you need to to take those pictures.

SPACECRAFT Okay. Appreciate it. Thank you. We'll let you know when we're going to do it.

CAPCOM Roger. And I have a couple of things for you. One, if someone is near panel A7, we'd like to get the MAD strain gauge back on.

SPACECRAFT Okay. We've switched nomenclature. Bo will get it.

CAPCOM Okay. On panel A - -

END OF TAPE

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CAPCOM And I have a couple of things for you. One, if someone is near panel A7 we'd like to get the MAD strain gage back on.

SPACECRAFT Okay, read the switch nomenclature, Bo will get it.

CAPCOM Okay, on panel A7, the MAD strain gage to on.

SPACECRAFT Okay, that's the one that SAL and PCM & A is going on.

CAPCOM Roger. And Challenger, if there's some one that can copy, we have a NOSL opportunity pad to give you for next rev.

SPACECRAFT Standby, Bo will get it in a minute. Go ahead.

CAPCOM Okay, the type of activity is very active thunderstorms over Louisiana and Mississippi. There are tornado watches in the area and this is the same area as yesterday. We'll be looking at a best opportunity is on orbit number 48.

SPACECRAFT Hey Dick.

CAPCOM Yes.

SPACECRAFT Are you there Houston?

CAPCOM That's affirmative.

SPACECRAFT Give me a quick short count Richard, will you please?

CAPCOM Roger, 5 4 3 2 1 2 3 4 5.

SPACECRAFT Okay, we've got a very loud buzz on UHF and S-band strengths have dropped down to about strength 2 at best.

CAPCOM Okay, we were in a handover there to Bermuda so that might have been what caught you.

SPACECRAFT No, it's still there but let me take Bo off UHF and go ahead and read you a NOSL though. Go ahead.

CAPCOM Okay, first did you copy the type of activity that I read.

SPACECRAFT It just conked out.

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CAPCOM Okay, the data start MET is day 2 slash 2 2 : 3 4 :
0 0 latitude 31 north, longitude 9 6 west through 8 0 west. Day
speed 1 / 1 0 0 0 F16.

SPACECRAFT Okay, that show thunderstorms along Louisiana
coast.

CAPCOM That's affirmative.

SPACECRAFT Okay, we'll try to get it. Dick, you expect to get
data Dakar and you want us to do this self test or when we get
you at Dakar?

CAPCOM We do not require site coverage for the self
test. You can do that at your convenience.

SPACECRAFT Okay.

CAPCOM And that we do want you to be at the IMU align
attitude prior to doing that self test.

SPACECRAFT Okay, I understand.

CAPCOM And PJ, we'd be interested in knowing if the UHF
noise that you're hearing is the same as you had yesterday?

SPACECRAFT Yes, it's doing better now than it was when I
reported it a minute or two ago. The intensity has dropped off
the pitch has gone up a little and the frequency, yes, has gone
up a little. I think it's a little lower than it was
yesterday. Interestingly when I'm listening to you on S-band
only you're about strength 2 and when I bring in the UHF the
noise comes in and it looks about strength 3.

CAPCOM Okay, we copy that. Challenger, Houston, have
another switch configuration on panel R1 if someone can get to
it?

SPACECRAFT Yes, go ahead.

CAPCOM Okay, we want to take the cryo O2 and H2 tank 3
heaters, alpha and bravo, to auto and that's all four switches.

SPACECRAFT Okay, that's complete Dick.

CAPCOM Okay, thank you.

SPACECRAFT Dick, are we going to burn out those tanks 3 first?

CAPCOM Standby and I'll get that for you.

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SPACECRAFT Just curious, I thought the plan was to use those up first and then just save tanks 1 and 2 but we seem to be keeping them pretty even.

CAPCOM Challenger, Houston, check your maneuver. It looks like the maneuver did not initiate correctly for right attitude.

END OF TAPE

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CAPCOM Challenger, Houston. Check your maneuver. It looks like the maneuver did not initiate correctly at the right attitude.

SPACECRAFT Okay, Dick. According to universal pointing, the required attitude is 253 2, 161 9 and 332 3. And that's the way we read out of the CAP. Do you want me to stop the maneuver?

CAPCOM Negative.

SPACECRAFT Dots in 5, 6 and 7 are also transferred into the lower right hand portion so it looks like it's in there correctly.

CAPCOM Okay. We might have a TM problem here so press on with your maneuver and we're going to go LOS here in about 10 seconds. We'll be with you again at Dakar at 21 18.

SPACECRAFT Okay. Just give me a warm feeling that the attitude in the CAP is correct cause that's where we're going.

CAPCOM It is correct.

SPACECRAFT Okay.

PAO This is Shuttle Mission Control. We'll be in contact with the Challenger again in 2 and a half minutes through Dakar. Some disagreement over the vehicles attitude and CAPCOM Dick Covey surmises that it may be a TM or telemetry problem and that the data we're looking at here in the Mission Control Center may not be completely reliable since universal pointing indicates to the crew onboard that the vehicle attitude is consistent with what's called for in the crew activity plan. Mission elapsed time now 2 days, 21 hours, 16 minutes. This is Shuttle Mission Control.

CAPCOM Challenger, Houston with you through Dakar for 7 minutes.

SPACECRAFT Roger.

CAPCOM And PJ, I have a question. Interested in knowing if you were still up on UHF as we went LOS at bermuda, and if you did, whether or not you noticed a change in the noise level.

SPACECRAFT Yea, and there wasn't, yes. Yes to both questions, Dick. It did diminish as a matter of fact it went away toward the end of the pass there.

CAPCOM Okay, we had switched UHF transmitters at bermuda so we might have found the source of the problem.

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SPACECRAFT Okay. Okay. Okay, and the marks are in, Houston. Do you want to look at the data?

CAPCOM Roger. We're looking at it now.

CAPCOM And PJ, we've got all the data we need on the IMUs.

SPACECRAFT Okay, we'll go ahead and torque them.

CAPCOM And Challenger, if there's someone who could give us a status of where you are in EVA preps, we'd appreciate it just so we could follow along with it.

SPACECRAFT Yea, I understand. Stand by. MS2 has his crews garment on and all his biomed instrumentation. MS1 is the same way.

CAPCOM Okay we copy.

SPACECRAFT And Houston. I didn't get the self test in yet. When the torqing is done, which it looks like it is now, I'll go ahead and do it.

CAPCOM Roger, we concur.

SPACECRAFT Okay, we got our standard response. Everything looks good up to the end and we got a pass on y and a fail on z.

CAPCOM Roger, we copy.

SPACECRAFT We're going back to ZLV.

CAPCOM Roger.

CAPCOM Challenger, Houston. We're 30 seconds to LOS. Be with you at Indian Ocean at 21 38.

SPACECRAFT Roger.

PAO Mission Control, Houston. 2 days, 21 hours, 25 minutes mission elapsed time. Challenger passing out of range at the tracking station at Dakar on orbit 47. Be reacquiring at about 12 minutes over Indian Ocean Station. Report from the crew is that they're currently on the revised timeline and preparations for the EVA. Mission Specialists Peterson and Musgrave...

END OF TAPE

PAO Mission Control, Houston. 2 days, 21 hours, 25 minutes mission elapsed time. Challenger passing out of range of the tracking station at Dakar on orbit 47. Be reacquiring in about 12 minutes over Indian Ocean Station. Report from the crew is that they are currently on the revised timeline in preparations for the EVA. Mission Specialist Peterson and Musgrave being in the airlock and hooking up their bioinstrumentation. Under the current schedule, they would be beginning, the crew would be beginning the prebreathe, that is the mission specialists who will be doing the spacewalk, beginning their prebreathe in a little under 2 hours from now. This is Mission Control, Houston.

PAO Mission Control, Houston standing by for acquisition through Indian Ocean Station.

CAPCOM Challenger, Houston with you through Indian Ocean for 6 minutes.

SPACECRAFT Roger Houston.

CAPCOM And Bo, I have an explanation for you on the cryo set 3.

SPACECRAFT Go ahead. Go ahead, I'm listening.

CAPCOM Okay. First, I'd just like to pass on that we are expecting the biomed check at this site and then relative to the cryo tanks, the reason we had you turn the heaters on for set 3 was that we wanted to get higher control pressures for the post EVA EMU recharge and after that we'll have you take the heaters back off with the overall goal of having all three cryo sets equal at end of mission.

SPACECRAFT Okay. And when we tried to set up our slider map this morning and it just doesn't seem to work out. It's been working before. We put in the 119.9 west and the time at 19:19 for the (garble) mode and that doesn't seem to match. (Garble).

CAPCOM Okay. We copy and let us look at that.

SPACECRAFT Okay, and I'll go down and see if we can get those guys on the biomed.

CAPCOM Thank you.

SPACECRAFT Houston, we should be set up for the EVA comm. We should be getting to you with the biomed in just a second.

CAPCOM Roger.

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SPACECRAFT And we prefer not to change out the LiOH cannister right now since there's a lot going on right in front of the hatch there.

CAPCOM Roger. We copy and that's no problem.

SPACECRAFT Okay. We'll put that off probably until the guys start to prebreathe or something.

SPACECRAFT Houston, Story and Don are plugged in so you should be getting biomed.

CAPCOM Okay. We're still looking.

CAPCOM Challenger, Houston. We have good biomed on EV1 and 2 and if you want to reconfigure your UHF so we have good UHF at Yarragadee, go ahead and do that. We'll be at Yarragadee at 21:53 and we'll be handing over to the Orbit Team by then. The planning shift would like to wish you the best on your EVA and to tell that it's been a pleasure to execute with you this morning. We'll execute with you anytime.

SPACECRAFT Thank you very much Dick.

PAO Mission Control, Houston. 2 days, 21 hours, 45 minutes mission elapsed time. Challenger has passed out of range of the tracking station at Indian Ocean.

END OF TAPE

PAO Mission Control Houston. 2 days 21 hours 45 minutes mission elapsed time. Challenger is passed out of range of the tracking station at Indian Ocean. Crew is currently on the timeline for their EVA preparations. During this last pass they were configuring their switches to checkout the biomedical attachments that the mission specialists will wear during the EVA. The change of shift press conference with off going flight director Randy Stone is scheduled to begin about 11:00 a.m. central time this morning. We understand that that should take place approximately on schedule as planned. 2 days 21 hours 46 minutes mission elapsed time this is Mission Control Houston. Mission Control Houston. 2 days 21 hours 50 minutes mission elapsed time. We're about 3 minutes away from reacquiring communication with the Challenger over the Yarragadee station. Currently on orbit number 47. Crew is in their pre EVA activities preparing the equipment in the airlock according to the standard timeline. It appears that the activities are running very close to the preflight published timeline. That timeline as updated slightly on the planning shift last night is very similar to the activities as in the published CAP. And we appear to be very close to that at this time. This is Mission Control Houston.

CAPCOM Good morning Challenger, you got the Crystal Team with you at Yarragadee for 8 minutes. And Challenger, if you've reconfigured you got the Crystal Team here with you for about 4 and half more minutes at Yarragadee. And Challenger, if you read us we'll see you over Orroral in about a minute and a half.

PAO Mission Control Houston. 2 days 22 hours 2 minutes mission elapsed time. We have a brief gap here as we go between the stations of Yarragadee and Orroral in Australia. Just be a very brief pass as we go over the Orroral station, perhaps not enough for any significant communication. If there's any attempted it's coming up in about a minute. Then it'll be some time before we reacquire over continental United States. Possibly a brief glimpse on the edge of Hawaii's range. But probably about 25 or 30 minutes before we actually can pick them up over the continental United States. Crew appears to be pretty much on the timeline on the published crew activity plan for their EVA activities. Mission specialists, Musgrave and Peterson, are preparing the airlock and their equipment at the present time. Probably an hour away from prebreathe start.

CAPCOM And Challenger, we got the Crystal Team with you at Orroral for a minute.

SPACECRAFT Read you loud and clear.

CAPCOM Read you the same Bo.

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SPACECRAFT Story, has his on and Don has the helmet piece on.

CAPCOM Copy. Okay, we're going to lose you in about 10 seconds and we'll see you up at Buckhorn at 2 2 3 0.

SPACECRAFT Roger, we'll see you in about 25 minutes.

END OF TAPE

PAO Mission Control, Houston. 2 days, 22 hours, 13 minutes mission elapsed time. Orbiter Challenger is out over the South Pacific at the present time on the last of orbit 47. Be reacquiring in about 17 minutes over the continental United States. Mission Specialists Story Musgrave and Don Peterson are currently in the process of preparing their space suits and getting into those. It's quite a long and complex process. It takes about an hour to set up all the pieces of gear, hook them together, get in those and run the checks that are appropriate. Crew is pretty much on the scheduled timeline apparently. It's about an hour before they would be scheduled to go into their pre-breathe period. We should get some indication of where they are once we pass over the U.S. The press conference for the offgoing Flight Director, Randy Stone, will occur at approximately 11:15 central standard time. At 2 days, 22 hours, 14 minutes mission elapsed time, this is Mission Control, Houston.

PAO Mission Control, Houston. 2 days, 22 hours, 26 minutes mission elapsed time. We're about 4 and a half minutes away from picking up communication with the Challenger over the continental United States. Just a reminder that the Change-of-Shift Press Conference with offgoing Amber Team Flight Director Randy Stone will take place at about 11:15 am central time. This is Mission Control.

PAO Mission Control, Houston. Standing by for acquisition of signal through the continental United States.

CAPCOM Hello, Challenger. We're with you over Buckhorn for about 6 minutes.

SPACECRAFT Hi there.

CAPCOM Hello.

SPACECRAFT (Garble).

CAPCOM And say that again please.

SPACECRAFT The helmets are going on.

CAPCOM Okay.

PAO Mission Control in Houston. Mission Specialist Musgrave reporting they were putting on their helmets. EVA position reports that both helmets are on at the present time and they'll be doing a leak check on those and then a purge. And that they are now about 15 minutes away from the start of pre-breathe activities. That's a 3 and a half hour pre-breathe.

CAPCOM And challenger, about (garble) could you put the TV control in the command position. And we got some good TV down here.

SPACECRAFT Roger, Houston. Houston see (garble).

SPACECRAFT Houston, Challenger.

CAPCOM Go ahead sir.

SPACECRAFT John, you might have somebody troubleshoot something. I got panel R10 set up to record on the VTR. I think coming out of that MS station that CCU power is on. It's plugged into the VTR. I got the audio mode to hot mike but anytime I turn on the ICOM we get what amounts to the same tone as in work mode - constant tone.

CAPCOM Okay. We'll work on it.

SPACECRAFT Okay. And that's on both ICOM A and B. Okay. We apologize for overdumping the water. Three guys were involved in EVA prep and the CDR was otherwise occupied.

CAPCOM Okay. There's no real problem there. We'll excuse you this time. And PJ, if you would, check on R10 and make sure the MS audio is in PTT/PTT and on R11 it should...

END OF TAPE

CAPCOM Okay, There's no real problem there. We'll excuse you this time.

CAPCOM And P.J., if you would check on R10 and make sure the MS audio is in PTT/PTT, and on R11 it should be in hot.

SPACECRAFT Okay. R10 (garble). (Garble). Okay. PTT/PTT and say again R11.

CAPCOM VTR to hot.

SPACECRAFT Switch on that fixed, and thank you.

CAPCOM Yes sir. We're going to lose you here. We're going to go through a short keyhole. See you at Mila.

PAO Mission Control, Houston. That recent TV pass, you could see the two mission specialist astronauts in their spacesuits, helmets closed.

CAPCOM Okay. We're back with you at Mila for about 12 more minutes. Got a good TV picture again.

SPACECRAFT It's a good scene of the old (garble) man I guess, or a girl as the case may be.

CAPCOM Copy.

SPACECRAFT (Garble) to the PLT's (garble). I hear Don and Story loud and clear.

CAPCOM That's good.

CAPCOM And Challenger, we here on the ground are ready to support your EVA comm configuration any time you want to do it. We recommend waiting to Dakar if it's okay with you.

SPACECRAFT Okay John. There's a lot of talk on the checkout and I can't understand you sometimes.

PAO Mission Control. We see the astronauts going through their checkout at the present time. Musgrave is the one with the red band around his, the leg of his spacesuit. There's another red marking on the life support system backpack. Pilot Karol Bobko assisting them in their checkout. Have a lot of systems to check over as they remain mounted to the wall of the airlock so that their life support systems are hooked up to the spacecraft for a power cooling. They do not have to diminish the power in the EMUs.

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SPACECRAFT Houston. Leak tests were successful. We're about a minute and a half into the purge mode.

CAPCOM That sounds great Bo.

PAO This is Mission Control. Musgrave and Peterson about 10 minutes away from beginning their prebreathe. At the present time, they announced they're part way through their helmet purge, suit purge. Mission Control, Houston. Once they start that 3-1/2 hour prebreathe, it's a fairly strict timeline. They should, they will be washing the nitrogen out of their blood so they do not experience any bends in the reduced pressure of the spacesuits. We should expect the EVA probably to begin, probably close to 3:00 p.m. Central Time. We would be expecting the crew to egress through the hatch from the airlock into the payload bay at about that time. 2 days, 22 hours, 45 minutes mission elapsed time. This is Mission Control, Houston.

SPACECRAFT Hello Houston, Challenger. Are you there?

CAPCOM Yes sir. We'll be with you for about 3-1/2 more minutes. We'd like for you to configure after LOS in Bermuda for the air to ground checks over Dakar.

SPACECRAFT Well, we're ready now. Are you?

CAPCOM Okay. We're ready. You'll have to reconfigure and don't forget the power switch on AW18 delta.

SPACECRAFT Do you read me all right?

SPACECRAFT I do now. Yeah. I'm not hearing P.J. at all.

SPACECRAFT That's because I'm not talking to you. EMU1 is checked in mode A and EMU2 in mode bravo - -

END OF TAPE

SPACECRAFT Do you read me all right?

SPACECRAFT I do now.

SPACECRAFT Yeah.

SPACECRAFT I'm not hearing P.J. at all.

SPACECRAFT That's because I'm not talking to you. EMU1 is checked in mode A and EMU2 in mode bravo. Standby. (Garble). Okay. Give em a call.

SPACECRAFT Houston, MS1.

CAPCOM Hey and I hear you loud and clear Story. How me?

SPACECRAFT Fantastic.

Houston, EV2 Yarragadee.

CAPCOM You're loud and clear also, Don.

SPACECRAFT You want us to switch modes now A and B.

SPACECRAFT Houston, you ready for us to switch modes?

CAPCOM Okay. We got a minute and a half. Go ahead and switch modes and we'll check that way.

SPACECRAFT MS1 on B.

CAPCOM (garble). I'm reading you Story but you're down in the

SPACECRAFT Okay.

CAPCOM That's a lot better.

SPACECRAFT Give another call Story.

SPACECRAFT 1 2 3 4 5 5 4 3 2 1.

CAPCOM Okay. I'm reading you loud and clear now.

SPACECRAFT And Houston, EV2 on alpha. How do you read.

CAPCOM I'm reading you 5 by 5 Don.

SPACECRAFT You're good also. I think what happend is, it takes them a while to warm up when you switch modes. It does.

CAPCOM Yeah, we concur with that. We've got 40 seconds to go.

SPACECRAFT Want to check out backup.

SPACECRAFT We're going to backup Houston.

CAPCOM We copy.

SPACECRAFT MS1 in backup.

CAPCOM Loud and clear.

SPACECRAFT MS2 in backup.

CAPCOM Loud and clear.

SPACECRAFT Okay. I will go back to A and...

SPACECRAFT Hold it Story. Hold it.

CAPCOM Okay, P.J., we're going to lose you in about 10 seconds. We'll see you over Dakar at 22:53.

SPACECRAFT Okay. We weren't ready for backup. We'll get you there on backup.

CAPCOM Sounds good.

PAO Mission Control, Houston. 2 days, 22 hours, 49 minutes. Just passed out of range of the tracking station at Bermuda. Will reacquire in about 3-1/2 minutes over Dakar. During that recent pass, got television coverage down from the spacecraft and mission specialists Musgrave and Peterson in their suits mounted to the walls of the airlock. They should be beginning their prebreathe cycle in just a few minutes. During that last pass, we did a communications check with the communication as it occurs between the ground and the mission specialists in the suits. All 3 systems appeared to be good in that check. We'll be hearing from them again in about 2-1/2 minutes over Dakar. This is Mission Control, Houston.

CAPCOM Challenger, we're back with you over Dakar for about 9-1/2 minutes.

SPACECRAFT Roger Houston. We started the prebreathe at 22:53.

CAPCOM We copy. 22:53.

SPACECRAFT Just a few seconds ago.

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SPACECRAFT Houston, Story's suit delta on the pressure check with 0 and Don's was about .1.

CAPCOM Okay. We copy.

SPACECRAFT Story, P.J. said that what you see now is a watchbird watching you.

CAPCOM Is he assuming we have TV?

SPACECRAFT Say again Houston.

CAPCOM Was he assuming we have TV or what?

SPACECRAFT Sorry Houston. You were broken up. Say again please.

CAPCOM Disregard Bo.

CAPCOM And CDR, Houston.

SPACECRAFT He's not on right now.

CAPCOM Okay. You might ask that, we think we got a good backup check unless you guys want to do another one but we would like to get another normal EVA check. That's Story on alpha and Don on bravo before we reconfigure.

SPACECRAFT Okay. Standby.

CAPCOM And before we do that, we've got to get the UHF mode back to EVA.

SPACECRAFT We'll get that set right now. P.J.'s on his way upstairs to set that up.

CAPCOM Okay.

END OF TAPE

CAPCOM And CDR Houston.

SPACECRAFT He's not on right now.

CAPCOM Okay. You might pass that we think we got a good backup check unless you guys want to do another one, but we would like to get another normal EVA check, that's Story on alpha and Don on bravo before we reconfigure.

SPACECRAFT Okay. Standby.

CAPCOM And before we do that, we've got to get the UHF mode back to EVA.

SPACECRAFT We'll get that set right now. P.J.'s on his way upstairs to set that up.

CAPCOM Okay.

SPACECRAFT We are going to configure for the EVA now.

CAPCOM Copy.

SPACECRAFT (Garble) EV1, are you in mode alpha?

SPACECRAFT Not yet. I'll go there.

SPACECRAFT Okay. EV1 to mode alpha please and EV2 to bravo.

SPACECRAFT Is EV1 in alpha and EV2 in bravo?

SPACECRAFT That's affirmative.

SPACECRAFT Okay. Give the (garble) a call will you please.

SPACECRAFT Well, wait a minute Story. (Garble).

SPACECRAFT Okay, give the count to Paul, Story.

SPACECRAFT This is EV1, 1 2 3 4 5 5 4 3 2 1.

CAPCOM Okay Story. We read you loud and clear. We've got a loud background - -

SPACECRAFT Boy, did you understand those Story?

SPACECRAFT No. You're unintelligible John. You're down in the mud and very broken and garbled.

CAPCOM Okay. How do you read me now?

SPACECRAFT That's a little better (garble) off.

CAPCOM Yeah. CDR concurred.

CAPCOM Okay. We need a call from MS2.

CAPCOM What did you say Story?

CAPCOM We've got about 50 seconds to go. We need a call from MS2.

SPACECRAFT EV2 Houston. How do you read?

CAPCOM Read you loud and clear with the same background noise.

SPACECRAFT Okay. That's a lousy call from you guys John.

SPACECRAFT Sounds like you have two transmitters here, two wave drops.

CAPCOM Okay P.J. We're going to lose you in about 30 seconds. Go ahead and reconfigure hardline and reconfigure the UHF and we'll see you down at Botswana at 23:11.

PAO Mission Control, Houston. 2 days, 23 hours, 2 minutes mission elapsed time. Challenger has passed out of range of the tracking station at Dakar. We're continuing to do communications checks through the spacesuits there with astronauts Musgrave and Peterson mounted in the airlock on the, in their EMUs. (garble).

CAPCOM (Garble) if you still read us go ahead and reconfigure simplex.

CAPCOM Challenger, we're coming to you over Botswana on 2:59 simplex for about 3 minutes.

CAPCOM Challenger, Houston with you over Botswana for about 2 more minutes on 2:59 UHF.

CAPCOM Challenger, we've got about 50 seconds to go here at Botswana. If we miss you we'll see you at Yarragadee at 23:28.

END OF TAPE

CAPCOM Challenger, we've got about 50 seconds to go here at Botswana. If we miss you we'll see you at Yarragadee at 23 28. Challenger, Houston with you over Yarragadee for 7 and half minutes. Challenger, Houston with you at Yarragadee for 6 minutes. Challenger, Houston with you on 259 over Yarragadee for about 4 more minutes. Challenger, we're going to lose you here at Yarragadee. We'll see you up at Hawaii at 23 54.

PAO Mission Control Houston standing by.

CAPCOM Houston with you over Hawaii for 7 and half minutes.

SPACECRAFT Thank you Houston. (garble) he'll be up in a minute. Houston, is there any reason why you don't wish us to be on hardline for the EVA guys to, while we're prebreathing?

CAPCOM Yes sir, we'd like for you to be on comm mode hard line.

SPACECRAFT Okay, comm mode hard line. Okay, let's go.

CAPCOM And just complete those steps that are there at the bottom of 3-2, the audio back to audio tone on AW18 delta and reconfigure the UHF on 2-4.

SPACECRAFT Roger. Houston, Challenger.

CAPCOM Yes sir.

SPACECRAFT Okay, about an hour into my 40 minute procedure on the DEU DDU screen. I got the four DDU filters cleaned as best I could through the holes in the access cover, John, and I guess I got now 80 to 90 percent of the lid off of it. The best part was getting the ones over here on the right hand side to take out the 34 screws or however many.

CAPCOM We copy.

SPACECRAFT And we don't have the right tools to do that job. Like to make a couple of suggestions. What you really need for that because these screws they don't ever come out easy. They're like they got locked tighter or you know, locking screws. I think what we really need, we got a speed wrench onboard but it won't fit the phillips drivers. It's a 3/8ths inch drive and the phillips is a quarter inch and we have an adapter to go from a quarter inch down to 3/8ths but not the other way. A ratchet wrench would be nice and we got one but it's that big (garble) that's primarily a torque wrench. It just is a lot of work to get that thing out.

CAPCOM We copy.

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SPACECRAFT Also, in the right hand side, to get at the panel that's over the DEU's, there's a cut out on the left hand side to account for some prime around the hatchway and that didn't fit right. But we had to break out Bo's swiss army knife and do a little surgery on some fiberglass or whatever this coming material is made out of and somehow or other we can get the panel off.

CAPCOM Okay, we copy that too.

SPACECRAFT And these screens are really dirty and I'll take some pictures of them and bring them back. But it's primarily lint but there's a lot of washers, screws, there's one sticky back snap, and assorted nuts, and what have you. So we'll get it cleaned off.

CAPCOM We copy. Sounds like you're giving the ship a clean sweep down fore and aft?

SPACECRAFT You know how these EV guys are. If we could only figure out what the fantail was. John, we just got message number 27, the NC weather data, and it looks pretty good.

CAPCOM Thank you sir.

END OF TAPE

CAPCOM Sounds like you're giving the ship a clean sweepdown fore and aft.

SPACECRAFT You know how these EV guys are. If we could only figure out what the fantail was.

SPACECRAFT John, we just got message number 27, the entry weather data and it looks pretty good.

CAPCOM Thank you sir. And P.J., sometime when you get a chance, we would like for you to configure the PCS system to system 2 automatic and that's on page 5-6 in the orbit ops checklist.

SPACECRAFT Roger. I'll pass it along.

CAPCOM Approaching LOS here at Hawaii. We'll see you in 3 minutes over the mainland.

SPACECRAFT What was that?

PAO Mission Control, Houston. 3 days, 0 hours, 2 minutes mission elapsed time. Challenger just passed out of range of the Hawaii tracking station. Commander Paul Weitz was discussing over the air to ground link there his efforts to clean out some of the air filters that protect the electronic equipment in the spacecraft. Reported quite a bit of debris, lint, washers, nuts and bolts, that sort of thing that were apparently left over from the manufacturing process that get into those filters in a weightless environment. They will be taking some pictures of those filters and cleaning them off. The crew has about 2 hours and 20 minutes remaining in their scheduled prebreathe period and at that point then, they have a few little things to do before they would be prepared to step outside the airlock for the beginning of the spacewalk. 3 days, 0 hours, 3 minutes mission elapsed time, this is Mission Control, Houston.

CAPCOM And we're back with you over the mainland here and we'll be with you for about 18 more minutes.

SPACECRAFT Okay, and we have (garble) ops are nominal on orbit configuration with system 2. Is that correct?

CAPCOM That's affirmative.

SPACECRAFT Houston - -

CAPCOM Go ahead.

SPACECRAFT Okay. It looks like it just switched to the low mode which may shut out more noise and of course it rang the master alarm. I take it back. P.J. says it looks like it's going to switch to N2 is when the alarm came on.

CAPCOM Okay. We copy.

SPACECRAFT Houston, Challenger.

CAPCOM Go ahead.

SPACECRAFT Just a couple of observations of interest to the ECOMS. Whether they're interested or not they're going to hear it. Real slow in O2 and it was making a (garble) of noise but a lot and our flow here was indicating off scale high. Then all of a sudden, the noise changed and it made a louder noise and I looked at the flows and O2 was going down and N2 was going up and the controller valve was asking for N2 and then all of a sudden the N2 flow jumped off scale high at which time the noise diminished. It is nearly gone now so apparently it was during the transition from O2 to N2 for some reason was making more noise in there.

CAPCOM Copy. What's the N2 doing now?

SPACECRAFT Well, it's off the peg right now. Just as you were asking it came off the peg. It's at 4.4 and dropping.

CAPCOM Okay. We copy.

SPACECRAFT We indicate that at present 14.7 PP02 about depending on which sensor you want to use. A is consistently reading a little higher than Band C as I'm sure they're aware of. We got by about 3 and a quarter PP02.

CAPCOM Roger that. EECOM thinks that's a normal cabin makeup.

SPACECRAFT (garble)

SPACECRAFT Houston, are you getting any TV down?

CAPCOM No sir. We're not getting any TV right now.

SPACECRAFT You at Mila?

CAPCOM We're not scheduling any over this pass.

SPACECRAFT Okay.

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CAPCOM If you would, we'd like for you to make a round
around the cabin there and make sure that all air to ground 2's
are in receive only except for the teleprinter.

SPACECRAFT I'll look.

END OF TAPE

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CAPCOM We're not scheduling any over this pass.

SPACECRAFT Okay.

CAPCOM If you would, we'd like for you to make a round around the cabin there and make sure that all air-to-ground 2's are in receive only except for the teleprinter.

SPACECRAFT I'll have a look.

CAPCOM And the one that has a VTR connected to it should be air-to-ground 2 should be off.

SPACECRAFT Transmission station RER. That's off. The only ones upstairs except for the payload station are in off on air-to-ground 2.

CAPCOM Okay, you might also check AW18 delta.

SPACECRAFT Okay.

CAPCOM And, welcome to flight day 4.

SPACECRAFT Thank you. The lower deck ones are in TR. Sorry, they were in receive.

CAPCOM Copy.

SPACECRAFT Houston, Challenger. Are we just over the Gulf Coast now?

CAPCOM That's affirmative. You're right over Houston.

SPACECRAFT Okay, well last time someone here, we were a little south. I couldn't get any last time because we were so busy with the EVA preps.

CAPCOM Copy. And we got a lot of people outside waving at you.

CAPCOM And Challenger, Houston. We're still getting a downlink indication that the teleprinter is running. We'd like for you to go through the teleprinter cue card, and see if you can find something out of configuration.

SPACECRAFT Okay.

CAPCOM And, Bo if you would, would you go to where you have a TPR plugged in and cycle the power off and back on?

SPACECRAFT Okay. John, (garble) told us some time ago that when we were finished with the MLR we probably could unplug one of the DC power sources from it. If that's true, we'd like to be able to do that since we have MLR taking up 2 of our DC's downstairs and (garble) there are a couple of others being taken up as well.

CAPCOM And you got to go to unplug the MLR.

SPACECRAFT Completely or which one of them?

CAPCOM Anyone of them. The best one that you need.

SPACECRAFT Okay, we'll unplug one.

CAPCOM And Bo, if you'd like to, you can also unplug the teleprinter and use that outlet.

SPACECRAFT Okay, we don't need it right now it just would be nice to have an extra DC auxilliary power down on the deck.

CAPCOM We copy. And we'll try to remind you on the last day to replug that MLR.

SPACECRAFT Thank you. Okay, I just cycled the power off and then cycled on on the TPR.

CAPCOM Copy.

SPACECRAFT It's giving us all kinds of trouble right now.

CAPCOM And we got about 40 seconds to go here. We'll see you down at Dakar and Ascension for 10 minutes and that'll start at 3 0.

SPACECRAFT Check, 3 0.

SPACECRAFT Houston, if you're still there the teleprinter just stopped.

CAPCOM Yes sir. We just noticed that. It's back to nominal it looks like.

PAO Mission Control, Houston. 3 days, 0 hour, 24 minutes mission elapsed time. Challenger is passing out of range of the tracking station at Bermuda. Has a little trek over the Atlantic Ocean until comes within range the station at Ascension and marginally the Dakar station as well. It'll be in about 6 minutes. Crew is troubleshooting teleprinter problem there.

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They're indication was that the teleprinter was on after checking switch configurations and cycling the power that, that difficulty went away. Crew has about 2 hours remaining in their scheduled pre-breathe. At 3 days, 0 hours, 25 minutes this is Mission Control, Houston.

END OF TAPE

PAO - - checking switch configurations and cycling the power, that difficulty went away. The crew has about 2 hours remaining in their scheduled prebreathe. At 3 days, 0 hours, 25 minutes, this is Mission Control, Houston.

PAO Mission Control, Houston standing by for acquisition right over the edge of the Dakar tracking station and through Ascension.

CAPCOM Challenger. We're with you for about 9-1/2 minutes over Dakar and Ascension.

SPACECRAFT Roger, Houston. GAS relay activations 3 and 4 went fine.

CAPCOM Thank you.

PAO Mission Control, Houston. Crew reporting a moment ago that they activated the getaway special cannister containing the snow experiment. The get away special from the Asahi Shimbun, the large newspaper, daily newspaper in Tokyo which sponsored the experiment to create snow on orbit inside the getaway special cannister. I just mention that they have activated that one now. Still have about 6-1/2 minutes remaining in this pass over Ascension and Dakar. This is Mission Control.

CAPCOM CDR, Houston.

SPACECRAFT (Garble).

CAPCOM Yeah Bo. We've been scrounging around here looking at our tool manifest and you should have an adapter in there that goes from a quarter to three eights and also one from three eights to a quarter.

SPACECRAFT Okay. I'll look.

CAPCOM And one of those adapters should have been in the top tray and one should have been in the bottom tray of the tool box there.

SPACECRAFT I'm almost afraid to give it to him now after he's taken all of them out. Putting them back in.

CAPCOM Yeah, that's what we figured.

CAPCOM We've got a minute to LOS here. We'll see you at Botswana at 04:04.

SPACECRAFT Roger.

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PAO Mission Control, Houston. 3 days, 0 hours, 41 minutes mission elapsed time. We have about a 3 minute gap here in communications between the Ascension station and the one at Botswana in Southern Africa.

CAPCOM Challenger, we're with you now at Botswana for about 7-1/2 minutes on the UHF.

SPACECRAFT Read you loud and clear.

CAPCOM Got you the same.

SPACECRAFT We found it John, and he still has enough so he's very happy about it.

CAPCOM That's good. There's nothing like working on your vehicle with the wrong tools.

SPACECRAFT How much longer do you have on this pass?

CAPCOM We've got 6-1/2 minutes.

SPACECRAFT I unplugged the MLR from N052J.

CAPCOM We copy.

SPACECRAFT Hey, Houston.

CAPCOM Yes sir.

SPACECRAFT Okay. An update. On the PDUs and PDUs on the starboard side John, I took off panels, whatever the 2 forward ones are, cleaned those 2 units in there and they were pretty dirty, dirtier than I thought. I did not take off panel R18, I guess it is. The aft motion, I could reach in with the vacuum cleaner and go down along there. I could clean the entire top screen and I got at least 90 percent of the stuff off the bottom screen.

CAPCOM We copy.

SPACECRAFT That speedwrench is a real life saver. I'm glad Bo found that adapter. I feel we're going to come back with forearms like Popeye or else not be able to use them for a month.

CAPCOM We copy.

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CAPCOM Challenger, we've got about a little less than a minute here at Botswana. We'll see you at Yarragadee at 0:4.

SPACECRAFT Roger, Houston.

SPACECRAFT Okay, the rewind button there. (garble).

END OF TAPE

CAPCOM Challenger we got about a little less than a minute here Botswana. We'll see you at Yarragadee at 0 4.

SPACECRAFT Roger, Houston. Okay, the rewind button there...

PAO Mission Control, Houston. 3 days, 0 hours, 52 minutes mission elapsed time. Challenger out of range of the station at Botswana. Be reacquiring in about 12 minutes over Yarragadee.

CAPCOM Challenger, we're with you over Yarragadee for 6 and a half minutes.

CAPCOM Challenger, Houston with you over Yarragadee for 5 and a half minutes.

SPACECRAFT Houston, how do you read Challenger?

CAPCOM Okay, Bo. Got you loud and clear now with 5 minutes left here at Yarragadee.

SPACECRAFT Okay.

CAPCOM And Bo, Guy and I ran those ascending node times and things through our maps, sliding map down here and checked them with FIDO and they looked pretty good.

SPACECRAFT Okay, well maybe we made a mistake.

CAPCOM We're going to LOS here at Yarragadee. We'll see you up at Guam at 1 8.

SPACECRAFT Roger.

PAO Mission Control, Houston. 3 days, 1 hour, 12 minutes mission elapsed time. Challenger out of range of the Yarragadee tracking station now. Will be reacquiring at about 6 and a half minutes over Guam. Crew has about an hour and 10 minutes remaining in their scheduled 3 and a half hour pre-breathe. This is Mission Control, Houston.

PAO Mission Control, Houston. Standing by for acquisition through Guam.

CAPCOM Challenger, Houston with you over Guam for a little less than 3 minutes.

SPACECRAFT Roger, Houston.

CAPCOM And PJ, if you would, check the teleprinter for number 28. Let me know if you got it.

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SPACECRAFT Okay, I'll go down and do that. He's busy still with the DDU's and DEU's. He's vacuumed them all and he's putting the last couple of panels back on them.

CAPCOM Okay, we've got a couple minutes.

CAPCOM Little under a minute here at Guam. See you over Hawaii at 1 2 9er.

SPACECRAFT Roger, we've got the teleprinter message and it's very readable.

CAPCOM Okay, I want to get a voice check with all four of you over Hawaii sometime.

SPACECRAFT (Garble).

CAPCOM And you might mention to Story and Pete, we'd like for them to stay hard line and on the wall till after Mila.

SPACECRAFT Understand, hard line and on the wall till after Mila. We got that.

PAO Mission Control, Houston. 3 days, 1 hour, 23 minutes mission elapsed time. Challenger out of range Guam station. Reacquire in about a little under 7 minutes over Hawaii.

PAO Mission Control, Houston. 3 days, 1 hour, 29 minutes mission elapsed time. We're about to reacquire communication with the Challenger over Hawaii.

CAPCOM And Challenger we're with you over Hawaii for 7, for 8 minutes.

SPACECRAFT Roger, Houston. Loud and clear.

CAPCOM You sound loud and clear...

END OF TAPE

PAO Mission Control, Houston. 3 days, 1 hour, 29 minutes mission elapsed time. We're about to reacquire communication with the Challenger over Hawaii.

CAPCOM And Challenger, we're with you over Hawaii for 8 minutes.

SPACECRAFT Got you Houston, loud and clear.

CAPCOM You sound loud and clear. Bo, when you get a chance sometime, let's get a voice check from the other 3 crewmen during this Hawaii pass.

SPACECRAFT EV1 loud and clear John.

CAPCOM I read you loud and clear Story.

SPACECRAFT EV2. Your loud and clear.

CAPCOM Read you the same Don.

SPACECRAFT I'll get P.J. on the headset. He's still struggling with the panel and we'll just remain in this configuration until after Mila.

CAPCOM Sounds good.

CAPCOM Tell P.J. we're working on a union card for him.

SPACECRAFT Hello Houston.

CAPCOM Read you loud and clear P.J.

SPACECRAFT Same here. I've got to go back to one last stubborn screw that won't go in. The last one in the whole batch.

CAPCOM Well, that's good news. It's always the last one.

CAPCOM And we're a little under a minute here at Hawaii. We'll see you over Buckhorn at 1:39er.

SPACECRAFT Roger. At 1:39er in about 2 minutes.

CAPCOM That's affirm.

PAO Mission Control, Houston. 3 days, 1 hour, 38 minutes mission elapsed time. We have a brief gap in communications here as the Orbiter passes between the range of the tracking stations at Hawaii and then reacquiring over

Continental United States in about a minute and a half. Mission Specialists Musgrave and Peterson have about 45 minutes remaining in their prebreathe activity. Shortly after they finish the prebreathe activities, they can begin their preparations for the EVA and depressurizing the airlock paneling on the EMUs. Perhaps shortly we'll get an update on when they plan to begin that. 3 days, 1 hour, 39 minutes, this is Mission Control, Houston.

CAPCOM Hello Challenger. We're with you over Buckhorn for about 7-1/2 minutes.

SPACECRAFT Roger Houston. Read you loud and clear.

SPACECRAFT Houston, Challenger.

CAPCOM Go ahead P.J.

SPACECRAFT Yeah. That DDU and DEU cleaning is complete. The closeouts have been replaced. It was a lot of hard work but I really think it was necessary. I'm glad we did it now. I gave an estimate yesterday that the screens I could see through the holes in panels L8 and R9 of L9 and R8, or whatever they are were about 40 or 50 percent covered and actually it was closer to 90 to 95, so we really took a lot of stuff off of that.

CAPCOM Probably save us about a week in turnaround.

SPACECRAFT When we're changing something out up here

CAPCOM And P.J., TV capability does exist for Mila at your call if you want to use it.

SPACECRAFT Yes, and we're set up for it.

PAO Mission Control, Houston. We expect to have some television here coming up over the Mila pass. Commander Paul Weitz going through his housekeeping duties cleaning the filters that strain particles, lint, whatever out of the air as it flows in to cool some of the electronic gear. It's a inflight maintenance procedure to go in and vacuum off those screens which collect anything that happens to be floating through the air.

CAPCOM And P.J., we've got about a minute here at Buckhorn. We're going to go into a minute and a half gap and I'll see you at Mila.

SPACECRAFT Okay.

PAO Mission Control, Houston. Standing by for acquisition through Mila. Expecting some TV on this pass.

END OF TAPE

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CAPCOM And PJ, we got about a minute here at Buckhorn. We're gonna go into a minute and a half gap and I'll see you at Mila.

SPACECRAFT Okay.

PAO Mission Control, Houston. Standing by for acquisition through Mila. Expect some TV on this pass.

CAPCOM Challenger, Houston with you over Mila for about 6 and a half minutes.

SPACECRAFT Roger, Houston.

CAPCOM And, you'll be pleased to know that President Reagan is standing by to say a few words to you so without further ado we're going to switch you over to the White House and the communications staff up there.

WHITE HOUSE Yes, Steve, hello?

PAO White House you're on. Go ahead.

WHITE HOUSE Yes, how do you read us Challenger?

SPACECRAFT Roger, loud and clear.

WHITE HOUSE Okay, the President will be on in just a little while here. Just wanted to give us a little voice check here. Give us another little quick test count?

SPACECRAFT Test 1 2 3 4 5 5 4 3 2 1.

WHITE HOUSE Okay, loud and clear on this end Let me check our (garble) please.

SPACECRAFT You're breaking up a little bit White House.

WHITE HOUSE Okay. How bout now. Check 1 2 3 4 5 5 4 3 2 1.

SPACECRAFT That soun little scratchy but it's quite workable.

WHITE HOUSE Okay, let me check with our (garble). Okay, you're standing by for the President. Are you ready?

SPACECRAFT Yes sir.

WHITE HOUSE We're still hanging in there.

SPACECRAFT Oh, all right. I was just about to call.

WHITE HOUSE Okay, stand by.

PRESIDENT REAGAN Hello? How do I know when they're on?

WHITE HOUSE Go ahead please.

PRESIDENT REAGAN Yes, am I talking to the Space Shuttle Challenger?

SPACECRAFT Yes sir, you certainly are.

PRESIDENT REAGAN Well, listen first of all congratulations on the continued success of your mission. I understand you're even ahead of schedule.

SPACECRAFT Well, we like to stay that way Mr. President.

PRESIDENT REAGAN Well, listen. The Challenger proves again the quality of our technology and the versatility of the Space Shuttle serves as a symbol, I think, of our commitment to maintain America's leadership in space. But all of it would be without any merit at all if it wasn't for men that we have like all of you Commander Weitz and your Pilot Karol Bobko and your Mission Specialists Story Musgrave and Donald Peterson. And I know that while one of you has been out in space there in connection with the space platform, the others this is your maiden voyage.

SPACECRAFT Well thank you sir and we appreciate that. I know it's, it's an old and well used song but you know we just get the glory. We really get to stand on the shoulders of giants when we participate in this program.

PRESIDENT REAGAN Well, you're pretty close to giants yourselves. I know that I shouldn't keep you too long because you're kind of anxious to make that space walk out there and we'll be all watching for that down here. And just please know that all of us, the American people, are very proud of your service to your country and what you're doing and we wish you well on the continued flight and on the space walk. I can't say I envy you but we are very proud of all of you. Good luck to you on the rest of your mission. God Bless you.

SPACECRAFT Well, thank you very much. Sir, it's an honor and a privilege to be here and we really much appreciate your call.

PRESIDENT REAGAN All right. Goodbye.

SPACECRAFT So long.

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CAPCOM Okay, Challenger. We're back in Houston now. We got about 2 and a half minutes to go.

SPACECRAFT Okay. Okay we just updated the clocks Houston. We got 29 minutes until we got 3 and a half hours of pre-breathe in.

CAPCOM We concur and we're getting some good shots of the hatch there.

SPACECRAFT Okay.

CAPCOM We've a little under a minute here at Mila. We'll see you down at Ascension at 2 0 8.

SPACECRAFT Roger.

CAPCOM That's a great shot from camera bravo.

PAO Mission Control, Houston. Passing out of range of the tracking station at Mila right now. At communication with the White House over that pass. Again, checking out the cameras for the upcoming space walk. It's 3 days, 1 hour, 56 minutes into the mission. Space Shuttle Challenger. Orbit number 50. Crew has about 27 minutes remaining in their 3 and a half hour pre-breathe period.

END OF TAPE

PAO It's 3 days, 1 hour, and 56 minutes into the mission, space shuttle Challenger, orbit number 50. Crew has about 27 minutes remaining in their 3-1/2 hour prebreathe period before they will then be ready to do the space walk. We'll reacquire again in about 12 minutes over Ascension Island. This is Mission Control, Houston.

PAO Mission Control, Houston. 3 days, 2 hours, 8 minutes mission elapsed time. Be reacquiring over Ascension Island here shortly. Crew has about 15 minutes remaining in the scheduled prebreathe.

SPACECRAFT (Garble) far enough. I think - -

SPACECRAFT Okay there you go. Lead the way. You got them on? Push down on the handle a little bit, I'll do the locking. Push down the handle just a little bit. There we're locked. Now be sure as far as the equalization valves here are closed.

SPACECRAFT Okay. Equalization valve off and off.

SPACECRAFT Thank you.

SPACECRAFT We'll put the covers on here.

SPACECRAFT No. Don't do that because we may need a rapid repress and that kind of business. They stay off. The covers stay off. Okay?

SPACECRAFT Okay. Want me to push you up a little bit Don?

SPACECRAFT I think I'm just about up against the ceiling, Story. I could bend over and get a little higher maybe. My backpack's up against the footrest now. I won't go much higher than that.

SPACECRAFT Okay. That'll be fine right like that.

SPACECRAFT Okay.

SPACECRAFT Now, I'm going to try to swing my legs up there, no, I'm good right here. I'm perfect right here for everything, Don.

SPACECRAFT Okay. What are you going to do with that?

SPACECRAFT Well, I'm going to stow it as soon as we get done using it.

SPACECRAFT Okay.

SPACECRAFT How are we doing approaching 3:30 out there guys?

SPACECRAFT We show about 3 minutes and 10.

SPACECRAFT 3 minutes and 10 seconds to go?

SPACECRAFT We've got 2:11 now.

SPACECRAFT 2:18 now has passed, so it's about 10 more minutes.

SPACECRAFT Okay.

CAPCOM Challenger, Houston's with you for about 4 more minutes over Ascension. We'll not have the Botswana pass with you.

SPACECRAFT Roger, Houston. Got the hatch closed and we're waiting for a go for depress on time.

CAPCOM Sounds good Bo.

SPACECRAFT Copy. We have a go for depress on time.

CAPCOM That's affirmative. You have a go. You might want to double check that seal if you didn't already.

SPACECRAFT We visually inspected it all around. I don't know what else to do.

CAPCOM Sounds good.

PAO Mission Control, Houston. Communication between the crew and the ground indicating that they are essentially ready.

SPACECRAFT And Don wanted to talk to (garble).

CAPCOM Okay.

PAO Essentially ready to depress the airlock in about 10 minutes. Accomplished that, they will take the pressure down part of the way down to about 5 pounds, check for leaks and make sure that the suit integrity is good and beyond that, after that check - -

SPACECRAFT Don, I think you gave me one too many film. We need 3 for this activity.

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SPACECRAFT Okay. I always give you a spare. Sometimes they don't work.

PAO They will depress the vacuum.

SPACECRAFT Essentially, you aren't supposed to film it. I'd like Story when he's going out to - -

END OF TAPE

PAO ... and beyond that, after that check.

SPACECRAFT Don I think you gave me one too many film. We need 3 for this activity.

SPACECRAFT Okay. I always give you spares. Sometimes they don't work.

SPACECRAFT Okay.

PAO They will depress the vacuum.

SPACECRAFT And since we are supposed to comment I'd like Story, when he's going out, to stop out there when he's done so that I can change the film magazine and then head it up for Don's going out.

SPACECRAFT Okay.

SPACECRAFT Okey doke. You won't have any trouble with that. You know how patient and understanding he is. PJ?

SPACECRAFT Go ahead. What do you need.

SPACECRAFT Any loss of comms (garble) I will stop the depress.

SPACECRAFT Sure thing, you bet. If you lose comm during the depress, you hold for about 5 minutes if you're no problem. And if we don't reestablish comm then you repress and come on in.

SPACECRAFT Right.

CAPCOM And PJ, everything looks good to us. We'll see you at 2 51 Guam. Good Luck.

SPACECRAFT Roger, doger.

PAO This is Mission Control, Houston. 3 days, 2 hours, 15 minutes mission elapsed time. Astronauts Musgrave and Peterson in the airlock preparing to depressurize the airlock partially. That's part of the procedure for going all the way to vacuum. We will not have voice communication during the upcoming pass over Botswana. That is a UHF only station and when the crew is in the, is configured in the EVA communication mode we would be unable to communicate with them during that particular pass. We will pick them up again over the Guam station in about 35 minutes and by that time we will anticipate that they may have, they may have egressed the airlock or at least depressurized and will have began their space walk. We'll be standing by to hear from then on that. At 3 days, 2 hours, 16 minutes mission elapsed time this is Mission Control, Houston.

PAO Mission Control, Houston. 3 days, 2 hours, 24 minutes mission elapsed time. The Astronauts Musgrave and Peterson have completed their 3 and a half hour pre-breathe time required and according to the EVA preparation timeline they now begin a 12 minute airlock depressurization cycle. During that period of time the airlock is very slowly depressurized till it reaches 5 pounds. At that point they close the airlock depressurization valves and do checks on the spacesuit to determine no leakage at 5 psi. They will wait at that once they have made that check before preceeding on with complete depressurization. Orbiter Challenger is currently over the Botswana site although we are receiving no communication because of the special communication configuration onboard the spacecraft. The communications are set up to be in the EVA mode, that is so that they can speak with the ground during the space walk and over UHF only sites we're not able to receive any transmission from them. We'll be reacquiring, however, over Guam at about 25 minutes and checking on their progress at that time. 3 days, 2 hours, 26 minutes mission elapsed time. This is Mission Control, Houston.

PAO Mission Control, Houston. 3 days, 2 hours, 50 minutes mission elapsed time. We will be picking up communication with the orbiter again shortly on this pass over Guam.

SPACECRAFT (Garble)

SPACECRAFT Story on the line. Here we go.

SPACECRAFT Good. Feels fantastic. Here we go!

SPACECRAFT Now, the (garble) right there.

SPACECRAFT It's a left hand turn. Could be about by your left hand (garble).

SPACECRAFT I see it, I got to pull over to it a little bit.

CAPCOM And Challenger, Houston's with you over Guam for about 7 and a half minutes.

SPACECRAFT Roger. Hatch is open. EV1 is half way out, They're configuring the airlock, getting ready for Don to come out.

CAPCOM That's great news.

SPACECRAFT Did you do it?

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SPACECRAFT I got it.

SPACECRAFT Great.

SPACECRAFT Houston, do you have a suggested setting for the DAP camera now in the sunlight? It's the one down here through the little hatch window.

(Garble).

END OF TAPE

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CAPCOM Challenger. Houston's with you over Guam for about 7-1/2 minutes.

SPACECRAFT Roger. The hatch is open. EV1 is half way out. They're configuring the other one getting ready for Don to come out.

CAPCOM That's great news.

SPACECRAFT I gathered.

SPACECRAFT Houston, do you have a suggested setting for the DAP camera now with the subtle light? There's the one down here through the little hatch window. (Garble). Story.

SPACECRAFT Yeah.

SPACECRAFT Your ACU is hooked on the door here kind of. You want me to just to leave it there (garble).

SPACECRAFT It'd be in the hatch. I think it's a fine place to leave it.

SPACECRAFT All right. I shall. Uh oh. The (garble) is loose Story, which - - that one that you have in the airlock with us. I caught it but I don't know what to do with it. That's why I wanted you to (garble).

SPACECRAFT I think you'll have to move. These velcros here over the outer hatch.

SPACECRAFT That's what I'm going to do Story.

SPACECRAFT Velcro on the inner hatch over there.

SPACECRAFT Velcro, I'm afraid I'll kick it loose. I'm going to bend it double and stick it into one of the pockets in the bag.

SPACECRAFT You don't have to bend it if you stick it in the back pocket of the bag.

SPACECRAFT All right.

SPACECRAFT The back pocket.

SPACECRAFT Okay. I'll try that.

SPACECRAFT After you get out of there, I'll come down and help you float starboard.

SPACECRAFT (Garble).

PAO This is Mission Control. We hear that Astronaut Story Musgrave is at least part way out of the airlock now. The hatch is open. This will be the first American space walk since 1974, Skylab 4 when Ed Gibson and Gerald Carr had an EVA on Skylab 4.

CAPCOM Bo, Houston. I have the settings for that DAP camera if you never got them.

SPACECRAFT Go ahead.

CAPCOM Okay. It's 12 frames per second. Speed is 160th and the F-stop is 2.

SPACECRAFT Do I need the shuttle lights up? Okay.

CAPCOM And Bo, if you've got the shuttle lights, you need to use the spot light also.

SPACECRAFT Okay. Don's out of the hatch and Story's up at the starboard longeron. I looked up and saw them looking over my shoulder in there.

CAPCOM Copy that P.J. Would you ask them to give us a status before we leave Guam. We have got 2-1/2 minutes to go.

SPACECRAFT Okay.

SPACECRAFT Do you want me to read it to you.

CAPCOM We're ready to copy.

SPACECRAFT PD2 is (garble) plus 4.3, O2 plus 831, (garble) plus 2.7, H2O gas pressure is 15.- -

END OF TAPE

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SPACECRAFT I looked up and saw them looking over my shoulder in there.

CAPCOM Copy that P.J. Would you ask them to give us a status before we leave Guam. We've only got 2-1/2 minutes to go.

SPACECRAFT Okay. Do you want me to read it to you.

CAPCOM We're ready to copy.

SPACECRAFT PD2 is PJ press 4.3, O2 press 831, (garble) press 2.7, H2O gas pressure is 15.7, water pressure 16.2, O2 position is EDA, time of EDA 24 minutes, 93 percent power left, time remaining is 5 plus 51. 97 percent O2, 93 percent power, (garble) is 18.6, O2O.9, H2O temp is 39 degrees. Hatch back to PJ press.

CAPCOM We copy Don. How about Story?

SPACECRAFT Just a second. I hate that thing to read it, it's so bright out here. EDA (garble) 25 minutes. (Garble) 93 percent power left. Time left 533 at 93 percent power. 99 percent O2, 93 percent power left. Battery volts 19.1. (Garble) 4.9, O2 temperature's 40, bridge pressure 4.3, oxygen .39, (garble) fan pressure 2.7, motor pressure 16.2, gas pressure's 14.6.

CAPCOM And Story, tell me your O2 pressure again.

CAPCOM We're going LOS. We'll see you at Hawaii. 3:05. We need your O2 pressure again Story, if you copy.

SPACECRAFT Yeah. It's 838.

CAPCOM Okay. Got a copy that time.

SPACECRAFT That (garble) bad to get back. The light is still in here brighter for this kind of (garble) conditions. I tried it all the way up.

CAPCOM We copy.

PAO Okay. It appears that both crewmen are out of the airlock at the present time. They should be hooking up to their slidewires. Musgrave who will be called EV1 on this spacewalk, Peterson EV2. Musgrave will be attaching to the starboard side slidewire, Peterson to the port side. During that last portion of the pass, the mission specialists were reading off the indications on their EMUs battery power, remaining oxygen, the other parameters that must be monitored periodically through the

EVA. One of the first things that will be happening momentarily, Musgrave will be moving down the starboard side. During that period of time, as he goes all the way to the aft bulkhead, Peterson will be monitoring his motion determining, watching the speed of the motion, how Musgrave is able to use the tethers, handholes, and the various other restraints. Crewmen will be evaluating their communications performance, will be checking out payload bay and EMU lighting and will be evaluating potential work sites for possible contingency EVAs in the future. We'll be reacquiring again in about 4 minutes over Hawaii. Be getting some television approximately at that time.

END OF TAPE

PAO ... crewmen will be evaluating their communications performance. Will be cecking out payload bay and the EMU lighting and will be evaluating potential work sites for possible contingency EVAs in the future. We'll be reacquiring again in about 4 minutes over Hawaii. Be getting some television approximately at that time. 3 days, 3 hours, 2 minutes mission elapsed time. This is Mission Control, Houston.

PAO Mission Control, Houston. We're about to reacquire communication again over Hawaii.

SPACECRAFT (Garble)

CAPCOM Challenger, Houston with you over Hawaii for 7 and a half minutes with a good picture.

SPACECRAFT Roger. Do you want to run them during the pass or do you want us to John?

CAPCOM We'd like to have ground control, PJ, if you don't mind.

SPACECRAFT That suits me. Gives me a break.

SPACECRAFT Say John, we're going to start our air translation.

CAPCOM Okay, we're watching.

SPACECRAFT Story?

SPACECRAFT Yea.

SPACECRAFT Close the door more so the ...

SPACECRAFT Wait I can pop it open. I think I can reach it.
Hold on.

SPACECRAFT Let me go down and get it.

SPACECRAFT Okay just a minute. I think I can...

SPACECRAFT Houston, Challenger. I want to go on hold at 0 3 0
9 John.

CAPCOM We copy that.

SPACECRAFT One of my problems is, Story, I'm on such a short tether now that I can't...

SPACECRAFT Let me go down below you and get it. I'm right
down here.

PAO Musgrave is the one with the red stripes on the legs and the side of the suit.

SPACECRAFT I'll head on down the end.

CAPCOM And PJ, you're right about panel AlR aren't you?

SPACECRAFT That's affirm.

CAPCOM We got a pretty bad ring here and we're wondering if you won't troubleshoot it for us by taking the UHF, yea the UHF air-to-air to the off position on AlR on the bottom row.

SPACECRAFT Stand by.

CAPCOM Okay, how do you read me now?

SPACECRAFT Okay, you're loud and clear. Houston, do you read Challenger?

CAPCOM Yes sir we read you. We still got the same echo. That's not problem. Go back to air-to-air on the UHF.

SPACECRAFT Okay, that's complete.

SPACECRAFT I'm doing a snap and a slide.

PAO Crew members working near the tool box. Peterson ...

SPACECRAFT If you're logging them PJ or Bo I snapped about 4 flicks.

SPACECRAFT No, we don't care. Guess I'll keep one.

PAO Peterson adjacent to the tool box now and Musgrave beginning to move down the starboard slide wire toward...

SPACECRAFT (Garble) I don't want go to that hold now so the next half of rev orbit of earth will be toward the sun.

CAPCOM Copy PJ.

SPACECRAFT Oh, there's three more pictures.

SPACECRAFT Got you. Three more.

PAO The starboard slide wire there attached to that projection in the payload bay. Musgrave back around the cradle that helped support the IUS TDRSS part of the cargo.

END OF TAPE

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SPACECRAFT Well there's 3 more. Pictures.

SPACECRAFT Got you, 3 more.

PAO The starboard slidewire there attached to that projection in the payload bay. Musgrave back around the cradle that helps support the IUS TDRSS combination when it was part of the cargo.

SPACECRAFT That's a (garble).

CAPCOM How does that compare to the water tank Story?

SPACECRAFT Well, there's no viscosity. If you get it going you can keep it going.

SPACECRAFT There's a reach right there that I could make in the water tank, but I can't make here.

PAO Musgrave now at the aft bulkhead evaluating the handholds on that rear wall of the spacecraft cargo bay.

CAPCOM We got a good shot of Mother Earth behind you there Story.

SPACECRAFT (Garble).

SPACECRAFT This is a little deeper pool than I've been used to working in.

PAO Musgrave comparing the spacewalk to his Earthly training in the water tank saying it's a little deeper pool than he's used to working in.

CAPCOM We're looking right at Story in camera bravo.

SPACECRAFT I see you.

SPACECRAFT I'm going to sneak down around you so I can watch Don.

CAPCOM Okay. We've got about 40 more seconds here at the Hawaii pass. We'll see you at Buckhorn at 3:15.

SPACECRAFT Okay Don. (Garble) after you head on across the port side, he'll be down here. Actually, I'm going across the bottom.

PAO Peterson now moving along the port slidewire in the cargo bay. Beginning to lose signal now from the tracking station at Hawaii. America's first spacewalk in about 9 years. Seems to be going well at this point.

PAO Mission Control, Houston. 3 days, 3 hours, 14 minutes mission elapsed time. Be reacquiring over the Continental United States just on the edge of the stations on the western U.S. for a brief pass in about a minute. After the crewmen have completed their evaluation of the handholds and restraints at the rear of the cargo bay, they will both move back to the forward bulkhead on the port side. Musgrave will stop about the midpoint of the port hinge line and evaluate the handling and dynamics of the safety tether. During that test, he will attach to the port slidewire with the waist tethers and then allow his safety tether, the retractable tether on a reel which you may have seen bouncing about there during the recent pass, will allow that to pull him toward the starboard side. As he is pulled to the center of the bay, he will evaluate his ability to control the rotation of the EMU, his suit, by varying the tension on the two tethers and this will be an evaluation of the reel in characteristics. The tether has about a 1 pound pulling force on it and we'll be determining how it moves the crewmen in the suit in the vacuum and weightless environment of space. We'll be acquiring here momentarily.

END OF TAPE

PAO - - reel in characteristics. The tether has about a one pound pulling force on it and will be determining how it moves the crewmen in the suit in the vacuum and weightless environment of space. We'll be acquiring here momentarily

CAPCOM And we're back with you over Buckhorn for about 6-1/2 minutes.

SPACECRAFT Okay.

SPACECRAFT (Garble)

PAO Astronaut Don Peterson moving along the hinge line.

CAPCOM Hey. We've got some good TV again.

SPACECRAFT Okay.

SPACECRAFT Okay. (Garble) at any length of time. (Garble).

SPACECRAFT Story. How does that tether work? Did you feel it pulling on you or anything.

SPACECRAFT No I don't.

SPACECRAFT There's a little more dynamics to it in terms of it flopping around and in the water of course. I don't feel anything Bo, and I could backup along next time, I'm going to see, I'm going to watch it pull me along. (Garble).

SPACECRAFT How's (garble) back in there?

SPACECRAFT (Garble) is mode deployed.

SPACECRAFT Everything is real clean right here.

SPACECRAFT Story, while your back under the hood, why don't you check the oil.

SPACECRAFT I don't see any.

SPACECRAFT That's good.

SPACECRAFT If anything was open you'd find it.

SPACECRAFT Don't forget, when you get up near the top, I don't know if you can get up high enough, see if you can see what those two flops are (garble).

SPACECRAFT Okay. (Garble) right now.

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SPACECRAFT Bo, what's that peninsula sticking out there that we're coming across.

SPACECRAFT Baja, I believe it's California, Story.

SPACECRAFT That's Baja, Texas.

SPACECRAFT Oh, Baja, Texas.

SPACECRAFT Bo didn't tell me that. I can see where those icicles came (garble).

CAPCOM And we're starting to lose signal P.J., we're going to lose you in a minute, and we'll see you down at Ascension at 3 plus 46 and we might have a starring opportunity. Would you put the star trackers back in the track mode please.

SPACECRAFT Oh yes. Sure will.

CAPCOM And P.J., you have the cameras back.

SPACECRAFT Okay. I'll release that.

PAO Mission Control, Houston. 3 days, 3 hours, 21 minutes mission elapsed time.

SPACECRAFT Okay Story. What do we do now?

SPACECRAFT We'll go back onto the port side. (Garble) we could not evaluate the (garble) during the heat of the day.

END OF TAPE

PAO Mission Control, Houston. 3 days, 3 hours, 21 minutes mission elapsed time.

SPACECRAFT Okay, Story. What do we do now?

SPACECRAFT We'll go back under the port side. (garble) we could not evaluate the lighting and all back there during the day. We'll have to remember that when it gets dark. We're going to translate 4 on the port side. Looking at one side so I can see (garble). Better dynamics. I'm going to hook onto your slider.

SPACECRAFT Okay.

PAO Still getting a little bit of communication from the 2 space walking astronauts in the cargo bay of the Challenger. We'll be having about a 25 minute loss of signal period here until we reacquire over the edge of the Ascension Island tracking station range. That's going to be all the TV for a while until we come back near Hawaii in the U.S. again. As we left the coverage of that ground station, astronaut Musgrave was maneuvering to look over the OMS POD to view the 2 flaps of surface insulation that appeared to have raised up during the launch phase. Both crewmen were evaluating handholds as they had moved to the aft bulkhead and shortly after checking out the communications from the aft part of the orbiter payload bay they'll begin the safety tether evaluations. 3 days, 3 hours, 23 minutes mission elapsed time. This is Mission Control, Houston.

PAO Mission Control, Houston. Standing by for reacquisition through Ascension momentarily.

SPACECRAFT (Garble)

CAPCOM Challenger, we're with you over Ascension for a couple of minutes and without reading all the numbers to us Story and Don we'd like a quick status check of your EMUs.

SPACECRAFT We just read them to Bo. Could he give them to you?

SPACECRAFT The status is good John. (Garble) pressure is 787 for Story and 761 for Don.

CAPCOM Okay, that's all we need.

SPACECRAFT With the suit evaluation part John, we're having a hard time getting the forward (garble) loosened up as expected.

SPACECRAFT (Garble) with the tool box valve.

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SPACECRAFT Okay, you just kick the hatch cover open. I guess Don opened it to get something in there.

SPACECRAFT I'm going inside.

SPACECRAFT I'm going to get the tools.

SPACECRAFT Powers remaining are 82 and 83 percent.

CAPCOM We copy that. We got about 45 seconds to go with a long LOS here. We'll see you up at Guam at 4 27.

SPACECRAFT Roger.

PAO Mission Control, Houston. 3 days, 3 hours, 48 minutes mission elapsed time. Just passing out of range of the tracking station at Ascension and won't reacquire communication until spacecraft comes within range of Guam in about 39 minutes so it will be quite a long loss of signal period.

SPACECRAFT (Garble) the inner hatch until you close the other one.

SPACECRAFT Yes sir. Very careful.

SPACECRAFT Don't kick a hole in it.

SPACECRAFT (Garble)

PAO Still getting a little comm on the edge of the range of the Ascension station.

END OF TAPE

PAO - - minutes mission elapsed time. It's passing out of range of tracking station at Ascension and we won't reacquire communication until spacecraft comes within range of Guam, about 39 minutes, so it'll be quite a long loss of signal period.

SPACECRAFT (Garble) inner latch hatch until you close the other one.

SPACECRAFT Yes sir. Very careful.

SPACECRAFT Don't kick a hole in it.

SPACECRAFT (Garble)

PAO Still getting a little comm on the edge of the range of the Ascension station. From the sounds of it, the crew is back up near the tool box area and will begin evaluating the tools and the tool box there. Musgrave talking about getting into the foot restraint. They lock the boots of their spacesuits into the foot restraint and enables them to work at the tool box. The removing and restowing of tools, evaluating movements and taking care of those, all the tools that are out are tethered and at any time and not allowed to float free. And they did another suit check evaluating the condition of the EMUs and everything was continuing to go well. CAPCOM on this shift has been talking to the crew, John McBride, Astronaut John McBride. Sitting close by him, Astronaut Bill Fisher who is the astronaut's office expert on the spacesuits. We have about 37 minutes before we hear from the Challenger again. 3 days, 3 hours, 50 minutes mission elapsed time. This is Mission Control, Houston.

END OF TAPE

SPACECRAFT Okay, (garble).

PAO Mission Control, Houston. 3 days, 4 hours, 26 minutes mission elapsed time. We're about a minute away from reacquiring communication with the Challenger over Guam at which time we'll get an update on the status of the EVA. Little more than halfway through the scheduled EVA. Stand by for, we'll be standing by for acquisition of signal here in a little less than a minute.

CAPCOM Challenger, we're with you at Guam for about 7 minutes.

SPACECRAFT Roger. Things are doing well, moving right along. Story's in the back of the bus evaluating the IUS tilt table procedure right now.

SPACECRAFT PJo.

SPACECRAFT Yea.

SPACECRAFT I'm below you. Story on the right. Swap hands?

SPACECRAFT (Garble)

SPACECRAFT I can get a better grip on it. Is that it?

SPACECRAFT Go a bit further.

SPACECRAFT Okay. It's in.

SPACECRAFT Okay. I'll start reeling up and put some tension on it.

SPACECRAFT (Garble)

SPACECRAFT It's pretty tight.

SPACECRAFT Okay. So much for that.

SPACECRAFT I'll give you some tension and we can take it off and reel it back up.

SPACECRAFT Okay.

CAPCOM PJ, if you've got time and you haven't done one recently we'd like to have a status check before we leave Guam. We've got about 4 and a half minutes to go.

SPACECRAFT Okay. I'll read mine and then you read yours Story.

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SPACECRAFT Stand by. Stand by John.

SPACECRAFT Okay.

SPACECRAFT Go ahead.

SPACECRAFT Okay. Relative position is GDA. Final, GDA's 157
52 percent power remaining. That's the determining factor for
time left. 52 percent power and 79 percent on 3. Battery volts
DC is 16.4. BO2 is 0.9er. H2O2 is about 40, oh and I believe it
is 40. It's switching back and forth. PGA press is 4 3. O2
pressure is 683. Open (garble) pressure is 2 9. H2O gas
pressure is 15 7 and the water pressure is 15 8.

CAPCOM Okay, we got a good copy...

END OF TAPE

SPACECRAFT - - H2O temp is about 40 - - oh, and I believe it is, 40 it's switching back and forth. PJ press is 43. O2 pressure is 683. (Garble) pressure is 29. H2O gas pressure is 15.7 and the water pressure is 15.8.

CAPCOM Okay. We got a good copy on that. Go ahead Story.

SPACECRAFT EVA, and EV 158, 98 percent now in last paragraph 4-12. 85 percent O2 left, 70 percent power left, (Garble) DAP 066, .9 on CO2. (Garble) pressure's 4.3, oxygen pressure's 733. (Garble). Gas pressure 426 and water pressure 327. It's very difficult to read with this much light (garble).

CAPCOM Okay. Thank you.

SPACECRAFT We've put the tension on the IUS with the rope out here and and we're about ready to rerope in.

CAPCOM We copy that P.J. If you would, we'd like for you to have the cameras prepositioned for us when we get to Hawaii.

SPACECRAFT We'll do it now.

SPACECRAFT (Garble).

CAPCOM We've got about 30 seconds here at Guam. We'll be over Hawaii at 4:41.

SPACECRAFT Okay. (Garble).

PAO Mission Control, Houston, 3 days, 4 hours, 34 minutes. It appears that Musgrave and Peterson in the aft portion of the cargo bay performing the IUS ops portion of the EVA which they set up a rope and lock mechanism tied in with their winch and - -

SPACECRAFT (Garble)

CAPCOM And P.J., just a quick reminder, go back to -ZLV in about 3 or 4 minutes.

PAO Mission Control, Houston. During that operation on the aft bulkhead of the orbiter cargo bay, they evaluate the operation of the winch. Call back from the status of the EMUs appears good at the present time. The consumables in the spacesuits being used approximately according to as they would be expected to be. We'll be reacquiring communication in about 5 minutes over Hawaii again on orbit 52 at 3 days, 4 hours, 36 minutes. This is Mission Control, Houston.

END OF TAPE

PAO - -in the spacesuits being used approximately according to as they would be expected to be. We'll be reacquiring communication in about 5 minutes over Hawaii again on orbit number 52, that's 3 days, 4 hours, 36 minutes. This is Mission Control, Houston.

PAO Mission Control, Houston. 3 days, 4 hours, 39 minutes mission elapsed time. Be picking up communication again in about a minute and a half over the Hawaii site. We should be getting a little downlink television from the spacecraft. About 2 hours into the EVA now. About an hour and a half remaining. The crew is expected to be completing the IUS ops procedure test out of the contingency plans should the tilt table not have restowed to the proper position after deployment. The crew could go back, hook up the winch and pulley and crank it in. Stow it to the proper angle. Should be about finished with that now and the EVA people think they will be probably be moving back to the forward bulkhead about this time and will be beginning operations on the forward bulkhead, forward bulkhead winch operations and at that time they will be setting up a similar rope and winch assembly, demonstrating the ability to apply a load with the winch, seeing how well they manage to stay in place while they turn the crank on that. We are about to reacquire.

CAPCOM We're back with you over Hawaii for about 7-1/2 minutes. Got a good TV picture.

SPACECRAFT Roger. I take it you are going to take the cameras now.

CAPCOM That's affirmative.

SPACECRAFT John, we're hung up real bad on getting the winch to winch out. We've been doing it before with tension on it. I cannot get it to ratchet out and we cannot get it to reel out.

CAPCOM We copy.

SPACECRAFT We've been through the usual fitches.

CAPCOM And Story, is the winch loaded with the capsule to the IUS at this time?

SPACECRAFT Yeah. It is.

SPACECRAFT We can't get any slack in that line at all huh Story?

SPACECRAFT That's right. Not enough to get off the hook.

SPACECRAFT Well, we'll let Houston think about it a little bit. You got a pry bar in the tool kit up here?

SPACECRAFT They do.

SPACECRAFT Well our options, I suppose are to try to pry it off the door roller or if there's anything in the tool kit you can cut it with, we can always cut it.

SPACECRAFT We've got scissors in it.

SPACECRAFT Do you think scissors will do it?

SPACECRAFT Yeah.

SPACECRAFT Okay. Well let's let the ground work it over for a little bit.

CAPCOM Yeah, P.J. and Story, we'll think this over and we definitely do not want you to cut it at this time.

SPACECRAFT Okay. We're just looking at options, John.

CAPCOM And Story, you reckon if you try to open up the snatch blocks ops?

SPACECRAFT Well, that's what I've been doing. I know that one too. Open the snatch block, and I can't. I've been through that one too.

CAPCOM We copy.

SPACECRAFT That's where I am right now.

END OF TAPE

SPACECRAFT Don a good possibility is if I can get it off the roller up above, I'll get some slack that way.

PAO Astronaut Musgrave attempting to...

SPACECRAFT Okay, I've got it.

PAO ... sliding the rope...

SPACECRAFT I yanked it off the, I yanked it off the roller. Now before we do anything else, if it isn't going to release we'll get the snatch block undone. We'll know we're home free.

SPACECRAFT Not until you lift it over that hook.

PAO Astronauts having momentary difficulty there with the rope. Just tied up. It's part of the wench operations on the aft bulkhead. Rope wraps around one of the pegs over which the doors latch on the aft bulkhead, one of the rollers. They could not get the tension loose from that line until Musgrave pulled the rope back up off the roller.

SPACECRAFT I can't pull in your feed there Don.

SPACECRAFT Okay.

SPACECRAFT Okay.

SPACECRAFT Okay we got it.

SPACECRAFT Yea, reel it in. (Garble)

CAPCOM Good work.

CAPCOM We got about 45 seconds till we lose you here at Hawaii. We got a long LOS. See you at IOS 5 3 9er.

SPACECRAFT Okay.

SPACECRAFT Okay Story. Are we going back up front when you finish here.

SPACECRAFT Just connect IUS slip ring.

SPACECRAFT Oh, okay.

SPACECRAFT The secondary slip ring.

SPACECRAFT Yea, I should have gotten the tool from you I guess.

SPACECRAFT If you guys have a chance you might turn off your lights.

SPACECRAFT Yea, I got. Okay.

SPACECRAFT I didn't know mine were on. Are they on Bo?

SPACECRAFT I thought I saw your right one on Don.

SPACECRAFT Okay.

SPACECRAFT Maybe it's just some reflection that I saw then.
SPACECRAFT Take a look.

SPACECRAFT Your right one is on.

PAO Crew is completing, they're moving, they're moving the wench and rope assembly in the back. They'll be stowing that before moving back up to the forward bulkhead and going through the forward bulkhead wench operation there. Had a momentary difficulty there as we passed over Hawaii the crew had connected the wench and rope assembly through the snatch block and down to the IUS tilt table. This was simulating the contingency operation of having to tilt that cradle back into the proper position if necessary if somehow the actuating mechanism there had not worked properly after the deployment of that satellite. The, once the tension was put on the rope, the tension could not be released and Astronaut Musgrave had to slip the rope from over...

END OF TAPE

PAO - - Had a momentary difficulty there as we passed over Hawaii, the crew had connected the winch and rope assembly through the snatch block and down to the IUS tilt table. This was simulating the contingency operation of having to tilt that cradle back into the proper position if necessary if somehow the actuating mechanism had not worked properly after the deployment of that satellite. Once the tension was put on the rope, the tension could not be released and Astronaut Musgrave had to slip the rope from over the roller. That is the, it's a peg like protrusion from the aft bulkhead over which one of the latches hook on closing the cargo bay doors. Once that tension was removed, they could then pull it loose, pull the rope loose from its other attachments and wind it in on the winch. We're at 3 days, 4 hours, 51 minutes mission elapsed time. We're having another long loss of signal period here, about 40 minutes before we reacquire over the Indian Ocean Station. Again, we'll be passing over the Botswana tracking station but will not have comm at the station since the crew is in a different communication configuration. This is Mission Control, Houston.

SPACECRAFT (Garble). We picked this up on camera (garble) on our (garble) Bo. I'm a little unstable with these (garble) on. Apparently. Now. Foot restraints and the lefthand anchoring - - better. Now with no foot restraints at all, (garble) ended operations. (Garble) body moves but (garble). (Garble) right here. (Garble). Right. The next thing we're going to do is put them over the rollers, then we're bringing it in, bringing some doors in. Okay. Ready for 1. Ready for 1. EVA, prime EV 302, 54 percent power left. Time left 3:28. 54 percent power left that's associated with the time left at 3:21. 77 percent O2 left, 54 percent power left, battery volts 60. CO2 .9, water temp 59, (garble) pressure 4.3 - -

END OF TAPE

SPACECRAFT (Garble)

SPACECRAFT Okay. Ready for 1. Ready for 1. EVA. Perm EV 302. 54 percent power left. Time left 3 28. 54 percent power left that's associated with the time left of 3 21. 57 percent O2 left. 54 percent power left. Battery volt 60 point. CO2 .9. Water temp 59. Air pressure 4.3. Voltage 4.3. O2 pressure 6 71. (Garble) 2.8. Gas pressure 14 7. Water pressure 15 7, 15.2.

SPACECRAFT Story here. Hang on till you make it out.

SPACECRAFT Are we going to do it?

SPACECRAFT (Garble). Must have put that in real amp.

SPACECRAFT (Garble). I can't get a foot. (Garble)

SPACECRAFT Well, just do it the hand in hand way.

SPACECRAFT Before you start cranking just get that reel in. (Garble) away with me. (Garble)

SPACECRAFT (Garble)

CAPCOM Challenger, Houston. We're with you over Indian Ocean for about 6 and a half minutes.

SPACECRAFT Yea, hello John. The EVA's going along all right. They're both up to 4 and then doing the wench and exergerie exercises and let me see the status Bo.

CAPCOM And okay at, we copied Story's readings over Botswana on UHF. We might like to have Don's and then we can check off that block.

SPACECRAFT Okay, but let me tell you first that at 4:58 Don had an O2 use high alarm. At the time he was back at the title table). He was working pretty hard to read all your teleme. We watched him for a couple minutes at the time and the time off is 2 hours and 27 minutes based on O2 left at 74 percent and the pressure 6 49. 4 minutes later O2 press was still 6 41, time was back up to say 16. I think that, and Story concurs, that Don was just working hard and that's an awful lot of O2 to pump through you but he must have been doing it and his last, which numbers do you want on Don's EMU status?

CAPCOM We would like to get the whole status on Don if we could PJ.

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SPACECRAFT Okay. (Garble) at 05 37. EVA was 304. (Garble) 3.30. Powers limiting consumable is 57 percent. O2 is 6 7. Battery volts 16.8. 202 is a status .9. Water temp 43. PGA press 4.3. O2 press 5 9er 3. (Garble) pressure 2.8. Water pressure was 15.8.

CAPCOM And the gas pressure please?

SPACECRAFT Well, he missed it going through his thing. If you really need it we can have him step through it again.

CAPCOM That's okay we'll get it next time.

SPACECRAFT Okay.

SPACECRAFT Okay, you ready to go?

SPACECRAFT Yea, practice reeling in over the rollers.

SPACECRAFT Wait a minute. Wait a minute I'm out of it. I'm out of the foot restraints all together.

SPACECRAFT Better just put them on by the (garble) Lead the way. Good.

CAPCOM PJ, before you go over the hill if you got the time we'd like EVA to report their temp control valve position.

SPACECRAFT (Garble) reeling Story.

END OF TAPE

CAPCOM PJ, before you go over the hill if you've got the time, we'd like EVA to report the temp control valve position.

SPACECRAFT You're free wheeling Story. No, I got tension on it. Opened it up over the last roller. Watch the hood. Good. Did you report your temperature control valve position number? Yes. Watch the hook Don. Okay, just let it go and I'll get it. It's over your back right now. Okay. I'm going to get that as soon as I got a hand to go look. Maybe I can see it. (garble) my work station down. I'm sure it's full (garble) but I'm (garble). (garble). I can see it from here. Okay, it's been full up the whole trip. Okay, Houston, Story's temperature control is at full up.

CAPCOM We copy.

SPACECRAFT Story, can you see where Don's is? I'll go over there (garble). Maybe I can see it. I can't either. That's alright, we'll get it next pass. I'm ready. I'll look. You want it back in or out? (garble) in. (garble). (garble).

CAPCOM We're coming up 30 seconds to go here at Indian Ocean. We'll see you at Guam at 6 0 5.

SPACECRAFT Roger. Okay, the payload retention device coming up next. (garble)? (garble).

PAO Mission Control Houston. 3 days 5 hours 47 minutes mission elapsed time. During that pass over the Indian Ocean station it appeared astronauts Musgrave and Peterson were completing the forward bulkhead winch operations in which they hook up a line through pulleys on the mounted on the door rather on the handrails on the forward bulkhead. They are over one of the rollers and apply some force to that by cranking the winch and evaluating their ability to do that with and without the foot restraints. As we were passing out of range of that station there Musgrave mentioned that they were about to be ready to begin the payload retention device operation, that is evaluation of a system that can be used to tie down loose objects in the cargo bay including the remote manipulator system, that is the mechanical arm that is sometimes flown to handle payloads. In the event that any of those things are unable to be properly latched down under their normal procedures, a crewman in a spacesuit can go out and by using this strap and ratcheting device that is attached to it can secure loose large objects in the payload bay. The readout from the PMU's indicating the status of the consumable items, the oxygen, the power, the other items on which the duration of the spacewalk depends, all look good after that readout. The EVA people seem happy with that and looks like they could go on some time. We are already at 3 hours

16 minutes into the EVA and looks like there's plenty of room for contingency operations in that. At 3 days 5 hours 50 minutes mission elapsed time this is Mission Control Houston.

END OF TAPE

PAO - - 50 minutes mission elapsed time. This is Mission Control, Houston.

PAO Mission Control, Houston. 3 days, 6 hours, 4 minutes mission elapsed time. Standing by for a brief pass over Guam.

SPACECRAFT (Garble) cut there.

SPACECRAFT You're cutting out (garble). What's (garble) to go in the hatch.

SPACECRAFT (Garble) off and on from now.

SPACECRAFT Well we may or may not get that.

CAPCOM Challenger, Houston with you over Guam for about 3 minutes and P.J., we're going to give you authorization of (garble) specialist in the EVA and we would like for the crew to be back in; however, if the cabin's on the repress by the next IOS pass. That's at 7 plus 14.

SPACECRAFT Cell test, we'll do that easy, John.

SPACECRAFT Just finished the come along ops, John.

CAPCOM We copy.

CAPCOM We're going to go in the keyhole here shortly P.J. It will be about a minute long and we'll see you for about 30 seconds after that.

SPACECRAFT Good.

PAO This is Mission Control. During that last communications, the crew was given the authority to extend the EVA as necessary up to the point of about 3 days, 7 hours, and 14 minutes MAT or until the next pass over Indian Ocean Station which is about an hour and seven minutes away. The crew indicated that would not be necessary. Musgrave had said that he estimated about 30 minutes more needed in the EVA to complete some things and be able to get back into the airlock. Consumables status in the EMUs looks good. The crew has more than enough time to be able to stay out that extra hour but would like to get them back in and get the cabin repressurized and have plenty of time this evening before the crew goes to bed to check for any leaks. Standing by for a little more comm here over the Guam station.

CAPCOM P.J., we've got just about long enough to tell you that we'll see you over at Hawaii at 6 plus 16.

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SPACECRAFT Roger. See you then.

SPACECRAFT Story, are you aware of where your safety tether is are you?

SPACECRAFT Yeah. It's right here and I looped mine to pass the vertical. Looped over the end to get it on the right side.

PAO Mission Control, Houston. Got about a 7 minute gap before we reacquire over Hawaii and expect to see some television, some additional coverage of that EVA which is drawing to a close now. The crew will probably be out about another half hour. Crew is proceeding along fairly well with the EVA timeline. Musgrave referring to the procedure called the massive article trans - -

END OF TAPE



National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas 77058

STS-6 AIR/GROUND TRANSCRIPT
VOLUME THREE
MET THREE DAYS, 6 HOURS THROUGH END OF MISSION

Public Information Officer/AP3
Johnson Space Center
Houston, Texas

PAO Crew is proceeding along fairly well with the EVA timeline. Musgrave referring to the procedure called the massive article translation where they take out a large bag of tools from the toolbox and Musgrave would carry that back to the aft bulkhead, across the aft bulkhead to the port slidewire and then back to the toolbox and that would be to evaluate the dynamics of carrying a large mass in space. Got about 5-1/2 minutes now before we pick up the Challenger again over Hawaii at 3 days, 6 hours, 11 minutes mission elapsed time. This is Mission Control, Houston. Mission Control, Houston at 3 days, 6 hours, 15 minutes mission elapsed time on orbit number 53. Challenger will be passing within range of the Hawaii tracking station momentarily.

SPACECRAFT Okay. (Garble) we got this off.

SPACECRAFT What is that thing you're working on there Story? Is that the massive article locker?

SPACECRAFT That's the (garble) centerline latch tools. They don't look like much out here.

SPACECRAFT A bag of centerline latch tools.

SPACECRAFT Okay.

CAPCOM And P.J., we're back with you over Hawaii for about 7-1/2 minutes. And Challenger, Houston with you for about 7 more minutes. We've got a good picture.

SPACECRAFT Okay, and you've got the cameras.

CAPCOM Okay. We'll take control.

SPACECRAFT I just finished the massive article transformation, did the CVSA (garble) centerline latch tools (garble). Got a hatch ingress.

CAPCOM We copy.

SPACECRAFT (Garble)

PAO Don Peterson hanging about halfway out the hatch.

SPACECRAFT Where are we PJ?

CAPCOM And you should be over the big island of Hawaii in about a minute and a half.

SPACECRAFT Okay. (Garble).

SPACECRAFT I was just, look out the top window and kind of behind you now. A little patch of, looks like shallow water,

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almost dead astern. It's light green amidst of all that blue.

SPACECRAFT Yeah. That's a little patch of shallow water.

SPACECRAFT Okay. We're coming up over the Hawaiian islands.

SPACECRAFT That's not one of the Hawaiian islands though.

SPACECRAFT That's all of them Don. That's all of them. You're a long ways away.

SPACECRAFT Whatever you say P.J.

SPACECRAFT I'm just not seeing what you guys are looking at.

SPACECRAFT Yes you are. There's another one straight down now.

SPACECRAFT There's some little islands off of the western part the Hawaiian chain.

SPACECRAFT (Garble) around there somewhere.

SPACECRAFT After all, that thing is one of the early ones and that might be it.

CAPCOM And Don, is it any easier to read your DCM with your visor down?

SPACECRAFT No it isn't. I tried that and it just blocks out more light. The problem is that when we read LEDs, it's not very bright. When you get any kind of bright light you almost can't see them.

CAPCOM We copy.

SPACECRAFT By the way, I don't know who to thank but I appreciate the (garble) pass when we stayed in attitude 0 and went around the Earth one time. It was real nice.

CAPCOM You can thank the Flight Director for that.

SPACECRAFT Many thanks. Many thanks. It was spectacular.

CAPCOM You owe him one.

SPACECRAFT (Garble) probably, camera overtemp we got on one of them. We'll find it.

END OF TAPE

CAPCOM You can thank the Flight Director for that.

SPACECRAFT Many thanks, many thanks. It was really spectacular. (garble) 6 comm probably camera overtemp we got on one of them. We'll find it. (garble).

CAPCOM And can you look down and see Kiloway, it's supposed to be really putting on a show now?

SPACECRAFT Not yet, but it's pretty cloudy over the islands as we're coming down here.

CAPCOM And PJ, we turned off camera Charlie so it won't be overtemp.

SPACECRAFT Okay, thank you. Hawaii is just like it was yesterday, you can tell where the island is by the color and the shape of the island of Hawaii.

CAPCOM We got about 2 and half more minutes of this exciting TV show.

SPACECRAFT Okay, Don, what have we got left to do around here? (garble).

SPACECRAFT (garble) Story. (garble).

SPACECRAFT (garble) ready?

SPACECRAFT Yes when you are. Okay.

PAO Musgrave's completed closing up the toolbox and all the items appear to be stowed away.

SPACECRAFT (garble). I'll stay down low. (garble).

PAO Peterson is in airlock.

SPACECRAFT (garble). Beautiful.

PAO Good picture of Musgrave going back in. Completing America's first spacewalk in 9 years. And the first in the Shuttle program.

SPACECRAFT (garble) inside. That's right. You got it on already.

SPACECRAFT That's right. I did that.

SPACECRAFT What you got to do is get the other one.

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CAPCOM And Challenger, we got 30 seconds to go at Hawaii. We see you in (garble) and don't forget to double-check those seals for us. We'll see you then at Santiago at 6:44.

SPACECRAFT Roger. (garble). Put this one on. (garble) more I'll get it. (garble). (garble) I got it. (garble).

CAPCOM And PJ, at LOS the (garble) cameras are yours.

SPACECRAFT Okay, thank you.

PAO We're passing out of range of the Hawaii station now. We saw astronauts Musgrave and Peterson getting back into the airlock. Preparing to repressurize and that'll take a little time, thus completing Shuttle spacewalk. First one of the space Shuttle program. Walk that lasted nearly 4 hours. Crew had plenty of margin left in their consumables, their power, and the oxygen, all the life support systems in their backpacks, and had completed all the tasks outlined for them in the EVA checklist. And are now back in the airlock. At 3 days 6 hours 26 minutes mission elapsed time this is Mission Control Houston.

END OF TAPE

PAO ... and that'll take a little time, thus completing the shuttle spacewalk. First one of the Space Shuttle Program. Walk that lasted nearly 4 hours. Crew had plenty of margin left in their consummables, their power and the oxygen - all the life support systems in their backpacks. And had completed all the tasks outlined for them in the EVA checklist and are now back in the airlock. At 3 days, 6 hours, 26 minutes mission elapsed time this is Mission Control, Houston. Mission elapsed time 3 days, 6 hours, 43 minutes. We'll be reacquiring very briefly over Santiago here in just about a minute. Orbit number 53. We've just seen the completion of the spacewalk which began 4 hours and 11 minutes ago approximately at mission elapsed time 3 days, 2 hours, 33 minutes. We don't have a finish time yet since they would have gone back on orbiter power and oxygen if they have done that yet while we were in the LOS phase or out of communication with the spacecraft. Standing by for acquisition through Santiago.

CAPCOM Challenger, we're with you over Santiago for about a minute (garble).

SPACECRAFT (Garble) Bo.

SPACECRAFT Oh your systems open and the airlock (garble). Looks like it's going back down when he stops.

SPACECRAFT But we need to get the time it stops and start the clock running.

SPACECRAFT Okay.

SPACECRAFT (Garble)

SPACECRAFT Story, we've been up to 3 and a half, we're back down to 2 and a half. The airlock is not holding pressure. Did you close the dump valve in the airlock? Airlock depress, whatever it's called.

SPACECRAFT Okay, that's it. (Garble)

SPACECRAFT Okay, that'll make a big difference. Okay, can you reach over and turn the audio box and then I can just press and you can hear so I won't get as much noise?

SPACECRAFT Yes. You got it closed now PJ?

SPACECRAFT It's closed.

SPACECRAFT I don't know. You guys got it down there.

SPACECRAFT It's closed.

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SPACECRAFT Okay, it's closed then.

PAO Pressure coming up in the airlock now. 2.9 pounds, brief moment where one of the vents, one of the valves was not totally closed to the outside. Pressure's up to 4 pounds now.

SPACECRAFT Okay Bo. Stop it there.

SPACECRAFT (Garble)

SPACECRAFT Okay, I'm indicating 5.0 up here.

SPACECRAFT Okay. Start a watch on.

SPACECRAFT Okay, I got one going. How long you gotta check it.

SPACECRAFT 2 minutes.

SPACECRAFT Okay. I'm moving the (garble) covers (garble) DNC.

SPACECRAFT I guess there's a slight gap in the checklist there, huh?

SPACECRAFT No I think it's on the outer side. (Garble)

CAPCOM PJ, Houston's with you for about 40 seconds. We see a good 5.0 psi differential there and we'll see you over at Botswana if you're configured, if not, we'll see you at Indian Ocean at 7 1 4.

SPACECRAFT Roger.

SPACECRAFT Okay, I got my (garble) connected.

SPACECRAFT Okay.

END OF TAPE

CAPCOM Okay, I got one done. How long do you have to check it?

SPACECRAFT Two minutes. Okay, (garble)

SPACECRAFT I guess there's a slight gap in the checklist there.

SPACECRAFT No, I think its on the outer side. (garble).

CAPCOM PJ, Houston's with you for about 40 seconds, we see a good 5.0 PSI differential there, and we'll see you over at Botswana if you're configured, if not, we'll see you at Indian Ocean at 7:14.

SPACECRAFT Roger. Okay, I've got my (garble) connected.

PAO Mission Control Houston, 3 days, 6 hours 49 minutes mission elapsed time. The astronauts repressurizing the airlock at a period of time had their pressure did not appear to be holding in the airlock. Checked the equalization valves and determined that one of them was not completely closed. Closed that valve and the airlock is holding pressure. Brought it up to 5 PSI to check and make sure that it is remaining steady. And after a period of time when they feel confident that it is holding then they will bring it back up to equalize with cabin pressure. We're about 17 minutes away from picking up the spacecraft again over Botswana, we may or may not have communication at that time, if they have switched back to normal communication configuration from the way they were set up during the EVA. Do not yet have an official time for the ending of the EVA, it actually ends when they go back off of the EMU power and are hooked up to the Orbiter again. We should be able to pick that up sometime soon from the crew. The time for the beginning of the spacewalk was at 3 days, 2 hours, and 33 minutes mission elapsed time, which is counted from the time that the crew members go on the EMU power rather than Orbiter power. This is Mission Control Houston. This is Mission Control, the approximate end to that time of the EVA is, it lasted for 4 hours and 17 minutes. That would have put it at about 3 days, 6 hours and 50 minutes mission elapsed time. That is the time that the EVA people are saying that they probably went back on Orbiter power for the life support systems. This is Mission Control.

CAPCOM Challenger, Houston with you over Botswana for about 5-1/2 minutes.

SPACECRAFT Roger, Jon.

CAPCOM Hey, reading you loud and clear. I got a couple of notes, PJ.

SPACECRAFT Go ahead.

CAPCOM I guess first of all, how'd the repress go?

SPACECRAFT Well, I noticed some very interesting things during the repress when you get a minute or so, and if ECOM listens I'll tell you about them.

CAPCOM Okay, go ahead and give us those now.

SPACECRAFT Okay, during the repress, and we missed a step somewhere, we'll have to see where we missed it or if its missing in the checklist. We didn't close the airlock depress valve before we tried to repress it so we wasted a little gas that way. We got that under control and the repress went nominally from then on. At one stage I noticed on my trusty SPEC 66, cabin press was 14.3, on system 2 the O2-N2 controller was calling for N2, we could hardly hear in here because there was so much gas flowing out of the M010W. I went down and held my hand on it, it almost hurt to hold it up close to the regulator. And the reg press on SPEC 66 was reading 183, I had the indicator then flow N2 flow with 1.1. Just to see what would happen, I went over to L2 . . .

END OF TAPE

SPACECRAFT ...and system 2 the O2/N2 controller was calling for N2. We could hardly hear in here because there was so much gas flowing out of the MO10W. I went down and held my hand on it and it almost hurt to hold it up close to the regulator and the repress on SPEC 66 was reading 183. I had the indicator then flow N2 flow was 1.1. I, just to see what would happen, I went over to L2 and put the O2/N2 controller valve to close, and open flows came up and indicated off scale high alright. I went back to normal, then called for N2 indicated the same thing as it did, what I just read to you before, that is low reg press and low flow, relatively speaking. But, and then the discernable difference in the flow rate dropped a way off, out of MO10W, at which point, then we got a flow high trip, we got the alarm and it went offscale high on N2 flow.

CAPCOM Sounds like we've got a little research on this one.

SPACECRAFT Yes, I (laughter), I can't quite figure that out but it looks like the gas is, maybe the slow meter rather than the regulator, but anyway from then on the repress went normally.

CAPCOM That's good news, the airlock D press valve closed is on the bottom of page 33 in the left column there.

SPACECRAFT Okay we just haven't got around to looking back at hit yet.

CAPCOM Okay a couple of quickies for you. We've got about 2 and a half, we're going to cancel the IMU alinement, tonight.

SPACECRAFT I'll say that Story has got (garble) and we're trying to get him out of the hut right now.

CAPCOM That sounds good.

SPACECRAFT Okay it's your turn Jon.

CAPCOM Okay, you copy cancel IMU alinement and your rendezous phasing maneuver number 4 is going to be a 9 foot per second, forward RCS and we're planning a TIG of 8 plus 23 right now.

SPACECRAFT Those old IMUs are really hanging in there, I understand cancel the IMU aline and there'll be forward RCS 9 foot per second at 823.

CAPCOM I'll give you the PAD here if we got time and if not, we'll do it at Indian Ocean. A couple more things, we want you to recharge the EMU before you do the H2O dump, which is scheduled at the same time. And when you do that dump on bravo, do it down to 30 percent again.

SPACECRAFT You're cutting in and out Jon, and I heard you, there's probably a water tank dump but why don't you just hold that for Indian Ocean, we'll get it from you then?

CAPCOM Okay we'll do that. We've got about 45 seconds to an LOS here at Botswana with a couple of minute keyhole, we'll see you at Indian Ocean at 714.

SPACECRAFT Roger.

CAPCOM And we'll have about an 8 and a half minute pass there to iron out some things.

SPACECRAFT Okay.

PAO Mission Control Houston. Have a brief gap here between the Botswana station and then the Indian Ocean station, at the very end of orbit number 53. Commander Paul Weitz reporting on their procedures in repressurizing the airlock occurred shortly before and noting some irregularities or perhaps unexpected behavior of the cabin pressurization system there which most likely related to the equalization of the pressure between the cabin and the airlock. We'll be picking up again at Indian Ocean station in about 30 seconds. This is Mission Control Houston.

CAPCOM And P.J. we're back with you over Indi for a little over 8 minutes.

SPACECRAFT P.J.'s on COMM right now, we're just starting to clean up after the EVA.

CAPCOM We copy, and Bo, we want to dump tank bravo on the water down to 30 percent this evening but we want you to recharge the EMUS before you do that.

SPACECRAFT Roger, we understand.

CAPCOM And make sure your teleprinter's hooked up, because we're going to send you up about 3 messages here at IOS.

SPACECRAFT Roger, we hear one clanking right now.

CAPCOM We're trying to troubleshoot a UHF turnaround problem that we had during the EVA and we were wondering if the MS's WCCUS were on during the EVA in the cabin.

SPACECRAFT I don't think so, I think we turned them off. We're checking.

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CAPCOM Okay you've got a good vector that just came onboard and the targets are there for the burn. And Bo while you're checking the WCCUs, check the power at the wall units also.

SPACECRAFT Okay, Don's is off. (garble) PCU power where they're both plugged into is off.

CAPCOM We copy that and we've got some PADS for you...

END OF TAPE

CAPCOM We copy that and we got some PADS for your burn if you want to drag those out. They're in Orbit OPS, page 10-15 thru 22.

SPACECRAFT PJ will be on in a second to copy those.

CAPCOM Okay. While were waiting, tell Story and Don they sure made our day down here this morning, or this afternoon. It's been a long time coming, this EVA. As a matter of fact, it's been over 9 years since we did it last, when Jerry Karr and Ed Gibson did it.

SPACECRAFT I'll tell those guys. Okay, Jon, I'm ready to copy the PAD, go ahead.

CAPCOM Okay, PJ. It's a -X, we're going to select RCS that's item 4, TV roll 180, weight 199350, TIG 0030823000, Delta V a -009.0, all balls, all balls, attitude 024.0, 249.0, 345.0. Delta V total 9 feet per second, 9.0. TIGO :30, MEGO -0008.58, all balls +002.73, that will give you an HA of 153 and a perigee of 148, 148.

SPACECRAFT Okay, -X RCS TV roll 180, weight is 199350, TIG is 30823000, Delta VX is -9, Y is (garble), attitude is 024, 249, 345. Delta V total is 9 feet a second, that'll take us 30 seconds to burn it. MEGO in attitude should be -8.580, +2.73, which puts us in orbit 153 by 148.

CAPCOM Readback is correct and according to FIDO that's a slight pitchup nose out of that -ZLV.

SPACECRAFT Okay.

CAPCOM And if you've got time, over on L2, we need the O2/N2 controller valve on system 2 to the close position.

SPACECRAFT Okay, that's complete and that puts both of them close.

CAPCOM Copy. And the teleprinter messages we sent you should be 26 alpha, 29 bravo, and 30.

SPACECRAFT Okay, thank you.

CAPCOM And PJ, time permitting, and you're in the mood, when we get over Hawaii, we want to troubleshoot this UHF turnaround problem some more so there'll be some calls on switches on 06 and A1 when you get to Hawaii.

SPACECRAFT Okay.

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CAPCOM A little less than a minute IOS, PJ, we may get you for a short skip at Guam, if not we'll see you at Hawaii at 7:52.

SPACECRAFT Roger. And Jon, both Don's and Story's leg units were off and CCU power was off, and they're both plugged into that one CCU.

CAPCOM Copy, thank you sir.

PAO Mission Control Houston, 3 days, 7 hours 23 minutes mission elapsed time. Passed out of range of the Indian Ocean station. Will be reacquiring in about 20 minutes over at Guam. Crew reported that they're cleaning up after the spacewalk. After stowing some of the gear that they used during that time they will be preparing for their evening meal and they need to be recharging the EMU's again, in case they need them for some contingency spacewalk later in the flight.

END OF TAPE

PAO The crew is due to perform another segment in their rendezvous phasing maneuver segment number 4. And this will be in the nature of a 9-foot per second burn by the forward Reaction Control System jets about 1 hour from now at 3 days, 8 hours and 23 minutes mission elapsed time, the IMU's, the Inertial Measurement Units, which are part of the guidance system onboard the spacecraft are performing very well, and this is not the first time that they have cancelled an alinement of those, they've held on very well. Guidance and navigation on this flight has been particularly good and on more than one occasion they have cancelled an opportunity to update the state vector, one element of the onboard guidance. At 3 days, 7 hours, 25 minutes elapsed time, this is Mission Control Houston.

CAPCOM Challenger, Houston with you at Guam, just long enough to say that we'll see you at Hawaii at 7+52.

SPACECRAFT 7+52 at Hawaii.

CAPCOM Rog, and we'll get our COMM checks there.

SPACECRAFT Houston, we had a problem here, we turned off the remaining DC utility power to the MLR and we don't know what to do about it now (garble).

CAPCOM Rog, we'll research that.

SPACECRAFT Okay, the talkback says off and the malfunction flash says (garble).

CAPCOM Copy.

PAO Mission Control Houston, about to reacquire through Hawaii.

CAPCOM Challenger, Houston with you in Hawaii for 7 minutes.

SPACECRAFT Roger, Houston loud and clear.

CAPCOM Rog, and I'd like to run through this COMM check here again with you, if your ready to change some switches for me while I talk.

SPACECRAFT Okay, go ahead.

CAPCOM I'll do these one at a time so that we can, when I give you the next switch we can checkout the COMM. The first thing is on panel 06, the UHF mode to EVA. Remember to pause 2 seconds in positions, and the frequency to 296.

SPACECRAFT It works. Okay, we're at 296 and EVA.

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CAPCOM Roger, next switch position back on panel A1, the audio center UHF air-to-ground 1 to TR.

SPACECRAFT It's there.

CAPCOM Okay, and in the same place, I'd like you to take air-to-air to TR.

SPACECRAFT It's already in TR.

CAPCOM Roger, now back on C3, I'd like you take the ACCU to number 2.

SPACECRAFT Works. Now audio center 2.

CAPCOM Roger, and that completes it, we'd like you to take the ACCU back to number 1.

SPACECRAFT In number 1 now.

CAPCOM Okay, now you can take the UHF, we'll reconfigure, take the, on 06 take the mode back to SIMPLEX frequency 259.

SPACECRAFT I've got SIMPLEX 2597.

CAPCOM Roger, and back on panel A1 the audio center UHF air-to-ground 1 to off, and leave air-to-air in TR.

SPACECRAFT Air-to-ground 1 is off.

CAPCOM Roger, thank you, and I've got a note here for some NOSL opportunities over South America if your ready to copy. While your getting that ready, I'd just like to confirm that you did the gas deactivated.

SPACECRAFT Yes, we got the gas deactivated. And go ahead on those NOSL opportunities.

CAPCOM Okay, we've got some strong convective storms over South America, the latitude is 25 south, longitude 73 degrees west. We have 2 opportunities, on orbit 54 just prior to the RCS burn and that will be at 8+17, and the the following orbit at 9+52. They'll be night settings of course.

END OF TAPE

CAPCOM ...4 just prior to the RCS burn and that'll be at 8 + 17 and then the following orbit at 9 + 52, there'll be a night setting of course.

SPACECRAFT Okay, that was 8 + 17 and when was the next one?

CAPCOM 9 + 52 on orbit 55.

SPACECRAFT Okay, I don't know about the first one, there's enough reflection off of the windows in here and you pretty much have to have the upper cabin quite dark. And that may be a little close to the burn to do that.

CAPCOM Roger, I understand. And on the MLR there's no problem since it was already shut off that we unplugged it, but we would like you to plug them both back in and everything will be fine and then we'll turn it on prior to entry to stir it up.

SPACECRAFT You're saying you need them both plugged back in now?

CAPCOM Negative, we just need them both plugged in prior to turning it on again.

SPACECRAFT Okay but we can leave them unplugged and off at this time?

CAPCOM That's correct Bo.

SPACECRAFT Okay, fine. (garble) some information we tried to get that Pursian Gulf site the other day with the oil spill and it was covered over with clouds. It was clear around it but with (garble) and by rain, shifts were cloudy.

CAPCOM Roger we copy. And Bo I've got a note here for you guys from Bill Thornton, he wanted to thank the crew for the fixing the connector there on the EOG box. We've got both data channels now giving excellent data recordings.

SPACECRAFT I'll pass it, I think Story's the one that did that.

CAPCOM And Challenger, Houston, for the EMU recharge we prefer that the crew have the helmets off for that. Challenger, Houston, you can ignore that water message, that's tank Charlie due to the recharge.

SPACECRAFT We just figured that out. That mean you want the helmets off for the change?

CAPCOM That's affirmative, off.

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SPACECRAFT Okay.

CAPCOM Challenger, Houston, we're about 30 seconds to LOS, we'll see you through Santiago at 8 + 18.

SPACECRAFT 8 + 18, roger.

PAO Mission Control Houston 3 days, 8 hours mission elapsed time. Challenger's just passed out of range of the Hawaii station, Astronauts Musgrave and Peterson are still recharging their spacesuit backpacks so that those would be ready for any contingency spacewalk that could become necessary later. Mission Control passed up some opportunities for observing lightning storms over South America. The backup CAPCOM on this team, the orbit team, Guy Gardner was talking to the crew on that pass. We have about 17-1/2 minutes before spacecraft comes within range of the Santiago tracking station. At 3 days, 8 hours, 1 minute mission elapsed time this is Mission Control Houston.

CAPCOM Challenger, Houston with you through Santiago for 5-1/2.

SPACECRAFT Okay, 5-1/2 minutes.

CAPCOM Roger, we get to watch a burn.

PAO This is Mission Control, the crew is preparing for the rendezvous phasing burn number 4, in about 1 minute. That'll be a burn of the forward RCS system, at a 9 foot per second burn.

CAPCOM Challenger, Houston, we show you should be in bravo manual norm.

END OF TAPE

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CAPCOM Challenger, Houston, we show that you should be bravo manual norm.

SPACECRAFT (garble) -.2, +.14, -.2.

CAPCOM Roger, we copy. Challenger, Houston, we're about 30 seconds to LOS, we'll see you at Ascension at 8 plus 36.

SPACECRAFT Roger.

CAPCOM Challenger, Houston, with you at Ascension for about 3 minutes.

SPACECRAFT Houston.

CAPCOM And I've got some presleep switch changes for you whenever you're ready.

SPACECRAFT Standby. Okay, go ahead.

CAPCOM Okay, back on AIR, the audio center panel, we would like to voice record select channel two, in ICOM B, if you haven't got it there.

SPACECRAFT Go ahead, You want it there now or you want it there for sleep?

CAPCOM We would like that one there now. That was an as required coming out of your EVA and we'll like it in ICOM bravo.

SPACECRAFT It's been there Guy.

CAPCOM Okay, we haven't got a look at that one. Okay, up front, on R1, like CRYO O2 and H2, tank 3 heaters, alpha and bravo off. That's all four switches off.

SPACECRAFT Okay.

CAPCOM And then for the PCS, over on L2, we'd like the O2/N2 controller valve system 1 to open, and then down on MO10W, the 14.7 cab reg inlet system 2 to close.

SPACECRAFT The O2 reg inlet system 2 closed?

CAPCOM That's affirmative. And Challenger, Houston, that MO10W was the 14.7 cabin reg inlet system 2 to close.

SPACECRAFT Okay, that sounds better. It's closed.

CAPCOM Okay, and you got the O2/N2 controller system 1 to open?

SPACECRAFT That's affirm, where we are now is O2/N2 controller system 1 is open, system 2 is closed. Both O2 reg inlet valves are open and 14.7 cabins are closed.

CAPCOM Roger, that's affirmative.

SPACECRAFT Okay, anything else?

CAPCOM Yes, you might get a leak message on left down-firing jet here and if you do, just follow the procedure. We don't think you are going to have to close the manifold.

SPACECRAFT Okay. (garble).

CAPCOM And Challenger, it's said same L2 delta jet that we had before.

SPACECRAFT Okay.

CAPCOM And just a reminder, we, before you go to sleep, we'd like you to put the cabin temp controller valve to full heat, and payloads would like to know how many NOSL magazines you've used or anticipated using today.

SPACECRAFT We haven't got to use any today.

CAPCOM Roger, we copy and understand.

SPACECRAFT And we may get to use one here a little later on, on that pass that you broadcasted up.

CAPCOM Understand and copy. And Challenger, Houston, we're about 30 seconds to LOS, we'll see you at Indian Ocean at 8 plus 52.

SPACECRAFT Okay.

PAO Mission Control, standing by for acquisition through Indian Ocean station.

END OF TAPE

PAO Mission Control standing by for acquisition through Indian Ocean station.

CAPCOM Challenger, Houston with you at Indian Ocean, and we'd like you to close the left manifold number 2 so we can just get some leak rates, we'll have you open it prior to LOS.

SPACECRAFT Okay, left manifold 2, closed now.

CAPCOM And I hope we have just one more presleep switch for you here, back on panel A7.

SPACECRAFT Go ahead.

CAPCOM The old MAD strain gage switch to PCM enable, please.

SPACECRAFT Okay, that's complete. I've got a note of interest for you Guy, on structures in this thing.

CAPCOM Go ahead.

SPACECRAFT (Garble) about one minute, we're all pretty sure we heard a pretty loud noise come from somewhere aft of us and on the left side it seemed like. And we think we both found it today. While gropping around for some other things, there was a bracket that holds the CCTV's back in its corner. The brackets, it kind of goes in and attaches to the aft bulkhead, and then there's one other place where it's been bonded, it looks like, it was bonded to the outer wall of the crew compartment, and that bonded pieces have come loose. Not only has it come loose, but it's not within 3/4 of an inch of where the mark was where it was.

CAPCOM Roger, we copy. And Challenger, Houston, you might note on your fuel cell SPEC 68 that your fuel cell 2 water flow transducer has failed, it's offscale low, nothing to worry about.

SPACECRAFT Well, I appreciate the update.

CAPCOM Roger, that's the H2 flow. And Challenger, Houston. We'd like you to open up that manifold now, the left 2 manifold.

SPACECRAFT Okay.

CAPCOM We're about to go LOS, the crystal team thanks you for a fine day, we'll be signing off and handing you over to the amber team.

SPACECRAFT Okay, enjoyed it, see you tomorrow.

CAPCOM Rog, they'll pick you up in Guam at 9+16.

SPACECRAFT Roger. Houston, MS1.

CAPCOM Go ahead Story.

SPACECRAFT Before you go over the hill, do you want me to change out the PLS batteries, or charge them? I've already got them down to an input of only 1.3 amps.

CAPCOM Roger, we'd like you to change them out.

SPACECRAFT Okay.

PAO Mission Control Houston, 3 days, 8 hours, 56 mission elapsed time. Challenger has just passed out of range of the Indian Ocean Station. We'll be picking up again over Guam in about 20 minutes. A reminder that about, approximately 10 p.m. Central Standard Time, we'll have out Change of Shift Press Conference with off-going orbit team Flight Director, Harold Draughon, and astronaut Bill Fisher who is familiar with the EVA techniques and spacesuits. That will be approximately 10 p.m. this evening, Central time. Handover is now being accomplished between the orbit team and the oncoming planning team. Three days, 8 hours, 57 minutes mission elapsed time, this is Mission Control Houston.

CAPCOM Challenger, Houston with you through Guam for about 5 minutes.

SPACECRAFT Roger, Houston. We'll talk to you in just a minute here.

CAPCOM Roger.

PAO This is Shuttle Mission Control at 3 days, 9 hours, 17 minutes and we'll be talking to the Challenger through Guam on orbit number 55. The amber team is on duty and CAPCOM is Dick Covey.

SPACECRAFT Houston, I just had, remembered that that manifold had been turned back off.

END OF TAPE

PAO ...orbit number 55. The amber team's on duty and CAPCOM is Dick Covey.

SPACECRAFT Houston I just had, remembered that that manifold had been turned back on.

CAPCOM I'm sorry Challenger, we didn't understand, say you did turn the manifold back on?

SPACECRAFT I just had remembered that I was going to ask you what we were going to do about it.

CAPCOM Okay, that's what I was going to come back to you with right now, you have a very very small leak in L2D, but it shouldn't cause us any problems over the night period with the manifold open, so we're going to leave it opened. Should you get a message relative to the left RCS leak during the night, that would mean the rate of leak had increased and we would want you to close the manifold 2.

SPACECRAFT Okay we understand.

CAPCOM Additionally I'd like to confirm that you got 3 teleprinter messages onboard about 2 hours ago.

SPACECRAFT Let me check that, I know we got at least one.

CAPCOM Okay the numbers we're looking for are 26 alpha, 29 bravo, and 30.

SPACECRAFT Roger we've got those messages.

CAPCOM Okay, and we need one more clarification on the structures problem that P.J. was briefing us on. We want a clarification on whether is the TV monitor blanket or bracket?

SPACECRAFT Bracket.

CAPCOM Roger I understand, the bracket.

SPACECRAFT Yes, that's roger.

CAPCOM And Challenger, Houston, the EVA support people are down here very interested in knowing if the EVA activities have been completed, something about heading for a local establishment?

SPACECRAFT The internal (garble) at all, but I finished the water recharge, finished the oxygen recharge, finished the other thoroughly cleanup, the only thing I got left to do is replenish that LiOH in the battery (garble) no trouble doing that.

CAPCOM Okay we copy.

SPACECRAFT And you do want the batteries replaced, not recharged?

CAPCOM That's affirmative Story.

SPACECRAFT Okay (garble) clean up all we got to do is change that around, cartridge in both, charge out a battery in both, we'll have no trouble doing that.

CAPCOM Okay we copy and the EVA support people thank you for the status and they'll be departing.

SPACECRAFT Thank them a whole bunch, looking forward to seeing them.

CAPCOM Story, the word's that they've asked me to pass to you, is to tell you that they're glad that you opened the hatch.

SPACECRAFT No gladder than we are.

CAPCOM Challenger, Houston, we're about 15 seconds to LOS, our next AOS will be at Santiago at 9:54 and we really don't have anything now to give you at that point so unless something else comes up or you need to talk to us we won't plan on bothering you again tonight.

SPACECRAFT Roger.

PAO This is Shuttle Mission Control, out of range of Guam now and we're about 37 minutes away from the beginning of the sleep period. Astronauts Story Musgrave just finishing up some final check points on the EMU systems and a few last minute items in the presleep period, we acquire signal again in about 30 minutes over Santiago and it's doubtful that there'll be any more voice contact with Challenger until the break of dawn. At 3 days, 9 hours, 23 minutes, mission elapsed time, this is Shuttle Mission Control.

END OF TAPE

PAO This is Shuttle Mission Control at 3 days, 10 hours, 17 minutes, Challenger has just completed a pass over Ascension Island. All positions in the MOCR got a look at their data and gave Flight Director Randy Stone the report that all systems are nominal. The Challenger is in a sleep configuration and the crew is into its sleep period now and no indication of any activity onboard the Challenger. On orbit number 56 at 3 days, 10 hours, 18 minutes this is Mission Control Houston. This is Shuttle Mission Control, 3 days, 10 hours, 57 minutes. Challenger is on orbit 56 over Guam right now, downlink data affirming nominal status of onboard systems. Here in the Mission Control Center we are playing back some of the video from today's EVA operations, giving the amber team the opportunity, their first opportunity, to look at the EVA ops. Amber team got off-console at 10:30 this morning, and only had about 8 or 9 hour turnaround before returning to this evening's shift. So during that crew rest period it's doubtful that any of these flight control team members had the opportunity to watch the EVA, so these replays of the video tapes represent their first chance to look at the day's activities. Everything continues to be quiet onboard Challenger, 7 hours remain in the sleep period at 3 days, 10 hours, 58 minutes, this is Shuttle Mission Control. This is Mission Control at Houston, Challenger's just completed a pass over Santiago, Chile.

END OF TAPE

PAO This is Mission Control Houston, Challenger's just completed a pass over Santiago, Chile. All positions report that everything continues to be quiet onboard the system, onboard the Challenger. NASA select television has been replaying the video tape of the Extra Vehicular Activity performed by the crew earlier today and the Mission Control team here in Houston watched part of that with a genuine sense of awe at the quality of the video that was downlinked from Challenger during that process. We are 6-1/2 hours remaining in this sleep period. Challenger on its 57th orbit of the Earth, mission elapsed time 3 days, 11 hours, 36 minutes. This is Shuttle Mission Control. This is Shuttle Mission Control, Challenger on orbit number 57 now passing over tracking station at Guam and all positions in the Mission Control Center are looking at data. Mission elapsed time 3 days, 12 hours, 27 minutes. This is Mission Control Houston at 3 days, 13 hours, 21 minutes. Challenger on its 58th orbit of the Earth. It's just had acquisition of signal at Dakar, and everything remains quiet and nominal onboard the vehicle. This is Mission Control Houston. This is Shuttle Mission Control, mission elapsed time 3 days, 13 hours, 38 minutes. NASA select continues to show replays of the EVA, meanwhile in realtime, Challenger is on its 58th orbit of the Earth and everything is quiet and nominal onboard the vehicle. This is Shuttle Mission Control. NASA select television has been replaying today's Extra Vehicular Activity. Meanwhile, in realtime, Challenger is on orbit 58 and systems continue to perform nominally, all is quiet onboard the vehicle. About 4 hours remain in the sleep period. Mission elapsed time is 3 days, 14 hours, 5 minutes this is Shuttle Mission Control. This is Mission Control Houston, Challenger on orbit 59, passing over the ground station at Dakar, Flight Director Randy Stone's gone around the room, checked out MOCR positions, to be sure operations continue to be normal. A quiet night for the crew, no alarms have occurred to interrupt their sleep period. About 3 hours remaining in the crew's sleep period. Mission elapsed time 3 days, 15 hours, even. This is Shuttle Mission Control.

END OF TAPE

PAO ...18 hours even. This is Shuttle Mission Control.

PAO This is Mission Control, Houston, Challenger on orbit 59, presently over Australia, but not in reach of any ground stations, in fact we are in a fairly long LOS period presently and don't acquire again for about another 50 minutes. All's quiet in Mission Control, all the highway functioning nominally. At mission elapsed time, 3 days 15 hours 45 minutes, this is Mission Control, Houston. This is Shuttle Mission Control we're two minutes away from acquisition of signal through Dakar, it'll be the first look we've had at the vehicle in over an hour. So the flight control team is going to be anxious to get a look at this downlink data. We'll report their reactions to you as soon as the Flight Director has surveyed the (garble). Mission elapsed time is 3 days, 16 hours, 31 minutes and we should have that status report to you in just a few more moments. Shuttle Mission Control. This is Shuttle Mission Control, looking at the Dakar data and all stations report normal operations onboard Challenger. About an hour and a half remaining in the sleep period. The off-going team here, the Amber Team, Flight Director Randy Stone, his change of shift briefing will be conducted at 7:00 central time. Our inclination at this point is to propose to cancel that change of shift briefing in the absence of any significant activities overnight and during the sleep period. If any news media have, take exception to that, we encourage you to notify the news center and we of course will make them available but once again our inclination at this point is to cancel that briefing in the absence of any significant activity. At 3 days 16 hours 36 minutes, this is Shuttle Mission Control. This is Shuttle Mission Control, Challenger has just passed by our ground station at Orroal, and the mission control team looked at the downlinked data and pronounced the vehicle, healthy. Challenger on orbit number 61, about 37 minutes remaining in the crew's sleep period, and members of the, members of the ascent/entry team and Flight Director Gary Coen are now tagging up in the Mission Control Center here for their handover. We are going to go ahead and cancel the change of shift debriefing with off-going Flight Director Randy Stone in as much as the event of the evening were static, the crew was asleep when this team came on, and will be asleep when this team goes off and no events during the night. Mission elapsed time is 3 days 17 hours...

END OF TAPE

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PAO ...as much as the events of the evening were static the crew was asleep when this team came on and will be asleep when the team goes off and no event during tonight. Mission elapsed time is 3 days, 17 hours, 23 minutes, this is Shuttle Mission Control. This is Mission Control Houston, Merritt Island launch area or Mila tracking station now has Challenger acquired, the spacecraft communicator Dick Covey likely will make the wakeup call in the overlapping Bermuda pass on the 61st orbit. Some 3 minutes remaining in the scheduled sleep period.

Music

CAPCOM Good morning Challenger, this is Houston how do you read? Challenger this is Houston, we're 30 seconds LOS, talk to you again through Dakar at 18:10.

PAO This is Mission Control Houston, no response from the Challenger crew to the wakeup music, which is a Korean War vintage song "The Poor Co-pilot", sung by Oscar Brand and the Roger Wilco 4. An acquisition of signal in about 4 minutes through Dakar and...

END OF TAPE

PAO Acquisition of signal in about 4 minutes through Dakar. INCO reports that the UHF downlink on the spacecraft had not been turned on during that pass.

CAPCOM Challenger, this is Houston. Good morning. We're with you through Dakar for 5 minutes.

CAPCOM Challenger, this is Houston and we're 15 seconds LOS. Talk to you again through Indian Ocean at 18:29.

PAO This is Mission Control. Loss of signal from Challenger through Dakar and Madrid. Some 10 minutes away from reacquisition through Indian Ocean station. Crew did not acknowledge two different wake up calls from CAPCOM Mary Cleave, offgoing CAPCOM on the planning team.

PAO Mission Control, Houston. We have acquisition through Indian Ocean station.

CAPCOM Challenger, this is Houston. How do you read?

CAPCOM Challenger, Challenger this is Houston and we're 40 seconds LOS. We'd like to remind you to configure for UHF simplex for Yarragadee. We'll speak to you through there at 18:45.

SPACECRAFT Houston, Challenger. Did you call?

CAPCOM Challenger, this is Houston. Yeah, good morning. We'd like to remind you to configure your UHF simplex for Yarragadee and we'll talk to you there at 18:45.

SPACECRAFT All right, thank you.

PAO Mission Control, Houston. Right at loss of signal at Indian Ocean station. The crew finally responded to CAPCOM Mary Cleave's calls. The systems controllers here reported prior to the wake up call that the crew was stirring a ...

END OF TAPE

PAO Indian Ocean station. The crew finally responded to Capcom, Mary Cleave's calls. The system's controllers here reported prior to the wakeup call that the crew was stirring about using various appliances and systems in the spacecraft. They apparently were just reluctant to answer during the last three passes as they got their breakfast on. Meanwhile, farther out in space where the tracking data relay satellite is not quite on station. The spacecraft remains in a stable sun oriented mode. Too early to do this. We continue to experience roll dynamics anomalies. The team is evaluating these conditions. No action other than maintaining the spacecraft is anticipated today. Plans to maneuver the spacecraft are still being developed and no action is anticipated for at least a week or two. This is from the TDRSS director, Bob Aller. Next station, Yarragadee, in about 5 and half minutes followed by Orroral Valley in Australia. This is Mission Control day 3, 18 hours 38 minutes. Mission Control Houston. Roughly 40 seconds away from predicted acquisition at Yarragadee, Australia. And we'll standby for further word of what's happening aboard Challenger this morning as the crew begins the day's activities. Primarily concerned with getting everything in its proper place and stowed away for entry tomorrow.

CAPCOM Challenger, Houston, Ascent Entry Team with you for 8 minutes at Yarragadee.

SPACECRAFT Okay.

CAPCOM Challenger, Houston, with a note for you on the PCS.

SPACECRAFT Go ahead.

CAPCOM Like you to reconfigure the PCS back to full automatic mode per the orbit OPS checklist page 5-6 using system 2.

SPACECRAFT Okay.

CAPCOM Challenger, Houston, 30 seconds to LOS, we'll see you at Orroral in about a minute.

SPACECRAFT Okay.

CAPCOM Challenger, Houston, with you Orroral for 4 and half minutes. Challenger, Houston, with you at Orroral for 4 minutes.

SPACECRAFT Okay.

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CAPCOM Challenger, Houston, 20 seconds to LOS. We've got a 30 minute LOS here and we'll see you at Mila at 19 29.

SPACECRAFT Okay, Mila, 19 29.

PAO This is Mission Control Houston. Loss of signal at Orroral Valley. A long LOS period across the Pacific to the Merritt Island launch area station. Challenger currently in a orbit measuring 147.6 nautical miles at perigee and 152.5 nautical miles at apogee. A period of 1 hour 30 minutes 10 seconds. Challenger has a 30 minute LOS to next station and this commentator has a 30 minute LOS for breakfast.

END OF TAPE

PAO Mission Control, Houston. We have acquisition through Merritt Island launch area early on orbit 61.

CAPCOM Challenger, Houston with you over the states for 11 minutes.

SPACECRAFT Okay. MSI's in the middle of the EVA entry prep.

CAPCOM Roger. Copy.

CAPCOM Challenger, Houston.

SPACECRAFT Yes.

CAPCOM Roger. I'm not sure if you got that part in the TPR yet but we want you to start the water dump now. Dump tank bravo to 20 percent. We'd like to get that over with so we can have a good 5 hours before we do the payload bay g-test later on with no dumps.

SPACECRAFT Tank bravo to 20 percent now.

CAPCOM Roger.

CAPCOM And, Challenger, Houston. Correction. That 5 hours is, we want 5 hours of no dumps prior to the rendezvous burn.

SPACECRAFT Okay.

CAPCOM Challenger, Houston. 20 seconds to LOS. We'll see you at Dakar at 19 plus 44.

SPACECRAFT Okay. See you then, Brian.

CAPCOM Challenger, Houston with you at Dakar for 6-1/2 minutes.

SPACECRAFT Okay.

CAPCOM And Challenger, we'd like a spec 1 on the GNC machine for variable parameter uplink.

SPACECRAFT Brian, we've got some people upstairs (garble). What were you wanting to spec 1?

CAPCOM Roger. We'd like a spec 1 on a GNC machine to uplink some GNC variable parameters so we can look at coas cal data later on.

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CAPCOM Challenger, Houston. You can have CRT 2 back. We've finished our uplink.

CAPCOM Challenger, Houston with a question for you.

SPACECRAFT Go ahead. Today's answer day.

CAPCOM Okay P.J., on this last pass over the states a few minutes ago, did you notice that buzz we were getting the other day on UHF?

SPACECRAFT No sir. I didn't but I haven't been on all the time. Don, did any of you guys notice it?

SPACECRAFT What's that P.J.?

SPACECRAFT No. No one onboard noticed it Brian and I feel sure we would have.

CAPCOM Okay. We're about to go LOS. We'll see you over Indian Ocean at 20:03. We're through with that CRT 2.

SPACECRAFT Okay.

PAO This is Mission Control, Houston. Loss of signal at Dakar. Indian Ocean station in 11 minutes. Day 3, 19 hours, 52 minutes. Mission Control, Houston.

END OF TAPE

PAO This is Mission Control, Houston. Loss of signal at Dakar, Indian Ocean station in 11 minutes. Day 3, 19 hours, 52 minutes. Mission Control, Houston.

PAO Mission Control, Houston. Acquisition through Indian Ocean station.

CAPCOM Challenger, Houston. With you for 8 minutes over Indian Ocean and I've got a switch on panel A7 lima for you.

SPACECRAFT Okay, we have somebody right there. Go ahead.

CAPCOM Roger. The MADS is cool d off again. We'd like to turn the MADS stream gage to on and we 'll give you another call in 5 or 6 hours to turn it back off.

SPACECRAFT Wilco. Do you want another star tracker self test on this one Brian?

CAPCOM Standby.

SPACECRAFT (Garble) we'll just shoot one anyway.

CAPCOM And Challenger, Houston. PJ, we don't need it if you've already started it go ahead but no requirement down here.

SPACECRAFT Okay. No I haven't. We'll, we'll skip it then.

CAPCOM Roger.

SPACECRAFT You still there Houston?

CAPCOM Roger. We're here.

SPACECRAFT (Garble) these water dumps are really something when you go into and out of sun light.

CAPCOM Roger, wish we could see that.

SPACECRAFT Boy I'll tell you one thing seeing (garble) attitude, Brian, and both shutters are closed. I just meant to turn the light off. That doesn't close the shutters, does it?

CAPCOM Standby.

CAPCOM Challenger, Houston. PJ, we see that the target suppress bit was set there for a while. It just went away. We've noticed before that in the daytime during water dumps that will happen a lot due to the reflection off the water particles.

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SPACECRAFT Yea, that's what Bo was just talking about so we'll just sit here till we go into darkness.

CAPCOM Roger.

SPACECRAFT It looks like, it looks like when you're driving at night in a snow storm and your lights see all of the snow particles out in front of you.

CAPCOM Roger.

SPACECRAFT Like an April night in El Paso. It's not snowing in Houston today, is it?

CAPCOM No, but it was almost cold enough this morning to.

SPACECRAFT Well Brian. When we got that attitude both shutters were closed. I did a manual open on both of them and came out of manual open and now they stayed open.

CAPCOM Roger.

SPACECRAFT (Garble) and clear the star table so these two sightings will be taken at the same time.

CAPCOM Roger.

SPACECRAFT Does that sound reasonable?

CAPCOM And Challenger, Houston. PJ, you don't need to do that. You've got 2 good stars in the now. We're about to go LOS. We'll see you at Yarragadee . . . 20 plus 19.

SPACECRAFT Yea, I see that. Okay. They got in before I did the (garble).

CAPCOM Roger.

SPACECRAFT 92.4 degrees with an air of .01.

CAPCOM Roger, copy.

SPACECRAFT Are you still there? How about if we do the fuel cell purge now?

CAPCOM Roger. You're go for fuel cell purge.

SPACECRAFT Thank you. Did you have a chance to see the torqing angles yet Brian.

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CAPCOM Roger. They're good. You can align.

SPACECRAFT Okay. It's mainly, most importantly is (garble)
we're copying them all down.

CAPCOM We have the numbers. No need to read them.

SPACECRAFT Okay.

END OF TAPE

SPACECRAFT Okay. Mainly and most importantly they just were copying them all down.

CAPCOM We have the numbers. No need to read them.

SPACECRAFT Okay.

PAO Mission Control, Houston. Loss of signal at Indian Ocean Station. Yarragadee in 6 minutes. At warmup of the onboard television monitors, the crew commented that the screens looked like an April snow storm in El Paso. Upcoming today, primarily stowage, getting ready for tomorrow's entry. Currently the Challenger is in a 147 by 152 nautical mile orbit. At 3 days, 20 hours, 14 minutes, Mission Control, Houston.

CAPCOM Challenger, Houston with you through over Yarragadee for 8 minutes.

SPACECRAFT Houston, loud and clear.

CAPCOM Roger. Go ahead and you have loud background noise.

SPACECRAFT Okay. What kind of a view would you like in the middeck cameras for the (garble)?

CAPCOM Roger. Standby.

CAPCOM Challenger, Houston. We're referring here to message number 32 alpha and line number 32. If you don't have that, we'll read it to you.

SPACECRAFT Okay. Sorry. I do see that.

CAPCOM Roger.

SPACECRAFT (Garble) we can do - -

CAPCOM Challenger, Houston with a note on NOSL for you.

SPACECRAFT Standby. We're taking a COAS marking scale test.

CAPCOM Roger.

SPACECRAFT Houston. Did you need something? I was off comm.

CAPCOM Roger. We just had a couple of words about NOSL for you if you want.

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SPACECRAFT Standby. Wait til Bo gets some lights and, I don't know, did you see that coas scale or do you want the numbers?

CAPCOM We're over no S-band site now. We'll go ahead and take the numbers if you can.

SPACECRAFT That's right, I forgot. Okay. The delta bias update report in was 0.74. It went in at 20:24:50. Go ahead with your NOSL comments.

CAPCOM Roger. Copy those numbers and there's a couple of very large thunder storms over the Gulf of Mexico building right now. Top's 38,000. Same system that dumped 11 inches of rain on New Orleans yesterday. Orbits 63, this one, and 64, the next one will be going right over that area. For orbit 63, a good start to MET for NOSL would be 3 plus 21 plus 04.

SPACECRAFT Okay. That sounds good. I'll try to get it. The last orbit I went over South American and it was just beautiful and clear and we coasted out and I just had given up and put the nozzle down and looked out again and saw the lightening flash. I grabbed it but I didn't get as good a picture as if I had been just been pointing straight down.

CAPCOM Roger that. We're going LOS for about a minute and we'll see you at Orroral.

SPACECRAFT Roger.

CAPCOM Challenger, Houston with you at Orroral for 2 minutes.

SPACECRAFT Roger.

CAPCOM Challenger, Houston. 20 seconds to LOS. We'll see you over the states at 21:04.

SPACECRAFT Okay, and we're ready for the CPTV bracket television at Mila.

CAPCOM Roger.

SPACECRAFT It's going to be hard to see back in that corner Brian, but we'll do our best.

CAPCOM Roger that.

END OF TAPE

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CAPCOM Challenger, Houston. 20 seconds to LOS. We'll see you over the States at 21:04.

SPACECRAFT Okay, and we're ready for the CC TV bracket television at Mila.

CAPCOM Roger.

SPACECRAFT Okay. It's going to be hard to see back in that corner, Brian, but we'll do our best.

CAPCOM Roger, that.

PAO Mission Control, Houston. Loss of signal at Orroral Valley, Australia. 31 minutes across the Pacific. The next acquisition at Merritt Island launch area. The crew of Challenger at that time will turn one of the onboard cabin television cameras toward a TV camera mount that apparently debonded during the launch phase. Another way of saying it came unglued. Nearing the end of orbit 62 in this first flight of Challenger. Crew setting about to put away all of the equipment that had been, has been used in the last four days. And winding up their breakfast aboard Challenger. 30 minutes until next station at Merritt Island launch area. At day 3, 20 hours, 33 minutes. This is Mission Control, Houston.

PAO This is Mission Control, Houston. We have acquisition of signal through Merritt Island launch area tracking station.

SPACECRAFT Roger Houston. Let me know when you get TV Brian. This is a terrible place to try to get light on with this TV system so you can see what's going on.

CAPCOM Roger. We have TV now and we're looking at a shadowy area there right over your head.

SPACECRAFT Oh, wait a minute. Let us back out so we can show you which bracket it is.

SPACECRAFT Okay, Brian. It's this aft corner back up in here. Can you see it. It's the one that's on the back. As you look at the CC TV bracket the upper right corner, there's a bracket on the backside where it was bonded to the bulkhead.

CAPCOM Okay, we can see that.

SPACECRAFT And that's the one that came loose. But you can see where it is. It can move to the left a little Don? We're going to have to try some hand held Brian. I know it's going to be a little wavy but we're going to have to do it. And we'll zoom in on it here.

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CAPCOM Roger. We're getting a much better shot of it now.

SPACECRAFT I don't know if you can see but that dark area, let me see if, the dark... Go and get a pencil a minute. Okay. I'll go on (garble) Brian. Do you hear me?

CAPCOM Roger, we got you.

SPACECRAFT I can't see Don. There. Okay. Can you see my pencil? Well, there's the bracket that came loose. Can you see it moving around?

CAPCOM That's affirm. We can see that moving.

SPACECRAFT Okay, and that's where it is now and then the dark area where my pencil is on the wall there is where it was bonded before. You can see how far away they are. They're pretty much an inch apart right now.

CAPCOM Yea, that's a real good shot. The EECOM folks down here got a good view and they think they know what the problem is now.

SPACECRAFT Okay.

CAPCOM They're going to look at it anyway.

SPACECRAFT All right. (Garble) We're not concerned about it. I, you know that, that is a pretty sturdy bracket and we think it'll stay sturdy coming in. Is that all the TV you need?

CAPCOM Roger. That's all we need on that PJ. Thank you very much.

SPACECRAFT Yes sir.

CAPCOM And we've got a picture of Story down by the mid deck with the CFES in the background.

SPACECRAFT (Garble) setup for our next operation that you're looking at down there. We're going to have to re-setup flight deck next. We left Story alone with the TV camera.

CAPCOM Roger that and we can tell from his movements that he's prob...

END OF TAPE

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CAPCOM Roger. That's all we need on that, P.J. Thank you very much.

SPACECRAFT Yes sir.

CAPCOM And we've got a picture of Story down by the middeck with the CFES in the background.

SPACECRAFT (Garble) setting up our stuff for our next operation that you're looking at down there. We're going to have to reset our flight deck next. We left Story alone with the TV cameras.

CAPCOM Roger that, and we can tell from his movements that he's probably finished with his EVA prep, post-EVA prep.

SPACECRAFT Well, I'm not sure. Brian, when you get a chance, how about giving us the run down on the forecast weather at Edwards for tomorrow.

CAPCOM Wilco.

SPACECRAFT Including predicted surface winds and a probable runway.

CAPCOM We'll get that together for you right now.

CAPCOM And Challenger, Houston. P.J. if you're ready to copy, I've got some wind, some weather and winds for you for tomorrow.

SPACECRAFT Yes. Go ahead.

CAPCOM Roger. Edwards for end of mission, 5,000 scattered

SPACECRAFT Wait. Hold it a minute.

SPACECRAFT All right, go ahead Brian.

CAPCOM Roger. That's Edwards, 5,000 scattered, winds variable at 5, runway 22, 40,000 port winds will be west-southwest at 60 knots max.

SPACECRAFT All right. All sounds very nice.

CAPCOM And Challenger, Houston. If you've got, if you can get a chance, we'd like an update on how the post-EVA prep went and also, when we went LOS yesterday during the EVA, Story was taking a, getting ready to take a look at the OMS pod for those tiles and we didn't hear what he saw, if anything. We'd like a report on that.

SPACECRAFT Yeah. Nothing much new, except that he said that there were pieces of frizzy, the frizzy that (garble) in the OMS pod. And there are a couple of three people talking. What else did you ask about?

CAPCOM Roger. The status of the post-EVA entry prep.

SPACECRAFT Oh yeah. I just went down and was the human lever for Story to use to try to close some of those lockers. You cannot, you know, when they pack this vehicle for flight, we really should not pack stuff like LCVGs and other things that are essentially vacuum packed at 1-g and that barely fit in a locker cause they are a real bear to get back in when you've used them and you try to get them back in at 0-g. That's the biggest problem we had is getting the stuff reasonably back in the places they came out.

CAPCOM Roger. Copy that.

SPACECRAFT But other than that, the EVA doctor has been plugging right along and doing everything. We've finished up. The main is recharging this last night when I'm on the post-EVA and pre-prep is finished.

CAPCOM Roger. Thank you very much. And Story, you need a haircut.

SPACECRAFT Is that a Marine Corp regulation haircut?

CAPCOM Yes sir.

SPACECRAFT Well, we get to lower your ears Story, one way or the other.

CAPCOM And Challenger, Houston. For Story, we're wondering if you ever got that bag back onto the EMU.

SPACECRAFT We just had a master alarm and it was (garble). (Garble) is being tripped again and the N2 flow (garble).

CAPCOM Roger.

SPACECRAFT - - even though as good as I want to be, it's at 0. The 3rd EMU is totally fixed now the arms are buttoned down. I was unable to get the bag to cover the necking and at the lower part of the (garble) but it's totally secure.

CAPCOM Roger. Copy.

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SPACECRAFT Now once again, we got here, Brian, is the situation on these started last night. You weren't on but we got a lot of noise when the gas flows up. Relatively lower than normal reg press and get indications of low flow. We're always here on 1.3 lbs an hour on the CRT now.

CAPCOM Roger. Copy.

SPACECRAFT Tank 7's up to 15 and it's still flowing pretty fast. I'm going to shut that reg off for now.

CAPCOM And Challenger, Houston. P.J., we'd like you to go ahead and close the, both systems 14.7 regs.

SPACECRAFT It's been done.

CAPCOM Okay. Thanks.

CAPCOM Challenger, Houston. Thanks a lot for that TV. It looked real good to us.

SPACECRAFT Okay.

END OF TAPE

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CAPCOM And Challenger, Houston, PJ we'd like you to go ahead and close both systems 14.7 regs.

SPACECRAFT It's been done.

CAPCOM Okay, thanks. Challenger, Houston, thanks a lot for that TV. Looked real good to us.

SPACECRAFT Okay.

CAPCOM Challenger, Houston 30 seconds to LOS. We'll see you next at Dakar at 21 19.

SPACECRAFT Roger.

PAO Mission Control Houston. Back in acquisition now through Dakar Senegal tracking station.

CAPCOM Challenger, Houston, standing by at Dakar for 7 minutes. Challenger, Houston with you at Dakar for 7 minutes.

SPACECRAFT Okay.

CAPCOM And Challenger, Houston, we have a couple of notes for you when you're ready.

SPACECRAFT Standby (garble) let me get a pencil.

CAPCOM Roger. Challenger, Houston, you won't need a pencil for these.

SPACECRAFT Go ahead.

CAPCOM And Challenger, Bo, we'd like you to use the manual procedure we gave you the other day for PCS management from here on out and also we need a GNC spec 1 for a variable parameter uplink.

SPACECRAFT Okay, GNC 1 on CRT 1.

CAPCOM Roger. Challenger, Houston, we're through with the CRT.

SPACECRAFT Roger.

CAPCOM Challenger, Houston, 20 seconds to LOS. We'll see you over Indian Ocean at 21 + 41.

SPACECRAFT Roger, Houston, see you then.

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PAO Mission Control Houston. Loss of signal at Dakar. 12 minutes away now from reacquisition through Indian Ocean station. Mission Control Houston. Challenger now reacquired through Indian Ocean station.

CAPCOM Challenger, Houston with you over Indian Ocean for 3 and half minutes. Challenger, Houston, standing by at Indian Ocean for 3 minutes. Challenger, Houston, two minutes to go at Indian Ocean. Challenger, Houston. Challenger, Houston. 15 seconds to LOS. We'll see you at Yarragadee at 21 54.

END OF TAPE

CAPCOM Challenger, Houston.

CAPCOM Challenger, Houston. 15 seconds to LOS. We'll see you at Yarragadee at 21:54.

CAPCOM Challenger, Houston. If you're calling us, we're not hearing you. We'll see you at Yarragadee.

PAO Mission Control, Houston. Absolutely no response from the crew over Indian Ocean station. Next station Yarragadee, Australia, in about 5 as, in 9 minutes. Preparations underway here in Mission Control room for the visit of Vice President George Bush later today and his conversation with the crew of Challenger. Day 3, 21:46. Mission Control Houston.

CAPCOM Challenger, Houston. With you at Yarragadee for 9 minutes.

CAPCOM Challenger, Houston. Radio check.

CAPCOM Challenger, Houston. At Yarragadee. Radio check.

CAPCOM Challenger, Houston at Yarragadee. How do you read?

CAPCOM Challenger, Houston. With you at Yarragadee. How do you read?

CAPCOM Challenger, Houston. In the blind. Challenger, Houston. In the blind. Switch to audio center 2. Over.

CAPCOM Challenger, Houston. In the blind. Switch to ACCU 2 and give me a radio check. Over.

CAPCOM Challenger, Houston. In the blind. One minute to LOS. We'll see you over Hawaii. 22 23.

PAO Mission Control, Houston. No joey over Yarragadee raising the crew.

END OF TAPE

CAPCOM Challenger, Houston, (garble) 1 minute to LOS. We'll see you over Hawaii 22 23.

PAO Mission Control Houston. No joy over Yarragadee raising the crew. The two mission specialists at this time should be doing the audiometry test and likely the other two crewmen do not have their audio turned up to where they can hear the ground calling. Also, the antenna patterns in the particular attitude on this Yarragadee pass were not the greatest in the world for getting good communications. However, all systems aboard the Challenger on the ground appear to be in good condition. As well as the downlink carrier signal. Hawaii in about 17 minutes. Nearing the end of orbit number 63. Day 3, 22 hours 5 minutes. Mission Control Houston. This is Mission Control Houston. We have acquisition at Hawaii tracking station. Sort of scratchy in as much as we're in the midst of a keyhole. Should come out of it momentarily.

CAPCOM Challenger, Houston with you at Hawaii for 4 minutes.

SPACECRAFT Okay. Okay, Houston.

CAPCOM Roger, got you loud and clear. Didn't hear you last couple of passes.

SPACECRAFT (garble) in the last experiment.

CAPCOM Roger that.

SPACECRAFT We did the fluid measurements on everybody and we did the audiometry on everybody, (garble) photos on everybody.

CAPCOM Okay.

SPACECRAFT Houston, Challenger.

CAPCOM Go ahead.

SPACECRAFT Yes, hi there. You are still on Bryan?

CAPCOM Yes sir. About to go off but I'm still on.

SPACECRAFT Couple of incidental items. I meant to mention these before. I don't remember folks mentioning it but Story and I, especially the first night, and I think it's because the function of how long you lie awake waiting to go to sleep. Story and I have seen isolated incidences of the old eyeball flashes and Don and Bo haven't. Which means either they don't see them at all or they sure go to sleep a lot quicker than Story and I did.

CAPCOM Roger, copy.

SPACECRAFT Alright, and another thing. We've been a little remiss in reporting to you. We frankly didn't stay up last night, I'm talking now about the oil slick in the Persian Gulf. We didn't stay up last night to get the opportunity. We saw it on the rev before and it was semi cloudy up that way and we were kind of tired most of us so we decided to turn in. But the night before, Bo and I stayed up. We got some pictures of it. It was partly cloud covered at the time. I think through the binocs, with the naked eye through the binoculars, I could make out what I think was some patches, some oil slicks very extensive in size and so most of the day between what's the peninsula Berain or Dacar whichever one it is, we'll be between the two places and I'm not sure if I would have recognized if I hadn't known it was there even through the binoculars. So we did get some pictures that we hope will be useful. The night before that, they were again there, the clouds kind of folded and it was my first pass over the area and frankly I got a little confused on the geography and we stabbed a couple kind at a relatively large oblique angle and I don't know how good they were.

CAPCOM Okay, thank you very much for the comments.

SPACECRAFT What you can't see visually Bryan

END OF TAPE

SPACECRAFT - - some pictures that we hope will be useful and the night before that, they were again there, the clouds kind of folded. It was my pass over the area and frankly, I got a little confused on the geography and we snapped a couple kind of at tried a relatively large oblique angle and I don't know how good they were.

CAPCOM Okay. Thank you very much for the comments.

SPACECRAFT Yeah, but what you can't see visually, Brian, it just looks like a darker patch in the blue of the water in the Gulf there.

CAPCOM Roger.

SPACECRAFT But the Gulf, north of Dakar and Barahain, there's been cloud coverage, so we can't really look up that way and visually determine the extent of the thing.

CAPCOM Okay. Thanks.

CAPCOM And Challenger, Houston. We're going LOS. We'll see you over the states in about 3 minutes.

PAO Mission Control, Houston. Loss of signal at Hawaii. Buckhorn in a minute and 50 seconds and on this pass over Florida, there should be additional opportunity for thunderstorm viewing with the night/day optical survey of lightening experiment on NOSL. At 3 days, 22 hours, 30 minutes. Mission Control, Houston.

CAPCOM Challenger, Houston's with you over the states for 21 minutes.

SPACECRAFT Okay. Paul was asking what kind of light flashes I had one night and it was just a bright burst of white light something like a flashbulb.

CAPCOM Challenger, Houston. I have a question for you regarding the PCS system, if you have a moment.

SPACECRAFT Go ahead.

CAPCOM Roger. We're still trying to see if we can track the incidents to any activities that you're doing onboard and we wanted to ask each of you if you can remember what you were doing during this last incident of high flow.

SPACECRAFT Okay. P.J.'s getting on the line now.

SPACECRAFT (Garble) a MET (garble).

SPACECRAFT Do you need to talk to each one of them?

CAPCOM No. We just were interested in the last one that happened, oh, about an hour ago.

SPACECRAFT Okay. What do you need Roy?

CAPCOM Well, we're just wondering if, what you all were doing at the time to see if we can relate the incidence to anything that's going on onboard, so we'd just like to have a report of what each of the crewmembers was doing at the time.

SPACECRAFT Yeah. Hold on a minute.

SPACECRAFT Okay. We thought we had a big (garble) to the WCS because Don was down there. It turned out all he was doing was getting out some cleanup gear. So he was not using a WCS, so I can't tie it to any of that Roy. We were, Story was getting, he was sending up for some audiometry. Bo was trying to figure out what had happened when his second wireless comm meter of the day had failed and you know, I can't really tie it to anything. It just started flowing, made the noise. We got an alarm. I looked up at the overhead panel and the flow on the panel read 0. I then called up the spec, but by then it read 1.3. You know we had already had the N2 flow master alarm in the (garble). By the sound that it was flowing into there at a pretty good rate. At about the time of spec 66, the cabin pressure showed 14.9 and the airlock pressure showed 15. I decided it was time to put off the regs and wait awhile, but we cannot tie this one to any event.

CAPCOM Roger, and thank you for your report, P.J.

SPACECRAFT Yes sir.

SPACECRAFT Hey, Roy. There is one thing now. Wait a minute. We were flowing at the time. I noticed we were flowing O2 and we had switched to N2 is when the problem started. I had forgotten that.

CAPCOM Okay. Good.

SPACECRAFT But I think the flow rates on the O2 were pretty nominal. You know, they were down around 1, or thereabouts. Maybe a half to 1-1/2. Anyway, not surprising because they didn't get my eye, but I do remember now at the time that Bo and I talked about, well there it goes when it does the old O2 to N2 shift when the control is shifted over to N2.

CAPCOM Okay. Understand.

SPACECRAFT And if you think of anything else that we can try to reconstruct, give us a hollar.

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CAPCOM Well, we're really grasping.

SPACECRAFT Well, I am too.

END OF TAPE

SPACECRAFT And I think the slow leaks on the O2 were pretty nominal. You know, they were down around 1 or thereabouts. Maybe a half to 1 and a half. Anyway, not surprising cause it didn't get my eye but I do remember now at the time that Bo and I talked about well there it goes when it does the old O2 to N2 shift, when the controller shifted over to N2.

CAPCOM Okay, understand.

SPACECRAFT And if you think of anything else that, you know, we can try to reconstruct here call us.

CAPCOM Well, we were really grasping.

SPACECRAFT Well, I am too.

CAPCOM And Challenger, Houston. Could you give us a few details on Bo's WCCU problems?

SPACECRAFT I'll let him talk.

CAPCOM Roger.

SPACECRAFT How do you read?

CAPCOM 5 by.

SPACECRAFT Okay, this morning I got up and replaced the battery in 1 and it worked just fine and all of a sudden it went dead and I looked down and the little light that's on the late unit was not on. So I went and put another battery on it and that didn't make any difference. So I got another one and...

SPACECRAFT Another battery or another unit?

SPACECRAFT I got another unit and started to use it and it worked fine until I started to get some static and that was the time I replaced the battery on it and we were up here talking about it when the problem happened with the PCS system so I just put it, I wrapped it up and put it away and I'm on the sideline now.

CAPCOM Okay. We copy. And we're about 20 seconds LOS for a short key hole. We'll be picking you up through Mila here very shortly and when we pick you up if you could tell us the numbers of the units that failed we'd appreciate it.

CAPCOM Challenger, Houston. We're out of the key hole now and with you through Mila.

SPACECRAFT We're getting a good view of Matagorda Island, Roy. The airport stands out quite markedly to the naked eye.

CAPCOM Yea. We finally got some good weather this morning.

SPACECRAFT Yea and you can make out with the naked eye Scholes Field also. The puffy clouds really make a difference. There's no clouds over Galveston Island which is why Scholes is easy to find. The puffy clouds break things up just enough that, there I just finally found Ellington.

CAPCOM Well, from all of us we'll send you a big hello, a big wave.

SPACECRAFT Yes sir. We're waving back. We see you. You see us?

CAPCOM Well, we're straining right now but it's kind of tough.

SPACECRAFT Okay.

CAPCOM Challenger, Houston. We're 30 seconds LOS. See you at Dakar at 2 2 5 5.

SPACECRAFT Okay.

PAO Mission Control, Houston. Loss of signal at Bermuda. 4 minutes away from reacquisition at Dakar, Senegal. During this just completed stateside pass, crew of Challenger reported on some high oxygen and nitrogen flow characteristics of the cabin pressurization system that had set off an alarm. They had experienced similar incidents before with this particular system. Bobko's, Karol Bobko's wireless mike went dead and he had to go to hardline. They also reported being able to see the runways that on Matagorda Island and Scholes Field in Galveston coming directly over the Texas coast. No report of being able to see thunderstorms in Florida on this orbit. There were 2 successive orbits over Florida in which the Night/Day Optical Survey of Lightning experiment could be operated. They'll return in 2 and a half minutes at Dakar. Day 3, 22 hours, 52 minutes, Mission Control Houston.

END OF TAPE

PAO successive orbits over Florida in which the night/day optical survey of lighting experiment could be operated. They'll return in 2 and half minutes at Dakar. Day 3, 22 hours 52 minutes Mission Control Houston. Mission Control Houston. We're in a few seconds of acquisition now at Dakar.

CAPCOM Challenger, Houston's with you at Dakar and Ascension for 10 minutes.

SPACECRAFT Okay. Houston, how do you read the PLT?

CAPCOM You're five by.

SPACECRAFT Houston do you read the PLT?

CAPCOM PLT Houston, you're five by, how me?

SPACECRAFT Okay, this is PCU C. The first PCU we had the problem with was A. The one dead and the second one was B, the one with the static.

CAPCOM Okay, we copy. Challenger, Houston, 30 seconds LOS. We'll see you at Botswana at 2 3 1 3.

SPACECRAFT Roger, Houston, see you there.

CAPCOM Challenger, Houston's with you at Botswana for 4 and half minutes.

SPACECRAFT Okay, Houston, read you loud and clear.

CAPCOM Okay, you're five by and Bo, have a suggestion for you on your WCCU if you can listen a second.

SPACECRAFT Okay.

CAPCOM Just in case you should need another unit later on our recommendation would be to switch the antenna from A to B, try that.

SPACECRAFT Okay.

CAPCOM We think the bravo unit should work okay once the antenna's switched.

SPACECRAFT Okay.

CAPCOM And Challenger, Houston, is Story on the comm?

SPACECRAFT Yes, sure am.

CAPCOM Story, have a question for you when you put the dead EMU batteries in the Return to Houston bag did you tape the terminals?

SPACECRAFT The used batteries are not in the Return to Houston bag. They're back in a locker.

CAPCOM Roger, does that include the dead batteries, the four dead ones?

SPACECRAFT The two dead ones. I only changed out the batteries on two EMU's, so I have two used batteries.

CAPCOM Story, I'm talking about the light, the EMU light batteries.

SPACECRAFT Okay, they are still in the lights themselves.

CAPCOM And what about the four dead EMU light batteries that you found on the first day's inspection?

SPACECRAFT I labeled all of them with gray tape.

CAPCOM Okay. My only concern here, Story, and the reason I was asking the question I should just get to the bottom line and tell you that. They were concerned if you'd put them in the Return to Houston bag without taping the terminals because there is a possibility of inadvertent discharge and the discharge could cause some venting. So in the event that you put them somewhere where they can move around and you did not tape the terminals recommend you do that.

SPACECRAFT Okay, each one of them is in its own foam compartment.

CAPCOM Okay, great.

SPACECRAFT So, they'll be alright.

CAPCOM Sounds great, Story, thank you.

SPACECRAFT That's good thinking though. I just ran a head max parameter on a CDR in about 23 12.

CAPCOM Okay, copy.

SPACECRAFT The IMU's switched in the middle of the data was because he was uncooperative and sneezed.

CAPCOM Okay, Story, we'll pass it onto Dr. Thorton.

END OF TAPE

Introducing Vice President Bush to Flight Director, Greg Coen, and Roy Bridges, CAPCOM.

PAO Let me give you just a list of here of what you're looking at. You're standing in the middle of Mission Control. This is the way it looks 24 hours a day once we start flying. The world map here is, you can see that we're coming, the little spaceship here shows you that we're coming up. We're coming up toward Hawaii and that's where you're going to be speaking through is the Hawaii tracking station.

VICE PRESIDENT BUSH All right.

PAO And then, we've even got a second shot at it across the United States on the hope that if anything would go wrong we could also communicate with them over the United States. The men in this room, or the people in this room, I should say both men and women, are kind of the tip of the iceberg. This is not where it all happens. They're supported by a number of people...

VICE PRESIDENT BUSH A giant communications net?

PAO ... there are a number of people in this building and around the world that are supporting them so it really, it really is the true tip of the iceberg that you see here. It's more or less like the cockpit of Mission Control. But there's many other things that are going on around the country and these people are at the focus of it. Roy here is the CAPCOM. He's going to give you little instruction now on what we've got to do to talk to them.

VICE PRESIDENT BUSH All right. Can I sit down here?

PAO Sure.

BUSH Okay.

PAO And I'll leave you standing. Stand right behind me.

ROY BRIDGES The telephone is not really too sensitive Mr. Vice President.

VICE PRESIDENT BUSH Yeah.

ROY BRIDGES But you do have to talk into the receiver (garble) and to activate the system just mash the button.

VICE PRESIDENT BUSH Is that for both testing and talking?

ROY BRIDGES No.

VICE PRESIDENT BUSH Just talking?

ROY BRIDGES Talking and you'll know when you're on because you'll hear what we call a guindar key and there will be a little beep so what you hear between the beep just go ahead and start talking. We have several comm loops going up and down. (Garble) real quickly a couple of words at the end.

VICE PRESIDENT BUSH I see, good.

PAO Roy, why don't you explain what's going on right now, in the flight plan so that he knows about, about what to expect to see them do.

ROY BRIDGES (Garble)...Basically what we've been doing is following this plan and there's been some medical (garble) primarily audiometry and also...

VICE PRESIDENT BUSH Who's doing this now?

ROY BRIDGES All 4 of the crew members.

VICE PRESIDENT BUSH All 4.

ROY BRIDGES And we do have a doctor aboard, Doctor Story Musgrave, he's leading the effort there.

VICE PRESIDENT BUSH How's Bo feeling today?

ROY BRIDGES Bo seems to be feeling fine. He's talked to us a couple of times and sounds very chipper today and the other things that they're doing, they will have the one more rendezvous burn this afternoon. We're in fact in a rendezvous to get ready for next flight and then we'll spend (garble) putting all the experiments away for entry tomorrow morning. Of course when they get up in the morning the crew will be very, very active in turning on all the systems (garble). (Garble) displays that we can call up and a number of parameters (garble) this is the orbit. They're about 160 miles (garble) orbit right now, looking at the (Garble) in this area. And we can also monitor the attitude...

VICE PRESIDENT BUSH If there is something unusual that would happen would you know it right here or would you have to get that put in by someone.

ROY BRIDGES Each member of the team is an expert on a particular system.

VICE PRESIDENT BUSH Circumstance. Yea.

ROY BRIDGES And the Flight Director is the focus of the effort of the team and all the information comes to him, he makes the decision and then I pass it to the crew.

VICE PRESIDENT BUSH I see. But the decision that you have to do something different, or touch this button or turn on. Some responsibility.

ROY BRIDGES There are a number of critical actions that have (garble).

VICE PRESIDENT BUSH But they would do that before they're instructed to be, depending on what it was.

ROY BRIDGES Yes. They have the final responsibility for the safety of the vehicle and we (garble).

VICE PRESIDENT BUSH Yes.

ROY BRIDGES Yes. They have (garble). (Garble). We've trained through a lot of simulations over here where they've dumped every malfunction known to man about the Orbiter. In fact (garble) we sometimes say if there's anything left (garble).

VICE PRESIDENT BUSH But have you ever had something that was a total surprise and had not been tested in the lab or on any of these flights?

ROY BRIDGES Well, we've had a few surprises but thank goodness they've all been minor. Supporting systems haven't had a big influence on the flights.

PAO Probably, I was going to say probably the best example of that was in Apollo, on the Apollo 13, you recall we were going to the moon and had an oxygen tank explode. It more or less blew off the side of the spacecraft. And that one was never simulated under any condition, under any circumstances. And it was a very serious, serious thing and we went on around the moon and brought them home. Used the lunar module as more or less a lifeboat. That taught us a lot about how to use that lunar module later as a, and we used that, planned it as a lifeboat.

VICE PRESIDENT BUSH Who was 13's pilots. Do you remember all that?

PAO 13's were Fred Haze, Jim Lovell and Jack Swiegart.

Taught us a lot about how to handle that kind of an emergency.

Yea, I would expect.

Frightening. It confirmed me. As I told you, I'm superstitious. It confirmed me as a triscadecaphobe. (Laughter) Never again. I don't know what I'm going to do when we get to number 13 in this series.

PAO Well over here, like the airlines, just skip that number and go to 14. (Laughter). We're just a few minutes away from acquisition now and, Roy, why don't you go through the sequence of how you'll...

ROY BRIDGES Yes sir.

PAO We want to make sure that we have the good TV picture and we'll be looking up then on live TV.

ROY BRIDGES We'll have acquisition with Hawaii. I'll talk to them and establish contact and make sure we have a picture. Then I'll introduce you to them and let you go ahead with your conference.

PAO You will be able to see the picture.

VICE PRESIDENT BUSH Oh, you see them up there on that. Who will we see on it?

ROY BRIDGES You should see Commander Paul Weitz, pronounced Weitz, Bo - Bobko the Pilot, Don Peterson...

VICE PRESIDENT BUSH Will we see all these guys in this shift?

ROY BRIDGES They should all be on there.

PAO This is about the, this is about what we expect during a normal flight. This is about the noise level in here. Keep it quiet. Lot of, lot of radio discipline so we haven't changed anything for your visit. This is the way it normally operates.

VICE PRESIDENT BUSH And how long are these, all these men and women on duty here in the week.

PAO Well, approximately 8 hour shifts, 24 hour coverage, and there's approximately 8 hours, there's some overlap on...

VICE PRESIDENT BUSH (Garble) three Flight Directors?

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PAO Three Flight Directors. All these positions are tripled and same thing goes on in the back rooms in the support areas same sort of thing.

VICE PRESIDENT BUSH Is that back in there?

PAO No, this is just a viewing room...

VICE PRESIDENT BUSH That's the Galley, yea.

PAO The Galley. The support rooms are on the sides here.

CAPCOM Challenger, Houston's with you through Hawaii for 8 minutes.

SPACECRAFT Roger.

CAPCOM And we're standing by to pick up your TV picture. Nothing yet. I'll let you know.

There they are.

CAPCOM Okay, we're picking up a picture now. I see three of you on the mid deck. (laughter).

PAO Smile for the camera.

CAPCOM Now we see all of you. We're very pleased to welcome a new CAPCOM to the STS-6 Entry Team and he would like to have a few words with you now.

SPACECRAFT Okay.

VICE PRESIDENT BUSH Can you hear me okay?

SPACECRAFT Coming in loud and clear.

VICE PRESIDENT BUSH Well I just wanted, this is the Vice President, and I just wanted to say we're sitting here, don't panic there are other CAPCOMs sitting next to me, but we wanted you to know

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SPACECRAFT The IV is switched in the middle of the data is because he was uncooperative and sneezed.

CAPCOM Okay, Story, thank you. We'll pass it on to Dr. Thorton. Challenger, Houston, we're 30 second LOS. See you at Yarragadee at 2 3 3 0.

PAO Mission Control Houston. Loss of signal at Botswana voice relay station. 12 minutes away from Yarragadee, Australia. Day 3, 23 18, Mission Control Houston.

CAPCOM Challenger, Houston's with you through Yarragadee for 8 minutes.

SPACECRAFT Okay, head and eye was running (garble) 23 30.

CAPCOM Okay, we copy, head and eye finished at 2 3 3 0, is that correct?

SPACECRAFT About 23 30.

CAPCOM Roger.

SPACECRAFT 2 3 30.

CAPCOM Copy. Challenger, Houston, we're about 1 minute LOS. Next pass will be Hawaii at 2 3 5 6 and wouldn't be surprised that you hear another Capcom on the loop at that time.

SPACECRAFT Roger Houston. (garble).

CAPCOM Roger, Hawaii is next at 23 56 and we're expecting to have TV there and you might be talking to another Capcom. A different one.

SPACECRAFT Roger, understand. Head and eye was run on Musgrave and 23 38.

CAPCOM Okay, copy.

PAO Mission Control Houston. Loss of signal at Yarragadee. 17 minutes away from reacquisition through Hawaii. The other Capcom alluded to by the present Capcom, Roy Bridges, will be the Vice President of the United States, George Bush, who will be escorted into the Control Room here by NASA administrator, James Beggs, and Gerald Griffin, JSC Director. Mission Control Houston. We're less than a minute now from acquisition at Hawaii at which the Vice President of the United

States, George Bush, will talk to the crew on the air ground. We'll have a downlink television picture from the spacecraft. We now have acquisition. Should be getting a TV picture momentarily.

CAPCOM Challenger, Houston's with you through Hawaii for 8 minutes.

SPACECRAFT Roger.

CAPCOM And we're standing by to pick up your TV picture, nothing yet, I'll let you know. Okay, we're picking up a picture now. I see three of you on the middeck.

SPACECRAFT Yes, that's all of us.

CAPCOM Now we see all of you. We're very pleased to welcome a new Capcom to the STS-6 Entry Team and he would like to have a few words with you now.

SPACECRAFT Okay.

GEORGE BUSH Now can you hear me okay?

SPACECRAFT Coming in loud and clear.

GEORGE BUSH Well, I just wanted to, this is the Vice President, and I just wanted to say we're sitting here, don't panic, there are other Capcoms sitting next to me but we wanted you to know you've driven the Beach Boys off the front pages of the papers down here in Houston and across the country. That's the good news and second,

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SPACECRAFT Okay.

VICE PRESIDENT BUSH Now. Can you hear me okay?

SPACECRAFT Coming in loud and clear.

VICE PRESIDENT BUSH Well, I just wanted -- this is the vice president and I just wanted to say, we're sitting here, don't panick, there are other CAPCOMs sitting next to me, but we wanted you to know that you've driven the Beach Boys off the front pages of the papers down here in Houston and across the country. That's the good news. And secondly, I've just had the pleasure of meeting many of your families and they are looking forward to tomorrow as much as the rest of the country. And lastly, we are certainly proud of this wonderful example that you're setting and once again, this whole NASA operation is really inspired and I think brings out the best in the United States, so I just wanted to add my words of congratulation to those of my boss yesterday and say how much we appreciate what you're doing. Over.

SPACECRAFT Oh, thank you very much, sir. And as I told the president yesterday, we just wanted the priviledge to be able to do this and hopefully as a demonstration of what we can do in this country when we apply the will and desire to do it.

VICE PRESIDENT BUSH Well, Jim Beggs is here and I'm sure he agrees with that. He's been getting -- yesterday he met with the president and me in the situation room at the White House and now here he is today with me in Houston and he gave an opportunity to -- along with others here in Houston, Johnson Space Center to brief fully on the future, but I think this mission of yours really does make a significant contribution to the whole effort and it's most inspiring and thanks ever so much for what you're doing. I'll now turn this over to the pro's.

SPACECRAFT All right. Fine. Thanks for calling. We appreciate it.

CAPCOM You guys look a little formal all grouped up there side by side. Come on relax would you.

SPACECRAFT Oh, gee whiz.

SPACECRAFT We're waiting for, I guess the pros can't get back on.

CAPCOM Woops, not that much.

CAPCOM Turn around will you?

SPACECRAFT Okay. Roy, we just wanted to say that so far we've done our best (to put these glasses on) and that this project has been brought to you by the Gerotol bunch, F-troop. We didn't have a chance to rehearse this very well. Okay. We're very pleased to find this stashed somewhere in the vehicle and it just goes to bring home that old adage, as that space leader John Young has said that spaceflight is really for old folks and, Bo.

CAPCOM That's great.

SPACECRAFT Okay, and maybe that's why we try a little harder.

CAPCOM Turn it down just a little to get the glare off of it. There, we have 11 years of aviation experience. All right.

SPACECRAFT Well, we try to please.

CAPCOM Hey, where are all the flags since the Vice President began, where are all the flags that Astronauts and Cosmonauts, etc. present to us. I mean there must be a jillian flags in that thing somewhere. Not F-troop but all of them.

SPACECRAFT Oh, I don't think so sir. I don't think they really fly those flags.

CAPCOM That's kind of been my feeling.

SPACECRAFT You'll have to talk to Mr. Beggs about that I guess.

SPACECRAFT Paul, as a matter of fact, we have them right here. The osk lock is right there. See if we can get into it. Knock the lock off on there, Don.

SPACECRAFT All 500,000 of them?

SPACECRAFT Well, so we've been told. (Garble) we got prior to burn. See we played the game. We didn't know if we could get in that lock. Oh, good Lord, it's vacuum packed. Don't pull it out. It's been put in with a hydraulic ramp, but take our word for it, sir. It's there.

CAPCOM Challenger, Houston. All of you have certainly given F-troop a good reputation, finally.

SPACECRAFT Thank you Roy. Like I say, we did try.

CAPCOM Well, it was certainly a great effort. We've all enjoyed working with you through the whole flight and we're looking forward to a great entry tomorrow morning.

SPACECRAFT I should say, that sounds like the last time. I hope you're going to be around at least one more time. I talked to Brian earlier about the weather. It sounds pretty good for Edwards tomorrow.

CAPCOM Oh, it's going to be a beautiful day out there and we're not expecting any problems at all. Got light winds and sunny skies.

SPACECRAFT Just for information, you don't happen to have the sequence in front of your forecast on the surface temp do you?

CAPCOM Standby a second. I think we can find out

SPACECRAFT Okay. Are you essentially done with the TV?

CAPCOM Well, we're enjoying Story's show there, but we've got about 1 minute left in the pass.

SPACECRAFT Yeah, he's trying to see if he can make himself sick again.

SPACECRAFT Well, we don't know. You know you've seen a lot of guided tours of the place I guess and because we got those cameras fixed but -- I tell you, it's tough to keep the place neat. We've kind of neatened up this end a little.

CAPCOM Well, the ship looks in great shape today and we appreciate the show. We're losing your picture now. We'll be picking you up over the states in about 2 minutes.

PAO Mission Control, Houston. Loss of signal from Hawaii and a brief gap of some 2 minutes until reacquisition at Buckhorn. A fairly animated exchange between the Vice President George Bush and the crew of Challenger, including the F-troop guidon flag which was dredged out of one of the lockers and displayed on the onboard television. The Gerotol Gang, as they refer to themselves, with reading glasses and all. We'll be back at Buckhorn in less than a minute. This is Mission Control, Houston.

END OF TAPE

CAPCOM We're enjoying Story's show there but we've got about one minute left in the pass.

SPACECRAFT He's trying to see if he can make himself sick again. Well, we don't know, you know you've seen a lot of guided tours of the place. I guess and because we got those cameras fixed but I tell you it's tough to keep the place neat. We tried to neaten up this end a little bit. Then we spend most of the morning trying to neaten up the passes the best we can. But it's kind of like taking a vacation in a cabin somewhere for 4 or 5 days. About the fifth day when you're ready to move you realize how much stuff has been out all over. There's an alien being that keeps grabbing your things and putting them where you haven't put them.

CAPCOM Well the ship looks in great shape today and we appreciate your show. We're losing your picture now. We'll be picking you up over the states in about 2 minutes.

SPACECRAFT Okay, talk to you then.

PAO Mission Control Houston. Loss of signal from Hawaii. A brief gap of some two minutes until reacquisition at Buckhorn. A fairly animated exchange between the Vice President, George Bush, and the crew of Challenger including the F Troop Gydon flag which was dredged out of one of the lockers and displayed on the onboard television. The Geritol gang as they refer to themselves with reading glasses and all. We'll be back at Buckhorn in less than a minute. This is Mission Control Houston.

CAPCOM Challenger, Houston, with you over the states for about 16 and half minutes. And Capcom 2nd class back with you.

SPACECRAFT I wouldn't say that Roy. Roy, we ran a head and Peterson just prior to the getting the last pass.

CAPCOM Okay, copy, you got Peterson just prior to last pass, thank you Story.

SPACECRAFT Listen Roy, on the last night pass we tried looking in the payload bay. And a dark payload bay without any lights with the CCTV's you can't see nothing. At least you can't see anything on the onboard monitor.

CAPCOM Okay, we copy.

SPACECRAFT Also, Roy, for information, you might just put in a log to pass on. I don't know when we'll get to it. If you see a

cabin fan master alarm it'll be nothing. I'm going to inspect the filters and the cabin fans and the IMU's sometime this afternoon again.

CAPCOM Okay, good idea.

SPACECRAFT Okay, we'll do our best to get that panel scooted back in. I still don't have any confidence we can get both screws in but Arthur said that as long as we get one in. The main concern is just not having the panel fall down during entry.

CAPCOM Okay. And Challenger, Houston, temperature tomorrow at Edwards at your landing time should be about 57 degrees.

SPACECRAFT Nice hearing that, that's really nice, thank you.

CAPCOM And Challenger, Houston, you all could not see TV of the room down here during your show on the last pass but hope it was obvious to you that the Vice President had a very good time talking to you and so did all the rest of us that were watching it.

SPACECRAFT Okay, thank you Roy. We did appreciate the call. Hello, Houston, you still there?

CAPCOM Yes sir.

SPACECRAFT Yes, we just found a, you know we've been picking up a lot trash in the cabin, a lot of screws and washers, and just found this little thing floating around, little. It's about 3 inches long, it's got a square shank and a ring on the top and I'd say that thing looks familiar but I can't place it. Yes, we just found it and it is the release or the unlock lever, wait that's not the hydrogen but, Don, that's to the hold. We don't even need it. Anyway, the ring that you use to unlock the headrest on the CDR seat to allow it to fold forward has come unscrewed. So that screw may be somewhere in our collection.

CAPCOM Okay.

SPACECRAFT I guess for a lack of a better place, Story standby. Yes, we'll put it in with the Return to Houston the film portion of the Return to Houston stuff Roy, the lever.

CAPCOM Okay, we copy.

END OF TAPE

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SPACECRAFT I guess for a lack of a better place, Story. Stand by, yes, we'll put it in with the Return to Houston, the film portion of the Return to Houston stuff, Roy, the dilemma.

CAPCOM Okay, we copy. Challenger, Houston, we're going to lose you here for about 10 seconds. We'll see you at Mila shortly.

SPACECRAFT Roger.

CAPCOM Challenger, Houston's back again through Mila and Bermuda for 10 minutes.

SPACECRAFT Roger.

CAPCOM Challenger, Houston, 30 seconds LOS. See you at Ascension at 3 4 after the hour.

SPACECRAFT Roger.

PAO Mission Control Houston. Loss of signal through Bermuda. Next station Ascension Island in 8 minutes. This is Mission Control Day 4, 0 hours 25 minutes. Mission Control Houston. Ascension Island should be acquiring at this time. In fact, we do have acquisition.

CAPCOM Challenger, Houston's with you through Ascension for 8 minutes.

SPACECRAFT Read you loud and clear.

CAPCOM Roger, you're five by and we've got a rendezvous maneuver pad for you.

SPACECRAFT Standby for just a second until I get the books.

CAPCOM Roger.

SPACECRAFT Been looking for Ascension but haven't been able to find it on the trip. I took a trip down there one time to see the guys that are working in the station. Obviously, they're still working because I got good comm through you. Okay, we're ready to copy the pad, go ahead.

CAPCOM Okay. We'll go slowly. And the pad is all balls itself. TIG time 4 days 1 hour 0 minutes 0 seconds. And burn attitude, roll 1 3 . 3, pitch 1 4 5 . 5 and yaw 3 3 2 .2. And a note, hold the attitude until 4 days 1 hour 53 minutes 0 seconds over.

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SPACECRAFT Okay, TIG is 4 days 1 hour and no minutes, attitude of 0 1 5 . 3, 14 5 . 5, 3 3 2 . 2, everything is zero. And to stay in our attitude till reach 4 days 1 hour and 53 minutes.

CAPCOM Good read back and have a good burn.

SPACECRAFT Okay.

CAPCOM Challenger, Houston, 20 seconds LOS and we'll see you at Botswana in three minutes.

SPACECRAFT Roger, Houston.

CAPCOM Challenger, Houston's with you at Botswana for 8 minutes.

SPACECRAFT Roger Houston.

CAPCOM And you're five by. Challenger, Houston, 30 seconds to LOS, see you at Yarragadee at 1 hour 7 minutes.

SPACECRAFT Roger, Houston, I

END OF TAPE

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CAPCOM Challenger, Houston, 30 seconds LOS. See you at Yarragadee in 1 hour 7 minutes.

SPACECRAFT Roger, Houston, right. I think I got a pretty good picture of some thunderstorms that we just passed over and unfortunately I could only get them out the back window since I didn't notice them until we got in here pretty close and it took me a few seconds to get the camera out and ready and items like that.

CAPCOM Okay, good, and we'll pass it on to the NOSL folks. I'm sure they'll be happy to hear that.

SPACECRAFT Roger.

PAO Mission Control Houston. An LOS at Botswana. Yarragadee upcoming in 13 minutes. It's reported from Challenger that some thunderstorms on Earth were spotted and through the back window of the flight deck. Looking out through the cargo bay the NOSL experiment was aimed and a photo was taken of those thunderstorms. We'll return at Yarragadee in about 12 minutes. This is Mission Control Houston.

CAPCOM Challenger, Houston's with you through Yarragadee for 4 and half minutes.

SPACECRAFT Roger, Houston, read you loud and clear, let me know the attitude.

CAPCOM Roger, and we read you five by, we're standing by. Challenger, Houston, 30 seconds LOS. We'll see you at Guam at 1 1 8.

SPACECRAFT Okay.

CAPCOM Challenger, Houston's with you through Guam for 6 and half minutes.

SPACECRAFT Thank you Houston, read you loud and clear.

CAPCOM Roger, and you're five by, we're standing by.

SPACECRAFT (garble) attitude. I guess there's not much else to do figuring the size of the burn.

CAPCOM Roger that. Challenger, Houston's 20 seconds LOS. See you at Hawaii at 1 3 2.

SPACECRAFT Roger.

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PAO Mission Control Houston. Acquisition at Hawaii momentarily.

CAPCOM Challenger, Houston's with you through Hawaii for 7 and half minutes.

SPACECRAFT Roger, Houston, read you loud and clear.

CAPCOM Roger, you're five by and we're standing by. And Challenger, we're shipping you a weather teleprinter message.

SPACECRAFT Okay, I can hear it clicking right now. Houston, have we ever told you that we've got to change that needle bravo water dispenser twice?

CAPCOM We know about the first one, we haven't heard about the second one.

SPACECRAFT The second one happened as well and it was the same thing. It looks like it's going to dump.

CAPCOM Roger, copy.

SPACECRAFT We'll try to clean up, we just put a new, rather than trying to clean it we just put a new one in and the other one will be returned.

CAPCOM Okay.

SPACECRAFT Houston, I just went down and replaced the magazines and the NOSL cartridge. I have taken 7 NOSL magazines and also replaced the batteries.

CAPCOM Roger, copy those, thank you.

SPACECRAFT And we've got the weather message and it looks okay.

CAPCOM Roger.

SPACECRAFT Hey Roy, you might pass on to the food folks, have somebody pass onto them. I was taking samples put some water in some drink containers on each of the four settings on the water dispenser and have put them in the fresh foods drawer. I've put them back in the drawer that we launched the fresh foods in.

END OF TAPE

CAPCOM Roger, copy Bo. Thank you.

SPACECRAFT And we've got the weather message and it looks okay.

CAPCOM Roger.

SPACECRAFT Hey Roy, you might pass on to the food folks or have somebody pass on to them. I've taken samples, put some water in some drink containers on each of the 4 settings on the water dispenser and I put them in the fresh foods drawer. I put them back in the drawer that we launched the fresh foods in.

CAPCOM Okay, we copy that.

SPACECRAFT And on those needles plugging up, I think they just plug up with plastic. I think we ought to fly some spare needles but I think it'd also be a good idea if they'd give us a little needle reaming tool of some sort.

CAPCOM Okay, we'll pass it on and work on it.

SPACECRAFT You know, once you put, when you put the needle down to the septum sometimes it just goes in a little harder than others and you figure that it might be picking up some plastics even though the container seems to be set in the dispenser correctly.

CAPCOM Roger.

CAPCOM Challenger, Houston. We're about 15 seconds LOS and we'll pick you up over the States in 3 minutes.

SPACECRAFT Roger.

CAPCOM Challenger, Houston's with you through Buckhorn for 7 and a half minutes. Standing by.

SPACECRAFT Roger, Houston.

CAPCOM And you're 5 by.

SPACECRAFT And Houston, we've completed the microbial screen.

CAPCOM Roger, copy.

SPACECRAFT Houston, Challenger. We have a question for you?

CAPCOM Go ahead.

SPACECRAFT Our windows, our overhead windows and aft windows have gotten a little greasy or stuff on them mostly from like us bumping into them with our hair, some of us bumping into them with our hair. We're wondering what we might clean it with. We have just plain water or we have those alcohol wipes or you might be able to suggest something else we have onboard.

CAPCOM Okay, let us work that a moment and I'll be back with you.

SPACECRAFT Okay.

CAPCOM Challenger, Houston. 10 seconds LOS. We'll see you at Mila in about a minute.

SPACECRAFT Roger, Houston.

CAPCOM Challenger, Houston's with you through Mila for 6 and a half minutes.

SPACECRAFT Roger. Roger, Houston.

CAPCOM And you're 5 by. We're standing by.

SPACECRAFT And if you're still with us we've started our maneuver back to ZOB.

CAPCOM Copy.

CAPCOM Challenger, Houston. We're 10 seconds LOS and we'll see you at Ascension at 0 2 1 0.

SPACECRAFT 0 2 1 0. See you then.

PAO Mission Control, Houston. Loss of signal through Merritt Island launch area tracking station. Ascension Island 10 minutes away. The crew currently winding up their midday meal and continue with cabin stowage immediately thereafter for the balance of the day apparently except for rendezvous phasing maneuver. At 4 days, 2 hours, 0 minutes. This is Mission Control, Houston.

CAPCOM Challenger, Crystal Team with you at Ascension for 6 minutes.

SPACECRAFT Okay.

CAPCOM Challenger, I've got a note here for you, slight change to the g-level measurement tests when you're ready for it.

SPACECRAFT (Garble). Roger, standby please.

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CAPCOM Roger wilco.

SPACECRAFT Okay, Houston. Go ahead. I've got the CAP out and the little sheet.

CAPCOM Roger. (Garble). All it is is it has you going to auto for the maneuvers there which would make it want to fly you back to -ZLV...

END OF TAPE

SPACECRAFT Okay Houston, go ahead. I've got the CAP out and the little sheets.

CAPCOM Roger. Tell him that's 24. All it is is it has you going to auto for the maneuvers there which would make it want to fly you back to minus ZLV. We want to make sure you're in attitude hold, manual discrete rate there instead of in the auto for the test.

SPACECRAFT Okay. There's a number of places where it calls that out.

CAPCOM Roger. The changes should be there at line 20, 22 and 32 and you want to make sure you're in manual of course as you're starting that test.

SPACECRAFT Okay, and say the DAP configuration again.

CAPCOM Will be manual and discrete discrete discrete. Where it has you switching from norms to burns and back to norms that remains the same. On your (garble) maneuver of course you can go back to auto and get back to minus ZLV.

SPACECRAFT Okay, that's line 20, 22 and 32.

CAPCOM That's affirmative Bo and I've also got a recommendation on the window cleaning if you're ready for it.

SPACECRAFT Go ahead.

CAPCOM First they recommend you gently rub the windows with the alcohol wipes to remove the grease and whatever and follow that gently rub them with the dry wipes. And they want to caution you that the inner window panes are made of a soft easily damaged material.

SPACECRAFT We'll try and be careful.

CAPCOM Thank you.

SPACECRAFT Houston, Challenger. I've got another question about that payload bay, payload bay g-level measurement DTO.

CAPCOM Roger, go ahead Bo.

SPACECRAFT Okay, reading down here on line 19 it says at AOS. Is that the Guam AOS that you're talking about?

CAPCOM That's affirmative.

SPACECRAFT That's at 2 47 I guess, 2 52 now that they've all been moved by a couple minutes.

CAPCOM Rog, 2 52.

SPACECRAFT Okay.

CAPCOM And we're just about LOS here. We'll see you at Botswana at 2 plus 21.

SPACECRAFT Roger.

PAO Mission Control, Houston. 4 days, 2 hours, 17 minutes mission elapsed time. Orbiter Challenger is out of range of Ascension. We'll be picking up over Botswana in about 3 and a half minutes. Crew is continuing with their cabin stowage. Will be preparing for a rendezvous phasing maneuver section number 5 in about 30 minutes. This is Mission Control, Houston.

CAPCOM Challenger, Houston with you in Botswana for 6 and a half minutes.

SPACECRAFT Roger, Houston. And just to triple check that DAP that's a B7 manual normal discrete discrete discrete for the one on 20 and that's the same with burn here on 22 and then again B7 manual normal for 32.

CAPCOM That's affirmative Bo.

SPACECRAFT Houston, Challenger.

CAPCOM Challenger, Houston.

SPACECRAFT I've got a couple of notes, IFM notes if you're ready to copy.

CAPCOM We're ready. Go ahead.

SPACECRAFT Okay guys. I just checked, rechecked the cabin fan filters. They weren't too bad but I went ahead and cleaned them anyway. A suggestion on a procedure. I've been taking the filters, all three filters out of the housing and cleaning them that way instead of trying to use that triple-threaded tool we got to try to clean them with.

CAPCOM Roger, copy.

SPACECRAFT And the IMU filters. They had a light coating of that blue lint on them so I went ahead and cleaned them again.

CAPCOM We copy.

SPACECRAFT On the DEUs 1 and 3 working through the access holes at that, that closeout place in there. I just hit them a lick again and I couldn't get to all of them and this results in a strong recommendation. We're gonna, I think we're going to have you know stuff floating around this spacecraft especially when we start reusing it on short turnaround and I think we ought to get some sort of flexible attachment for the vacuum like a small hose you know an adaptor connecting down but you really want 3 or 4 feet of hose that's flexible enough to push places and yet stiff enough that you can direct it when you get back into where you need it.

END OF TAPE

SPACECRAFT (Garble) especially when we started reusing it on short turnaround, but I think we have to get some sort of flexible attachment for the vacuum like a small hose, you know, an adapter to make it down, but you really want 3 or 4 feet of hose that's flexible enough to push places and yet stiff enough that you can direct it when you get back in to where you need it.

CAPCOM Roger. We copy and we'll pass that on.

SPACECRAFT Okay, and we ain't done yet. Well, I got a note on - - were you the one we talked to the other day about that panel that you have to drop down into overhead of the middeck to get at the IMU filters?

CAPCOM That's affirmative.

SPACECRAFT Okay. Well, we just tried to get that thing screwed back up. It's held up by 2 screws. We couldn't do anything short of being afraid to break adjacent structure by prying on that to get the 2 sets of holes lined up. We did get one screw, the one in the starboard end of that panel, we got that screw in and fully seated, but on the port end, right underneath it, there's a camera wedge mount, or whatever we call those things, and it's fairly close to it, so just in case the other screw in the other end comes loose, we don't want that flopping around, so we put a camera extension bracket on that wedge and hopefully, if the door drops down, that bracket will stop it from falling too far.

CAPCOM Roger. We copy that.

SPACECRAFT Okay.

PAO Mission Control Houston standing by for acquisition through Guam.

CAPCOM Challenger, with you at Guam for 7-1/2.

SPACECRAFT Roger Houston. We're ready to go to B manual auto when you are.

CAPCOM Roger. Go ahead.

SPACECRAFT Houston, we're firing all the jets.

CAPCOM Roger. We see that.

CAPCOM Challenger, Houston. We see where you're using a lot of RCS but it's about just what we expected.

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SPACECRAFT Comforting. (Garble). That's kind of like riding down a rough road.

CAPCOM Roger.

SPACECRAFT We show that we used about 6 percent RCS fuel.

CAPCOM Roger. We confirm.

SPACECRAFT Story's looking out the back and he said you can see things being jarred loose and pouring out in the payload bay and the vehicle twisting and - - as the RCS jets fire.

CAPCOM And Challenger, Houston. We're using a little bit more than we expected. Like you to continue the test but shut it off once you get down to 50 percent on either of the aft pods.

SPACECRAFT Wilco.

SPACECRAFT Houston, (garble).

SPACECRAFT We show we're just about 53 percent.

CAPCOM Copy.

CAPCOM Challenger, Houston. We're about to go LOS and we'd like to make sure you're at .05 on the discrete rate here and we'll see you at - - on the norms, when you go to the norm jets and we'll see you at Hawaii at 3 plus 07.

SPACECRAFT Item 16 at 6.05 and we'll go to norms and - - do you want me to wait to go to norms until we get to Hawaii or just go ahead?

CAPCOM Just go continue through the procedure. 20 minutes on the verns and then go to the norm.

SPACECRAFT And we'll quit 50 percent.

CAPCOM That's affirmative.

CAPCOM Challenger, Houston with you through Hawaii for 7 minutes.

SPACECRAFT Houston, read you loud and clear.

END OF TAPE

CAPCOM Challenger, Houston with you through Hawaii for 7 minutes.

SPACECRAFT Read you loud and clear.

CAPCOM Challenger, Houston, we'd all be interested in any subjective comments you may have on what's going during the norms, and the burns and then again tail only after we go LOS here.

SPACECRAFT Okay, well the burns are nothing. We can hardly detect them burning at all. Norms, they're pretty loud and they shake the whole vehicle and it seems every time you fire norms you fire at least two. We were getting nearly continuous popping of the norms and the guys who were looking out the back window said they could see the payload bay shake. Looked like it was twisting and things like that.

CAPCOM Roger, did you see debris floating around when it was due to the shaking did you say that?

SPACECRAFT We did see debris floating out when the test was going on in the norms.

CAPCOM Roger copy. Challenger, Houston, 30 seconds to LOS. We'll see you over Buckhorn at 3 + 17.

SPACECRAFT Okay, 3 + 17 we'll look for you there.

CAPCOM Challenger, Houston with you through Buckhorn for 5 minutes. And we noticed that the shaking around apparently L2 deltas that leak in that very very slow rate once again.

SPACECRAFT Sorry I didn't understand that but why don't we wait just a minute. We're coming up on the point where we go to the tail control.

CAPCOM Roger.

SPACECRAFT And we selected aft jet. We don't feel (garble) do you show the fire?

CAPCOM Challenger, Houston, looks like you're just standing nice in deadband from the vernier maneuver and haven't had any reason to fire any jets yet.

SPACECRAFT We felt one now. Feels like a shake coming up through the vehicle. Houston, Challenger.

CAPCOM Challenger, Houston, go ahead.

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SPACECRAFT Yes, an interesting thing we just noticed looking out the back of the bus here, Guy, is that in our sub solar point we could see the, you know, deflection ring around the shadow. Obviously, we can't see our shadow but we could see the rainbow halo around what obviously was our sub solar point.

CAPCOM Roger, copy.

SPACECRAFT We show it's time to quit at about 20 minutes, you ready?

CAPCOM Roger, you can go ahead, clear the procedure and we're about 40 seconds to LOS. We'll see you down at Botswana at 3 + 56.

SPACECRAFT Roger Houston.

CAPCOM And my earlier comment though is that the L2 delta jet had started leaking again during that maneuver just the same very very slow rate.

SPACECRAFT Okay, I thought you were saying maybe it had seated itself again during the maneuver, understand.

CAPCOM Challenger, Houston with you through Botswana for 6 and half minutes.

SPACECRAFT Roger.

CAPCOM And Challenger, Houston.

SPACECRAFT Houston, you read, we read you.

CAPCOM Yes sir, we've been jabbering away down here about what to do about the CCTV bracket problem and it looks like we've decided probably the best thing to do is to take that two TV monitors off and stow them for entry because people don't believe it's going to sustain the loading on the four brackets down below the bracket bolts.

END OF TAPE

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CAPCOM Challenger, Houston with you through Botswana for 6-1/2 minutes.

SPACECRAFT Roger.

CAPCOM And Challenger, Houston.

SPACECRAFT Houston, you read? We read you.

CAPCOM Yes sir. We've been jabbering away down here about what to do about that CCTV bracket problem and looks like we've decided the best to do is to take that - - 2 TV monitors off and stow them for entry because people don't believe it's going to sustain the loading on the four brackets down below where the bracket bolts.

SPACECRAFT (Garble).

CAPCOM And if you know now who you think might be doing that thing, I'll be happy to talk to them about it. We've already run it through the 1-g trainer and got ideas for how to get it off and where to store it, etc.

SPACECRAFT (Garble).

CAPCOM Now we've got about 3-1/2 more minutes here at Botswana.

SPACECRAFT Roger.

CAPCOM You want to talk about that IFM now or later?

CAPCOM And as an aside, we're not going to take the TV monitors down until after the payload bay door closing. You're going to take - - plan on taking the four bolts off that bottom bracket which is on the left side of the bottom monitor number 2.

SPACECRAFT Sorry John. Say again. Somebody was talking downstairs and I didn't hear you.

CAPCOM Okay Bo. We're going to take the TV monitors off for entry and secure them on the middeck. Sometime between now and before you go to sleep tonight, we'd like for you to take the 4 retaining bolts out of the bracket that holds those monitors. That's on the bottom left side of monitor number 2.

SPACECRAFT Yeah. We see those bolts and I think that Don's going to do it and he'll be talking to you in just a second, but that's probably not on this pass because it's too short.

CAPCOM Okay. We've got a couple of minutes here and then about a minute keyhold and I'll be with you at Indian Ocean for about 3 more.

SPACECRAFT John. What they're going to do here, they're going to get a good look at it and talk to you at IOS or whatever the next station is.

CAPCOM Okay. Sounds good.

CAPCOM I guess what they can look at before we talk to them about it is see if they can locate those 4 bolts on the bottom left side and also there are 2 electrical connectors in the back and 2 air ducts in the back and that's all we'll have to take loose.

SPACECRAFT Say again please. You're cut out from somebody talking here.

CAPCOM Okay. To take the thing off the wall, you'll have to take the 4 bolts off the bottom left side of monitor number 2 and there are 2 electrical cannon plugs in the back and 2 clamps that release the air ducts in the back and have them take a look at those if they can see them.

SPACECRAFT I understand.

CAPCOM Got about 20 seconds here at Botswana. I'll see you at Indian Ocean at 4:08.

SPACECRAFT Good IOS. See you.

PAO Mission Control, Houston. We're in a brief gap between the Botswana station and Indian Ocean station. The crew about ready to discuss the dismantling of the two TV monitor attachment brackets on the aft crew station.

CAPCOM And Challenger, Houston with you at IOS. How do you read?

CAPCOM Challenger, Houston with you for a little over 2 minutes at IOS.

SPACECRAFT Roger. Standby just a second while we get up there and look at this again.

CAPCOM Okay.

SPACECRAFT Okay. As it looks to us, you want us to take monitors off the bracket which has 4 bolts and nuts and in the back there is the 2 electrical connectors and the 2 (garble).

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CAPCOM That's affirmative, but the only thing we want you to do right away is go ahead and take those 4 bolts loose at the bottom there and let the thing kind of hang free. It should hold in position with the electrical connectors and the air ducts.

SPACECRAFT Okay. Will do.

CAPCOM And we recommend when you take the bolts out that you just put them back in the bracket and tighten them down on the bracket.

CAPCOM And should the monitor start to swing around any, a couple of pieces of gray tape or something to hold it into place until tomorrow. We're going to use the monitors for the payload bay door closing.

END OF TAPE

CAPCOM and the air ducts.

SPACECRAFT Okay, will do.

CAPCOM And we recommend when you take the bolts out that you just put them back in the bracket and tighten them down on the bracket. And should the monitors start to swing around any, a couple pieces of gray tape or something to hold it in place till tomorrow. We're going use the monitors for the payload bay door closing. And Don, are you listening? Are you going to be the guy that takes it off?

SPACECRAFT Say again Houston.

CAPCOM Understand you're going to be taking the monitors off tomorrow after the payload bay door closing?

SPACECRAFT I presume I will.

CAPCOM Okay, what they'd like for you to do is after the doors are closed and we get a power down, we'll go through that later on, is for you to take the four pillows that you have onboard and put one in front covering the screens, one on top and bottom and one on the side where all the controls are and wrap it up tightly with gray tape and stow it on the middeck just to the right of the lockers, the right corner forward on the starboard side.

SPACECRAFT Okay, understood where you wanted it stowed. Don said you wanted it wrapped good. Repeat after that what you said.

CAPCOM They want the pillows, there are four pillows onboard, one in the front, one on the back, one on the side, and one on the bottom to secure it, and wrap it up tightly with some gray tape.

SPACECRAFT Okay, we'll take care of it.

CAPCOM I guess the best way to put it to you is they say it's very fragile, very valuable, so it's up to you.

PAO Mission Control Houston. 4 days 4 hours 12 minutes mission elapsed time. Challenger has passed out of range of the Indian Ocean station and we have a about a 17 minute loss of signal period before we reacquire over Guam. Crew is getting instructions on taking apart the brackets that hold the two TV monitors. They are on the right hand side as you're looking out the back windows into the payload bay. Those two monitors were used for the external television cameras and enabled the crew to see what the television cameras see. They will be unhooked from the brackets tonight and simply secured loosely with tape for the

evening and they'll be used for the closing to monitor the closing of the payload bay doors tomorrow. Subsequent to that they'll be tied up with padded up with some pillows, tied up with gray tape, disconnected, stowed down on the middeck for entry. This is Mission Control Houston.

CAPCOM And Challenger, we're with you over Guam for 6 minutes.

SPACECRAFT Houston.

CAPCOM And if you would on that maintenance on the TV monitors let us know when you've got the bolts out and what it looks like and all that stuff.

SPACECRAFT Okay, Houston, this is Don. We've got the bolts out now. And we're going to tape them to the side of the monitors. The electro connects on the backs are no problem a bit. We are turning the viewing connectors right now.

CAPCOM Okay, it's recommended that you take those nuts and bolts and put them back in the bracket and tighten them down.

SPACECRAFT Okay, we'll do that.

CAPCOM About all you have to do then tomorrow after the payload bay is to just power the thing down on the front and on the, yes, there are four circuit breakers on panel R15 and and row delta for the TV cameras. We'll send you up a message to cover those. But (garble).

SPACECRAFT (garble) we'll get that in the morning.

CAPCOM That's affirm. That's all you have to do is power it down there, pull those breakers, wrap it up and secure it.

SPACECRAFT Okay, we'll take care of it.

CAPCOM Roger that, and we'll send you a little message tonight just to recap it. And just to make sure, we do want to use it for the payload bay door closing tomorrow before you take it all apart.

SPACECRAFT Roger, we'll do that.

CAPCOM Thank you sir.

SPACECRAFT We understand that John, and that (garble) I'd like to just take the bolts and tape them, gray tape them, to the monitors otherwise we got to get up more tools and put those bolts back in the brackets.

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CAPCOM At your call PJ we agree.

SPACECRAFT Okay.

CAPCOM And Challenger, Houston, this may be way too late but if you still have, know which containers you're using when the water needles clogged. We'd like for you to just mark them and save them for us.

SPACECRAFT (garble).

CAPCOM Roger, understand. Challenger, we're 30 seconds to LOS. See you at Hawaii at 4 + 42.

END OF TAPE

CAPCOM Challenger, we're 30 seconds to LOS. See you at Hawaii at 4 plus 42.

PAO Mission Control, Houston. 4 days, 4 hours, 36 minutes mission elapsed time. Crew is continuing with their housekeeping and stowage activities. Getting everything squared away and they have about 4 hours remaining before they are put to bed tonight. Presently working on unbolting the brackets that hold the two TV monitors on the aft crew station. And we're about 5 minutes away from picking up communication again over Hawaii on this orbit number 68. This is Mission Control, Houston.

CAPCOM Challenger, Houston with you through Hawaii for 7-1/2.

CAPCOM Challenger, Houston with you through Hawaii for 7 minutes.

CAPCOM Challenger, Houston with 3 more minutes at Hawaii.

SPACECRAFT Okay, Houston. We have finished a sort of a dry run on all of our procedures for tomorrow just so we're satisfied we can get them off in the morning and in probably 5 minutes or less.

CAPCOM Okay. Sounds good.

SPACECRAFT And you did understand that we're going to gray tape the bolts opposed to the side of the monitors.

CAPCOM Roger. That sounds good.

CAPCOM Challenger, Houston. 20 seconds left at Hawaii. We'll see you at Botswana at 5 plus 32.

SPACECRAFT Okay Houston.

PAO Mission Control, Houston. 4 days, 4 hours, 53 minutes mission elapsed time. Challenger is out of range of the tracking stations at Hawaii and we have almost 40 minutes before we reacquire again and that will be over Botswana in southern Africa. This is orbit number 68. This is Mission Control, Houston.

PAO Mission Control, Houston. 4 days, 5 hours, 32 minutes mission elapsed time standing by for acquisition through Botswana.

CAPCOM Challenger, Houston with you through Botswana for 6 minutes.

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SPACECRAFT (Garble).

CAPCOM Nice music there in the background. I've got a switch for you on panel L2 if anybody's there.

CAPCOM Can't tell if that's live or on tape. On panel L2, we'd like a flash evap feedline heater bravo supply to number 2. We're going to try to check that thing out again.

SPACECRAFT Okay. Flash evap feedline heater bravo supply to number 2 now.

CAPCOM Roger. Thank you Bo and if you get a spec 88 thermal of that message, then go ahead and switch it back to heater 1. We're just going to monitor it here and we'll be moving the water dump up a little earlier so we can look at it through the water dump as well.

SPACECRAFT I'm sorry.

CAPCOM I realize it's hard to hear with all the buglers but we're going to monitor that through the water dump tonight and I'll get back to you on the water dump. We'll probably move it up a little earlier.

SPACECRAFT I'm sorry Houston. Would you say all of that last transmission again please.

CAPCOM Roger. We're going to monitor the feedline heater there through the water dump tonight and I'll get back to you on the water dump. We'll probably move it up a little bit earlier.

SPACECRAFT That's fine.

CAPCOM Challenger, Houston. Approaching LOS. See you at IOS.

END OF TAPE

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CAPCOM Challenger, Houston. Approaching LOS. See you at IOS.

CAPCOM Challenger, Houston with you through Indian Ocean for 8 minutes.

SPACECRAFT Roger. Yea I had something, Guy that I wanted to send down a couple 3 days ago early on and frankly we haven't had time to hardly scratch our heads lately so better late than never.

CAPCOM Okay. Co ahead.

SPACECRAFT Music.

CAPCOM That sounded real fine.

CAPCOM Challenger, Houston. I've got words on when we want that water dump done.

SPACECRAFT Okay. Go Ahead.

CAPCOM We'd like you to do that at 6 plus 4 0 and dump tank bravo to 22 percent and the only other note there is you'll be doing the IMU align during that time period so we want to make sure you get the align done during the darkness.

SPACECRAFT Okay. I understand. At 6 40 start dumping the bravo at 20 percent.

CAPCOM That's 22 percent.

SPACECRAFT Oh, okay on this end - 22. You guys are getting precise now aren't you.

CAPCOM You bet.

SPACECRAFT Okay. Here's another one Houston we saw today that some of the boys in the, on the site whipped up for us.

CAPCOM We're anxiously awaiting.

SPACECRAFT Music. There's more but I'm not sure you're ready for it.

CAPCOM Dwight says you're dating yourselves. He's the only one who remebered that music.

SPACECRAFT I didn't ask for it. Well in a way I did.

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CAPCOM Challenger, Houston. We still have a couple more minutes here in Indian Ocean if you've got anything else for us.

SPACECRAFT Houston.

CAPCOM Go ahead.

SPACECRAFT Yea, we started getting out tomorrows flight data file today and we can't find the entry DTO go/no go cue card. If anyone has any ideas we'll be glad to receive them and test them.

CAPCOM Roger. We'll research that. I've got about 30 seconds left here before LOS and we'll see you at Guam at 6 plus 0 9.

SPACECRAFT Okay. No rush Guy. There are not, it is not where we though it ought to be in beta card kit number 1.

CAPCOM Okay. Thank you.

PAO Mission Control, Houston. 4 days, 5 hours, 52 minutes mission elapsed time. That recent pass over Indian Ocean station the crew was relaxing a little bit with some music, taped music, they had brought along.

END OF TAPE

PAO Mission Control, Houston. 4 days, 5 hours, 52 minutes mission elapsed time. In that recent pass over Indian Ocean Station, the crew was relaxing a little bit with some music, taped music they had brought along. Crew is currently proceeding with the cabin stowage and the housekeeping functions. All the routine day before entry chores and they are currently scheduled to be in their scheduled meal period. Very little left on the timeline this evening. They have about 2-1/2 hours before they are due to be put to bed for the night. IMU alignment and a fuel cell purge and that's about all that's on the calendar before sleep tonight. On orbit number 69, we're at 4 days, 5 hours, and 53 minutes mission elapsed time. This is Mission Control.

SPACECRAFT (Garble).

CAPCOM Challenger, Houston with you at Guam for about 10 seconds. See you at Hawaii at 6 plus 18.

SPACECRAFT (Garble). Roger Houston. Guy, are you still on?

CAPCOM Roger.

SPACECRAFT Could we start that maneuver a few minutes early to get ready for that IMU align?

CAPCOM You mean the water dump. That should be fine.

PAO Mission Control, Houston. 4 days, 6 hours, 16 minutes mission elapsed time. We're about to come up on the Hawaii tracking station in about a minute. Crew should be in their meal period right now according to the timeline.

CAPCOM Challenger, Houston with you at Hawaii for 8 minutes.

SPACECRAFT Roger Houston.

CAPCOM And I've got some words on the entry card location.

SPACECRAFT I'm sorry. Read you were broken up. Say again.

CAPCOM Roger. I've got some words on where the entry card should have been.

SPACECRAFT Okay. I'm listening.

CAPCOM Roger. They should have been in the kit number 1 and the way it was packaged was the CDR had one pouch that had the entry maneuvers card in the same little pouch with the entry no-go check list and then there was a separate pouch for your same two cards Bo.

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SPACECRAFT Looking at kit number 1. There was a plastic pouch and it had (garble). (Garble) to get it but I know we didn't find that card.

CAPCOM Let me just confirm which one you're missing. Is the one that has entry data and entry no-go checklist on one side and the ADTA and tacan management on the other side.

SPACECRAFT No. That's not the one.

CAPCOM Is it the entry maneuvers cue card?

SPACECRAFT No, it's the entry GTO go-no-go cards.

CAPCOM We're having trouble being familiar with just what you're talking about. What is on that card Bo?

SPACECRAFT It's the one, you know, (garble) a couple (garble). It tells you when you can do the PTIs essentially, when you have the AA down and things like that.

CAPCOM Roger. That's on the entry data and entry no-go checklist. That's - -

END OF TAPE

CAPCOM We're having trouble being familiar with just what you're talking about, what is on that card, Bill?

SPACECRAFT M1, you know we have a couple that tells you when you could do the pti, essentially when you have the entry data and things like that.

CAPCOM Roger, that's on the entry data and entry NO-GO checklist, it should be that card. It's the one with the delta L and delta body flap parts on it.

SPACECRAFT Let me go look. Houston, Houston, Challenger.

CAPCOM Roger, go ahead.

SPACECRAFT Okay I apologize, we found it.

CAPCOM Roger.

SPACECRAFT It's got a different name and it's on a different place that I've been used to seeing, but it's here.

CAPCOM That's okay, we were looking for something to do down here.

SPACECRAFT Yes, would you guys mind if we maneuvered to the IMU a line attitude a little earlier than 6:47 in the CAP?

CAPCOM That'll be fine.

SPACECRAFT Okay. And Guy, I got, we're waiting for your call to do the manual pressure control procedure, is that when you expect it?

CAPCOM Roger that, we'll do one and we'll give you a call as to when you'll do it.

SPACECRAFT Okay.

CAPCOM Challenger, Houston, since you found that card we've rehired our FAO but at a lower rating.

SPACECRAFT Guy don't do that.

CAPCOM Don't rehire him?

SPACECRAFT (Laughter) No, no, no, don't hire him at a lower rate. We've got another item for you Houston.

CAPCOM Roger go ahead, we've got about a minute and a half.

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SPACECRAFT Yes, that last meal, when our water dispenser started flowing slowly, at least the water dispenser did, and we took it off, took the needle off and Bo went into the pin kit and got out the number 60 wire, and tried to ram that through, which we did, but did not see anything come out of the needle. So we figured that that didn't help any, put it back in, ran a test case, it appears to function normally now.

CAPCOM Roger we copy. Challenger, Houston, we're 20 seconds to LOS, see you at Santiago at 6 + 45.

PAO Mission Control Houston, about to reacquire over Santiago.

CAPCOM Challenger, Houston, with you at Santiago for 5 minutes. Challenger, Houston, with you 1 minute left at Santiago, see you at Botswana for a real quick one at 7 + 08. Challenger, Houston, with you through Botswana for about 30 seconds, we'll see you at Indian Ocean at 7 + 15.

SPACECRAFT Okay.

CAPCOM Challenger, Houston, with you through Indian Ocean for 7 minutes and I've got some switches for you.

SPACECRAFT Oh my goodness, okay, go ahead.

CAPCOM Okay, I've got one downstairs, that 14.7 reg and I've got a couple upstairs, which would you like first?

SPACECRAFT Wait a minute. Okay, which reg you want opened on M010W, Guy?

CAPCOM The 14.7 CAB reg inlet system one to open, and you'll get a cabin O2 message you can ignore.

SPACECRAFT Okay.

CAPCOM And we'll secure that during crew sleep period. And now I've got a couple of switches up on the aft panels, one on A7 and one on A1.

SPACECRAFT Okay go ahead and we're going to teleprinter message now.

CAPCOM Roger, copy. On A7, A2 a MAD strain gages, like them back in PCM enable.

SPACECRAFT Okay that is complete.

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CAPCOM And over on Al Romeo, the payload recorder, we'd like the function switch in mode select and the mode switch in stop.

SPACECRAFT Wait a minute, wait a minute, payload recorder?

CAPCOM Rog.

END OF TAPE

CAPCOM ...we'll secure that during crew sleep period and then I've got a couple of switches up on the aft panels. One on A7, one on A1.

SPACECRAFT Okay. Go ahead, and we're getting a teleprinter message now.

CAPCOM Roger, copy. On A7, A2 the MAD strain gauges, like them back in PCM enable.

SPACECRAFT Okay, that is complete.

CAPCOM And over on A1 Romeo, the payload recorder, we would like the function switch in mode select and the mode switch in stop.

SPACECRAFT Wait a minute, wait a minute. Payload recorder?

CAPCOM Roger.

SPACECRAFT Oh, okay. Wait a minute, Story won't let me move it.

SPACECRAFT Is there a function switch to mode select?

CAPCOM Roger, in the middle, and the mode switch straight up at stop.

SPACECRAFT Okay, that's complete.

CAPCOM And payloads would like to know the time there for the MLR deorbit procedure, back at 6 plus 45.

SPACECRAFT (garble) we did that about 5 minutes ago.

CAPCOM Copy, thank you.

SPACECRAFT We assume what you wanted to do, we did the procedures and we're set up in a message and ended the cue card. Is that the way you wanted it?

CAPCOM Roger, that's correct.

SPACECRAFT Okay. Did you, do you need to torque the angle?

CAPCOM Yes. We'd like them please.

SPACECRAFT Okay, let me know when you're ready to copy.

CAPCOM Go ahead.

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SPACECRAFT Okay, we're in correct (garble) angle error was .02 and I'll read from top to bottom. IMU 1 was plus .06 plus .09 plus .11. Number two was minus .11 minus .10 minus .20. Number three was minus .05, zero, minus .01. The time was 06, 53, 15.

CAPCOM We copy P.J., thanks.

SPACECRAFT And just for your information, even though we were well into darkness, we got several following tracks on a wide tracker before it finally did get dark, so I don't know if we were picking up water particles in the dark or what it was doing.

CAPCOM And the reason was the star hadn't quite risen yet, we think.

SPACECRAFT Oh, that's right. The AOS's off in the book also, aren't they?

CAPCOM Roger.

SPACECRAFT (garble) excitement for you, okay. Where are we now, about 5 minutes away?

CAPCOM That's right.

SPACECRAFT A little early I guess, depending on your preference, but we understand, thank you.

CAPCOM Okay, we're 2 and a half minutes to LOS here, however you want to call that early or late.

SPACECRAFT That's okay.

CAPCOM And Challenger we're approaching LOS, we'll see you at Guam at 7 plus 44.

SPACECRAFT Roger.

CAPCOM Challenger, Houston, with you at Guam for a minute and a half.

SPACECRAFT Okay.

END OF TAPE

CAPCOM Challenger, Houston with you at Guam for a minute and 1/2.

SPACECRAFT Okay.

CAPCOM Challenger, Houston. We're 30 seconds to LOS, we'll see you at Hawaii at 7+54.

SPACECRAFT Roger, Houston.

PAO Mission Control Houston, 4 days, 7 hours, 50 minutes mission elapsed time. Challenger on orbit number 70 and the crew has about 40 minutes remaining before they go to sleep. We'll be reacquiring over Hawaii in about 4 minutes. In the meantime we have some preliminary numbers, these are updates on the entry events. Several people have been asking for the expected times for the various events in the entry phase tomorrow, just prior to landing. We have those numbers now, a new set of those numbers. We will be reading those out here shortly. We would anticipate cancelling the 11 p.m. Central Standard Time press conference this evening, unless there is considerable interest that causes us to have one, we will, for that reason be putting out these numbers a couple of times this evening to be sure that everybody that needs them, gets them. And if there are additional questions please check with the news centers. We are expecting these will be in Central Standard Times. Deorbit burn Saturday this will be a 2-engine burn of the OMS engines, to occur at 11:57 Central Standard Time, 11:57 a.m. Central Standard Time. That will take place at latitude 28 degrees 35 minutes south, 67 degrees 57 minutes east longitude. Delta V, a change in velocity of 288 feet per second. Then we will reacquire communication with the spacecraft next at that point over Yarragadee. That will be at 12:01 Central Standard Time. The current number on that is 12:01 and 26 seconds, but those are, those things will vary as we proceed along over night here and tomorrow, so I'll just read the minutes out except on the more critical ones. And we'll have loss of signal through Yarragadee at 12:08, then approximately 34 seconds, 12:08:34 Central Time. Entry interface begins at 12:22:59, or about 12:23 Central Time. Begin S-band blackout at 12:25. End blackout at 12:40. That, during that period of blackout we would probably miss the Hawaii pass. We would normally have acquired over Hawaii at that time between those 2, between that, during that blackout period. We would then again first reacquire over Buckhorn at 12:40:56 or approximately 12:41 p.m. Central Standard Time. Spacecraft enters terminal area energy-management interface at 12:47. Acquires the heading alignment circle at 12:50, 12:50:12 according to the very precise times here, but again those will probably change as we move along...

END OF TAPE

PAO ...the heading alinement circle at 12:50 and 12 seconds according to the vary precise times here, but again those will probably change as we move along through the night but those are the current numbers that the computers run out. Prefinal will begin at 12:51, 12:51:36 again for the (garble) and touchdown weight on main gear at 12:53:18, or 12:53 Central Standard Time. We'll be reading those numbers again periodically through the evening, we would anticipate cancelling that 11 p.m. Central Standard Time change of shift press conference unless events cause us to need to reinstate that, but at the present time we'll just try to keep updating you on the entry numbers, current expected event, times for tomorrow in lieu of that briefing.

SPACECRAFT Close, both are closed.

CAPCOM Roger, and then the other ones were up on Lima 2.

SPACECRAFT Go ahead.

CAPCOM The O2, N2 controller valve system 1 open, system 2 closed.

SPACECRAFT System 1 open, system 2 closed.

CAPCOM Rog, and the flash evap feedline heater bravo, supply on the L2 there to one.

SPACECRAFT Back to 1. And did it work?

CAPCOM Well, kept it just above your C&W, it wasn't cycling and bringing temps up like it should have.

SPACECRAFT Was not cycling and bringing temps up quite as high as it should have, ah?

CAPCOM That's affirmative, it went down just kind of going very slowly, lower and lower and it probably will get you a caution warning later on this evening. And Challenger, we'll give you a state vector GO for next PLS later on this evening, via teleprinter.

SPACECRAFT Okay, we got one teleprinter message here a little bit ago about the weather and you say another one's coming?

CAPCOM Roger, should be one this pass on the IFM, should be onboard now on the IFM on stowing the TV monitors there after the payload bay door closing and later on tonight we'll send you a message, giving you a GO for the state vector for the next PLS.

SPACECRAFT Okay and I see the message right on now.

CAPCOM Roger. Challenger, Houston, just reminders on the LiOH canisters and depend the temp control at full cold tonight before you hit the bed.

SPACECRAFT Say again about the LiOH canisters.

CAPCOM Roger, we'd like for you to go ahead and change those tonight.

SPACECRAFT We changed one, do you want the other one changed as well?

CAPCOM That's a negative.

SPACECRAFT Okay and tend the cabin full cold.

CAPCOM No, I think you want it full hot, that's where we've done it every night.

SPACECRAFT Roger, full hot, thank you. I was thinking about tomorrow morning we want a if of full cold for the entry.

CAPCOM Roger. And Challenger, Houston, we've got about 1 minute left here at Hawaii, we'll let you guys get to sleep, we'd like to wish you happy landing tomorrow, and on behalf of the Orbit Team we'd like to thank you for an outstanding mission.

SPACECRAFT We'd like to thank you gentlemen for an outstanding mission too. We're looking forward to seeing you in a couple of days.

CAPCOM Roger that.

PAO Mission Control Houston, 4 days 8 hours mission elapsed time. The Challenger's just passed out of range of the tracking station at Hawaii on orbit number 70. The crew is beginning to power down the CRTs onboard, among the things that they do before going to sleep, currently scheduled to be awake for about another 29 minutes but it's a pretty flexible schedule. To repeat what we were saying earlier during that Hawaii pass, inadvertant conflict with the air to ground communications, we are considering cancelling the 11 p.m. Central Standard time press briefing, the change of shift press conference that would normally take place at that time, we do have some updated numbers for the entry events tomorrow and I'll be reading those off shortly. Again, that would hopefully take the place of having to hold this late night press conference. If that should not cover all the questions, we could handle perhaps any overflow through the news rooms and we'll try to get the answers for your questions this evening, just to read off some of these entry events and these are in Central Standard time. The deorbit burn would be a 2-engine OMS engine burn would occur

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according to the present schedule at 11:57 a.m. Central Standard time, that's just a little bit less than 1 hour before actual touchdown that they do that deorbit burn out over the Indian Ocean. The actual location of that on the ground track is at latitude 28 degrees, 35 minutes south, longitude 67 degrees, 57 minutes east, the change in velocity by that engine burn is 288 feet per seconds. Next event is the...

END OF TAPE

PAO ...the deorbit burn would be a two engine, OMS-engine burn, would occur according to the present schedule at 11:57 a.m. Central Standard Time. That's just a little bit less than one hour before actual touchdown, that they do that deorbit burn out over the Indian Ocean. The actual location of that on the ground track is at latitude 28 degrees, 35 minutes south longitude, 67 degrees 55 minutes east. The change in velocity by that, by that engine burn is 288 feet per second. The next event is the reacquiring over Yarragadee in western Australia. That tracking station picks up communication with the spacecraft at 12:01 Central Standard Time, 12:01 p.m., and loses communication at 12:08. Entry interface begins at 12:22 and 59 seconds, or roughly 12:23. Again these numbers will be revised somewhat very late in the flight as we get down to the last couple of hours and even then, the actual event may vary by a number of seconds from the latest updates you should get a couple of hours before landing. So these numbers are the best estimates at the current time based on current path of the spacecraft and time. The blackout will begin at 12:25, 12:25 and 31 seconds approximately, and that would end at 12:40:03, or about 15 minutes later. We would probably miss the Hawaii pass there, it would normally come in between those two times, between the beginning and the ending of that blackout. We should be out of communication with the spacecraft at that time, because the reentry heat that creates a ionized layer of the atmosphere around the spacecraft interrupting our communications. Should reacquire the first communication after blackout, should be through the Buckhorn station at 12:40, 56 seconds or about 12:41 p.m. Central Standard Time. The, for the technical people, the terminal area energy management interface is at 12:47. Spacecraft will then pick up the heading alignment circle at 12:50, 12:50, 12 seconds. Prefinal begins at 12:51 and a half, and touchdown, or weight on the main gear at 12:53 Central Standard Time. Now if there are some entry events that are important to you that you didn't hear the times on, please let the newsrooms know and we'll try and get those for you. The groundtrack of the spacecraft crosses the California coast practically directly over Santa Barbara, California. Some of the additional bits of information that may be of interest to you relating to these figures. At entry interface, which is really the point at which the spacecraft has its, really begins to enter the atmosphere at 12:23. The velocity is 24,395 feet per second. Altitude at that point is 418,000 feet and range is 4,049.9 miles. At the time that the blackout begins, velocity is at 24,487 feet per second, altitude is at 335,000 feet and the range is at 3,453 feet, excuse me, 3,453 miles. At the end of that blackout, spacecraft is 514 miles out, at an altitude of 181,000 feet and moving at 12,500 feet per second approximately.

END OF TAPE

FAO ... feet, and the range is at 3,453 feet, excuse me, 3,453 miles. At the end of that blackout the spacecraft is 514 miles out, at an altitude of 191,000 feet and moving at 12,500 feet per second approximately. The Challenger will be picking up the heading alignment circle that's about 17 miles out, at an altitude of 32,000 feet and begins prefinal at 13,000 feet or about 13,800 feet that's 7.8 miles out. At 4 days, 8 hours, and 7 minutes mission elapsed time, this is Mission Control Houston. Mission Control Houston, 4 days 9 hours 4 minutes mission elapsed time. To repeat we are planning on cancelling that 11:00 p.m. Central Standard Time change of shift press conference. We'll make that announcement one more time in about 15 or 20 minutes that we have cancelled that. Just to repeat a few of the entry event numbers for those of you who are still looking for those. The 2-engine, 2-OMS engine deorbit burn at 11:57 Central Standard Time tomorrow morning will reduce the velocity of the spacecraft by 288 feet per second. This burn will occur out over the Indian Ocean at latitude 20 degrees 35 minutes south, longitude 67 degrees 57 minutes east. Then we will, that will be while we are out of communication with the spacecraft. Mission Control will reacquire the Challenger through the Yarragadee station in western Australia at 12:01 Central time. We'll have communication for about 7 minutes until 12:08 when the spacecraft will pass out of range of the Yarragadee station. We'll be on the very tail end of orbit number 80. Spacecraft will begin entry interface, that is first contacting the sensible atmosphere at 12:22:59, or essentially 12:23 p.m. Central time. The blackout period when the ionized atmosphere around the spacecraft is heated with the heat of reentry preventing communication that will be in at 12:25 Central time and end at 12:40. During that period of time we would have passed within the range of the Hawaii tracking station, but because the blackout we're not expecting to have any communication during that time. We should first hear from the crew of the Challenger again over Buckhorn through the Buckhorn station beginning at about 12:41 Central Standard Time. The spacecraft will be crossing the coast right about that time, probably somewhere around 12:43, and we'll pick up what's called terminal area energy management interface at about 12:47 p.m. The spacecraft crosses the coast right over the city of Santa Barbara, California and we'll acquire the heading alignment circle, that's a large circle that helps them align themselves with the runway. We'll be landing on Edwards runway 22. They acquire the heading alignment circle at approximately 12:50, and begin their prefinal approach at 12:51 and touchdown with the weight on the main landing gear comes at 12:53 Central Standard Time. If you need a repeat of those figures, and should we not repeat them over the Mission Control communication commentary line this evening, you can get those through the JSC news center at Houston and probably through the other news centers as well. The Challenger is about 9 minutes away from being within range of the Guam station but the crew is in the sleep configuration at

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this time. All the CRTs are powered down so that they are not making inputs into the computer. It's one of the last things they do before going to bed for the night.

END OF TAPE

PAO through the JSC newscenter in Houston and probably through the other newscenters as well. The Challenger is about 9 minutes away from being within range at the Guam station, but the crew is in the sleep configuration at this time, all the CRTs are powered down, so that they are not making inputs into the computer, it's one of the last things they do before going to bed for the night. Challenger is on orbit number 71 and it's 4 days, 9 hours and 8 minutes into the Space Shuttle flight number 6, this is Mission Control, Houston.

CAPCOM Roger, copy, GPC 2.

SPACECRAFT 90635, all the GPC 2's verticle light are lit as appropriate, that is 1, 2, and 4. However on the plug banks it's output was gray, and the mode is still in run. And when I took the mode switch to standby the talkback stayed in run. We filled the GPC fill is shutdown. Have done most of the pocket checklist procedures, that is we have assumed that we only need one GNC GPC, we are holding in the first block of the MAL procedure on page 95-5, we have realined IMUs 2 and 3 to 1 and that's about where we stand now, Dick.

CAPCOM Okay, we copy that, and let us discuss it just a second and we'll get some words back to you.

SPACECRAFT Okay. And as you can probably see now, the IMUs 2 and 3 are holding down.

CAPCOM Okay, we copy that.

SPACECRAFT Yes, we did reselect them before we alined them.

CAPCOM Challenger, you can reselect IMU 2 and 3 at your convenience. Challenger, Houston.

SPACECRAFT Go ahead.

CAPCOM Roger, what we would like for you to do is go to GPC FRP 3 page 5-53 of the MAL, and do the steps alpha and bravo which are the hardware dump and the software dump. And that's all we'll need for you to do tonight, that will give us a chance to evaluate the GPC while you're asleep.

SPACECRAFT Okay, so you intend to put us to sleep on GPC 1 then.

CAPCOM Say again, Challenger.

SPACECRAFT I say, you intend to see us through the night on GPC 1.

CAPCOM That's affirmative.

SPACECRAFT Okay.

CAPCOM And Challenger, Houston, we would like for you to get the software dump onto the OPS 2 recorder and you don't need to start that, we would like for you not to start that until after LOS, this sight.

SPACECRAFT Oh, I don't think we will Dick, I don't think we'll get to it before then. 44 dump on OPS 2 recorder.

CAPCOM That's affirm.

SPACECRAFT Okay, now we're configured okay, the sleep dump doesn't foul up anything as far as that's concerned, does it?

CAPCOM Negative. Challenger, Houston, we're about a minute and 1/2 to LOS, we have dumped the OPS 2 recorder, so you'll have a clean start on it when we go LOS.

SPACECRAFT Okay, thank you, you do good work.

CAPCOM Roger, and that'll be about a 20 minute run on it without rewinding.

SPACECRAFT Rog.

CAPCOM And Challenger, Houston, just to let you know, confirmation that your state vector is good until end of mission.

SPACECRAFT Okay, that sounds good, thank you. Dick, are you still there?

CAPCOM That's affirmative.

SPACECRAFT Okay, I'll give you a downlist of (garble), I thought you were gone, full copy on it.

CAPCOM Roger, we'll be LOS shortly here.

SPACECRAFT Okay, we're holding at step 3 of SSR 1 until we're LOS.

CAPCOM Okay, you can go ahead and start now.

SPACECRAFT Okay, thank you.

END OF TAPE

PAO Mission Control Houston, 4 days 9 hours 28 minutes, mission elapsed time. We've heard some communication with the crew there on that last pass over Guam. They were awakened, that is if they had got to sleep by now. That alarm, one of the redundant set four GPCs, general purpose computers, had gone off-line. It's been shut down, apparently that single computer did fail. That's one of a set of four. It only takes one computer to actually fly the spacecraft. They, flight control teams here in Mission Control will be analyzing that this evening to determine why that computer failed. There is no significant impact other than rerouting some of the functions that were shared by that computer as one of a set of four to one of the other computers. Normally two of the set of four would be handling the avionics, the guidance onboard, monitoring the inertial measurement units and one of those two computers has shut down and its functions are then being restrung to the other computer. The crew has a short malfunction procedure to go through and then can get back to sleep. That will mean, unless they are able to reinitialize that computer, that will mean that entry will be flown with three computers instead of four online. And of course there remains the backup flight system, backup computer, which is a fifth independently developed and programmed computer, which runs in sync with the redundant set of four. So in actuality you have five computers, any one of which could fly the spacecraft. Just to repeat, the crew was awakened apparently by a alarm here just a little while ago, about 25 minutes ago, just before they went over the Guam site, that told them that one of their redundant set, one of their computers in the set of four that normally handle all the functions onboard the spacecraft had been shut down, automatically voted offline, the computer is said to have failed, and flight controllers will be looking at that tonight. No significant impact to the flight at this time, nor would we expect any. At 4 days 9 hours 31 minutes mission elapsed time, this is Mission Control Houston. Mission Control Houston, 4 days 9 hours 46 minutes, mission elapsed time. This is to repeat about a half an hour ago, as we came up on the pass over Guam, the crew commander Paul Weitz, contacted Mission Control, notified that they had had one of their redundant set of four computers go offline, one of the GPC's, general purpose computers had failed. That system is, that one computer is offline and its functions are taken over by one of the others. That was one of the two computers in that set of four that normally manages some of the guidance functions, the inertial measurement units, its functions were transferred over to its partner in that set. No significant impact here, the commander Paul Weitz was asked to feed that data from the computer onto a tape, one of the OPS recorders and the ground controllers will dump that to the ground automatically sometime later and will be looking at that to determine why that computer went down. The impact there simply means that we will be flying entry with three rather than four computers. Just for background, there are five general purpose computers onboard,

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four of them in the primary set. They work with each other. Any one of those computers by itself can fly the spacecraft, handle all the computing functions and all the automatic things that have to be managed. The fifth computer is the backup computer that should there be some generic problem with the primary computers that they should all go down...

END OF TAPE

PAO ...impact there, simply means we'll be flying entry with 3 rather than 4 computers. Just for background, there are 5 general purpose computers onboard, 4 of them in the primary set, they work with each other, any one of those computers by itself can fly the spacecraft, handle all of the computing functions and all of the automatic things that have to be managed. The fifth computer is the backup computer that should there be some generic problem with the primary computers, if they should all go down, that computer then takes over all the functions of flight and can safely fly, handle all the functions and the vehicle can be safely flown. Of course, these are the same type of computers identical with the ones that have flown 5 space flights with Columbia and no generic problems have surfaced with either the hardware or the software so there's quite a bit of confidence in those, in that hardware and the software. Again, one of the set of 4 of general purpose computers which fly the spacecraft did shutdown and that data for the reason, the reason for that shutdown will be analyzed later during the night, the impact is that entry will be flown on three computers, it's no significant impact, certainly it will not be apparent in the way the flight is flown or handled in any way, and that will be analyzed some tonight by the data processing people and the team onboard, the planning shift on Mission Control tonight and we would probably hear some more about that tomorrow morning. We also again have cancelled that 11:00 central time change of shift press conference. The figures for entry, tomorrow's reentry are in the news centers, many of those we've read out earlier on the communication loop. I'll repeat a few of them here. Just to go over these again, the deorbit burn will occur at, be initiated at 11:57 p.m. Saturday, tomorrow, Central Standard time, with, it will change the velocity of the spacecraft 288 feet per second, slowing it down by that much and allowing it to reenter the Earth's atmosphere, we will reacquire again as soon as reacquisition or offset of communications after that burn will be through the Yarragadee tracking station beginning at 12:01 p.m. central time and we'll have communications for about 7 minutes over Yarragadee before the spacecraft then begins entry interface, that is, enters the sensible atmosphere of the Earth at 12:23 approximately or actually 12:22:59 seconds by the current figures. There will be a blackout period of about 15 minutes long, that is set to begin, estimated at about 12:25, 12:25-1/2, end at 12:40 central time and just about that time, a little less than a minute after the end of the blackout, we should have communications again with the spacecraft through the Buckhorn station on the west coast, that at 12:41. The terminal area Energy Management Interface the last portion of the flight begins at 12:46:58, or 12:47 central time, that will be after it has crossed the coast, the spacecraft's groundtrack brings it over Santa Barbara, California. The Challenger will then pick up on the heading alignment circle, a large circular area that helps them line up on the runway, they'll be coming into runway 22 at Edwards. There will be light and variable winds about 5 knots,

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so we won't be expecting much in the way of being able, to get a crosswind to test on this. The spacecraft will begin its prefinal approach at 12:51-1/2 and touchdown should be at 12:53 and that would be the point which computer tells the crew on the ground that wheels, the main gear have contacted the ground. Roll out will be about 10,000 feet estimated and we will have a braking test on this landing.

END OF TAPE

PAO ...and that would be the point at which computer tells, tells the crew and the ground that the wheels, the main gear have contacted the ground. Roll out will be about 10,000 feet estimated and we will have a braking test on this, on this landing. We'll be coming up over the Santiago, Chile tracking station in about 2 minutes. Could conceivably have communication with commander Paul Weitz on this flight, if he is completed his malfunction procedure as called for, shutting down that failed computer and loading that data on to the OPS recorder which would be looked at by the flight controllers here later. We may or may not hear from them and we expect that he would be going back to bed shortly, if indeed he had already gone to sleep. We were only about an hour, not even an hour into their scheduled sleep period. At 4 days, 9 hours, 54 minutes mission elapsed time, this is Mission Control Houston.

SPACECRAFT Houston, Challenger, are you there?

CAPCOM That's affirmative, Challenger. Houston standing by.

SPACECRAFT Okay, you ready for some times on the dump?

CAPCOM That's affirmative.

SPACECRAFT (Garble)

CAPCOM We can just barely read you, Bo. Hardly at all, you're very weak.

SPACECRAFT Okay, on the hardware dump that was on the (garble) recorder 2 track 1, it's running forward at 6 percent, and we started at 09:24. The software dump recorder 2 track 1 forward at 32 percent at MET 09:32.

CAPCOM Okay, we copied all the data, Challenger.

SPACECRAFT Okay, we would like to certainly get rid of, at least, the GPC warning light, which we could inhibit that back there, (garble) power switch, or would you rather not to power down GPC 2 yet?

CAPCOM Standby. Challenger, Houston. We're about a minute to LOS here at Santiago, you have a go to take the GPC 2 power to off. Please, do not do airlog resets and this will be our last transmission to you tonight unless y'all have something else for us.

SPACECRAFT Okay, good enough, see you in the morning. Are you going to be on tomorrow?

CAPCOM We'll be here about that time, we might have the entry team talking to you first.

SPACECRAFT Okay. Thanks for the quick help Dick, appreciate it, see you tomorrow.

CAPCOM Thanks.

PAO Mission Control Houston, 4 days 10 hours mission elapsed time. That pass over Santiago, the closeout of that brief episode with the failure of General Purpose Computer number 2. Commander Weitz told to go ahead and power that computer off. That would shut off that caution and warning light that was on there and allow the crew to get back to sleep. Ground controllers planning on powering that computer back up in the morning and seeing if they can reinitiate it. It failed about 50 minutes ago. That is one of 4 computers that normally would be operating to fly the spacecraft. Its a redundant set, its functions are taken over by one of the other computers and there is no impact to the operation of the flight. Should the computer not be able to be reloaded again tomorrow, if it is actually failed completely, then the flight entry can certainly be run on 3 computers, and can indeed be run on one computer. As would happen should there be any total failure of that primary system, there is one backup computer independently programmed, developed and built to not share the same characteristics as that primary set. Naturally it can fly the spacecraft on its own as can any of the computers in that set of 4. Just a final notice, we have cancelled that 11 p.m. Central Standard time press conference.

END OF TAPE

FAO ...independently programmed, developed, and built to not share the same characteristics as that primary set and naturally it can fly the spacecraft on its own, as can any of the computers in that set of four. Just a final notice, we have cancelled that 11:00 p.m. Central Standard Time press conference. We have provided the entry numbers for tomorrow, and if you somehow managed to miss those, they are available in the JSC news room and perhaps some of the other space center news rooms as well. The amber team with Flight Director Randy Stone has taken over and they will be watching the spacecraft tonight. The crew will be getting some sleep and be up tomorrow making their final preparations for entry, with their scheduled touchdown on runway 22 at Edwards tomorrow afternoon central time at 12:53, 12:53 p.m. Central Standard Time. At 4 days 10 hours 3 minutes, mission elapsed time, this is Mission Control Houston. Shuttle Mission Control, Challenger on its 72rd orbit of the Earth, over flying the tracking station at Guam the flight control team has had a look at the data and pronounced the vehicle healthy and stable. Five and a half hours remaining in the sleep period, mission elapsed time, 4 days 10 hours 58 minutes. This is Mission Control Houston. This is Mission Control Houston, Challenger on its 73rd orbit of the Earth, right now presently positioned right above the Suez Canal. Four and a half hours remaining in the sleep period. All continues to be quiet onboard the vehicle and...

END OF TAPE

PAO ...independently programmed, developed, and built to not share the same characteristics as that primary set and naturally it can fly the spacecraft on its own, as can any of the computers in that set of four. Just a final notice, we have cancelled that 11:00 p.m. Central Standard Time press conference. We have provided the entry numbers for tomorrow, and if you somehow managed to miss those, they are available in the JSC news room and perhaps some of the other space center news rooms as well. The amber team with Flight Director Randy Stone has taken over and they will be watching the spacecraft tonight. The crew will be getting some sleep and be up tomorrow making their final preparations for entry, with their scheduled touchdown on runway 22 at Edwards tomorrow afternoon central time at 12:53, 12:53 p.m. Central Standard Time. At 4 days 10 hours 3 minutes, mission elapsed time, this is Mission Control Houston. Shuttle Mission Control, Challenger on its 72nd orbit of the Earth, over flying the tracking station at Guam the flight control team has had a look at the data and pronounced the vehicle healthy and stable. Five and a half hours remaining in the sleep period, mission elapsed time, 4 days 10 hours 58 minutes. This is Mission Control Houston. This is Mission Control Houston, Challenger on its 73rd orbit of the Earth, right now presently positioned right above the Suez Canal. Four and a half hours remaining in the sleep period. All continues to be quiet onboard the vehicle and...

END OF TAPE

STS-6 AIR/GROUND t243j 099:06:33 through

PAO All continues to be quiet onboard the vehicle and the crew have seen an apparently uneventful night since the General Purpose Computer alarm about 2 hours ago. Mission elapsed time, 4 days, 12 hours, 3 minutes. This is Shuttle Mission Control. This is Shuttle Mission Control, we have just had a data check at Guam and all positions have given a GO at mission elapsed time 4 days, 12 hours, 30 minutes. This is Shuttle Mission Control we just had a data take over Dakar on orbit number 74 and the Flight Control team have verified normal operations onboard Challenger, at mission elapsed time, 4 days, 13 hours, 24 minutes. This is Shuttle Mission Control, Challenger's on the descending node of 75th orbit right now over the South Pacific. We're in the middle of a long LOS period of almost an hour and a half. It's been nearly an hour since we lost signal in Dakar. We don't reacquire until we go to the Dakar site again in about 29 minutes. There's been no judgement yet on the nature of the failure of General Purpose Computer 2, GPC number 2 onboard the vehicle. They did get a good software dump and are looking at the software and hardware configuration presently and no evaluation is available yet, but a team of IBM people here in Building 30 are looking at that data presently. There's a change in the time of a change of shift debriefing with the Flight Director. Handover has been moved up an hour and the entry team will come to the Control Center at 4:30, begin an hour-long handover accordingly. Off-going Flight Director Randy Stone will be available for questions at 5:30 a.m. central time as opposed to the earlier advertised time of 7:00 a.m. central time. Once again the change in the time of the availability of off-going Flight Director Randy Stone in case there's any interest in directing questions to him, he will be available at 5:30 a.m. central time. We'll acquire data again from Challenger in about 27 minutes. This is Shuttle Mission Control, at mission elapsed time 4 days 14 hours 30 minutes. This is Shuttle Mission Control, at 4 days 14 hours 57 minutes, with just a minute away from acquisition of signal through Dakar which will be our first look at the vehicle in almost an hour and a half. And the Mission Control team here is poised to analyze that downlinked data as soon as the stream is acquired through the Dakar site. We'll report status to you just as soon as that data has been looked at and Flight Director Randy Stone has poiled the Mission Control team. Shuttle Mission Control, status check in the control here resulted in go from all stations. The crew has about an hour and a half remaining in its sleep period. Data indicates that cabin temperature, inside Challenger is 73 degrees which is about 4 degrees cooler than we've seen it on the past overnights, that could be an artifact of having that GPC number 2 power down, the GPC's generate about, generate a little heat, they're 600-watt machines and that temperature differential could be, prior to that GPC powerdown or it may just be that the crew neglected to turn the cabin temperature up to full heat for the overnight. Once again a change of the time of the availability of the off-going Flight Director Randy Stone, the change of shift debriefing which had been scheduled for 7:00 central time has

been changed due to a change in the handover times. Randy Stone, if there are any interested media, Randy would be available at 5:30 a.m. central time. Mission elapsed time, 4 days 15 hours 1 minute, this is Mission Control Houston. This is Mission Control Houston, at 4 days 15 hours 43 minutes. Challenger is over Australia right now but its path doesn't carry it over any of the ground stations. We're in orbit 76 and this is another long LOS period and no data since the Dakar pass. And we won't acquire any data again until about 43 minutes from now to Mila. Still no word on the nature of the failure of GPC number 2. Just to recap that briefly, about 10 minutes into the sleep period the crew received a caution and warning alarm announcing the failure of GPC number 2. The ground commanded the software and hardware data dump. Got a good dump from the vehicle and since that time for about the past hour, that data has been under the scrutiny of an IBM team here in the Mission Control Center and as of now there are still no conclusions as to the cause of that failure. Obviously the team's hope is to produce some sort of conclusions that will generate a workaround and try to get that computer back up online for entry activities tomorrow morning although it's certainly not mission critical. And in case it's not going to be brought back online there's a workaround that's been designed by the Data Systems engineer here in the Mission Control Center which has the effect of stringing some of the data flow around through the other 3 General Purpose Computers and bypassing the failed GPC number 2. Once again, there will be no mission impact resulting from that failure, however, we'll require signal in about 40 minutes, mission elapsed time is presently 4 days, 15 hours, 45 minutes. Anticipating good weather at landing site at Edwards Air Force Base, California, clear skies, light winds, Challenger now on orbit 76, this is Mission Control Houston. Shuttle Mission Control once again, we're desperately trying to find somebody interested in a change of shift briefing with the off-going Flight Director, Randy Stone. Again the press conference with Mr. Stone originally planned for 7:00 is going to be moved up due to a change in the handover schedule, he'll be available now at 5:30 a.m. central time in case anyone has questions for him. If we don't get some response within about the next half hour we'll probably go ahead and cancel that change of shift briefing with Randy Stone. Mission elapsed time, 4 days, 15 hours, 48 minutes, this is Mission Control Houston. This is Shuttle Mission Control, we're about 7 minutes away from acquisition of signal through Bermuda on orbit 76. There's 10 minutes remaining in the sleep period, and we might anticipate the wakeup call through Bermuda if there's any indication that the crew is up and around. If the food warmers are not on and CRTs are not turned on and there's no indication that the crew's up, but it's doubtful that the Mission Control team will initiate the wakeup call. In the absence of any demonstrated interest in interviewing Flight Director, Randy Stone, despite a sincere interest to, or sincere efforts to drum up some interest the change of shift debriefing with the Flight Director will be cancelled. Flight Director Jay Green and his Flight Control team have tagged up here in the Mission Control Center and will take

this next pass. Mission elapsed time is 4 days, 16 hours, 21 minutes, this is Mission Control Houston.

CAPCOM Good morning Challenger, welcome to entry day.

SPACECRAFT Thank you, how are you doing this morning?

CAPCOM Just great and we hear you loud and clear, and we have a GPC message for you here, when you're ready to copy.

SPACECRAFT No way. Let me rub some of this sleeping sand out of my eyes, I'll be with you in a minute.

CAPCOM Okay, just wanted to give you a leg up on that test, on the TPR's.

SPACECRAFT Okay, I understand. Okay, go ahead.

CAPCOM Roger, GPC 2 fail recovery. Check GPC 2 output to normal. Check mode to halt. Power to on.

SPACECRAFT Wait a minute, second step, let me interrupt you, say again, was that output to normal?

CAPCOM Okay, after output to normal, mode to halt, then power on. Then perform steps delta and echo of malf FRP3 which is on page 5-53.

SPACECRAFT Okay, we got that.

CAPCOM And that's all we got for you this pass.

SPACECRAFT Okay. Do you want that done right away?

CAPCOM We just wanted to be sure you got that first thing, you can do it at your convenience.

SPACECRAFT Oh, good.

CAPCOM Challenger, Houston. We're going LOS, we'll see you at IOS at 16:56.

SPACECRAFT Roger.

PAO Mission Control Houston, loss of signal at Dakar and Madrid. Indian Ocean station 11 minutes away. Wake up music piped up from Dakar, was 'Ode to the Lions' as rendered by Rusty Gordon. This is a Penn State song referring to the Nittany Lions, of Penn State University which is Paul Weitz alma mater. He earned his Bachelor in Aeronautical Engineering at Penn State in 1954. Final day of the flight starting for the crew, they go into their deorbit preparations after breakfast. And looking at a deorbit burn at about 11:57 a.m. Central Standard Time. We'll be landing at 12:53 p.m. central, at Edwards Air Force Base.

We'll return at Indian Ocean station in 10 minutes. Mission Control Houston.

SPACECRAFT (garble)

PAO We have acquisition of signal at Indian Ocean station for 4 minutes.

CAPCOM Challenger, Houston, with you at IOS for 3 minutes.

SPACECRAFT Roger. (garble).

CAPCOM Okay. (garble).

PAO Mission Control Houston, loss of signal at Indian Ocean station. Not much response from the crew there but the data processing system engineer here in Mission Control reported to the Flight Director that the General Purpose Computer or GPC number 2 is back up and running. Back online carrying stings 1 and 4 of the system management jobs. Acquisition again at Yarragadee, Australia is about 10 minutes. This is Mission Control, day 4, 17:01. Mission Control Houston, acquisition momentarily coming up on Yarragadee, Australia. The crew currently reviewing the teleprinter messages they received during the night and shortly will be cooking breakfast.

CAPCOM Challenger, Houston, with you at Yarragadee for 6-1/2 minutes.

SPACECRAFT Roger, Houston be with you in a minute. Houston, GPC 2 recovered, it's back in redundant set.

CAPCOM Roger, we copy that and we've got a note for you, for some flight deck switches.

SPACECRAFT Standby. Go ahead.

CAPCOM Roger, now that the cryo tanks are getting down to about half full, we don't need so many heaters. On panel R1 alpha 2 cryo oxygen tank 1 and 2 heater bravo, both switches should be off. And we'd like you to pressurize the cabin through the manual procedure that we passed up previously on message 19.

SPACECRAFT 19 copy. Hello Houston, you there?

CAPCOM Roger, copy.

SPACECRAFT Houston, your breaking up a little, let me read it back to you. That's on panel R1, cryo O2 tank 1 and 2 bravo off.

CAPCOM That's affirmative.

SPACECRAFT Okay, go ahead.

CAPCOM Roger, and the second part is, we'd like to pressurize the cabin per the manual procedures we passed up a couple of days ago. Reference message 19.

SPACECRAFT Understand. Use message 19 and pressurize the cabin manually.

CAPCOM That's affirmative.

SPACECRAFT Did not receive message 48 parting shot, and instead we got a (garble) message that was nothing but diamonds primarily with a few odd symbols scattered in it.

CAPCOM Okay, that was not the parting shot message, we'll take a look.

SPACECRAFT Okay, and Bo's looking now, but I think we got everything else.

CAPCOM Roger.

SPACECRAFT He says we got everything else according to your list.

CAPCOM Okay. Challenger, Houston. Just to let you know the teleprinter status. We've still got a couple more messages to send you this morning.

SPACECRAFT Roger, I understand. We'll leave the teleprinter up for a little while.

CAPCOM Roger.

SPACECRAFT Houston, MS1.

CAPCOM Go ahead, MS1.

SPACECRAFT We've got a water dump coming up on 18:20, have you got the numbers on that?

CAPCOM And Challenger, Houston. Sorry, water dump will not be required.

SPACECRAFT Thank you.

CAPCOM Challenger, Houston. Ten seconds to LOS, we'll see you at Orroral in 2 minutes.

SPACECRAFT Roger, Houston.

CAPCOM Challenger, Houston with you at Orroral for 2-1/2 minutes.

SPACECRAFT Okay, we see the high load outboard, we had high load outboard down arrow on number 2. That was 121, 122 degrees.

CAPCOM Roger. And Challenger, Houston. We're looking at that right now, we'll get back to you. Challenger, Houston. We see you're still on manual control on the DAP, we'd like you to go to auto.

SPACECRAFT Roger.

CAPCOM Challenger, Houston, on your thermal evap message, it's just a little bit slow reaction time with the temps, no action required.

SPACECRAFT Thank you, I see it coming up slowly now.

CAPCOM Challenger, Houston. 30 seconds to a long LOS, we'll see you over the states at 17+55.

SPACECRAFT Okay, Houston. The LiOH canisters changed (garble).

CAPCOM Roger, thanks Story.

PAO Mission Control Houston, loss of signal at Orroral Valley. 30 minutes across the Pacific to reacquisition at MILA, Merritt Island Launch Area and Tracking station. As the crew of Challenger prepares for today's entry, the teleprinter message they mentioned that had been in the menu sent up that they claimed not to have received, labeled as the parting shot is a computer teleprinter reproduction of the F troop guidon flight, likely that'll be retransmitted later in the day. Returning in 29 minutes at Merritt Island launch area, Mission Control Houston.

CAPCOM Challenger, Houston, with you over the states for 11 minutes.

SPACECRAFT P.J. we're up. Houston read you loud and clear.

CAPCOM Roger have you the same.

SPACECRAFT You broke up.

CAPCOM Challenger, Houston, understand, we are breaking up.

SPACECRAFT That one came through loud and clear. When do you want us to do that manual PCS procedure?

CAPCOM Roger Bo, that's at your convenience. Challenger, Houston.

SPACECRAFT Go ahead Houston.

CAPCOM Roger we have three more teleprinter messages we'll be sending up over Bermuda real shortly. You can look for 40 bravo, 49 alpha and 48.3. 40 bravo is the entry summary, 49 alpha is the weather message, 48.3 is the average age of the crew, and is also that signoff message we were telling you about before.

SPACECRAFT Okay wise guy, but I didn't have any place to write, how about saying the message numbers again?

CAPCOM Roger, 40 bravo, 49 alpha, 48.3. And if you make.

SPACECRAFT 40 bravo, 49 alpha and 48.3.

CAPCOM Okay I'm glad you got it this time, if I had to read it again it would have been 48.4.

SPACECRAFT Roger. And Challenger is your message, is your TPR message transmission completed?

CAPCOM That's affirmative, we just completed it.

SPACECRAFT I'll go down and take a look at them.

CAPCOM And Challenger, Houston, we're 20 seconds to LOS, we'll see you at Dakar at 18:11.

SPACECRAFT 18:11 at Dakar.

PAO Mission Control Houston, LOS at Bermuda overlapping coverage there at Mila and Bermuda. Several teleprinter messages that did not get through complete on earlier transmissions have been retransmitted. Dakar in about 3 minutes. Day 4, 18 hours, 8 minutes, Mission Control Houston. Mission Control Houston, 30 seconds away from acquisition now again at Dakar.

CAPCOM Challenger, Houston, with you at Dakar, standing by for 5 minutes.

SPACECRAFT We seem to have a real problem up here right now, the paper roll light is on the teleprinter. (garble) we've turned the teleprinter off because it's stuck in a high power mode again, we'll turn it on at your command.

CAPCOM Roger, standby. Challenger, Houston, Bo, we'd like for you to turn the DC utility power off for the teleprinter on panel A15.

SPACECRAFT Okay, its off now and I'll leave it off until you tell us to turn it back on.

CAPCOM Roger. Challenger, Houston.

SPACECRAFT Okay, Houston.

CAPCOM And Bo, can you confirm the numbers so that the teleprinter messages that you did receive before you had this problem.

SPACECRAFT Standby. We were doing the startracker self testing.

CAPCOM Roger.

SPACECRAFT We got glasses on both startrackers.

CAPCOM Roger. Challenger, Houston, 30 seconds to LOS, we'll see you at IOS at 18 29.

SPACECRAFT IOS at 18 29. Houston, do you see the torquing angles or do we have to copy them?

CAPCOM We see them.

PAO Mission Control Houston, LOS at Dakar, 12 minutes to Indian Ocean station. Challenger crew currently doing an inertial measurement unit alignment on schedule in the flight plan, as the final preparations for entry begin. 4 days 18 hours 17 minutes, returning at Indian Ocean station. Mission Control Houston. Mission Control Houston, Indian Ocean station acquiring in less than 30 seconds. Orbit number 77 for Challenger. Flight Director currently getting a briefing from the weather station here in Mission Control on today's landing site weather as well as other landing sites around the world. We have acquisition now at IOS.

CAPCOM Challenger, Houston, with you standing by at IOS for eight minutes.

SPACECRAFT (garble)

CAPCOM And Challenger, Houston, when you can we'd like you tell us what the last teleprinters messages were that you got up there before you had the teleprinter problem.

SPACECRAFT The last messages we got, were the three that you called up. Standby one. The messages we got were 40 bravo, 49 alpha and 48.3.

CAPCOM Roger, thank you. Challenger, Houston, Don we're through with the teleprinter then, that's it.

SPACECRAFT Okay are you telling me I can go ahead and disconnect and stow all that stuff?

CAPCOM That's affirmative.

SPACECRAFT (garble).

CAPCOM Challenger, Houston.

SPACECRAFT Go ahead, Houston.

CAPCOM Roger, we see that...

SPACECRAFT Houston?

CAPCOM Roger, how do you hear? Challenger, Houston, how do you read me?

SPACECRAFT Broken up, read you loud and clear now.

CAPCOM Okay, we see the RADs have been bypassed, we think you ought to be in normal jets for FCS ops.

SPACECRAFT (garble)

CAPCOM That's B auto norm. Challenger, Houston, to avoid these PPO2 messages, you need to reconfigure the Caution & Warning as per the message 19 and we're 20 seconds to LOS. We'll see you at Yarragadee at 18:45.

SPACECRAFT Repeat your last message, you were broken up, please.

CAPCOM Roger, reconfigure Caution & Warning per message 19. And Challenger, Houston. We don't see DAP bravo either, you need DAP bravo.

PAG This is Mission Control Houston. Loss of signal at Indian Ocean station, Yarragadee in 6 minutes. Challenger crew has now, or is in the process of stowing the teleprinter, its done its job for the 5 days of flight. Cabin repressurization or topping off the cabin pressure is complete. The spacecraft is around the tail-sun attitude for about the next 2-1/2 hours. End of mission weather at Edwards Air Force Base is predicted to be a layer of scattered clouds at 25,000 feet. Winds out of the southwest at 12 knots, which is just slightly off the nose on runway 22. To recap the situation on the General Purpose Computer, GPC 2 is back online and will stay online unless it fails again in which case it would be retired from service and the other computers carry the load. Returning in 5 minutes at Yarragadee. Mission Control Houston.

CAPCOM Challenger, Houston with at Yarragadee for 7-1/2 minutes.

SPACECRAFT Roger, Houston.

CAPCOM Challenger, Houston, we're going to lose you for about a minute, we'll pick you up at Orroral.

CAPCOM Challenger, Houston, with you at Orroral for 4-1/2 minutes.

SPACECRAFT Okay, read you loud and clear.

CAPCOM And we read you loud and clear also.

SPACECRAFT (Garble)

CAPCOM Challenger, Houston. Did you call?

SPACECRAFT Negative.

CAPCOM Okay.

SPACECRAFT Houston, we all appreciated message 48.3.

CAPCOM Roger that, the planning team had fun making it. Challenger, Houston, 45 seconds to LOS, long LOS here, we'll see you at 19:29 over the states.

SPACECRAFT 19:29, over the states, thank you.

PAO This is Mission Control Houston. Loss of signal at Orroral Valley, 30 minutes loss of signal until next station at Merritt Island Launch Area or MILA. One comment during the Orroral pass is that the crew on Challenger did finally receive teleprinter message 48.3 and it was appreciated. That of course was the final one in the teleprinter messages for this flight and was a computer graphic sort of depiction of the F-Troop guide on. Also in an earlier teleprinter message an entry summary was uplinked to the crew giving the approximate times of ignition and delta-V for the deorbit burn. 292 feet per second retrograde, cross range steering will take out 378 nautical miles to the north from the regular ground track with landing at approximately 10:53 Pacific Standard Time. Winds are forecast to be 10 knots at 230 degrees which is southwest. It will be an overhead approach and a turn to the left around the Heading Alignment Circle on to Edwards runway 22. The lakebeds at Edwards still no/go for landing. At day 4, 19 hours, 1 minute, this is Mission Control, Houston.

PAO Mission Control, Houston. We have acquisition through Merritt Island launch area.

CAPCOM Challenger, Houston, with you over the states for 12 minutes.

SPACECRAFT Roger.

CAPCOM And we've got a CRT timer update for you when you are ready to copy.

SPACECRAFT All right, go ahead.

CAPCOM Okay, PJ, item 17 plus 23 plus 25 plus 00.

SPACECRAFT It's still good, we already have that one in.

CAPCOM Okay.

SPACECRAFT See, we took you at your word from earlier this morning.

CAPCOM Just checking.

SPACECRAFT Thought you guys could see that, you mean that's 2 things you can't see, huh?

CAPCOM That's the only 2 we can't see.

SPACECRAFT Okay, we are going to go ahead and do the vent model determination now.

CAPCOM Roger that.

CAPCOM Challenger, Houston, when you are finished with the vent test, we've got a couple of fairly long notes to talk to you about considering the jets and the GPC's for entry.

SPACECRAFT Okay, let me get out the deorbit prep and I'll write it in there, Brian.

CAPCOM Okay. First page we'll talk about is page 1-11.

SPACECRAFT Okay fantastic view of sunny beautiful Guantanamo Bay today.

CAPCOM That's super.

SPACECRAFT That's probably before your time.

CAPCOM My father told me about it.

SPACECRAFT (Ha), I did not need that.

SPACECRAFT Okay, page 1-11, go ahead.

CAPCOM Yes sir, we're talking about how we are going to string today given that we have lost GPC, GPC 2 once before, the nominal stringing for page 1-11, the deorbit prep, string 1 to GPC 1, string 4 to GPC 2, 3 stays with 3, and string 2 on GPC 4. MASS memory 2 to GPC 4 and CRT 2 to GPC 4. If GPC 2 fails, free or postburn and then we want you to string as follows: GPC 1 will have string 2.

SPACECRAFT Hey, wait a minute, Brian. It would make it a lot

easier if you could read me the strings and tell me which GPC is going to have the string.

CAPCOM Okay, I'll get the strings first, if GPC 2 fails, do not try to recover GPC 2, restring as follows; string 2 goes to GPC 1, strings 1 and 4 to GPC 3, and string 3 to GPC 4. You should powerdown GPC 2 and do not attempt recovery. And rationale for that stringing is to protect for as many things as we can. IMU redundancy, NSP redundancy, and the right OMS TVC and ignition, as well as the left non-firing jets.

SPACECRAFT Okay, well you guys thought of more things than we do, we didn't come up with that restringing in the event of a failure, but we were close enough I guess.

CAPCOM And we've got a long note for you on, a fairly long note for you on the jets. You might want to use a pad or paper for this so you can talk it over.

SPACECRAFT Okay, my jet's person is with me, wait and see if he's ready to copy.

SPACECRAFT Yes, go ahead.

CAPCOM Roger, we told you a little bit on the mission summary message this morning 47 bravo, about L1U and L2D, and these are just more words on the same subject. Prior to transition to Ops 3, increase the left pod jet fail limit to 3. This will allow for 2 additional auto jet deselections during entry.

SPACECRAFT Hold it a minute, that was prior to ops 3 transition?

CAPCOM You can do that anytime prior to Ops 3.

SPACECRAFT Okay.

CAPCOM And procedure for that on spec 23 left RCS item 2 execute and jet fail limit item 4 + 3 execute.

SPACECRAFT Yes, we got that.

CAPCOM Okay, next part, since L1U and L2D are deselected for entry. You should reselect those jets for the following reasons; reselect only for loss of one or both of the other left jets in the same direction.

SPACECRAFT Okay.

CAPCOM And this failure can be any jet fail on/off or leak. It could be a manifold closure for any reason, or it could be for a loss of FA MDM or GPC. And we want you to go, I'm going to break into this procedure, we need you to MADs on A7 left, we need you to go to MADs ASEP PCN to command.

aboard the spacecraft. Returning in 10 minutes at Indian Ocean station, Mission Control Houston.

CAPCOM NASA 903 Houston. NASA 0 3 Houston.
NASA 903 Houston, NASA 903, with a weather report.

CAPCOM Go ahead John, we're standing by.

NASA 903 Yes sir, There are no clouds in the sky all the way to the coast except for the low cloud cover in the Los Angeles Basin. And the only factor is no turbulence below-all the way from 35,000 feet to the ground that I can feel to amount to anything and the (garble) T-38 but the only factor is the wind. And it's right down the runway at 12 knots right now.

CAPCOM Roger, copy, and wonder if you could take a look at the high wind aim point on runway 2 2 and tell us whether or not you can visually observe it.

NASA 903 Alright, They haven't got the PAPA's turned on yet but I'll take a look.

CAPCOM Okay, well we won't have any PAPA's on the high wind and it looks like we're right on the borderline of having to switch to the high wind aim point for the landing.

NASA 903 Yes, I think that may be ...

PAO This is Mission Control Houston. 5 minutes away from reacquisition at Indian Ocean station. Out at Edwards Air Force Base John Young is airborne in a T38 making his first of two weather surveys. He reports no clouds in the landing area. No turbulence that he can feel from the surface up to 35,000 feet.

CAPCOM Roger copy.

PAO Winds are down the main runway, that's 2 2, at about 12 knots.

SPACECRAFT A point of land that sticks out (garble).

PAO There's some low clouds in the Los Angeles Basin that he can see. Later on this morning he will make a second weather flight in one of the Shuttle training aircraft.

CAPCOM And NASA 03 if you don't have any more (garble).

PAO Four minutes to Indian Ocean station, Mission Control Houston.

CAPCOM UHF mode and we'll be talking to you at the telecon - on the telecon about 7 0 2 this morning.

NASA 903 I see, Roger, in general the weather's just beautiful.

CAPCOM That's great news. Thanks a lot.

PAO Mission Control Houston. Acquisition at Indian Ocean station.

CAPCOM Challenger, Houston, with you over Indian Ocean for 7 minutes.

SPACECRAFT Roger, Houston, we're standing by to close the doors.

CAPCOM Roger, and we're looking.

CAPCOM Challenger, Houston, you're go for payload bay door closing.

SPACECRAFT (garble) Houston, we'll close them.

CAPCOM Challenger, Houston, we see you did not get the aft closed indication, recommend you look at the scallop.

SPACECRAFT Yes, it's well below the target line Brian. The scallop is at least an inch below the bottom point of the target line.

CAPCOM Roger, go ahead with the bulkhead latching, and we'll see you over Australia.

SPACECRAFT Okay.

PAO Mission control Houston, loss of signal at Indian Ocean Station. Next station is Yarragadee in 6 minutes. Crew just got the left door closed, the left payload bay door closed. And by the time we reacquire at Yarragadee they likely will have indication that the right hand door is closed and latched. This is mission control Houston, day 4 20 hours 15 minutes.

CAPCOM Challenger, Houston, with you at Yarragadee for 8 minutes.

SPACECRAFT We got the door closed, and we got everything but the center (garble) of latches closed, and they're closing now.

CAPCOM Roger.

SPACECRAFT Everything is zipped up Brian. You saw the most off-nominal thing of the whole sequence was that no indication of closed in one end of the port door.

CAPCOM Roger, understand.

SPACECRAFT And the latch that was going to make first contact, I would say was latch number 12 and it was aiming at the horizontal line, about a 1.8.

CAPCOM Roger, copy Story.

SPACECRAFT We're at 3/4 of the way between B and A.

CAPCOM Roger that.

SPACECRAFT Houston, our IMU alignment is tested.

CAPCOM That's affirmative, the pad's good, no update.

SPACECRAFT Thank you.

SPACECRAFT So, you don't want an alignment again, huh?

CAPCOM We didn't say that.

SPACECRAFT Okay. Houston, are you still there?

CAPCOM Yes sir, go ahead.

SPACECRAFT If we're going to do the alignment we'd just as soon get on with it.

CAPCOM Standby. Challenger, Houston, you're go to maneuver for the IMU alignment and we'll lose you for about a minute here and pick you up at Orroral at 20 30.

SPACECRAFT Okay.

CAPCOM Challenger, Houston, standing by Orroral Valley for two minutes.

SPACECRAFT Roger sir.

CAPCOM Challenger, Houston, 20 seconds to LOS. We'll see you over Buckhorn at 20 59.

SPACECRAFT Roger.

PAO This is Mission Control Houston. Loss of signal for the final time this mission at Orroral Valley. Near the end of orbit number 78. Systems engineers here in Mission Control confirm that the payload bay doors are closed and latched. Crew starting their final alignment of the inertial measurement unit prior to deentry. Reentry. Next station Buckhorn in about 25 minutes across the Pacific. This is Mission Control, Day 4, 20 hours 33 minutes. Mission Control Houston. We have acquisition through Buckhorn in California. And overlapping Mila and Bermuda pass.

CAPCOM Challenger, Houston with you through Buckhorn for 5 minutes.

SPACECRAFT Read you loud and clear.

CAPCOM And You're five by.

SPACECRAFT Okay. The boiler controller's on.

CAPCOM Roger.

SPACECRAFT You have our pads.

CAPCOM Go ahead.

SPACECRAFT Do you have our pads?

CAPCOM Well the pads are almost ready. We'll have them ready for you a little later in this pass.

SPACECRAFT Okay. Houston, PJ just turned off the third star tracker and we got a forward RCS PDP. We were showing at that that's just because of the transmission of data up to the star trackers along with the forward RCS stuff.

CAPCOM We agree with that and the forward RCS quantities are correct.

SPACECRAFT Thank you.

CAPCOM Challenger, Houston, we're about 20 seconds LOS. We'll have about a minute keyhole and we'll pick you up at Mila and then I'll have your del pads.

SPACECRAFT Okay. I just changed the jet fail up to three on the left RCS.

CAPCOM Copy. Challenger, Houston is with you through Mila and Bermuda for 12 minutes.

SPACECRAFT Okay.

CAPCOM And Challenger, we need a GNC Spec 1 for variable parameters.

SPACECRAFT You got it.

CAPCOM Be advised we're uplinking a new vector picked for targets and runway 0-Edward's 04 the secondary slot in the primary.

SPACECRAFT Yes sir.

CAPCOM And I'm ready to read you the del pad.

SPACECRAFT We're ready to copy.

CAPCOM Okay, burn attitude roll 1 5 2 0 9 7 3 5 4.

SPACECRAFT Okay, that's complete.

SPACECRAFT Roger, and I'll pick up. We've got about a minute to go here. If L2D is reselected, do not toggle RM. Now, the only time we want you to reselect these jets is between EI and Q-bar of 20. And that's it for the message, if you want to talk about it, we'll see you at Dakar at 19:45.

SPACECRAFT Okay, we think we understand most of it. But I also further understand this whole procedure only applies between EI and Q-bar 20.

SPACECRAFT That's affirmative.

CAPCOM Challenger, Houston, with you at Dakar for 7 minutes.

SPACECRAFT Roger, we tried to get some pictures it's a pretty spectacular show when we're in a tail-sun attitude, the flash evaps are firing so it's just a continuous trail of particles of all sizes coming out at all velocities and all directions and you can also see the thrusters when they fire, it's kinda nice to watch.

CAPCOM Roger, we'll look forward to those pictures.

SPACECRAFT We're not going to show them to anybody under 30.

SPACECRAFT Or maybe 35.

CAPCOM Wait a minute, you're getting close to knocking some people in this room out of the viewing room.

SPACECRAFT (garble)?

CAPCOM And, no comment on that. Challenger, Houston, PJ, a confirmation on the note I passed over the states.

SPACECRAFT Okay, let me find it. Okay, we're ready to listen, go ahead.

CAPCOM Okay, when we talked about the timeframe between EI and cue bar 20, that applied to the failures. We did, however, want you to do that first step of increasing the jet fail limit to three sometime before OPS 3.

SPACECRAFT Oh, yes sir, that's what I assumed, okay, but thanks for the clarification. You still there, Bryan?

CAPCOM Yes sir, go ahead.

SPACECRAFT The forward loading is work in progress.

CAPCOM Roger that. Challenger, Houston, 30 seconds to LOS. We'll see you over IOS at 20 05.

SPACECRAFT Okay, sir, and we got the BFS up number on CRT 2.

CAPCOM Roger.

PAO Mission Control Houston. Loss of signal at Dakar Indian Ocean station 10 minutes from now. As the crew of Challenger moves on into deorbit preparations. Payload bay closing. Payload bay door closing. The next major activity...

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CAPCOM target 155 + 001, 292.2, 2:27, propellant all balls. TIG slip 2:00, 085, 085, safe hp 85, 18, 28, 73, 41, forward RCS DAP 2, all balls, 1100.2 + 0.2, over read back.

SPACECRAFT The burn attitude, 152, 097, 354, 155, + 001, 292.2 2:27 all balls, 2 + 00, 085, 085, 85, 18, 28, 73, 41, 00 1100.2 + 0.2.

CAPCOM Good read back. Inertial attitude roll 199, 315, 024, check left, all balls. Yarragadee EI -22, EI -14, 30.05, 23:58:02 15616, check left overhead, 200, Edwards 22. 275 50, 275 55, 280 40, 285 40, 300 at 9er, surface 220 at 10, APU start sequence 1 then 3, over and hold your readback until we get through a keyhole.

SPACECRAFT Roger, holding.

CAPCOM Challenger, Houston, go with the readback, we should have continuous comm.

SPACECRAFT Roger, our roll, 199, 315, 024, left 0's Yarragadee, EI -22, EI -14, 30.05, 23:58:02, 15616, left overhead 200 degrees, runway Edwards 22, 275 50, 275 55, 280 40, 285 40, 300 at 9, 220 at 10, APU start 1 then 3.

CAPCOM Okay good readback, and a note on the pad. The TIG slip of 2 minutes is for procedural problems, for RCS down moding, we will have forward RCS down moding from the OMS propellant after about 10 seconds of burn, for a down moding at TIG you'll need to switch to RCS feed at a V-go of 10 ft per second, over.

SPACECRAFT We got it. Brian how much OM do you think we're going to have when we finish the burn?

CAPCOM Stand by.

SPACECRAFT I'm sorry, Roy, if you were using it, I took away your spec 1 for a minute.

CAPCOM Challenger, Houston. We're complete with Spec 1.

SPACECRAFT Okay, I went into burn attitude and if you need it or want it I got the IMU align info.

CAPCOM Stand by. Okay, we're standing by for the IMU numbers.

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SPACECRAFT Okay. The star angle error was .01. Delta angles on IMU 1 -.03, +.01, +.01; on number 2, -.03, -.05, -.11; on number 3, -.06, +.03, +.02.

CAPCOM Okay. we copy.

END OF TAPE

CAPCOM Okay, we copy.

SPACECRAFT And if you (garble) I'm sure you expected on the align check the delta angles are all zeros.

CAPCOM Roger, copy.

CAPCOM And Challenger, Houston, I'd like to have the torque time.

SPACECRAFT (Garble) let me find that.

CAPCOM Okay.

SPACECRAFT I can't find it right now Roy, sometime around 2:37 2:38, somewhere around there.

CAPCOM Okay, we copy. That's good enough.

CAPCOM And Challenger, Houston, PJ, we need you to do the dedicated display entry config blocked 10 so we can give you go for OPS 3.

SPACECRAFT Yes sir, that's in

CAPCOM Roger.

CAPCOM And if Bo is not tied up with that, I'll read the the maneuver plan.

SPACECRAFT Go ahead ready to copy the pad.

CAPCOM Okay, check OMS both, roll is 180, minus 0.3, plus 5.7, minus 5.7, 197 426. TIG is 4 days, 23:25: all balls, Cl 147 94, minus 0.5954, 065.832, 116.756, propellants all balls. Next 7 targets are not applicable. Burn attitude 152 097 354, 4044, 25:57, delta V total 0292.2, V GO 2 minutes, 27 seconds, V GO X + 280.78 all balls, +81 . 07, target 155 + 001, over. And let's read it back over Dakar and we'll pick you up at Dakar at 21:21.

SPACECRAFT See you in 4 minutes.

SPACECRAFT Houston, if you read, we got the monitors out and stowed.

CAPCOM Roger.

PAO This is Mission Control, Houston, loss of signal through the states side pass. Dakar in little over a minute. The maneuver numbers for the deorbit burn, read up to the crew during that pass. Dakar coming up in less than a minute now. Mission Control, Houston.

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CAPCOM Challenger, Houston's with you through Dakar for 8 and 1/2 minutes.

CAPCOM Challenger, Houston's with you at Dakar for 3 and 1/2 minutes.

SPACECRAFT Roger.

CAPCOM And Challenger, you have a go for OPS 3.

SPACECRAFT They're on the way. Ready for the read back.

CAPCOM That's affirmative, before you read back, Bo, on your trim load, we got a reversal of our signs on the pad here, for the left yaw the sign should be negative, Right yaw should be positive. Over and ready for the read back.

SPACECRAFT Roger. OMS both 180, OMS both. Am I coming through?

CAPCOM affirmative, loud and clear.

SPACECRAFT Okay, -0.3 -5.7 +5.7, 197 426, 4 days/23:25:00.0, 14794.

END OF TAPE

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SPACECRAFT Okay -0.3, -5.7, +5.7, 197 426, 4 days/23:25:00.0, 14794, -0.5954, 065.832, 116.756, all balls, net applicable. 152, 097, 354, 4044, 25:57, 0292.2, 02:27, +280.78, all balls, plus 081.07, 155, +001.

CAPCOM Good read back, Bo.

SPACECRAFT Okay, and moving into the DPS config.

CAPCOM Roger.

SPACECRAFT Houston, are you there?

CAPCOM Yes sir, go.

SPACECRAFT When we got to Ops 3 on that GPC config for Ops 3, do you want the strings to be 1221 or 2112? Or it doesn't matter?

CAPCOM Stand by.

CAPCOM Challenger, Houston, our preference is 2112.

SPACECRAFT Okay.

CAPCOM Challenger, Houston, we're 20 seconds LOS we have a short Botswana pass, should see you there at 2139.

SPACECRAFT Roger.

PAO Mission Control Houston, LOS at Dakar, very brief pass at Botswana voice relay station in 8 minutes. During the states and Dakar pass the two maneuver pads were read up to the crew for today's deorbit burn. And the landing sequence, entry sequence. The vehicle weight at deorbit burn will be 197,426 pounds. The time of ignition, day 4, 23 hours, 25 minutes, 0 seconds, about 1 hour and 53 minutes from now. Total delta v of the deorbit burn, 292.2 ft per second retrograde, obviously. 7 minutes to reacquisition at Botswana. Mission control Houston.

CAPCOM Challenger, Houston's with you at Botswana for 1 minute.

SPACECRAFT Okay, we hear you very weakly.

CAPCOM Hear you five by Bo.

CAPCOM Challenger, Houston, we're going LOS, we'll see you at Yarragadee at 2156.

SPACECRAFT Roger.

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PAO This is Mission control Houston, 7 minutes from reacquisition through Yarragadee toward the end of orbit number 79. To recap the entry sequence of events with times and mission elapsed time, ignition for the deorbit burn, day 4, 23 hours 25 minutes 0 seconds, entry interface, day 4, 23 hours, 53 minutes, 27 seconds. At a range from Edwards of 4043 nautical miles. Begin blackout, day 4, 23 hours, 55 minutes, 59 seconds, 3447 nautical miles up range from Edwards. End blackout, day 5, 0 hours, 10 minutes, 29 seconds, 514 nautical miles up range. Touchdown, day 5, 0 hours, 23 minutes, 42 seconds. These are the current numbers...

END OF TAPE

PAO uprange from Edwards. In blackout. Day 5, 0 hours, 10 minutes, 29 seconds. 514 nautical miles uprange. Touchdown at Day 5, 0 hours, 23 minutes, 42 seconds. These are the current numbers being generated in the entry elapsed time display here in Mission Control. They're likely to change plus or minus a few seconds as different tracking stations massage the numbers somewhat in the data base here. 5 minutes away from reacquisition at Yarragadee. This is Mission Control Houston.

CAPCOM Challenger, Houston's with you at Yarragadee for 8 minutes.

SPACECRAFT Roger. Well, we feel we're ready in all respects.

CAPCOM Roger, copy, ready in all respects. And Challenger, Houston, I've got a couple of notes for you depending on what you're doing right now. One's on the deorbit burn flight rule cue card and an update on the left pitch jets note that we gave you earlier.

SPACECRAFT Okay, standby, is it pressing? I tell you what I'd like to do. Bo is down getting his harness and boots and that on now and I'd just as soon wait until he's back up on the loop we can talk about it then.

CAPCOM No problem. Give me a call. If we can't catch it here we'll catch it at Hawaii.

SPACECRAFT Okay. (garble) Hawaii?

CAPCOM Hawaii's coming up at 2 2 2 3.

SPACECRAFT Okay, Roy, go ahead and start with the deorbit burn roll.

CAPCOM Okay. You can delete the third column from the left.

SPACECRAFT Okay.

CAPCOM And under DPS, following one GPC or FAFF, add a param, exclude GPC 2 if time for restring.

SPACECRAFT Wait a minute. Exclude GPC 2 if time for restring, which means if GPC 2 goes nominally at time to restring that is not a cause for a delay?

CAPCOM That's affirm and we've already given you the restringing plan. If you should lose any other GPC, we want a one rev delay.

SPACECRAFT Okay, understand.

CAPCOM Okay, under ECLS, add a line, 2 AV bay fans in bay one. Put an X under one day. And also about 2nd line from the bottom where it says 2 AV bay fans in bay 1 or 3, you can cross out the 1 or, over.

SPACECRAFT Okay.

CAPCOM Under GN & C scratch the line that says 380 TA's and that's the end of the update.

SPACECRAFT RCS? Okay, what else did you want to talk about their

CAPCOM Yes, I'll talk to you about left aft RCS pitch jet flight note we gave you earlier at Hawaii. We're going LOS now. We'll see you there at 2 2 2 3, over.

SPACECRAFT Okay.

PAO Mission Control Houston. Loss of signal at Yarragadee. Hawaii 17 minutes from acquisition which will be early in the final orbit of this mission. Crew donning their personal equipment, harnesses, etc. for the entry and landing. At day 4, 22 0 5, Mission Control Houston.

CAPCOM NASA 946, Houston. NASA 946, Houston.

NASA 946 946, go ahead.

END OF TAPE

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CAPCOM Roger, John. We've got a couple of things for you and we are standing by for your weather input.

NASA 946 Okay, the surface winds at take off were 220 at 18 gusts at 23, at 1000 ft 243 at 22, 2000 ft 276 at 16, 3000 ft 263 at 19, 4000 ft 275 at 15, 5000 ft 314 at 12.

CAPCOM Okay, we copy.

NASA 946 And 10,000 feet 233 at 18, 15,000 ft 250 at 25, 20,000 256 at 38, 25,000 ft 278 at 45, 30,000 287 at 36, 35,000 ft 290 at 24. And those are above ground level.

CAPCOM Okay we copy.

NASA 946 For the first run we used the close end aim point and our touch down was normalize to 185 knots it was about 20 at 680 feet.

CAPCOM Okay, we copy that.

CAPCOM How's the turbulence?

NASA 946 In the STA, it is very light all the way up and all the way down.

CAPCOM Okay, we copy and you got good data out of the MLS and the Tacans.

NASA 946 The Tacans is good, the ball bar, the PAPA's are good and the ball bar looks okay.

CAPCOM Okay good.

CAPCOM And 946, do you still think the spit of land there to the left of the center line pointing to the close aim point as a good call?

NASA 946 Yeah, I guess so, I think they're, well the way we are looking at it right now the normally point probably would put him 1500 hundred feet in, according to our pass, I guess 2500 is good enough.

CAPCOM Roger, and the wind data we've gotten here, we have also seen this high wind velocity down real close to the surface and depending on the balloon run that we get, that can cause us to have a fairly high speed brake setting which can keep maybe keep the speed brakes open at 2500 feet. We're planning on recommending to them that they manually close the speed brake at 2500.

NAS 946 Roger. Ours closed automatically and we have 50 percent speed brake. I'm not sure how realistic that is in terms of the way this thing handles in the wind, though.

CAPCOM Roger, the weather man has given us an update on the winds. They believe that and at the landing time that we have that we will see a slight trend down in the wind velocity. And we will probably see something on the order of 200 to 220 degrees 13 gusts to 18 knots. Later in the day, they will anticipate the wind would go as high as 15 gusts to 25. So that would probably apply for a 1 rev go around situation.

NASA 946 Roger.

CAPCOM Well based on what you have seen so far John, What's your feeling on going with current conditions?

NASA 946 I think yeah, they are go. The only cloud decks is over in the LA basin and they're starting to creep over the edge but they generally do that, up that way.

CAPCOM Okay, well, we'll be keeping in touch with you. Right now, we copy your go and keep us advised on any cross wind problems or any other things that come up.

NAS 956 Sure do that.

PAO Mission Control, Houston, that was an exchange between John Young and in shuttle training Aircraft at Dryden, and Roy Bridges here in Mission Control. Young reporting on the turbulence and wind velocities and directions and different altitudes, also the 1 run he made using the aiming point that's being recommended to the crew based on the current head wind conditions on virtually right down the runway.

END OF TAPE

PAO Mission control Houston, that was an exchange between John Young in a shuttle training aircraft out at Dryden and Roy Bridges here at mission control. Young reporting on the turbulence and wind velocities and directions at different altitudes, also, the one run he made using the aiming point, that's being recommended to the crew based on the current head wind conditions virtually right down the runway. Hawaii acquisition in 5 minutes. This is mission control Houston.

CAPCOM NASA 946, Houston, we'll be dropping off to talk to Orbiter at Hawaii now, and we'll be talking to you again after Bermuda LOS at 922, over.

NASA 946 946, copy.

CAPCOM Challenger, Houston's with you through Hawaii for 6 1/2 minutes. Configure AOS.

SPACECRAFT Roger, Houston, read you loud and clear, how do you read us?

CAPCOM You're five by and configure AOS.

SPACECRAFT Roger.

CAPCOM And Challenger, Houston, have an addition to a note we sent up to you on the teleprinter this morning, before you do your right OMS interconnect return, request you repress the right OMS.

SPACECRAFT Roger, in work. Right OMS is pressurized and the pressures are stable.

CAPCOM And we copy Challenger, see a good repress, and your're go to close the helium valves again and do your interconnect return.

SPACECRAFT Roger.

CAPCOM And Challenger, Houston, when you're complete with what your're doing there and have a moment to listen, I'll give you the flight note I talked to you about over Australia and give you an update on the weather.

SPACECRAFT Roger, stand by.

CAPCOM And Challenger, Houston, if somebody's standing back by panel Alpha 12, I've got a couple switches.

SPACECRAFT Go ahead with the A R12 switches, Houston.

CAPCOM Okay, that's A12, Alpha 12, hydraulic heaters, bravo 4 of them to off.

SPACECRAFT Okay, those switches are done. Anything else.

SPACECRAFT They're in work, and Don is in the process of doing those Roy, and we'll get them.

CAPCOM Okay good, and you ready for a weather update?

SPACECRAFT You bet, go ahead.

CAPCOM Okay, well you got a beautiful day down at Edwards, no clouds, it is getting a little windier than what we had mentioned to you earlier. Winds are currently running 200 to 220 degrees at 15 gusts to 22 and at your landing time, we're predicting same direction, 13 gusts to 18, little bit lower. And we're recommending that you use the close aim point, we're also recommending that you manually close the speed brakes at 2500 ft.

SPACECRAFT Okay.

CAPCOM The STA's reporting negative turbulence of any significance and all other systems are go out there. You got a big crowd waiting to watch you touchdown.

SPACECRAFT Okay, thank you.

SPACECRAFT The interconnect return is complete.

CAPCOM Roger, and Challenger, Houston PJ as you know, we have no PAPAS on the close aim point. There is a small spit of dry land to the left of the centerline, that points to the close aim point.

SPACECRAFT Well my trusty auto ought to get me there.

CAPCOM Roger that.

CAPCOM Challenger, Houston, we're 30 seconds LOS we'll be picking you up at Buckhorn in about 3 minutes. And configure LOS.

END OF TAPE

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CAPCOM Roger that. Challenger, Houston, we're 30 seconds LOS. We'll be picking you up at Buckhorn in about 3 minutes and configure LOS. Challenger, Houston's with you through the states for 19 minutes, configure AOS. Challenger, Houston's with you through the states for 19 minutes, configure AOS.

SPACECRAFT Okay, you got it.

CAPCOM Challenger, Houston, we'd like to send you a pass hac position G mim. Request a G&C spec 0. Also request that you do not call a spec 50 until we complete this.

SPACECRAFT Okay, tell us what it's (garble).

CAPCOM And Challenger, Houston, recommend you return to auto dap and check your attitude.

SPACECRAFT Thanks.

CAPCOM Challenger, Houston, Bo I've got a couple switches on R4 if you have a second.

SPACECRAFT Go ahead.

CAPCOM And Challenger, Houston, you have the CRT back and release a from the restriction on spec 0 and, Bo, the switches are MPS manifold press, two of them, to open. And MPS fill and drain LH2 inboard to open.

SPACECRAFT Roger, standby here a second. Okay, MPS manifold press 2 to open and what was the other one?

CAPCOM Let's see, MPS fill and drain LH2 inboard to open.

SPACECRAFT Houston, Challenger, with another one a propellant fill and drain LH2 inboard.

CAPCOM Propellant fill and drain, LH2 inboard to open, that's correct.

SPACECRAFT Roger.

CAPCOM And Challenger, Houston, PJ and Bo, like to talk to you about the flight note on the aft RCS if I could.

SPACECRAFT Say again Houston.

CAPCOM Like to discuss the aft RCS pitch jet flight note.

SPACECRAFT Okay, can we do it quickly.

CAPCOM Very quickly. We told you to reselect L1U or L2D if you needed to between EI and cue-bar 20. We want to caution you that if you should get a pitch jet failure prior to doing the PTI cue-bar of 8 that you go CSS, inhibit the PTI until after you've reselected the appropriate jet. Then you could reenable PTI's over.

SPACECRAFT Okay, thank you.

CAPCOM And Challenger, Houston, I have one more flight note and then our slate is clean. Switch on panel A14.

SPACECRAFT There's nobody back there right now. We'll have to get it later?

CAPCOM Okay, let us know.

SPACECRAFT Houston, are you there?

CAPCOM Roger, we had a short keyhole.

SPACECRAFT You ready for a gimbal check?

CAPCOM While we're standing by, reminder, do not check the left secondary.

SPACECRAFT Okay, but I'm going to check the right secondary.

CAPCOM Roger that.

SPACECRAFT Houston, I haven't turned off those hydraulic SEP pumps. I intend to do that just before the APU start, is that acceptable?

CAPCOM That's good Bo.

SPACECRAFT Okay, the APU fuel tank valves are open and I have three grays and I'm getting ready to close them.

CAPCOM Okay, it looked good Bo. Good prestart. Challenger, Houston, had a good gimbal check.

SPACECRAFT Okay, understand that the secondaries on the left side are not usable at all, is that correct?

CAPCOM That's affirmative.

END OF TAPE

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CAPCOM Challenger, Houston, had a good gimbal check.

SPACECRAFT Okay. And I understand that the secondaries on the left side are not usable at all, is that correct?

CAPCOM That's affirmative.

SPACECRAFT Confirm you want to use the close aim point?

CAPCOM That's affirm. We're recommending the close aim point. Challenger, Houston, you have a go to load your targets.

SPACECRAFT Thank you. Houston, the OMS burn preps are complete.

CAPCOM Copy, burn prep complete. Challenger, Houston, we sent you a new vector and we'd like for you to go ahead now and do another target load on pass and BFS.

SPACECRAFT Okay.

CAPCOM Challenger, Houston, your onboard solution looks good to us.

SPACECRAFT Boy, I don't know what I'd do if you'd said something else.

CAPCOM We'd all be in trouble. Challenger, Houston, we're 15 seconds LOS. We'll see you at Dakar at 2 2 5 7 configure LOS.

SPACECRAFT Okay, see you there.

PAO Mission Control Houston. LOS at Bermuda. Dakar Senegal tracking station voice relay station coming up at about 4 minutes.

CAPCOM NASA 946, Houston.

PAO Roy Bridges making a call to John Young in the Shuttle Training aircraft, NASA 946. We'll listen in on that.

CAPCOM NASA 946, Houston.

NASA 946 46, go ahead.

CAPCOM Roger, we got a couple of minutes here before we get to Dakar. Everything is looking good onboard, John, they are ready to come home. Want to get an update from you.

NASA 946 Okay, we just did a pass that normalized to 185 knots, touchdown was 2450 foot down the runway.

CAPCOM Okay, we copy.

NASA 946 The 1,000 foot winds were 245 and 24, the 2,000 foot winds 260 at 24, the 3,000 foot winds 249 at 22, the 4,000 foot winds 250 at 20, and the 5,000 foot winds 271 at 10. The speedbrakes setting at 3,000 feet was about 50 percent again.

CAPCOM Okay, we copy.

NASA 946 Yes, the turbulence is unnoticeable so it's pretty good for landing.

CAPCOM Okay, that's good news, John, thank you very much and we'll be talking to you after Ascension and as far as you're concerned we're go, right?

NASA 946 That's affirmative, the only clouds that you can see are the ones on the other side of the mountain LA Basin.

CAPCOM Okay, we got a good TV shot of the field. Looks clear as a bell.

NASA 946 It's beautiful.

CAPCOM Thank you very much and I'll talk to you in let's see here about 9 49.

NASA 946 Okay. The HUD camera setting is F16.

CAPCOM Okay, copy F16, thank you.

PAO Mission Control Houston, currently the helicopter out at Dryden Flight Research Facility at Edwards Air Force Base, flying along parallel to runway 22 where Challenger will touchdown. Severe clear at the landing site. Dakar about a minute 10 seconds away from reacquisition. Challenger crew all buttoned up with the all systems ready for landing. And we're some 29 minutes away from ignition of the deorbit burn over the Indian Ocean.

END OF TAPE

CAPCOM Challenger, Houston's with you through Dakar and Ascension for 11 minutes, configure AOS.

SPACECRAFT Roger.

CAPCOM Challenger, Houston, the setting for your HUD camera is Fl6.

SPACECRAFT Okay Fl6 now.

CAPCOM Challenger, Houston, PJ, I got a couple flight notes, still got a switch on panel Alpha 14.

SPACECRAFT Okay what do you need?

CAPCOM Okay, I need the RCS OMS heaters forward RCS switch to off.

SPACECRAFT Okay, that was the forward RCS heaters, you want them all to off?

CAPCOM That's just one switch in the upper left corner.

SPACECRAFT Okay, say it again, please.

CAPCOM RCS OMS heaters forward RCS switch, one of them, to off.

SPACECRAFT Okay, we got you.

CAPCOM And Challenger, Houston, a note, when using the OMS helium pressure versus delta v chart on the XCG calculator.

SPACECRAFT Roger.

CAPCOM Need to subtract 100 psi from the tank reading, and use that value on the chart to get the delta v available.

SPACECRAFT Roger.

PAO Flight Director Gary Coen polling the positions here in MOCR for go for deorbit.

CAPCOM Challenger, Houston, a reminder, when you closed out the WCS on ML31C we need the vacuum vent ISOL to close, and the nozzle heater off.

SPACECRAFT Vent doors are going closed.

CAPCOM Roger, copy, vent doors closed and did you copy the WCS closeout notes?

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SPACECRAFT Yes sir, we'll do that when we close it out.

CAPCOM Okay copy, and you have a go for the deorbit burn.

SPACECRAFT Okay thank you, it's on at 302.

CAPCOM Challenger, Houston, we've updated your state vector. We'd like another reload past BFS.

SPACECRAFT Okay.

SPACECRAFT Houston, on that subtracting 100 psi from the helium pressure?

CAPCOM Roger.

SPACECRAFT If I look at 30 percent as an example, am I supposed to subtract the 100 and get 26 and that shows I have a 145 ft per second capability now?

CAPCOM Stand by.

CAPCOM That's Affirm.

SPACECRAFT Okay, so we have about 290 ft per second on board?

CAPCOM That's correct Bo.

SPACECRAFT Thank you.

CAPCOM Challenger, Houston, we're 30 seconds LOS, we'll see you over Botswana in 5 minutes, configure LOS.

SPACECRAFT Roger. See you there.

PAO Mission control Houston, loss of signal at Ascension Island. Coming up in 4 minutes at Botswana voice relay station.

SPACECRAFT Houston, are you still there?

CAPCOM Challenger, Houston's with you through Botswana now for 7 minutes.

SPACECRAFT We just looked at our onboard pad and we'd like to confirm the EI -5 attitude as 199, 315, 024.

CAPCOM That's what I read you, and stand by we'll re-check it.

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CAPCOM And Challenger, Houston, the attitude you read down is correct. And one note for you, hydraulic thermal conditioning at EI -11 will not be required.

SPACECRAFT Super, thank you.

CAPCOM And we're standing by.

END OF TAPE

CAPCOM Challenger, Houston, The altitude that you read down is correct and one note for you. The hydraulic thermal conditioning EI-11 will not be required.

SPACECRAFT Super, thank you.

CAPCOM And we are standing by.

SPACECRAFT See the reason we asked that is that we looked back at the (garble) pads that are in the checklist and found out that they were quite different.

CAPCOM Roger I think that most of those other ones were for the next rev.

SPACECRAFT Check.

CAPCOM Challenger, Houston, we are 30 seconds LOS, see you at Yarragadee at DI-22. Have a good burn.

SPACECRAFT We'll do our best. Thank you.

SPACECRAFT And thanks for your help getting us ready this morning.

CAPCOM It's been a real pleasure.

PAO Mission Control, Houston, loss of signal at Botswana Voice Relay Station. Next station will be Yarragadee in 12 minutes. Ignition for deorbit in about 6 minutes. We should have confirmation at Yarragadee that the burn was successful. This is Mission Control, Houston.

CAPCOM NASA 946, Houston.

NASA 946 NASA 946, go ahead.

CAPCOM Roger, we sent them over the hill at Botswana. We're passed, the point of no return. How does everything look?

NASA 946 Looks good. One of my questions was is, did they incorporate into the tank guidance the alpha profile that allows you to go to 12 degrees angle to TAC and there was supposed to be I load at T-50 I's. The reason I asked that is because turn around and follow we're ending up a little low on energy with the speed brake in automatic and that will be corrected if the, if that change was put in.

CAPCOM Roger, that change was in for Gurtles, I don't believe it applied to the OPS 305. Stand by, we'll check.

CAPCOM Challenger, Houston, we confirm that it is a Gurtles only I-load and if you are getting low transitions to approach and land out there, low energy, it's probably due to the winds.

NASA 946 Well I don't know, I think just tell them to keep an eye on the speed brake, coming around the hock that's all so it don't dump to much energy on them.

CAPCOM Roger, and John we have not noticed in our runs with the baloon wind so far any problems on energy. Could you give me a feel for where you are getting the transition to approach and land. What altitude?

NASA 946 Yeah, right at 10,000.

CAPCOM Okay, thank you.

PAO Mission Control, Houston, coming up on the time of the ignition for deorbit burn. Mark the ignition should be under way now for the Challenger. Touchdown, a hour and 12 minutes from now.

CAPCOM NASA 946, Houston, John, could you give us a little bit more information on where you think you are getting low on energy, where you are encountering the problem?

NASA 946 Right as you turn on final, I am going to leave the speedbrake in auto this time just like PJ would and see what happens.

CAPCOM Okay, good, we'll be standing by here for a couple of more minutes. We're about 4 minutes til we pick them up at Yarragadee.

NASA 946 Okay.

CAPCOM NASA 946, Houston.

CAPCOM NASA 946, We are about a minute before acquisition at Australia, we'll be back with you in about 10 minutes.

NASA 946 46, Roger.

PAO Mission Control, Houston, acquisition at Yarragadee coming up in about 40 seconds. We're some 52 minutes away from touchdown at this time. Should get confirmation of the deorbit burn here at Yarragadee.

END OF TAPE

PAO Mission Control Houston. Acquisition of Yarragadee coming up in about 40 seconds. We're some 52 minutes away from touchdown at this time. Should get confirmation of a deorbit burn here at Yarragadee.

CAPCOM Challenger, Houston's with you at Yarragadee for 7 minutes.

SPACECRAFT Roger sir. Was a good burn right down the pipe and smooth all the way.

CAPCOM That's great news.

SPACECRAFT I gave everybody a last vote at 30 seconds if they didn't want to go around one more time and all I got was a blank look, nobody wanted to do that.

CAPCOM Well, I'm sure you'd like to have a lot more time in space but maybe we can get you another flight real soon. I think that's a better way to go.

SPACECRAFT Okay.

CAPCOM Challenger, Houston, we're 20 seconds LOS and recheck configured LOS, looking forward to seeing F Troup coming over the hill at Buckhorn at about 30 minutes.

SPACECRAFT So are we, Babe.

PAO Mission Control Houston. Loss of signal at Yarragadee. There's an outside possibility we may get some data and perhaps voice from the Hawaii pass since the spacecraft ground track takes it almost directly over that station. That remains to be seen. Some 42 minutes until touchdown. Entry interface in 13 minutes 10 seconds. Which will be Day 4, 23 53 27. Challenger on its way back after 5 days in space on its maiden flight. The burn report made over Yarragadee by Commander Paul Weitz said it was good burn, right down the pike and smooth all the way. He found no takers on his offer to go around one more time. This is Mission Control Day 4, 23 41. Mission Control Houston. The convoy for safing and deservicing the spacecraft is in position to move on out to the runway after landing. Some 100,000 people are estimated to be at Edwards to view the landing. And TV chase aircraft, a T38, is taxiing into position for takeoff at Edwards. We're some 40 minutes now away from touchdown of Challenger.

CAPCOM NASA 946, Houston.

NASA 946 946, go ahead.

CAPCOM Roger, John, they had a good burn, they're headed your way in good shape.

NASA 946 Okay, we made another run and I'm convinced that that's just the way we're set up here that -

CAPCOM Okay, so the energy's looking fine now.

NASA 946 Yes.

CAPCOM Thanks a lot, that makes us feel a lot better.

NASA 946 Me too.

CAPCOM And 946, I'll be off the air for just a moment to do a convoy UHF check and then we'll be back with you and be standing by.

NASA 946 Roger.

CAPCOM Convoy Commander, Houston on the UHF, how do you read?

CONVOY COMMANDER Houston, flight, this is Convoy Commander on UHF, read you loud and clear, how me?

CAPCOM Convoy, Houston, you're also five by. Chase, Houston, radio check, how do you read?

CHASE Chase, read you loud and clear Houston.

CAPCOM Roger, and you're five by.

CHASE Chase copy.

PAO Mission Control Houston. Coming up on predicted time of entry interface. That is when the spacecraft comes into the sensible atmosphere at approximately 400,000 feet.

END OF TAPE

All the way.

PAO Mission control Houston, coming up on predicted time of entry interface, that is when the Spacecraft comes into the sensible atmosphere at approximately 400,000 ft. At that time the range to the Spacecraft will be 4043 nautical miles, mark entry interface at this time. Velocity 24,399 ft per second, altitude as I mentioned earlier is around 400,000 ft. When the first molecules of atmosphere begin to collide with the Spacecraft. Four minutes away from acquisition at Hawaii, that is if the S-Band can punch through the ionized layer of atmosphere around the Spacecraft. Touchdown now 29 minutes away.

PAO Mission control Houston, the Challenger should be in blackout at this time. Blackout began at about 3447 nautical miles uprange from Edwards at an altitude of 335,570 ft. 26 minutes away now from predicted touchdown.

CAPCOM NASA 946 and Chase will be going off frequency for a moment and monitoring as the Orbiter goes over Hawaii, we'll be back with you in about 10 minutes.

NASA 946 6, Roger.

CHASE Chase, I copy.

PAO This current blackout period is predicted to run until 10 minutes, 10 1/2 minutes past the hour. They're past day 50 hours in mission elapsed time. For about another 11 minutes. Velocity now down to 23,330 ft per second, range to the runway 2345 nautical. Getting data from Hawaii. Range 2000 nautical miles from touchdown. And Hawaii has had loss of signal, intermittent signal from the Spacecraft as it passed over that station, range now 1760 nautical miles, altitude 250,251 ft.

CAPCOM NASA 946 Houston's back with you.

CAPCOM NASA 946 Houston's with you again.

NASA 946 946, Roger we made our last run and normalized to 185 knots, it's 2600 ft down the runway at the close aim point.

CAPCOM Roger, copy John, and we got a little bit of data coming over Hawaii from them, couldn't talk to them, but all the systems were looking real good.

NASA 946 Outstanding.

CAPCOM Chase, Houston, radio check.

CHASE Loud and clear, Chase.

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CAPCOM Okay, you're still five by.

CHASE Copy.

PAO Some 5 minutes remaining in the blackout period before predicted end of blackout. Currently the range is, the display is frozen, the range should be around 514 nautical miles. Western test range stations at Vandenburg have picked up Challenger.

END OF TAPE

PAO western test range station at Vandenberg had picked up Challenger. Ground track and the energy, that is the velocity, the descent rate, etc. for the Challenger are all nominal. 509 nautical miles to touchdown.

CAPCOM Chase, Houston, standby for mach 12. Mark, Mach 12.

CHASE Chase, coping mach 12.

PAO Buckhorn has acquisition. 415 nautical miles uprange from Edwards. Altitude 168,516 feet.

CAPCOM Challenger, Houston's with you through Buckhorn configure AOS.

SPACECRAFT Roger, (garble).

CAPCOM Okay, you're looking real good. Your energy and ground track are right on, NAV is good.

SPACECRAFT Okay, the time 23 57 30. We had an alert message IMU brake 3 but it did not show up on the (garble).

CAPCOM Copy.

SPACECRAFT We also had a master alarm when I opened the (garble) TVC isol number 2 probably just during the system (garble).

CAPCOM Copy.

PAO 300 nautical miles to the runway.

CAPCOM Challenger, Houston, IMU 3 looks good. Probably just had a transient.

SPACECRAFT Right.

CAPCOM Challenger, Houston, recheck configure AOS.

SPACECRAFT Okay, you got it now, Roy.

CAPCOM Roger.

PAO Velocity down to 7790 feet per second. Altitude 150,400 feet. Range 240 nautical.

CAPCOM Challenger, Houston, an update on the surface winds, holding fairly steady at 210 degrees at 22 knots headwind, Four knots on the left side, altimeter is the same I gave you before.

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SPACECRAFT Okay, thank you Roy.

CAPCOM Challenger, Houston, take TACAN and PJ, we need for you to cycle the rad controller loop one only.

SPACECRAFT Oh, I got it maybe there was nothing wrong with the simulator. Yes, they were both in rad 12 before.

CAPCOM Right, we saw that.

PAO Velocity 5800 feet per second, range 170 nautical miles. Altitude 126,397 feet. Velocity down to 5,000 feet per second. 140 nautical mile range.

CAPCOM Challenger, (garble) evap out message, disregard.

SPACECRAFT Well we just got it, Roy.

CAPCOM Roger.

PAO Spacecraft deservicing convoy at Edwards. Ready to roll. Range now 110 nautical miles, Altitude 107,000 feet. Velocity down now to 4,000 feet per second.

CAPCOM Challenger, Houston, take care of data to GNC only.

SPACECRAFT (garble).

PAO 91,000 feet altitude. 3,000 feet per second. 72 nautical mile range.

CAPCOM Challenger, Houston, take care of data to nav.

SPACECRAFT Wilco.

PAO Altitude 78,000 feet, 2100 feet per second, 52 nautical miles. The cameras at Santa Anez, California have picked up the spacecraft. Range 30 nautical miles, 60,000 feet altitude, velocity 1250 feet per second. Range 20 nautical miles.

SPACECRAFT The only profit we've been waiting for.

CAPCOM Roger, copy that. You're right on your energy.

SPACECRAFT Boy, everything looks good ...

END OF TAPE

PAO Range 20 nautical miles

SPACECRAFT That's the only buffet we've been waiting for.

CAPCOM Roger copy that, you're right on your energy.

SPACECRAFT Well everything looks good here Roy, couldn't look better.

CAPCOM Looks the same down here, PJ.

PAO Velocity down less than 1000 ft per second, 40,000 ft altitude.

CAPCOM Challenger, Houston, Bo, request manual open on landing gear ISOL valve number 2.

CHASE Challenger, the chase is coming up on the left.

SPACECRAFT Hello, how are you today Charlie?

CHASE Doing pretty good, you guys are looking great.

SPACECRAFT Thank you sir.

PAO Spacecraft making the turn around the heading alignment circle.

CAPCOM (garble) intercepting the lack you're right on.

PAO Photo Chase Pilot Charlie Justus is tagged up with the Spacecraft getting a good picture now from the rear seat camera. 25,000 ft altitude. Now the manual pitch and roll mode.

SPACECRAFT And we see Balmy Lake Edwards (garble) in the sun (garble) right there.

CAPCOM There are probably a lot of sailboats out there today.

PAO Nine miles from touchdown.

SPACECRAFT We got the hud camera on.

CAPCOM That's great, final wind update, 220 right down the runway at 18 knots.

SPACECRAFT Okay, I verify you still at the close aim point.

CAPCOM That's affirm.

PAO 14,000 ft altitude. Still in manual mode on pitch and yaw. 7 miles to touchdown. 10,000 ft, we mark the unofficial touchdown time at 5 days 0 hours 23 minutes 42 seconds. Wheels stopped at 32 past the hour. Convoy vehicles moving out to the Spacecraft to begin the deservicing procedures and safing. And another orbiter joins the fleet of active Spacecraft in the STS system.

SPACECRAFT Okay Houston, I inadvertently turned off the RJD logic by mistake here, it was either L15 and R1 or else it was the one next to it there RJD FLA.

PAO Unofficial wheel stop time, day 5 0 hours 24 minutes 32 seconds.

CAPCOM Okay, PJ that's no problem you can press on.

CAPCOM And Challenger, Houston, I've got a couple of changes to your post landing when you're ready to copy.

SPACECRAFT Stand by.

CAPCOM Challenger, you're go for master MADS power off.

SPACECRAFT Master MADS power off now OMS RCS safing is complete and go ahead with your changes.

CAPCOM Roger, on page 5-9.

SPACECRAFT Go ahead.

CAPCOM On page 5-9 after victor fox bravo 84 for a complete message. Add panel 06 check IMU 2 off, MDM FF 2 to on, and then an I/O reset. Next change is page 5-17.

SPACECRAFT Okay, go ahead with 5-17.

SPACECRAFT Go ahead with 5-17, Houston.

CAPCOM Okay, I got a correction for 5-9, if you want to go back to 5-9.

SPACECRAFT Well, we might as well. Go ahead.

CAPCOM Roger, the first step, after SSME repositioning, panel 06 MDM FF 2 to off.

SPACECRAFT Yes, okay, you cycle MDM off back on, then I/O reset.

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CAPCOM Roger, you turn it off after the title SSME repositioning. And then you turn it back to on down at the bottom of the page there.

SPACECRAFT Okay, let me get it squared away now, you turn the MDM off before you start the procedure, when you're done with the procedure you turn the IMU off the MDM back on, and then an I/O reset.

CAPCOM That's affirmative. Next change is on page 5-11.

SPACECRAFT 5-11, we're ready.

CAPCOM The lead circ pump ops.

END OF TAPE

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SPACECRAFT ... you turn the MDM off before you start the procedure and you're done with the procedure you turn the IMU off and the MDM back on and then do an I/O reset.

CAPCOM That's affirmative. Next change is on page 5-11.

SPACECRAFT 5-11, we're ready.

CAPCOM Delete circ pump ops.

SPACECRAFT Okay, delete circ pump ops and the note applies.

CAPCOM That's affirmative and on page 5-17 is the next.

SPACECRAFT Okay, we're ready.

CAPCOM Under RCS oms heaters power down change forward RCS jets 1, 2, 3, 4, 4 to off to ready auto instead of OFF. And the same with the next line. Aft 1, 2, 3, 4, off, change that to ready auto.

SPACECRAFT Okay, we got it. Is that it?

CAPCOM And Challenger, Houston, you're go to turn off the ops 1 recorder. Return the mode switch of the ops 1 recorder to standby.

SPACECRAFT Okay, we'll do that. Are we cleared to press on with the checklist on page 5-6?

CAPCOM That's affirm.

SPACECRAFT It's in work. When that's in work we're going on with hydraulic load test.

CAPCOM Roger.

PAO Mission Control Houston. Some 9100 feet is the nearest marker. The edge of the runway where orbiter Challenger stopped so the actual rollout distance will be somewhat less than that depending on how far beyond the threshold the main gear touchdown and that will be sometime in the coming out when someone walks the ground.

SPACECRAFT I'm ready for DPS transmission, Houston.

CAPCOM Roger, standby. Challenger, Houston. You're go for the ops 9, transition.

SPACECRAFT Roger.

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CAPCOM Challenger, Houston. You're clear for the ammonia activation on page 5-6.

SPACECRAFT Okay, when ops 9 pass and 0 backup.

CAPCOM Roger.

PAO Some more unofficial landing numbers. The main gear is estimated to have touchdown on the Edwards 22 at 1800 feet beyond the threshold. Nose gear down at 4800 feet and since the spacecraft came to rest at the 91 hundred foot mark that gives a difference for a rollout at 7300 feet, subject to change.

SPACECRAFT The ammonia board is activated Houston, as you can probably see.

CAPCOM Roger, we see that.

PAO Ground crew dressed in protective clothing surrounding the Orbiter attaching various support carts, deservicing equipment.

SPACECRAFT Okay. Main A (garbl) repositioning complete. Pressing on to AP hydraulic shutdown.

CAPCOM Roger.

PAO The auxiliary power units on Challenger have now been turned off.

SPACECRAFT Okay. Ready to shutdown GPC's 2, 3, and 4.

CAPCOM Roger.

PAO Challenger crew currently powering down the general purpose computers in the spacecraft.

CAPCOM Challenger, Houston. We have ground cooling. You deactivate the NH3 as per 5-19.

SPACECRAFT Roger, you (garble) to hand over that right now.

CAPCOM Roger.

SPACECRAFT I'll let him do it so I don't read the clock.

CAPCOM That's sounds (garble).

SPACECRAFT Houston, the PLT is turning over to the aft.

CAPCOM Roger.

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SPACECRAFT This is Challenger exchange keys onboard, ready to start.

CAPCOM Roger, read you loud and clear. How me?

SPACECRAFT The same. CDR reads you loud and clear and the aft PLT reads you loud and clear.

CAPCOM Roger, read you the same.

PAO Challengers crew now exiting the spacecraft coming down the stairs where perhaps a walk around kick the tires before going over the medical exam and the ceremony thereafter being greeted by JSC Director Flight Operations, George Abbey.

END OF TAPE

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