KSC LAUNCH CONTROL This is Shuttle Launch Control at T minus nine minutes and holding. The GOX vent arm or beanie cap has just been retracted and will be moved to the side momentarily. At that point we will have several important milestones still remaining in the countdown. When we come out of the count, or come out of the hold and begin the count once again, the Ground Launch Sequencer will take over command of the remaining events as well as monitoring the Shuttle Systems response. At T-7 minutes the Orbiter access arm will retract. At T-5 minutes, the auxilliary power units will be started. At T-4 minutes a purge of the main engines will start, and at T-2 minutes and 55 seconds, liquid oxygen pressurization will begin. At 1 minute, 57 seconds, liquid hydrogen pressurization will start. And at T-28 seconds the redundant set sequencer will take over. At that point, events happen far too quickly and readng of systems must be done too fast for humans to perform. At the present time, waiting for NASA Test Directo George Page, our launch director to say a few words to the crew about the procedures which will be followed. The gaseous oxygen vent arm, the cap has been retracted and the arm is just about to move away from the external tank. At the present time, everything going very, very smoothly. The gaseous oxygen vent arm now is moving back to the retract position, getting it out of the way so the Orbiter can lift off at and clear the tower properly. The launch director coming up to speak to the crew. The launch director is talking to his team about the launch commit criteria at the present time. The launch director is going through the launch commit criteria with the launch team and he is telling them that if they see something that would require we cut off, that that is the thing to do and we are not going to be taking any chances. Everybody will be talking on the same channel, on what is our channel 212. "...of all Americans with you. You go in the hand of God and draw on the courage of life. Our countryman and poet, William Cullen Bryant, once said, 'America is where mankind throws off his last fetters.' With your exploits, we loosen one more. Truly said shall place the limits of giant strength or curb his swiftness in the fallen race. Through you today, we all feel as giants once again. Once again we feel the surge of pride which comes from knowing we are the first and we are the best, and we are so because we are free. For all Americans, Nancy and I thank you, and the thousands from earth in a craft unlike any other ever constructed, you will do so in a feat of American technology and American will. May God bless you. May God bring you safely home to us again." That is the end of the message. John, we can't do more from the launch team than say, we sure wish you an awful lot of luck. We are with you 1000 percent and we are awful proud to have been a part of it. Good Luck gentlemen. "
That was Shuttle Launch Control, our Launch Director George Page, reading a message from President Reagan to the Columbia crew which began: You go forward this morning in a daring enterprise and you take the hopes and prayers of all Americans with you. Launch Director George Page added his best wishes . He said, "We wish you an awful lot of luck and that we are with you 1000 per cent on the trip. We are just about to come out of this T minus

9 minute hold in just about two minutes from now. We are having a check of the managers who are monitoring this morning's launch and all of them who have been polled so far said that they are ready to go. Be ready to pick up in just about a minute and a half from now. This is Shuttle Launch Control. Stand by 30 seconds. This is Shuttle Launch Control at T minus 9 minutes and holding. We are approximately 26 seconds away from picking up the countdown at the T minus 9 minute point. Nine minutes remaining between now and 7 a.m., when we expect to have a liftoff of America's first Space Shuttle. The launch team has been briefed on the way in which a hold can be called to the countdown. During the final 9 minutes of the countdown, and we are coming out. We are T minus 9 minutes and counting. The launch events are being controlled by the ground launch sequencer now that has been initiated and that will be in control of to T minus --up to T minus 25 seconds when they switch to the on-board redundant set launch sequencer. The ground launch sequencer is a part of the launch processing system and operates by relaying commands to the Orbiter's on-board computer which then reports back to the launch processing system that the command has been executed. The primary job of the computers is to check that all of the launch commit criteria such as the propellant loads, temperatures, pressures, and other measure-ments are satisfactory. The primary chase aircraft have taken off. The third --a third T-38 will take off at the T minus five minutes mark. The timing of this plane is a tight window that --such a tight window that a 15- second delay would mean that they would not be in the proper position at launch. The T-38 supersonic trainers have such critical timing because of the small fuel load that they carry. T minus 7 minutes 52 seconds and counting. Approximately 40 seconds away from the movement of the Orbiter access arm. This is the final arm which was being moved out of the way to provide for the Orbiter to clear the tower properly. This may be a very interesting launch to watch from the standpoint that the Orbiter is able to translate slightly horizontally because as it begins to lift off it also does a roll maneuver which will place the Orbiter sort of on a track as it goes towards the proper inclination to the Equator. T minus 7 minutes and 7 seconds and counting. T minus 7 minutes and counting and we have retraction of the Orbiter access arm beginning to move the stack first away from the Orbiter and then to swing away. This was the walkway attached to the service structure used by the crew to walk to the Orbiter. The crew has been advised to lower their helmet visors. A very slow movement by the Orbiter access arm. T minus 6 minutes 29 seconds and counting. The crew is beginning the APU pre-start. The start begins at the 5-minute point in the countdown. T minus 15 seconds and counting. The APU's are turbine devices fueled by hydrazine which provide hydraulic power to change the angle of the engines and the flight surfaces on the Orbiter. T-5 min. 59 sec. and counting. Pilot Bob Crippen had begun that APU prestart which started about 48 sec. from now. The development flight instrumentation which measures the stresses on the Orbiter during flight have been turned on and recorders store information for

playback after landing. T-5 min. 30 sec. mark and counting. Pilot Bob Crippen has indicated the auxilliary power units are ready to be started. T-5 min. 15 sec. and counting. Coming up on the 5 min. point, 4, 3, 2, 1 mark. T-5 min. and counting. We have had a go for APU start. APU start is in work. This is a start sequence. The final chase plane has taken off from Patrick Air Force Base. T-4 min. 42 sec. and counting. T-4 min. 30 sec. and counting. Once we get the APU start, we have a total of 12 min. of hydrazine supply for running the APUs prior to the liftoff. Everything going very smoothly in the count. The APU start is complete. T-4 min. 10 sec. and counting. As preparation for main engine ignition the main fuel valve heaters have been turned off. T-3 min. 57 sec. and counting. The final helium purge on the Shuttle main engines has been started in preparation for engine start. The liquid oxygen replenish system has been turned off in preparation for pressurization of the tanks for the launch. T-3 min. 35 sec. and counting. The elevon speed brake and rudder are being moved through a preprogrammed pattern to be sure they will be ready for use in flight. T-3 min. 20 sec. and counting. The Shuttle is now on internal power, however the fuel cells are still receiving their fuels from the ground support system for one more additional minute. Coming up on T-3 min., T-3 min. and counting. The engine gimbol, our movement check is underway to assure that they are ready for flight control. T-2 min. 52 sec. the launch valve on the external tank has been closed and pressurization has begun. After the tank is pressurized the hold capability is limited to 3 min. 36 sec. T-2 min. 40 sec. and counting. The fuel cell ground supply of oxygen and hydrogen has been terminated and the vehicle is using its onboard supply. T-2 min. 25 sec. and counting. T-2 min. 15 sec. The pressure in the LOX tank is at flight pressure. Coming up on 2 min. away from launch. T-2 min. mark and counting. The liquid hydrogen vent valve has been closed and flight pressurization is underway. T-1 min. 50 sec. and counting. Chuck Hannon has just said "smooth sailing, baby" to astronauts John Young and Bob Crippen. T-1 min. 35 sec. and counting. T-1 min. 20 sec. and counting, we can see the purges of the main engines as we prepare for ignition. T-1 min. 10 sec. and counting. Liquid hydrogen tank is at flight pressure. T-1 min. mark and counting. The firing system for the sounds supression water will be armed and in just a couple of seconds from now. It has been armed. T-45 sec. and counting. T-40 sec. and counting. The development flight instrumentation recorders are on. T-35 sec. We are just seconds away from switching to the redundant set sequencer. T-27 sec. We have gone for redundant set sequencer start, T-20 sec. and counting. T-15, 14, 13, T-10, 9, 8, 7, 6, 5, 4, we have gone for main engine start, we have main engine start and we have liftoff, liftoff of America's first Space Shuttle and the Shuttle has cleared the tower.

SC 434 (garbled)

CAPCOM Roger, Columbia, Houston. You're go at throttle up.

SC Roger, go at throttle up.

CAPCOM Roger, Columbia, on the nice ride. You're lofting a little bit, you'll probably be slightly high at staging.

PAO One minute forty five seconds, coming up on go/no go.
CAPCOM Columbia, you're negative seats.
PAO That callup says that Columbia, the altitude is too high for ejection seat use...
CAPCOM Columbia, you are go for SRB sep.
PAO Two minutes, four seconds, standing by for SRB sep confirmation.
SC (garbled)
CAPCOM Roger on the sep Columbia.
PAO Mark two minutes twenty seconds, confirm solid rocket booster sep.
SC (garbled) initiate.
PAO Mark 2 minutes 30 seconds. On board guidance is converging as programmed. Columbia is now steering for its precise window in space for main engine cutoff. Mark two minutes forty seconds. Columbia now 39 nautical miles in altitude, 42 nautical miles downrange. Mark two minutes 50 seconds. Columbia...
CAPCOM Columbia, you're looking a little hot and all your cails will be a little early.
SC Okay.
PAO Columbia now has two engine Rota capability.
SC ...looks good here.
PAO Mark, three minutes. Young and Crippen really moving out now, velocity now reading 6200 feet per second. Mark 3 minutes 15 seconds, Columbia now 51 nautical miles in altitude, 66 nautical miles downrange, velocity now reading 6500 feet per second. Mark 3 minutes 30 seconds. Columbia now 55 nautical miles altitude,78 nautical miles downrange. Mark 3 minutes forty seconds, standing by for a return status check in mission control by Flight Director Neil Hutchinson. Columbia given a green to continue. Mark 3 min. 55 sec., standing by for a Press to MECO which says that if Columbia should lose one engine ...
CAPCOM Stand by. Press to MECO.
PAO Columbia continues flying forward. Coming up on negative return .
CAPCOM Mark, press for MECO.
SC Roger, press for MECO.
PAO Mark 4 min. 8...
CAPCOM Columbia, stand by for negative return. Mark, negative return. And your evap is good.
PAO Mark 4 min. 25 sec. with that call up from CAPCOM Brandenstein Columbia now committed to space travel. Young and Crippen can no longer turn around and return to launch site.
CAPCOM Columbia, Houston, we are showing both OMS PC transducers off-scale high.
PAO Mark 4 min. 45 sec. The flash evaporator is activated onboard...the crew of Columbia...
SC Ours are setting off-scale low here.
CAPCOM Roger, stand by. We will keep an eye on it.
PAO Mark 4 min. 56 sec. Columbia is lofting early in the second stage, it is now being taken out of the trajectory as programmed. Columbia now 74 nautical miles altitude, 181 nautical miles downrange.

SC What a view, what a view!
CAPCOM Glad, you are enjoying it.
PAO Mark 5 min. 15 sec. Columbia now 75 nautical miles altitude, 202 nautical miles downrange. Velocity now reading 11,000 feet per second. A status check in Mission Control by Flight Director Neil Hutchinson.
CAPCOM Columbia Houston you are go at 5:30, MECO, 8+34.
PAO Mark 5 min. 40 sec. That callup from CAPCOM Brandenstein says Columbia trajectory, navigation and engine performance look good.
CAPCOM Roger, Columbia reading you loud and clear.
SC Okay, you clear, a little weak.
PAO Mark 5 min. 55 sec.
CAPCOM We just switched over to Bermuda, voice should get better here in a second.
SC Roger, that. Okay doke, that's good.
PAO Six minutes, Columbia now 76 nautical miles in altitude, 280 nautical miles downrange, velocity now reading 13,000 fps.
CAPCOM Columbia, Houston, could we have the cryo heaters, please? And Columbia, you are single engine Rota.
SC Roger that.
PAO Mark 6 min. 25 sec.
SC Okay, we got the cryo heaters.
PAO That callup from CAPCOM Brandenstein says that if a two engine failure occurred Columbia is capable of an emergency landing at Rota Naval Air Station, Spain. Mark 6 min. 40 sec. Columbia pitching over now, diving to increase velocity, decrease altitude, giving Columbia her most favorable attitude. Columbia now 72 nautical miles altitude, 373 nautical miles downrange. Velocity now reading 16,400 fps. Standing by for a single engine press to MECO callup from CAPCOM Brandenstein.
CAPCOM Columbia, you are single engine press for MECO.
PAO Mark 7 min. 20 sec. That report says that Young and Crippen can achieve orbital insertion even if two engines go out. Mark 7 min. 30 sec. Columbia 67 nautical miles in altitude, 485 nautical miles downrange. G forces building for Young and Crippen, now. Up to 3 g's. Mark 7 min. 45 sec. Columbia's main engine slowly being throttled back now, should be throttled at 65 percent, that is 6 sec. before main engine cutoff. Status check in the Control Center.
CAPCOM Columbia, Houston, you are go at 8.
PAO Mark, 8 min. 4 sec.
SC (garbled) looking good.
PAO Columbia now 63 nautical miles altitude, 606 nautical miles downrange. Mark 8 min. 15 sec. Columbia now 63 nautical miles altitude, 650 nautical miles downrange. Standing by now for main engine cutoff.
SC Okay, MECO, 25, 6, 7, 0 up and doing it at 220 fps.
CAPCOM Roger, Columbia, MECO.
PAO Confirm shutdown. Columbia, the gem of this new ocean, now in space, not yet in orbit. Standing by now for external tank separation.
SC Okay, we've had sep.
CAPCOM Roger, we confirm the sep, Columbia.

PAO Nine minutes 3 seconds, confirm external tank separation. Columbia now performing an evasive maneuver moving below and beyond and translating to the north of the external tank. Young should see it moving away out his window. Nine minutes and 40 seconds, go-no-go status check in mission control for the first OMS burn. Given a Go.
CAPCOM Columbia, Houston. You are go for nominal OMS 1 and for APU shut down on time.
SC Roger that.
PAO Mark nine minutes 55 seconds . Columbia now maneuvering through its OMS-1 burn attitude. Using the two 6,000 pounds thrust engine OMS-1 will be posi-grade, moving Columbia forward on her flight path placing Columbia in orbit. Standing by for ignition, 10 minutes 22 seconds --Columbia 67 nautical miles in altitude, 1160 nautical miles downrange .
SC Okay, we got 102 on the left and 101 on the right, PC.
CAPCOM Roger, Columbia. They're looking good to us.
PAO A status check in the Control Center.
CAPCOM Columbia, Houston. We have 40 seconds to LOS. Configure LOS. You're looking good burning over the hill, we'll see you in Madrid.
SC (garbled) seconds to go. We are in a 97 by 42 right now.
CAPCOM Roger.
PAO Shuttle Control, Houston, 12 minutes mission elapsed time -- we have had loss of signal with Columbia through Bermuda. The next station to acquire will be Madrid. Still receiving data, however, at the Control Center. Right at the shutdown, right at loss of signal they saw the shutdown of the OMS.
PAO This is Shuttle Control Houston at 15 minutes 30 seconds MET . Flight Dynamics Officer J. Green reports the OMS 1 burn was nominal. Time of ignition 10 minutes 37 seconds MET. Delta V 164.7 feet per second. Duration of the burn, 1 minute 27 seconds. Resulting orbit apogee 132 nautical miles perigee 57 nautical miles so Columbia is now in orbit--not yet her desirable orbit. At the start of OMS 1 Columbia was about 400 feet below 150 feet in front and 350 feet north of the external tank. Also Columbia weighed 4 and one half million pounds at launch. She now weighs about 214,000 pounds. At 16 minutes MET, this is Shuttle Control Houston. This is Shuttle Control Houston at 18 minutes MET about a minute away now from reacquiring Columbia through the Madrid tracking station. We'll stand by with the line open. We are now receiving data from Madrid.
CAPCOM Columbia, Houston, talking to you through Madrid. Configure AOS, we have you for 4 1/2 min.
SC Okay, we are looking good. The burn stuff looks nominal, the OMS 1 burn was nominal and on time, the residual was about half.
SC Okay, Daniel, and APUs all secured nominally We're down through ET umbilical door closing, they all closed up and latched, looking good.
CAPCOM Roger.
SC (garbled, I could not see Gibraltar. I was too darn busy plus there was a lot of clouds up there.

CAPCOM Roger.
PAO That was Bob Crippen on the line to CAPCOM Dan Brandenstein.Main engines are stowed now, as programmed.
SC And advise Booster I have got a low helium pressure, red pressure on the center engine. Everything looks nominal though.
CAPCOM Roger, Columbia. We are watching it. Looks good to us.They're just bleeding down.
SC Roger, that.
PAO Status check in the Control Center now by Flight Director Neil Hutchinson, a go/no go for OMS 2.
CAPCOM Columbia, Houston, you are go for nominal OMS 2.
SC Okay, we got the targets loaded and how does it look to you? We're showing 132 fps and we are in a 130 by 135, going for a 131 by 130.
CAPCOM Roger, we see all that and it looks good to us.
SC Okay.
CAPCOM And Columbia, Houston, just to reaffirm on that center engine, its just bleeding down below the reqs so there will be no problem with that.
SC Roger it looks good to us and we concur that's what it looks like. Daniel, that was one fantastic ride.
CAPCOM Well, wish we could have been along.
SC I highly recommend it.
PAO Shuttle control, Houston, 23 min. Mission Elapsed Time.
CAPCOM Columbia, we are 20 sec. from LOS. We would like the flash evaporator heater feed line system bravo to two.
SC (garbled)
CAPCOM And we are 13 sec. from LOS, configure LOS. We will see you at Indy at 36 +00.
SC Roger that. Thirty-six plus 00.
PAO This is Shuttle Control Houston. . .
SC Looks pretty good to us..
PAO 23 min. Mission Elapsed Time. We have had a loss of signal through Madrid with Columbia. The next station to acquire will be the Indian Ocean Station at approximately 12 min.
PAO This is Shuttle Control Houston at 35 min. Mission Elapsed Time. We are less than a minute away now from reacquiring Columbia through Indian Ocean Station. Flight dynamics officer J. Green reports for OMS 2 that the time of ignition should be at 44 min. Mission Elapsed Time. Delta V 136.5 fps, the burn duration, 1 min. 17 sec. OMS 2 should result in an apogee of reading 132.5 nautical miles and a perigee reading 132.2 nautical miles. We have acquisition of signal now with Indian Ocean, 36 min. Mission Elapsed Time.
CAPCOM Roger Columbia, reading you loud and clear.
SC (garbled).
CAPCOM Roger, and I have your OMS pad for your OMS 2 burn when you're ready to copy.
SC (garbled)
CAPCOM Roger, for your cue cards cross-feed cue.
SC (garbled).
CAPCOM Roger, for you OMS 2 cross-feed cue its 42 percent on the left and 48 percent on the right.
SC Roger. Okay, (garbled)...seen some stuff going out on

the ones going (garbled).
CAPCOM Roger.
PAO That's Bob Crippen talking to CAPCOM Dan Brandenstein.
CAPCOM And Crip, I forgot to remind you configure AOS.
SC I had already done that just about the time I called you. You should be in good configuration at this time.
CAPCOM Roger. And Columbia, we don't have any S-band yet, we're talking UHF.
SC Okay, we read you loud and clear. The UHF certainly sounds good.
CAPCOM Yeah, it sure does.
SC Well, the view hasn't changed any. It's really something else(Young talking). I tell you, John has been telling me about it for three years but aint no way you can describe it. (Crippen talking) It's hard to get my head in the cockpit here and do my procedures (Crippen).
CAPCOM I can imagine.
SC We got a little particulate junk floating around the cabin every now and then and when we get a chance we're going to get the vacuum cleaner and get some of that up.
CAPCOM Roger, we copy that.
SC It's not very much, just a couple of pieces here and there. (garbled)...could not tell about when the MPS was venting there during OMS one that it was significantly affecting our thrust at all as far as the attitude needles was concerned. Just about ready to press into the vacuum inerting terminator at this time.
CAPCOM And Columbia we saw the vacuum inerting going on in Madrid and it looked real good. We believe it's all been dumped.
SC Yeah, okay that's great, yeah. We think that too, I was just commenting I don't think we got as much thrust out of the thing as some people were expecting.
CAPCOM Roger.
SC Got a pogo out of it right at shutdown there,though, y'all might look at the data.
CAPCOM Roger, we'll take a look.
SC I mean, I don't mean a pogo out of the engine...(garbled)...bouncing around in here you might look at some of the data.
CAPCOM Roger, we broke up a little bit on that. We didn't copy what was bouncing around.
SC The vehicle.
CAPCOM Roger.
SC It might have been during the valve closing (garbled).
CAPCOM And Columbia, just for your information, the com right now is clicking in and out a little bit.
PAO This is Shuttle Control Houston, 41 min. Mission Elapsed Time. That was John Young reporting to Mission Control that at main engine cutoff there was a little shaking around inside the ship, but no POGO on the engines. Status check in the Control Center by Neil Hutchinson, go/no/go for OMS 2.
CAPCOM And Columbia, Houston. We got a good S-band now and everything is looking good.
CAPCOM Roger. Roger, we copy.

SC (garbled).
CAPCOM Roger, Columbia. And Columbia, Houston, we're 30 seconds from LOS. Configure LOS. We'll see you at Yarragadee at 52 plus 00.
PAO This is Shuttle Control Houston at 44 min. Mission Elapsed Time. We have loss of signal now with Columbia, the next station to acquire in about 8 min. will be Yarragadee. This is Shuttle Control Houston. This is Shuttle Control Houston at 46 min. from Mission Elapsed Time. We have a report that the external tank came down within 10 miles of predicted location in the Indian Ocean. At 46 min. Mission Elapsed Time, this is Shuttle Control Houston. This is Shuttle Control Houston at 47 min. Mission Elapsed Time, the one clarification on our external tank report that is a projected landing or impact point. 47 minutes Mission Elapsed Time. This is Shuttle Control Houston. This is Shuttle Control Houston, 48 min. Mission Elapsed Time. We have a report that the solid rocket boosters chutes worked okay. Both solid rocket boosters in the water floating normally. This is Shuttle Control Houston, 49 min. Mission Elapsed Time, we have a report from the surgeon that Bob Crippen's heart rate at liftoff was 130 and John Young's heart rate ranged between 85 and 90 at liftoff. This is Shuttle Control Houston at 51 min. Mission Elapsed Time. We will have the tape replay for engineers of the mission evaluation room at the Johnson Space Center and they are looking at the tape replay from camera positions on the pad. This is Shuttle Control Houston. This is Shuttle Control Houston at 52 min. Mission Elapsed Time less than a minute away now from reacquiring Columbia through Yarragadee tracking. This is Shuttle Control Houston,55 min. Mission Elapsed Time. Unsuccessful so far in reaching astronauts Young and Crippen through this Yarragadee pass. It appears to be....
CAPCOM ...through Yarragadee...
PAO They are now going to wait until they get a different aspect/angle on the antenna to try and call the crew again.
CAPCOM Columbia, Houston, with a UHF check through Yarragadee.
SC Loud and clear, Dan'l. How do you read Columbia?
CAPCOM Roger, we got you now, loud and clear. Columbia, you just broke up again. We have you for about 2 and a half minutes more.
PAO That reply is for Bob Crippen on this third or fourth call.
SC Dan'l... Do you read me now?
CAPCOM Roger, I got you right now. Read you loud and clear on UHF and we would like to get an OMS 2 status when you can get it.
SC was nominal and on time. Right now we are down through the OPS transition. We are in OPS 2 in both GNC and SM. We have a freeze dried (garbled) and on page 1-5 and right now we are reconfiguring GPCs.
CAPCOM Roger, we copy.
PAO That report that the onboard computer is being reconfigured for OPS 2, the on-orbit program. We are at 57 min MET. This is Shuttle Control Houston. We are less than a minute away now from loss of signal through Yarragadee. That report also that the OMS 2 burn came off as programmed.

CAPCOM Columbia, Houston. We are 30 seconds from LOS. We will see you at Orroral in about 3 min.
SC OK. Dan'l.
PAO This is Shuttle Control at 59 min MET, coming up on loss of signal through Yarragadee. The next station to acquire will be Orroral Valley. We had a report from the crew aboard Columbia that they performed the OMS 2 burn as programmed and are presently moving into OPS 2, the on-orbit, onboard computer program. Four major events must occur during the first few hours for Young and Crippen to stay on orbit. First, the onboard computer system must be reloaded from OPS 1 to OPS 2. This has been accomplishd. This is needed to align the inertial platforms. Also, one computer is loaded with OPS 3, the entry program, and put to sleep--taken off line. Second, the payload bay doors must be open to provide cooling through their radiators to Columbia. The flash evaporator has a lifetime of several hours. Third the inertial platforms must be realigned. They have been drifting since launch and are good only through rev 5 or 6. Fourth, at least 2 of the 3 fuel cells must be purged with hydrogen and oxygen to rid the impurities. The fuel cells can survive only so many hours without purging. In the mission they will be purged about every 8 hours. We will follow these key activities as they occur. We are at 1 hour MET. This is Shuttle Control Houston.
PAO This is Shuttle Control Houston, One hour, one minute mission elapsed time. Less than 30 seconds away now from reacquiring Columbia through Orroral Valley. This is Shuttle Control Houston, one hour ,two minutes MET. For those watching the tape replay, that concludes the tape. Shuttle Control Houston one hour and two minutes MET, standing by for reacquisition of Columbia through Orroral Valley. Receiving Orroral data...
CAPCOM Hello, Columbia, talking to you through Orroral. We have you for two minutes and 45 seconds and we do have some flight notes when you are ready. Columbia, Houston talking to you through Orroral. We have you for two and one half minutes. Columbia, Houston talking to you through Orroral. We have you for two minutes. Columbia, Houston talking to you through Orroral. Columbia, Houston, in the blind, you are Go for vernier jets.
PAO A report Mission Control that the crew has initiated the maneuver for the payload bay doors open attitude.No voice contact yet with Astronauts Young and Crippen aboard Columbia. However, we are receiving data in the control center.
CAPCOM Columbia,Houston. We are 30 seconds LOS --this is in the blind. We'll see you at the States at 1 plus 3 zero.
PAO This is Shuttle Control Houston. The data processing systems engineer reports that the Columbia is configured properly for OPS 2, the on-board computer onorbit program. This is Shuttle Control Houston at one hour six minutes MET. We have had loss of signal now with Columbia through Orroral. We establishd no voice contact on this pass. However, we received good data from the on-board systems for Columbia. This is Shuttle Control Houston at one hour six minutes MET. Shuttle Control Houston at one hour

seven minutes MET. The Flight Dynamics Officer reports he had run the data picked up over Orroral and Columbia's orbit is at expected(garbled)...
PAO This is Shuttle Control,Housto at 1 hour 20 min MET. We are a bit over 10 minutes away now from reacquiring Columbia on this first state-side pass. However, work on the payload bay doors is probably already in progress, a slow and deliberate process. Both Young and Crippen are at the back station, the aft flight deck. Left is Crippen, right is Young. Crippen is operating the keyboard and switches for the latch and door opening. He is watching television only. Young is doing the optical work, working television, binoculars and out the window. There are four latches on each bulkhead and 16 down the centerline. The latch test cycling comes first. Probably started somewhere over or beyond Australia. Then the starboard door is opened first. The port door remains closed. Then the starboard door is brought down again without opening the port door to check alignment and to make sure it is not warped. The doors are all closed and latched again to make sure they work. The doors are then opened. The starboard first, then the port door is opened. Then it is brought ...to bring it up then to bring it down, but at that point it is not latched. Then the port door is brought back up. Then the radiators which are inside the door panels are deployed away from the doors. We are at 1 hour 22 min MET. This is Shuttle Control Houston.
PAO This is Shuttle Control Houston at 1 hour 23 min MET. We have a report that the first television transmission should occur ,should be received at 1 hour 36 min 22 sec. This is the payload bay door opening. This will occur over the States. We also have a report from the surgeon that at external tank separation heart rates read as follows: For Commander John Young, 110, and for Pilot Bob Crippen, 130. We are at 1 hour 23 min MET. This is Shuttle Control, Houston.
END OF FIRST SEGMENT OF TRANSCRIPTS. NEXT SET BEGINS AT TAPE NUMBER 38.

CAPCOM This is Shuttle Control Houston at 1 hour 30 minutes MET, less then a minute away now from reacquiring Columbia from her first stateside pass. We will stand by. We do expect downlink television on the Mila Pass on the stateside pass. We are at 1 hour 31 minutes MET.
CAPCOM Hello, Columbia, talking to you through the states. How do you copy?
SC Okay, we copy , Daniel. How us? We read you loud and clear.
CAPCOM Roger. We get you loud and clear now. We had a little trouble with the Orroral we are still trying to track down. We gave you the go for verniers there in the blind.
If you didn't copy you are go for verniers.
SC OK, we had not copied that, we'll go ahead and select B auto vernier at this time and we're just about at the point where we're ready to open the right door.
PAO Shuttle Control Houston..
CAPCOM Roger, Columbia.
PAO We show all the latches released on the enter line and all on the bulkhead with the exception of the port forward and port aft.
SC We've got B auto vernier and GNC can take a look at that.
SC (garbled) picked up and it's kind of bouncing this thing around a a little, so it's kind of nice to get the verniers.
CAPCOM Roger.
SC You guys getting TV down there?
CAPCOM We're going to have to wait til we get to Mila, but we'll be waiting for it.
CAPCOM It will be 3 minutes before we get to Mila.
SC You're missing one fantastic sight. Here comes the right door and boy that is really beautiful out there.
CAPCOM We appreciate the great view updates.
SC Roger that.
CAPCOM Right door now open.
SC We can see a little trash floating out of the payload bay, but nothing really all that significant.
SC All the latches work just fine and the door looks like she's doing her thing.
CAPCOM Roger Columbia and we're just trying this one on S-band only.
CAPCOM Columbia we'd like a voice check on air ground one only please.
SC You want us to come...
END OF TAPE

we got

PAO Standing by for the closure of the starboard door.

CAPCOM Columbia, Houston. We are about 30 sec. from TBAor port door is now closed.
SC OK. I just got the right door closed. All that came back nicely. We are getting ready to latch it back up.

CAPCOM Roger.

PAO Columbia, Houston, the picture is looking good to us.

SC Roger that.

CAPCOM Columbia, Houston, we'd like to verify that the DFI is in high sample.
cPAO We show all of the bulkhead latches closed now and they are now going up the centerline. Latching up the centerline now.

CAPCOM Columbia, Houston. We'd like to verify that the DFI is in high sample, please.

SC OK, should be. Let me doublecheck.

CAPCOM Roger.

SC Position of the switch is in high sample. I've got a gray talkback at this time like it is still running.

CAPCOM Roger. We see it still running, Crip.

SC OK. You want me to go to low sample on it?

CAPCOM Roger. We'd like to cycle at the low sample.

SC OK. We are at low sample. I still got a gray talkback.

CAPCOM Roger. We show it still continues record. We'll take a look at it.

SC & CAPCOM (garbled)

SC I can stop it up, up here if you wish. OK. Doors all latched up beautiful. We are getting ready to open them back up again.

CAPCOM Roger.

PAO That report from Bob Crippen...

CAPCOM Columbia, for the CDR, we'd like to know if your TV picture is somewhat washed out or if you had a good clear one.

SC I've got about the best picture you can get.

CAPCOM Roger.

SC Danny, it might be of interest to you that when we opened up that right door, well, first when we opened up the centerlines, we noticed no movement at all in the door. When I opened up the fore and aft bulkheads, it maybe bounced up half an inch and door opened up nice and smooth--came back it looked like we'd come through about position alpha and it came on down all the way to getting it closed.

PAO This is Shuttle Control Houston. 1 hour 40 min MET. We show Bob Crippen again unlatching the doors, going down the centerline now.

CAPCOM Roger, Crip. We copied the first part of that then we went into a handover. But we copy that everything was right down the pike in the closing.

SC That's affirmative.

PAO Shuttle Control Houston. All of the centerline latches are released now.

CAPCOM Columbia, Houston, we'd like the DFI to stop until we figure out what the problem is.

SC I'm sorry. Can you say that one again?

CAPCOM Roger. On that DFI recorder, we'd like it to stop until we figure out what the problem is

SC OK, we are in stop.

CAPCOM Thank you.
SC My talkback is still gray.

CAPCOM Roger Columbia. We show it stuck running.

SC OK.

CAPCOM Columbia, Houston. One more confirmation on that. We'd like to confirm that the DFI PCM is the one that you turned off.

SC Standby 1. The PCM recorder is in stop, that's af-

firm. on the DFI. DFI PCM recorder in stop, S-T-O-P.

End of tape.

SC Columbia Houston one more confirmation of that. We would like to confirm that the DFI PCM is the one that you turned off.
SC Standby One. The PCM recorder is in stop. STOP. affirmative on the DFI. DFI PCM recorder in stop. STOP.
CAPCOM Roger, thank you Crip.
PAO This is Shuttle Control Houston at one hour 43 minutes of mission elapsed time. We lost television transmission as we've passed out over Hila Station range and we're under acquisition now trhough Bermuda, however, we will pickup televsion again on the Madrid pass in a little less than 10 minutes. One hour 43 minutes mission elapsed time this is Shuttle Control Houston.
CAPCOM Columbia, Houston, we are LOS on the TV and for that recorder we'd like for you to pull the circuit breaker to see

that recorder we'd like for you to pull the circuit breaker t see

if we can get that thing stopped. And that' s on panel R11. If the forward container recorder main C circuit breaker on row G.
SC Okay, it's pulled.
CAPCOM Thank you. Okay Columbia, that stopped it for us thank you. Columbia, Houston, we've got the variable parameter in so the CRT is yours again.
SC Roger that.
PAO This is Shuttle Control Houston, at 1 hour 46 minutes mission elapsed time less than a minute away now from loss of signal through Bermuda.
CAPCOM Columibia, Houston, we're about 30 seconds from LOS so we'll see you at Madrid at an hour and 53 minutes.
SC (garbled) the port doors coming open now.
CAPCOM Roger, copy.
APO The recoder being discussed on this pass is a real time development flight instrumentation that would be used for post flight analysis. We're at 1 hour 56 minutes mission slapsed time. This is Shuttle Control Houston.
PAO SHUTTLE CONTROL Houston 1 hour 47 minutes mission elapsed time, we show all of the latches both down the center line and bulkhead have been released.
PAO This is Shuttle Control Houston, at 1 hour 49 minutes mission elapse time we're a little over 3 minutes away now from reacquiring Columbia over Madrid, we are scheduled for down link video on this pass. Flight dynamics reports Columbia is currently in an orbit 133.5 nautical miles by 132 nautical miles. At 1 hour 50 minutes mission elapsed time this is Shuttle Control Houston.
CACPOM Hello Columbia, we are talking to you through Madrid, have you for about 3 and a half minutes and the picture looks great.
SC Roger that.
CAPCOM And we do have a couple of flight notes we would like

to pass and also to let you know that you are go for item 48.
SC Okay we thank you. We appreciate that. Doors are all opened up and hunkey dorey. We are now ready to proceed with rad deployment
CAPCOM Roger. PAO Shuttle Control Houston. We show both payload bay doors opened.
SC Okay, what camera are you all looking at right now? Do you know?
CAPCOM Roger, we're looking out the forward camera.
SC OK, we want to show you all we do have a few tiles missing off both of them. Off of the starboard pod it's got basically what appears to be three tiles and some smaller pieces and off the port pod looks like I see
END OF TAPE

SC Ok, what camera are y'all looking at now, do you know?
CAPCOM Roger, we're looking out the forward camera.
SC Ok, we're -- we want to tell y'all here we do have a few tiles missing off both of them -- off the starboard pod, basically it got what appears to be 3 tile and some smaller pieces and off the port pod -- looks like -- I see one full square and looks like a few little triangler shapes that are missing and we are trying to put that on TV right now.
CAPCOM Roger, Crip, we can see that good. Columbia, Houston, we have a state vector coming your way.
SC Do declare. Ok, the right latches are coming loose.
CAPCOM Roger.
SC Ok and they release. (garbled) 24 seconds.
CAPCOM Roger.
SC From what we can see of both wings tops and (garbled). all fully in tact. Ok and the rads are coming out.

CAPCOM Roger.
PAO That report from John Young showing a few of the missing tiles, also he reported.
CAPCOM Columbia, we're 30seconds from LOS -- we'll see you at the Indian at 2 plus 12.
SC Roger, we'll see you then.
CAPCOM And the radiators look good.
SC Rads are deployed right on time.
PAO Young also reported that the tiles on the wing or wings appeared to be in tact. This is Shuttle Control Houston at 1 hour, 56 minutes mission elapsed time. We've hd loss of signal with Madrid, the next station to acquire will be Indian Ocean Station in about 15 minutes. This is Shuttle Control Houston at one hour 56 minutes mission elapsed time.
PAO This is Shuttle Control Houston at 2 hours mission elapsed time, we're out of station contact now with Columbia, meanwhile JSC Engineering and Development Director, Max Faget is in the Control Center and watched the television transmission of the missing tiles. He reports that these are not critical tiles. These tiles that are missing represent no hazard to the vehicle or the crew. Dr Faget further states that the worst that can happen is that after landing a small patch of skin underneath the tiles may have to be replaced. We're at 2 hours, 1 minute mission elapsed time. This is Shuttle Control Houston
PAO This is Shuttle Control Houston at 2 hours 11 minutes mission elapsed time. Stnading by for reacquisition of signal
end of tape

PAO This is Shuttle Control Houston, 2 hours, 11 minutes mission elapsed time, standing by for reaquisition of signal with Columbia through Indian Ocean station. Columbia now on her second revoulution around the earth.
CAPCOM Hello Columbia, talking to you through Indy we have you for 3 minutes.
SC Read you loud and clear.
SC OK, Daniel I initiated the manuever to this (garbled)

CAPCOM Roger Columbia. I'd like to pass up that your IMU's are looking good, so the constraints in the PDP are valid and we do have 3 flight notes we'd like to pass up when you have some time.
SC OK, we understand that.
CAPCOM Roger, we'd like you to go to panel 014 and 015 and check on some status for us and give me a call when you get there.
SC OK, I'm there, go ahead.
CAPCOM OK, we had some bites on the DSC 0I1 and 4. We'd like to verify that our panel 014 bravo circuit breaker main A, OI signal conditioner OF1 and 4 alpha is in. And on panel 015
CAPCOM Roger, we want to know the status of it, we don't want you to do anything with it.
SC OK, OF1 slash 4 alpha on 014 is in. The one, OI CF1/4 Robravo on 015 is popped.
CAPCOM Roger, we copy. You can leave them right there, that answers our question. We do have some C&W limits to change. You ready to copy tose.
SC Stand by one.
SC OK, Daniel we're go.
CAPCOM The upper limit on the cabin pressure it's parameter number 4 cabin press. We'd like changed to 3.80 volts, which is 15.2. That puts hardware in sync with SM.
SC OK cabin pressure (garbled)
SC Volts, that's 15.2 PSI.
CAPCOM Roger, we have 4 more, they are for the OMS tank pressure.
SC OK, we just got highload duct inboard light on. You want us to turn those duct heaters now.
CAPCOM That's affimative.
CAPCOM Columbia we're 20 seconds from LOS so we'll catch you at Yarragadee at 2+27 and finish C&Ws.
pao This is Shuttle Control Houston at 2 hours, 15 minutes mission elapsed time. We've had loss of signal with Columbia. through Indian Ocean Station. The next station will be Yarragadee at approximately 12 minutes. This is Shuttle Control Houston.
END OF TAPE

PAO This is Shuttle Control Houston, at 2 hours and 27 minutes mission elapsed time, standing by for reacquisition of Columbia through Yarragadee.
CAPCOM And we do have a question concerning that on the starboard OMS pod. We would like to know the color of the area where the tile is missing.
SC Roger, it's red.
CAPCOM Roger, Crip, we copied red. And we do have the remainder of that C&W limit changes to voice to you whenever you are ready to copy them.
SC (garbled)
CAPCOM Roger, I understand you are ready to copy, you're way down in the mud, we can barely hear you. What I have is four OMS tank pressures for OX and fuel. It's upper limit change it's parameter #7, 17, 37, and 47, and we would like them changed to 3.55 volts and that is 284 psi. All four of them the same.
SC OK, the comm just clear up, I did not get any of that change.
CAPCOM Roger, I'll run it past it again. There is four OMS tank pressures, OX and fuel. It's parameters' 7, 17, 37, and 47. We want to change to 3.55 volts, that is 284 psi and it is the same for all four parameters.
SC Say again the volts for the psi.
CAPCOM Roger, the psi is 284.
SC OK, and the volts.
CAPCOM Roger, and the volts are 3.55.
SC Roger, that's the OMS tank pressure, parameters are 7, 17, 37 and 47. Change volts to 355, that's 284 psi.
CAPCOM That is correct and that's it, thanks.
SC OK, we appreciate it. I tell you going around here with these big jets on it, it really moves this vehicle around.
CAPCOM Roger Columbia
SC I don't think there's any doubt if we ended back on normal when you didn't want to
CAPCOM Thats good to know.
SC Hey Dan, do you still, no you look like you're over the hill.
CAPCOM Roger, we still have you for about a minute and 50 seconds.
SC You might try to correlate the time of that OI circuit breaker eaker coming out. Its quite possible it got kicked or something.
CAPCOM Roger, Crip and we're fine just the way we are and we'll take that into consideration.
SC (garbled)
CAPCOM Roger, Crip I misunderstood your question. That we figured it came out somewhere around 11 mirutes after MECO.
SC It's certainly at that point. Oh 11 minutes after MECO.
CAPCOM No. At 11 minutes, about 3 minutes after MECO and we're going to go back and get you a hard time on that.
SC OK, I have completed all that C&W reconfiguration.
CAPCOM Roger, thank you. And Crip we're about 30 seconds from LOS and Yarragadee we're see you in Orroral in about 2-2 1/2 minutes and we have a little procedure we'd like to try to get the

DFI PCM working again.
SC We'll (garbled)
PAO This is Shuttle Control Houston, we've had lost of signal through Yarragadee, we're at 2 hours 33 minutes mission elapsed time. We're acquire Orroral in less than 2 minutes. Meanwhile
END OF TAPE

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pao
PAO This is Shuttle Control Houston, we've had loss of signal through Yarragadee. We're at 2 hours, 33 minutes mission elapsed time. WE'll acquire Orroral in less than 2 minutes. Meanwhile, we have a statement in preparation for the STS-1 mission, a potential for tile loss was considered, premission planning included a complete review of the launch television, followed by a detiiled assessment of 70 mm launch film. In addition there are many surface temperature measurements monitored via the developmental flight instrumentation system, these measurements are routinely screened for any abnormalities. This information coupled with television returned from the spacecraft will be assessed for any other potential tile damage. In addition, Department of Defense ground stations, that's Hawaii and Malibar Florida will be utilized and obtain ground based photography for any other potential damage. The tiles in this particular area that were shown, the OMS pod are not critical to reentry. There is no requirement for an EVA, and none is being considered. This is Shuttle Control Houston at 2 hours, 34 minutes mission elapsed time. Standing by for reacquisition of Columbia through Orroral Valley.
CAP COM Hello Columbia, talking to you through Orroral Valley, we have you for 4 minutes.
SC Okay Dan. We can see some big cities down there.
CAP COM Well good.
SC See all the lights. We're just now looking up on our scars there.
CAP COM Roger. Man we locked onto rose like we knew what we were doing.
CAP COM That's good. And Columbia PLT we'd like to go do this DFI PCM procedure if you're available.
SC We are available.
CAPCOM Roger I'd like to go back on Panel R-11 and take the DFI PCM forward container circuit breaker to close, that's the one you opened earlier.
SC OK, It's closed.
CAPCOM And the DFI PCM recorder to stop and then to forward control.
SC (garbled)
CAPCOM OK, we'd like .....
SC WE've got an awful lot of static in the comm here and ...
CAPCOM Roger, you if got that to stop and to forward control, we'd like to go to Panel C-3 and take the DFI PCM rcorder.
SC If you can read me, you are completely unreadable at this tme.
CAPCOM Roger, Columbia.
PAO Noisey comm through Orroal Valley.

CAPCOM Columbia, Houston, how do you read now?
SC Read you ok, Dan.
CAPCOM Roger, we'd like to press on with this procedure if you're reading me ok. I wanted the DFI PCM recorder to stop and then to forward control and following that to go to Panel C-3 and take the DFI PCM recorder to high sample.
SC Ok, Dan, I was getting a little bit of static and still am you want me to be in stop on the recorder which I am at, you want me to go forward control and then go to high sample, is that affirmative?
CAPCOM Columbia, that is affirmative.
SC Ok, we go to forward control at this time and we are in high sample at this time and our talk back has remained gray.
CAP Roger, we're looking at it Columbia.
SC I don't know if you can see these (garbled) angles Dan, but they look great. The biggest one is on IMU3 (garbled) +05 and minus 06.
CAP COM Roger, we see it, John, it looks great and ... Columbia, Houston, we'd like you to pull that circuit breaker -- that main C circuit breaker on the DFI PCM FORward continer again, we're 20 seconds to LOS. We might see you at Hawaii at 2 plus 55, if not it will be at the states at 3 plus 01.
SC OK, ON the recorder, it's pulled and I didn't get the AOS time we'll see wherever it is.
capCOM Roger, possibly Hawaii at 2 plus 55 ....
end of tape
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CAPCOM We're 20 seconds to LOS we might see you in Hawaii at 2+55, if not we'll be in the states at 3+01
SC Okay, on the recorder it's pulled and I didn't get the AOS that time, but we'll see you then.
CAPCOM Roger, possibly Hawaii at 2+55 and the states at 3+01
SC Ok.
PAO This is Shuttle Control Houston at 2 hours and 39 minutes of mission elapsed time. We've had loss of signal with the Orroral Valley on this second revolution following, since we've had loss of signal, we'll now have a playback of downlink television showing the Mila televsion first and the Madrid television second with a 30 second drop out between the two television passes.
PAO This is Shuttle Control Houston at 2 hours 52 minutes mission elapsed time that concludes the television playback. This is Shuttle Control Houston at 2 hours 55 minutes mission elapsed time, we're less than a minute away now from Hawaii tracking station. It's questionable what kind of contact we might have through Hawaii since it's a very short duration pass, however we'll stand by with the line open.
CAPCOM Hello, Columbia, we have you here for about 2 minutes at Hawaii, how do you read?
SC I read you loud and clear.
CAPCOM Roger read you the same we dont't have any thing so we'll just stand by for anything you have.
SC Okay, Dan I got two for you. We've had couple of propellant thermal pod messages and a fuel cell message. The propellant thermal pod were due to the test points going out on both pods, which is not supposed to happen. It happened just like that in the simulator. Also my purge heater on the fuel cell is going out limits around 302, I'd like some advice on both of those items.
CAPCOM Roger, Stand by
SC Okay on the IMU alignment, the IMU alignment on IMU's 1 and 2 torquing angles are a minus 06 +01, +06,-03,+01, +03 and that was done at 2 hours 50 minutes 10 seconds. IMU's 1 and 2.
CAPCOM Roger we copy that.
SC On the IMU verification, you want those angles? They were all very small, on IMU 1 they were -01, -00, -01, on IMU2 they were-01, -00, +00.
CAPCOM Roger, we got them, thank you. And we are 10 second to LOS , so we'll have some answers for you on those questions Crip at the states at 3+01.
SC Also our high load duct heater got a little bit hot after we turned it off, after we took off the high-load, I'm sorry the forward duct, and we secured it.
CAPCOM Roger, copy.
PAO This is Shuttle Control Houston at 2 hours 57 minutes mission elapsed time, loss of signal now at Hawaii, we will next

acquire Columbia over the states. The crew is running about 10 minutes ahead of their flight plan, the platform has been aligned, the next critical item in the flight plan will be the purges of the three fuel cells. We may pick-up
END OF TAPE

PAO ...57 minutes mission elapsed time. Loss of signal now with Hawaii. We will next acquire Columbia over the states. The crew is running about 10 minutes ahead of their flight plan. The platform has been aligned. The next critical item in the flight plan will be the purging of the 3 fuel cells. We may pick up this activity over the states. We're at 2 hours, 57 minutes mission elapsed time. This is Shuttle Control Houston.
PAO This is Shutle Control Houston, 3 hours, 1 minute mission elapsed time, less than a minute away now from reacquiring Columbia on this stateside pass over the states. Columbia will be in her third revolution. Meanwhile, as we come up on this stateside pass we expect CAPCOM Dan Brandenstein to pass on a go to begin the fuel cell purge. This is Shuttle Control Houston. Now receiving data through the states. This will also be the pass in which astronauts Young and Crippen will be given their go, no go to remain on orbit.
CAPCOM Hello Columbia, talking to you over the states. We have you for 18 minutes and 20 seonds.
CAPCOM Columbia, Houston we have you for 18 minutes.
CAPCOM Columbia, Houston, talking to you over the states, we have you for 17 and 1/2 minutes.
SC OK, we read you loud and clear, how do you read us.
CAPCOM ROGER, read you loud and clear.
SC OK, Dan, I had a couple more things since I last talked to you. Our airlock pressure reading 0.6 and cabin temp is reading 81, however, it feels much cooler then that.
CAPCOM Roger, we copy. On the fuel cells purge line heater, we'd like that left on. And, just to continue with your purge.
SC OK, and I'm go to initiate that purge whenever you guys are.
CAPCOM, Roger, we're ready to go.
SC OK.
CAPCOM And, Crip on the PROP thermal pod there is no action on that item.
SC Roger that, didn't thing there was. I'm working right now...
SC Ok, we've got a fuel cell purge message. Ok got it on fuel cell two, and got it fuel cell three.
CAPCOM Roger Columbia, and we request manual purge.
SC Roger, we understand.
SC Ok, Billy can probably look at that now, we're now pulling out of fuel cell one and it looks like it's doing pretty good.
END OF TAPE

SC OK, Billy can probably look at that now, we're now flowing out of fuel cell one and it looks like its doing pretty good.
CAPCOM Roger Crip, we have no data right now.
SC OK, I'm reading for 02 flow, 4.4, and H2 flow, 0.6.
CAPCOM Roger, we have our data back now, we concur.
SC Oh man that is so pretty.
SC We're over the Sierra's right now.
CAPCOM Roger.
CAPCOM Columbia, Houston, we think that airlock transducer is probably lost. Sometime, at your convenience, when someone is available, we'd like you to check the Delta-P gauge on the airlock hatch.
SC OK, we'll do that.
SC Just came across the (garbled) Lake area.
SC That purge line temp is really still going on up there.
CAPCOM Roger.
CAPCOM Columbia, we see it coming down some at this time.
SC OK, fine, then we're starting to purge on fuel cell two.
CAPCOM Roger.
SC We're still getting a few little flakes coming off the vehicle here periodically.
SC Like a little snow.
SC It seems to be eminating from the rearend back there.
SC I concur, it does look like it's cooling down some.
CAPCOM Roger Columbia.
CAPCOM Columbia, Houston.
SC OK, Dan.
CAPCOM Roger, we need the APU cooling, A to off and B to auto, please.
SC OK, that's coming up.
SC DAN, I'm not sure what was going on over that pass back around Australia, but I had a dickens of a time with static.
CAPCOM Roger, Columbia, we had some problems also and we're trying to ring it out and hopefully we'll have better luck next time.
SC OK. As Billy can see we've got fuel cell 3 purge going now.
CAPCOM ROGER.
SC Also, or booster, I got parameter 79, which is the MPS manifold pressure, has triggered a C&W, actually it did it back there during the burn at OMS 2. It's still sitting on my light. I wonder if can go ahead and inhibit that parameter. What do you all think about that.
CAPCOM Stand by Crip, I'll get back with you in a second.
CAPCOM Roger, Columbia, we concur, inihbit it.
SC OK. I appreciate that , thank you.
CAPCOM Columbia, Houston, we changed our mind on that MPS manifold press parameter. We'd like to not inhibit it til after the second vaccum inerting.
SC Houston, did we just fly over St. Louis?
CAPCOM That's affirmative.
SC I just saw Lambert Field down there. I'll be darn.

CAPCOM Columbia, you copy that last comment about not inhibiting that MPS manifold pressure.
SC No, I thought I understood you all to go to inhibit it.
CAPCOM Roger, we changed our mind, we'd like to leave it as is until we do our second vaccum inerting
SC OK, I'll reenable it.
CAPCOM Roger, thank you.
PAO That was John Young reporting that he saw Lambert Field.
SC OK, we've terminted the purge.
CAPCOM Roger, we copy.
PAO Bob Crippen reporting...
END OF TAPE

SC OK, and we've terminated the purge.
CAPCOM Roger, we copy.
PAO Bob Crippen reporting that the purge has been accomplished on the 3 fuel cells.
SC Houston, we started that maneuver to the ZLV- pop at 2:56, 2:57:44 instead of 3.
CAPCOM Roger, Columbia
PAO Mission Control Houston, status check in Mission Control now, go, no go to stay on orbit.

. Giving a go to stay on orbit and
CAPCOM Columbia, Houston,, you guys did so good we're going to let you stay up there for a couple of days. You're go for on orbit.
SC Spacecraft, let's go for on orbit, this thing is performing just outstanding.
CAPCOM Roger, we agree with that and one reminder, to remove from the ascent checklist the post landing pages for entry checklist before you deposit it.
SC OK we'll study on that some.
PAO That was John Young reporting on the peformance on spacecraft Columbia. We're 3 hours 16 minutes mission elapsed time and the crew aboard Columbia has been given a go to stay on orbit. This provides them with the opportunity to doff their suits and continue with Orbital operations. We have about 4 minutes remaining.
CAPCOM Columbia Houston, just for your information you dropped those SRBs right on target and they were floating just the way they ought to be and the boats are getting ready to fish them and bring them back.
SC OK, The ride that they gave us was pretty neat, it was the vibration was a little high frequency and there was a place in the middle where it shook a little, the frequency, but it was all very low and you could read the instruments and do all that kind of stuff.
CAPCOM That's good to know, we won't have to make the print on the cue cards any bigger then.
SC Yeah, that's right, and it was a sharper vibration than what we've been experiencing in the simulator, but it was very moderate.
CAPCOM Roger Columbia and Columbia Houston, do you have a couple of seconds. We'd like another run through or description of that pogoing effect that you noticed near MECO.
SC OK, this was after MECO. It was during the dump. And Crip.....(cut out)
CAPCOM Columbia Houston, we're not copying you right now. We did copy that it was after MECO and not before MECO.
SC Yes, it was during the dump appeared to be to me and that it might of been when pre valves were closing or something but it was a real bounce up and down, vehicle wise you ought to see it on the accelerometers.
CAPCOM Columbia, were the OMS engines burning at that time?
SC That's a good question. This thing was post OMS burn but you have to look at the data.
CAPCOM Roger, we'll sort it out. Thanks a lot.

SC Sorry, we're not much help there. I think it was at the completion of the dump termination or something about that time.
CAPCOM Roger, thank you Columbia. And Columbia, Houston we're 30 seconds from LOS so we'll see at Dekar and UHF at 3 plus 2 6.
SC Ok, we'll be there. Hello, are you reading PLT ok?
CAPCOM Roger Columbia, read you loud and clear.

CAPCOM And Columbia, Houston, we're 30 seconds from LOS, so we'll see you at Dekar at UHF at 3.26.
SC Okay, we'll be there. Daniel do you read PLT okay?
CAPCOM Roger, Columbia, we read you loud and clear.
SC Okay coming up on the mid deck speaker.
CAPCOM Roger, do you have that delta-P for us?
SC Roger, that. Delta-P is 0.
CAPCOM Roger, thank you.
SC (garbled) is a good one.
CAPCOM Roger
APO This is Shuttle Control Houston, at 3 hours 21 minutes mission elapsed time, we've had lost of signal with Columbia on the start of her third revolution. Next station to acquire will be Dekar in about 4 minutes. On this state side pass Astronauts John Young and Bob Crippen were given a go to stay on orbit. At 3 hours 22 minutes mission elapsed time this is Shuttle Control Houston. This is Shuttle Control Houston at 3 hours 26 minutes mission elapsed time. Shuttle Control Houston 3 hours 27 minutes that a standing joke between silver team of flight controllers and the astronauts, during many simulations the control center would send out for burritos to bring in. That conversation about the cabin temperature. We're at three hours 31 minutes mission elapsed time, about 2 minutes remaining on this pass with Dekar.
END OF TAPE

APO This is Mission Control Houston, at 3 hours 41 minutes after the launch of Columbia and about a minute away from acquisition trough the Botswana voice relay station in South Africa. At this time the crew of Columbia should be crawling out of the tan colored escape pressure suites and activating the teleprinter aboard Columbia. Standing by now for reacquisition through Botswana.
CAPCOM Hello Columbia, coming to you through Botswana
SC HELLO, Neil, how do you read?
CAPCOM Roger, We got you loud and clear. And we have you for about 4 minutes.
SC Okay, fine and dandy. I'm just enjoying the view right now.
CAPCOM Well good. And Columbia, we'd like a read out on that fuel cell purge line temp please.
SC Standy by. Okay it's ready 356 on the 02.
CAPCOM Roger we copy 356.
SC 210
CAPCOM Roger, Columbia, Houston we're not concerned about that 356 temp. We'd like to leave the heater on for the normal burnout.
SC Roger, we understand. we have about another 10 minutes here. I have a timer going on it.
CAPCOM Roger
SC Okay, John's out of hs suit now and we just about got all of the configurations for on orbit done. Next big step will be for me to get out of my suit and activate the teleprinter.
CAPCOM Roger, we can't wait for that, we have a couple ready already.
SC I should have known. I should have known.
CAPCOM Columbia, Houston, we are about 40 seconds from LOS and we'll see you at Yarragadee at 4.00.
APO This is Mission Control Houston, LOS through the Botswana via the UFH station, somewhat scratchy communications there. We're 12 minutes away from reacquisition through Yarragadee and Western Australia. Here in Mission Control Center the orbit team headed by Chuck Lewis is beginning to take over from the out going launch team. Flight Director Neil Hutchinson. They're off on a separate group getting all of their coordinations accomplished. And right now were at 3 hours 48 minutes into the voyage o spaceship Columbia and 11 minutes away from reacquistion through the Australia tracking station at Yarragadee. Mission Control Houston.

PAO Now we're at 3 hours, 48 minutes into the voayge of spaceship Columbia. And 11 minutes away from reacquisition through the Australia tracking station. Yarragadee. Mission Control Houston.
This is Mission Control, Houston. About 50 seconds away from reacquisition of the the Spacecrft Columbia through the Yarragadee, Australia. The crew aboard Columbia falling out for police call to clean up all the trash that's accumulated in the cabin apparently, tidying up the spacecraft for orbital operations. About 27 seconds now we should be getting a fairly good com through Yarragadee. At least ehe voice checks for -- between the two comm techs,here and at Yaragadee sounded clean. Fourteen seconds, standing by.
CAPCOM Hello Columbia, coming to you through Yaragadee. We have you for 6minutes.
CAPCOM Columbia, Houston, coming to you through Yaragadee. We're 5 minutes 30 seconds. Columbia, Houston, coming to you through Yaragadee, we have you for 5 minutes.
Columbia Houston, coming to you through Yaragadee, we have you for 4 and a half minutes. Columbia, Houston, radio check through Yaragadee. Hello Columia, talking to you through Yaragadee. Columbia Houston coming to you through Yaragadee. Columbia Houston talking to you through Yaragadee. We have you for 2 more minutes. Columbia, talking to you through Yaragadee, Columbia Houston coming to you in the blind. At 4 + 09, we should have a short pass through Orroral. Columbia Houson we're 30 seconds from LOS through Yaragadee, we'll see you at Orroral in a couple of minutes.
PAO This is Mission Control Houston. No joy in raising the crew of Apollo -- I beg your pardon of Columbia at the Yaraagadee Station, however, we'r just a few seconds away from reacqussition through Orroral Valley. Perhaps we'll have better success there. Communication switches must be in the wrong configuration or perhaps they had their head sets off. Some 12 seconds away from reacqusition through Orroral Valey.
CAPCOM Go Columbia, talking to you through Orroral, we have you for a little under 2 minutes.
SC HOUSTON, we read you loud and clear and we heard you the entire time that you were calling us over Yarragadee.
CAPCOM Well sorry to disturb you we weren't sure I guess
SC Well you didn't disturb us but we heard you loud and clear anytime you're over there I guess you've been talking to us but we can't apparently get back to you.
CAPCOM Roger we'll have to track that down. We didn't hear a peep out of you guys. And for your information when we get to Hawaii....
end of tape

SC We read you loud and clear and we heard the entire time that you were calling us over Yarragadee.
CAPCOM Well, sorry to disturb you. We weren't sure I guess.
SC You didn't disturb. But we heard you loud and clear anytime your over there I guess you can talk to us but we can't apparently get back to you.
CAPCOM Roger, we'll have to track that down. We didn't hear a peep out of you guys. For your information, when we get to Hawaii we're going back to work on that DFI PCM and EGIL would like to know the fuel cell purge line temp, now tnat the heaters are off.
SC OK,
CAPCOM Crip we can see it now and you can secure that heater
SC OK, we'll turn it off.
CAPCOM Thank you.
CAPCOM Columbia, Houston, we're 15 seconds from LOS, recommend you check the dead band no the DAP, and we'll see you at Hawaii at 4+26.
SC OK, sure will.
PAO Mission Control Houston, a loss of signal at Orroral Valley apparently when CAPCOM Dan Brandenstein had been attempting to reach Young and Crippen onboard Columbia at the previous station, Yarragadee, he was coming through, but they could not in turn reply to him. Somehow the downlink voice was not reaching the station and getting on to the NET. At 14 minutes now away from reacquisition through Hawaii, and the subsequent pass over the states, we'll be back at that time. Currently 4 hours 11 minutes into the flight of Columbia and some 20 minutes, or 18 minutes away from shifting from the post deorbit insertion, post insertion deorbit prep, checklist onto the crew activity plan. Which will take place 4 hours 30 minutes. This is Mission Control Houston.
PAO This is Mission Control Houston about 55 seconds away from reacquisition of the spacecraft Columbia through Hawaii. Here in the control center the launch team of flight directors, and flight controllers under Neil Hutchinson have just recently watched a playback of the launch.
CAPCOM Columbia, Houston, talking to you through Hawaii. We have you for about 6 minutes.
PAO And its the first time they have seen the launch. They purposely do not watch the television of launch when they're in the launch phase.
CAPCOM Hello Columbia, Houston, talking to you through Hawaii for about 6 minutes.
SC Go ahead, over.
CAPCOM Roger, Columbia reading you loud and clear. We have you for about 6 minutes and you're go for APU cooling off. Your waste water dump quantity is dumped to 80%. And, whenever you guys are ready we'll try to sort out this DFI procedure.
CAPCOM Columbia, Houston, radio check.
SC Loud and clear.

CAPCOM Roger, we have you again a little fade out a little earlier. Did you copy the APU cooling, your clear to turn that off and waste water dump to 80%.
SC Rog, APU cooling is off, waste water is 80%,
CAPCOM Roger, and we have a flight note to troubleshoot the DFI recorder at you convenience.
SC Dan, is that something we can just do here while we're talking to you or do we need to write it down?
CAPCOM Roger, we'll walk you through it.
SC OK, stand by one.
SC Ok, I'm go for that.
CAPCOM Roger, on panel C-3, we'd like to DFI recorders PCM to continuous record.
SC OK, continue.
CPPCOM Over to panel...
SC Incidently, the talkback is barberpole that's the first tme I've seen it that way. Go.
CAPCOM Roger, stand by...
END OF TAPE
D

CAPCOM Okay, now over to panel--

SC Talk back is barberpole the first tme I've seen it that way. Go.

CAPCOM Roger. Stand by and let us take a look at it if that happens.

SC Yeah, but the recorder circuit breaker's still pulled out.

CAPCOM Roger, okay, now over to panel R11.

SC Go.

CAPCOM We'd like the rotary switch to forward control and verified.

SC You got the verified.

CAPCOM Okay, we'd like the circuit breaker main C back in.

SC That talkback is still barberpole (barberpole_)

CAPCOM Roger. And now we'd like the rotary switch stop and note the DFI talk back status. That's the status on C-3. Columbia, after the circuit breaker's closed, we'd like the rotary switch to stop.

SC OK. Dan, let's wait a minute. What do you want first? first thing, you want --what do you want the first thing now, you want the circuit breaker pulled again?

CAPCOM Negative. We had a com drop. We'd like that circuit breaker closed, and then we would like the rotary switch to stop.

SC OK. You got that.

CAPCOM OK, Crip, and now we'd like the recorder rotary switch to play back reverse, and we'd like to mark when you go to that position.

SC To mark, you're in that position.

CAPCOM Thank you. And, Crip, what's the talk-back status of on C03 now?

SC Roger, it's barberpole.

CAPCOM Roger. And, just, we await your 5 minutes, and if we do lose com during this time, we'd like you to pull the circuit breaker again after 5 minutes.

SC OK. We understand.

CAPCOM And before you pull that circuit breaker, we'd like to know the talk-back status, and that will happen after we go LOS, so you'll have to repot that over to states.

SC Roger that.

CAPCOM Roger, Crip. Well, we'd like to verify you're in playback reverse, as we see no motion at this time.

SC Th rotary is in playback reverse, and the circuit breaker is out, though.

CAPCOM Roger, we'd like the circuit breaker in please.

SC OK, circuit breaker is in. The talk-back is great.

CAPCOM Roger, and we'd like you to mark the time and then 5 minutes from now you can pull the circuit breaker again and then note the talk-back status at that time.

CAPCOM And, Crip, if it works the way we think it should, it should run to end of tape and the talk-back should go barberpole and it should stop.

SC Roger. Okay, now (garble) we're monitoring that.

CAPCOM Roger. Thank you. And we're 40 seconds from LOS. We certainly enjoyed getting you up there. You've been reporting the great view you had, but we played the tape back, and it was beautiful going up, and you'll have to look forward to seeing that, and we'll see you in the morning. The brnze people have you over the states at 4 plus 3-6.

SC The silver team did a super job today. We certainly appreciate all the effort. Hey, that was great, wasn't it? Y'all wake us up in the morning.

CAPCOM We sure will. You guys enjoy yourselves.

SC You got it.

PAO This is Mission Control Houston, LOS through Hawaii from the spacecraft Columbia about two and a half minutes until reacquisition through Goldstone tracking station in California. Through abort Columbia still troubleshooting the pesky DFI recorder that apparently will not stop running. Currently a mission documentation is over into the crew activities plan page 2-2 for those of you who are following the flight with the crew activity plan at 4 hours 33 minutes elapsed time. We're estimating that change of shift press conference to take place at - in the main auditorium here at Johnson Space Center at 11:30 CST. That's approximately 50 minutes from now with Flight

Director Neal Hutchinson and JSC Deputy Director of Flight Operations, Gene Kranz.

END OF TAPE

PAO ...with Flight Director Neil Hutchinson and JSC Deputy Director of Flight Operations, Gene Kranz. As I mentioned earlier, the launch team has watched a playback of the launch videotape, first time they've seen it. They purposely do not watch the launch in the actual operation, for it is a distraction. About a minute and 13 seconds away from reacquisition through Goldstone. Back at that time, this is Mission Control Houston.
CAPCOM Columbia, Houston, greetings from the Bronze team we'll be with you here for about 18 minutes. How are things going? Looks like your off to a great start.
SC Things are going great Henry, you sound good.
CAPCOM Columbia, Houston, we would like to change the SM variable parameter down list with your convenience. We need CRT with SM spec 1.
SC OK.
SC Houston.
CAPCOM Roger John, you can go ahead and secure the water loop.
CAPCOM Columbia, Houston, CDR you can go ahead and secure water loop 1. For info, the text messages for the teleprinter are onboard. That's text message 1 also the weather message 2, and block data, message 3.
SC Ok, thank you.
CAPCOM And of course, Columbia, we'll be very much interested in how the message looks.
CAPCP, Columbia, Houston, we're about 10 seconds from LOS. Dekar next is a UHF site if we have trouble with the UHF there we'll see you at Ascension at 5:04.
SC OK.
PAO This is Mission Control Houston. A loss of signal through Bermuda. 4 minutes away from possible contact through Dekar, however, it's not expected to be top flight communications through that station. During the stateside pass the preliminary ignition time and Delta-V and so on for the OMS 3 manuever is passed up by spacecraft communicator Hank Hartsfield. Ignitition time at 6 hours 20 minutes, 45 f seconds elapsed tme or 1220 pm cenral standard time. Single engine using the right OMS engine. 25.7 feet per second posigrade, that is in the direction of flight. Which will raise the orbit to 131.7 nautical miles at perigee by 147.5 at apogee
PAO We have no comm confirmation that the crew has checked the teleprinter to see if the ... has indeed been received aboard Columbia. Crew should be entering their first meal in space shortly. The meal period in crew activity plan schedule to begin at 5 hours ground elapsed time. The waste water storage tank dump was carried out routinely according to the flight plan at the time inedicated. 1 minute 53 seconds away from reqcquisition perhaps through the voice relay station, Dekar. Mission Control Houston at 4 hours 58 minutes after the launch of Columbia.
CAPCOM Columbia, Houston through Dekar at Ascension for the next 10 and 1/2 minutes.
SC LOUD and clear Houston.
CAPCOM OK, reading you loud and clear. For info the...

END OF TAPE

CAPCOM Columbia, Houston through Dekar at Ascencion for the next ten and a half minutes.
SC Okay, loud and clear Houston.
CAPCOM kay, reading you loud and clear also, and for info, the preliminary pre-pad we sent you will be the final pad.
SC Okay, that's fine.
CAPCOM And at your convenience we would like to get a status on where you are in the flight plan, whether you are on schedule, ahead or behind.
SC Haven't dumpedthe wastewater yet but we've done everything up to that.
CAPCOM Okay, good show.
SC And we're in the CAP...and we didn't get the block data on that teleprinter message, we got some stuff on there but not any more than that.
CAPCOM Could you give us a summary of what you did get and how it looks?
SC Well, it's just a (garbled) message , looks like, it says receive envelope options 5,6,5A, 43, 5A, 43,14,40 40,40, transmit envelope options 5,6,14, you know. That's not too good 'a stuff there Henry.
CAPCOM Is that all you got John, just that test message initialization?
SC That is affirmative.
CAPCOM Okay, we'll be getting you here at Ascencion here in a couple of minutes or so. We'll try once again then at Ascencion to send the block data and the weather.
SC Okay.
END OF TAPE

CAPCOM ...try to transmit it. At your convenience, we'd like to get you to recheck the installation, and also to check the comm configuration and after you've had a chance to check that we'll fire one more tme.
SC Ok, we'll do it. We got the when it was transmitting up here on air to ground. You can hear it. It's much calmer than it used to be in both the tests and it's not objectionable you can tell what's going on.
CAPCOM Ok, apparently we're supposed to get a turnarund on the tone, to tell us that it's making a complete loop and we're not getting it.
SC Ok, well I think we just fixed it cause ther's a switch out of configure here.
CAPCOM Ok, and we're getting the tone now.

SC and so are we, and we're getting the message now, too.
CAPCOM Columbia Houston, after you got the switch configuration changed, did the tone on air to ground two, did it change?
SC Yes, it's changed now and it's transmitting like crazy.
CAPCOM Is the tone objectionable?
SC Say again.
CAPCOM Roger, we're trying to find out -- you know during the sims that tone was objectonable and so we wound up turning air to ground to receive off upstairs there. We were wondering is it objectionable now? Can you tolerate it or do you keep it turned off?
SC (garble)
CAPCOM Columbia Houston, your last transmission broke up on us yes or no sir was it objectionable?
SC Medium objectionable.
CAPCOM Medium, understand.
SC We won't be able to sleep with it like that.
CAPCOM Understand that.
We have completed transmission, and it may take a while for the buffer to finish printing that upstairs to you. We're about 1 minute to LOS. Botswana is coming up next at 05:15.
SC Ok great.
PAO Mission Control Houston. 20 seconds until predicted acquisition to the relay station at Botswana, South Africa
CPAC
CAPCOM Columbia Houston through Botswana for the next 4-1/2 minutes.
Columbia Houston, WE're transmitting in the blind here. Botswana We assume that it's attitude problem on the downlink. So we'll see if we still can get something up to you this way, we'll ask you about it the next pass. You might want to take one of your yellow markers out of the C-6 flight data file and locker there and put over the L-2 flash evap feed line hearter B supply no. 2 just as a reminder to leave that switch in the number 2 position unless we want to turn it off for power down or some other reason. We'll ask you about this at the next sight. And the next site is Yarragaadee.

at 5:34 which is also a UHF site, we might not ask you at the next site. Maybe Hawaii.
PAO This is Mission Control, Houston. Apprrently because of antenna look angles, aboard the spacecraft, there was no success in getting the voice downlink from Columbia during this just completed pass over the UHF relay station at Botswana. We won't know until the next Comtech whether they were hearing spacecraft communicator Hank Hartsfield. Next station in some 12 minutes at Yarragadee. However, we're some 8 minutes away from commencement.....
end of tape

PAO ...Next station in some 12 minutes at Yarragadee, however, we're some 8 minutes away from commencement of the change of shift press conference with off going Flight Director Neil Hutchinson JSC Deputy Director of Flight Operations, Gene Kranz, and a thermal expert named Jim Smith. As in past...in a compressed dump after the press conference is over. We have 5 hours 22 minutes elapsed time this is Mission Control Houston,.
PAO This is Mission Control Houston, participants in the change of shift press briefing are in route if not indeed in Building 2. 5 hours 32 minutes into the flight of Columbia.

PAO LOS We will replay all of the accumulated air-ground during the just completed press conference.
PAO This is Mission Control Houston. Another 5 minutes away from reacquisition Botswana during the just completed press conference. The crew of Columbia did the OMS 3 burn on time, totaly nominal. Measurements of the Orbit now are 131.7 by 148.0 and at this time, we'll play catch up by replaying the accumulated air-to-ground tapes and be compressed somewhat now in actual time sequence and we'll go live as we complete the tape playback.
CAPCOM Columbia, Houston thrcugh Yarragadee for the next 8 minutes.
SC All clear Houston
CAPCOM OK, we read you there very weakly.
SC Now, (garbled) check.
CAPCOM Did you copy my message regarding the switch markers?
SC (garbled)
CAPCOM OK, you're starting to fade out I understood you said affirmative. We probably won't be able to talk to you since you're going right over the site almost right at your sub point there. In the event that we lose you completely, Hawaii is at 0601 and we should be able to get you S band there. Columbia, Houston, we're about one minute from LOS and Hawaii is next at 601.
SC All right.
CAPCOM I read you bye bye.
SC All rignt.
CAPCOM (garbled) the next five minutes with the keyhole in the middle.
SC OK, Henry, loud and clear.
CAPCOM And Columbia, Houston, as a reminder because we haven't made up our minds on the DFI PCM recorder. We will not operate that during the OMS 3 and 4 burns.
SC OK, Hank, we understand, I'm assuming we can still run the wide band mission in.
END OF TAPE

CAPCOM —the next five minutes with keyhole in the middle.

SC OK, (garble)

CAPCOM And, Columbia Houston, There's a reminder because we haven't made up our minds yet on the DFI PCM recorder, we will not operate that during the OMS 3 and 4 burns.

SC OK, Hank, we understand. I'm assuming we can still run the wide band mission then.

CAPCOM That's affirmative, Crip.

SC How are you guys doing today? I've been so busy running around I haven't had a chance to chat with you.

CAPCOM Well, we're doing great, and we think you're doing great work also.

SC Hey, Hank, I guarantee you it's wortn all the time you and I have been waiting for it.

CAPCOM Crip, did you ever get a chance to look at the teleprinter message?

SC No, I haven't, Henry. I put that after the priority after each chow. I have not had an opportunity to change out the CO2 cartridges yet, and I do want to clean out my cabin fan down there, because we have lots of junk floating around here in the cabin, and heard a couple of noises I didn't like down there while ago, so I'm going to get that as soon as I get through with the software.

CAPCOM OK, we copy that.

SC Hank, I'm going to fixed format right now

CAPCOM OK, we copy that. And while we've got a few minutes here I might tell you that we had a pretty big flare pop on the sun here back at 1700 zulu on the 10th and relatively low high energy activity. However, the low energy activity is expected to peak at about 5:00 p.m. central time today. That's about 11 hours MET in the mission. No concern at all for radiation effects. However, we do want to caution you that during the next 4 revs as you pass through the South Atlantic anomaly, there may be enough radiation there's a possibility of kicking off your smoke detector.

SC Good grief, Henry! OK, Hank, that sounds like fun. Who thought of that?

CAPCOM Also, there's a good chance there's going to be a spectacular

aurora later this evening, and we're looking at (garble)

SC Okey-doke. And could somebody look at these coordinates and see if they look okay to you?

CAPCOM Targets look good, John. (garble) we're out of keyhole now. We've got about 50 seconds to LOS. Stateside's coming up next at 6:10 and somewhere in there we do have your final OMS 4 burn, and if you want to copy that stateside prior to OMS-3, I'll have it for you.

SC OK, Henry. We should be right in the middle of a burn right over (garble) according to computer timeline.

CAPCOM That's about right, and we should have time prior to the burn if it's convenient then we can read it up to you.
SC OK. OK, Hank, I'm not sure whether Harry was looking at that gimble check we just did, but then we had a problem with our right pitch gimble primary.

CAPCOM OK, we copy that. We're going LOS. We'll talk to you stateside.

PAO Columbia Houston with you stateside for the next 15 and a half minutes. We did not see enough of that gimble check to tell you much. If it's convenient, we would like you to run it again, so we can look at it, and also we will be shipping you a new state vector.

SC OK, Hank, we did re-run it, and we had no problem - we'll run it once more for you (garble) locked up with data, data.
CAPCOM OK, Crip, we got data, if you'll go ahead and shoot it to us.

SC OK (garble)

CAPCOM OK, it's looking good to us so far.

SC (GARBLE)
CAPCAM Columbia Houston, the new vectors on board. (garble)

SC OK got it (garble)

CAPCOM That's about right. You ought to be right over.

SC (garble)

CAPCOM OK, that's about right, and Crip, we did not see the backup follow the reload. Would you give us and item 39 on the BFS?

SC (garble)

END OF TAPE

CAPCOM Okay, it's looking good to us so far.
SC Roger, copy that.
CAPCOM Columbia Houston the new vectds onboard, we'd like to target and load again.
SC Okay you gotit, got it. We got those straighten out.
CAPCOM That's about right you ought to be right over.
SC We're about (garbled)
CAPCOM Okay that looks about right, and Crip we did not see the back up follow the reload. Would you give us an item 39 on the BFS
SC (garbled)
CAPCOM Okay that explains it. Columbia Houston we have about 6 and a half minutes to the TIG time for OMSand as we said earlier I do have the OMS 4 final pad if it's convienent to copy between now and TIG.
SC Well (garbled)
CAPCOM And the backup targets look good.
SC (garbled)
CAPCOM OKAY this is OMS 4 final attitude 019326 (garbled_)
SC That would be a -5.3 with the left engine a weight of that would be a -5.3 with the left engine a weight of 209367 x 070531.8 Delta-V are 28.40 09.7 x is less than .2 over
CAPCOM and Crip all is correct except the yaw trim is +5.3.
SC Roger, it's +5.3 sorry. And would you like to (garble)
CAPCOM X only to less than .2. Over there the +x I mean X is to be trimmed only to less than .2.
SC (garbled) Hello, Housotn how do you read me? (garbled)
CAPCOM OKay reading you loud and clear now, that is affirmative, the OMS 3 burn is X only less than .2.
SC Okay we copy the whole thing. Okay take a look at the (garble) configuration.
CAPCOM I say you look[illegible]d everything but the vapor vapor on the left.
SC Roger and we are standing by for treatment for that.
CAPCOM Columbia Houston your prop config looks good and we're still standing by to see the DAP and TVD configurations auto.
SC Roger that, we're just to (garbled)
END OF TAPE

we're still standing by to see the DAP and TV C configuration
auto.
CAPCOM Roger that we're just about to do that
SC We're trying to keep these pressures
really wop the vehicle around.
Try to the vehicle around.
CAPCOM Ok.
SC We're in auto on the DAP.
CAPCOM Ok, we copy.
SC I got an execute
SC Cleared at 100%. On the right engine
(garbled)7. Just had a nice view of the Cape coming by
(garbled_ 7. Just had
CAPCOM Roger and it looked like a good burn.
Columbia Houston when we hand over to Bermuda here shortly we may
have about a 30 second S-band keyhole.
sc Ok, understand.
CAPCOM GARBLE About 5 seconds from LOS.
SC Ok, the burn looked good to us. And we loaded it for OMS burn
2, how does that look to you?
CAPCOM looked good to us in both machines.
Ascension is coming up next at 6:39.
CAPCOM Columbia Houston through Ascension for the 2-1/2 minutes.
(garbled) the cabin fan and he's down there getting
SC Ok, read you loud and clear we're maneuvering to the attitude
and tee cabin fan and he's down there getting
and he's down there changing LiOH canister
off less than a couple of minutes on cabin fan cleaning
CO2 jobbies there. We'll be sending your entry REFSMATS up to you and you
do not need a state vector update.
SC Well, that's outstanding.
CAPCOM Ok, your entry REFSMATS are onboard now and as
a reminder you'll need to reload your targets. Also, we've noted
D3
a reminder you'll need to reload your targets. alos, we've noted
that the vacuum vent nozzle temp has been (garble)
You'll get that about 200 the last time we saw it was about 184
but It's nothing to be concerned about if you get it ignore it.
SC Ok, the vacuum vent nozzle temp is coming up and we should ignore it.
If it comes up.
CAPCOM That's affirmative and belay that about reloading
the targets that's only if you got a state vector update.
SC Yes, I didn't think we did it for REFSMATS.
CAPCOM Columbia Houston, we're about 1 minute to LOS. This
is our last data pass before the OMS 4 burn. At this point you
are go for the burn.Botswana UHF at 0651. If we don't talk to
you there, I guess you can read us. You'r still go for the
burn.
SC Ok, Henry, we can hear you over this UHF
So if there is anything important you want to tell why don't hesi-
tate.

SC I think they'r trying send us something on the teleprinter but

it ain't getting through You mean you can make that sucker make noie on the air to ground.
END OF TAPE

SC I think they're trying to tell us something on the (garble) but it ain't getting through.
CAPCOM Oh. Do you think you can make that sucker make noise on the air-to-ground (garble) also?
SC Yep.
CAPCOM Houston end of line. We're not sending anything up. You might make sure that you are in auto with the power switch on the teleprinter.
SC In auto on the power switch on the teleprinter. OK. We are in auto on the power switch on the teleprinter, Houston.
CAPCOM OK, we copy, and we're probably going to lose you here. We're hanging in longer than we thought. We'll ask you some questions about that noise a little later.
HOUSTON COMTECH Botswana Comtech, this is Houston Comtech, testing 1, 2, 3, 4, 5, 4, 3, 2, 1. Test out.
BOTSWANA Botswana had hundred percent (garble) go.
HOUSTON COMTECH Copy Botswana, configure for your pass please.
BOTSWANA Roger, will you confirm with going to acquire squelch off.
HOUSTON COMTECH That's affirmative.
BOT Roger.
CAPCOM Columbia Houston through Botswana for the next minute and a half.
SC OK, Hank, how do you read me through Botswana?
CAPCOM OK. Read you weak but clear, Crip. I think at these low elevations is about the only time we can read you. We have one thing I want to say to you about the minus Y startracker. We see that the target suppress bit has been set. This hardware bit will hold the shutter closed unless it's manually commanded open, so while it's night time there, we would recommend that you call spec 22 and do an item 15 execute to manually open the shutter and then another item 15 to get you back to auto.
SC OK. You think it's a good idea, though, to run around with that shutter manually open?
CAPCOM The second item 15, Crip, will put it back into shutter auto.
SC OK, and then you think it'll work then after that?
CAPCOM We're hoping it will. We'd like you to at least try to reset it that way one time and then we'll take a look at it next air.
SC OK. Ok, Hank and you wanted an item 15 to override it open and then go back to auto?
CAPCOM That's affirmative, Crip. And we're going LOS. We'll see you next at Yarragadee at 0709.
SC OK, and we've completed that, and at that time it stayed open.
CAPCOM OK, we copy that.
END OF TAPE

CAPCOM Columbia, Houston through Yarragadee for the next 5 and 1/2 minutes. How do you read?
SC Ok, Hank we read you loud and clear all full with nominal and
CAPCOM OK, we copy that. We have several items for you, if your ready to listen up.
CAPCOM Your fading out Crip, I'll just read this in the blind. On Spec 67 if you ever have to use that the electric display on the third cloumn there the last item which is the amps aft main C. When you look at that it will be reading high. Approximately 173 amps and this corresponds to 1 PCM count. The measurement has failed, its a measurement failure only, and there's no mission effect and the other currents read okay.
SC Ok, we understand. I say we understand that.
CAPCOM Ok, got you. One other thing I'll just get it out of the way here. When we run the STS checkout stateside, there is a program note that just came out recently. I don't think you got it. There is a potential problem during the checkout If the secondary actuator check is started before the completion of the aerosurface drive test, what will happen is the biases added to the surfaces and the asterick indicating the channel selection will not be removed by the test term inated or an OPS transition. We just want to make sure that you do not start the secondary actuator check until you have a go from us.
SC Tell me again that parameter you said was out of tolerance.
CAPCOM It's the amps on the aft main C .
SC OK, I'M reading 193, 194 on the amps.
CAPCOM Ok, that's reading way too high and it is a measurement failure. You can't believe anything you read on that particular parameter. All the others should be okay.
SC Ok.
CAPCOM Columbia Houston through Ascension for the next 2 and 1/2 minutes.
sc OK, we read you loud and clear (garbled)...and he's down there changing out the Lioh canister. We're off less than a couple of minutes on that cabin cleaning.
CAPCOM OK, we copy that.
We'll be sending your entry REFSMMAT up to you and you do not need a state vector update.
SC Well that's outstanding.
CAPCOM OK, entry REFSMMAT are onboard now. As a reminder there you'll need to reload your targets. Also, we noted that vaccum vent nozzle temp had been...you'll get that about 200, last time we stored about 184 but it's nothing to be concerned about, if you get it ignore it.
SC OK, the vaccum vent nozzle temp is coming up and we should ignore it when it comes up.
CAPCOM And delay that about reloading the targets, that's only if you've got a state vector update.
SC I didn' think we did it for REFSMMAT .
CAPCOM Columbia, Houston, we're about 1 minute from LOS...

CAPCOM That's affirmative the belay that about reloading the targets that's only if you got a state vector update.
SC I didn't think we did it for REFSMAT.
CAPCOM Columbia Houston we are about 1 minute to LOS this is our last data pass before the OMS 4 burn at this point you are go for the burn, Botswana UHF is next at 0651, if we don't talk to you there, I guess you can read us, you are still go for the burn.
SC Okay, Hank and we're back in OPS2 now and all reconfigured
CAPCOM Roger, copy you're back in OPS 2 and just for info, we get to Guam we're going to try do that DFI PCM recorder check again. There is some confusion on our part as to when the circut breaker came out. We had you to put it in then the next time, we had a comm drop out there and I think we got kind of messed up a little bit in that procedure, so just to make sure we're going to try to repeat it at Guam.
SC Yeah
CAPCOM Houston in the blind we are not sending anything up, you might make sure that you are in auto in the power switch on the teleprinter
SC In auto on the power switch on the teleprinter, okay? We're in auto on the power switch on the teleprinter, Houston.
CAPCOM Okay, we copy and we'll probably going to lose you here, we're hanging in longer than we thought, we'll ask you some questions about that noise a little later. Columbia Houston, we are about 1 minute to LOS, Guam is next at 0721.
PAO This is Mission Control Houston at 7 hours 19 minutes we're now finished with playback of the accumulated air ground tape. Coming up on Guam in 1 minute and 19 seconds. We're now standing by for that pass.
CAPCOM Columbia Houston through Guam for the next 7 and a half minutes, we're going to be shipping you a weather teleprinter message during this pass and we got a few more items for you.
SC Okay Hank, and for you the previous messages that you gave me, the block update the test message and the water message were all good. I did verfy that. Also I'm looking at OMS cross feed bulkhead mid temp that's been running around between 49 and 50 degrees, in fact it just started to warm up a little bit. That had given me a message a while ago but it looks like its coming back up now and I didn't do anything to it and I'm go.
CAPCOM Roger, Crip, I copy that and we'll take a look at it and we would like for you, we see you're in OPS 2 we would like for you to lay there and we want to send a test text uplink message to you
SC Okay, I understand that test text uplink to the memory area.
CAPCOM That's affirmative. It will be number 914.
SC 914
CAPCOM And your teleprinter message should be on the way and we're going to use APU number 1 for the checkout.
SC Copy that APU number 1.
CAPCOM Columbia, Houston at your convenience we'd like for you to clean up the cross feed from OMS 4.
SC Oh, yeah. Thank you very much.

CAPCOM And Columbia at your convenience we're ready to run through the DFI recorder check again.
SC Okay Hank I got it.
CAPCOM Okay on C3 DFI recorders PCM to continuous record.
SC Okay that's a verify.
END OF TAPE
56;61

CAPCOM ...recorder check again.
SC Ok,Hank, lets have it.
CAPCOM Ok, on C3, PFI recorded PCM to continuous record
SC OK, thats a verify.
CAPCOM On R11, DFI PCM and record a rotary to forward control. Verify.
SC Ok, we're going from reverse to forward control at this tme.
CACOM Ok, also on R11 the DFI PCM forward container recorder main C. I'd like to close that circuit breaker.
SC Ok, we're coming close and stand by one.
SC Ok, coming close at this time. Mark.
SC My talkback went to gray when I closed it.
CAPCOM Ok, we copy that Crip. On R11 The DFI PCM recorder rotary to stop. And tell us what happens.
SC We're going to stop, mark when stop.
SC My talkback went to barber pole.
CAPCOM Ok, let us mull that one and then we'll have another step for you.
CAPCOM Ok, Crip, we'd like now to take the DFI PCM recorder rotary to playback reverse and give us a mark.
SC Ok, we're going to playback reverse , mark.
SC And the talkback is gray.
CAPCOM Ok, we copy that.
CAPCOM Ok, we've got a clock going on you Crip and what should happen is that in 5 minutes the talkback should go to barber pole.
SC Ok Hank, this is what we did before and does not go to barber pole. We ran it for at least 5 minutes and 40 seconds.
CAPCOM Columbia, Houston, we're not getting the return core tone on the teleprinter. Did you, when you tore those messages off down there. Did you happen to move that switch?
SC Should not have.
SC Let me take a look at it Hank.
CAPCOM Ok, what ever was out of configuration before maybe it happened again.
SC No, what was out of configuration before was the CCU power was off and it is still on.
CAPCOM Ok, we copied that.
SCA Ok my little green light is out too on that. No wait a minute the green light in the front is still there. That's still in auto.
SC Everything looks normal according to what I can see.
CAPCOM Columbia, Houston, we're about 40 seconds away from LOS. SPEC 914 is onboard and if by 7:31 MET there the talkback has not gone back to barber pole on that DFI recorder, we'd like you to go ahead and pull the circuit breaker.
SC Roger we understand.
CAPCOM We'll see you at Buckhorn at 7:44.
SC OK henry.
PAO This is Mission Control Houston. Loss of signal through the Guam station. 14 minutes and 48 seconds until reacquisition through the stateside series of tracking stations. Crew aboard

Columbia continuing to troubleshoot the bulky teleprinter, I beg your pardon, DFI. in te cargo bay. Apparently one of the recorders will continue running if all of the circuits are up and on. Perhaps they should have carried the Pete Contrad Skylab hammer with them. 7 hours 29 minutes into the fight. 7 hours 30 minutes. This is Mission Control Houston.
END OF TAPE

PAO This is Mission Control Houston, 20 seconds away from reacquisition through Goldstone and most of the stateside tracking stations, standing by for some further reporting by the crew on troubleshooting the DFI recorder problem. We should have acquisition at this time.

CAPCOM Columbia Houston, we're with you stateside for 14 and a half minutes.

SC Okay, Hank, ready to set up (garble)
CAPCOM And Houston's ready, Crip. Go ahead.
SC (garble)
CAPCOM [illegible]ut my UHF off again. Seems like this particular site is really [illegible]m for the simo. We're ready for the start, Crip.
SC Okey-dokey. Incidentally, that recorder did not turn itself off. Ok, pull the breaker.
CAPCOM Roger. We copy. Thank you, Crip.
SC Okay, we're starting the service drive.
CAPCOM Okay, and this is a reminder don't start the secondary actuator check until we give you a go.
SC Roger, that.
SC Okay, We've studied, and we can go ahead and terminate it.
CAPCOM Your clear.
SC Henry, you still with us?
CAPCOM That's affirmative.
SC OK, we got a go?
CAPCOM OK, you have a go for secondary actuator check.
SC Roger, that.
END OF TAPE

CAPCOM Okay you have a go for secondary actuator checks
SC Roger that.
channel 3 looks good,
CAPCOM And channel 1 looks good, channel 2 looks good,
SC Okay Hank all those look good to us we're standing by
for your go for the shut down.
CAPCOM Okay looks good to us too Crip, you're clear to
shut her down.
SC Roger that. Okay Hank all that looked good to us.
CAPCOM Everything looked real fine to us Crip.
SC Okay, we're ready to go back into OPS 2
CAPCOM Okay we're ready for that Crip. And while you are
doing that if John could answer a couple of questions for us, we
had some items in the check list that we were trying to verify
that did get accomplished, for example back in the PDP there
was a call out for the announciator caution warning lamp
test and the fire and smoke detection test, did those get
accomplished?
SC That's affirmative, they sure did.
CAPCOM Okay and there's been a query also regarding the whole gas
samples and the solid absorbent sampling.
SC Yes, they're all done. We would have told you if we did
not do them. Alright Henry.
CAPCOM You do super work guys.
SC We got about the neatest place to work you ever seen, I'll
tell you that. Except it sure is hard to keep your eyeballs
inside the cockpit doing your work.
CAPCOM And Columbia, Houston, you ever have a changd to see if you got
Spec 914 on board yet?
SC No Hank, I haven't got around to it yet. I'll give you a holler when
I do.
CAPCOM Don't look now we're just wondering if you had and we
think we got your teleprinter message on board with the weather
data.
SC Okay I'll check. Heard that coming up while ago.
We're looking right down at White Sands here?
CAPCOM The little airplane looks like it ought to be pretty
much right over it.
SC Okay, see it from here.
CAPCOM Columbia Houston for info, we're advised that your
launch is the number 1 news story around the world today.
SC It certainly was in here. That launch control team did
a supper job down there as well as our guys.
CAPCOM While we've got a minute here in the CAP on page
2-6 coming up at 8 hours and 20 minutes, there's a call out
there for the vacuum inerting procedure and we would like for you to do
that procedure even if your pressure does reach zero, and then
we want a chance to verify that procedure before you terminate
it.
SC Okay, I understand Hank. I believe we just came across Corpus Christi
SC There Henry.

CAPCOM Columbia Houston say that again.
SC Looked like we just passed over Corpus.
CAFOM Right, should have been trough there just a couple of minutes ago.
SC Okay
CAPCOM On that vaccum and Crip, you were reading zero on the gage, we would like for you to do the vaccum and for 30 minutes. And when we are satisfied the pressure is zero we're going to go ahead and have you inhibit the LS manifold pressure, but do that on our call.
SC Roger that. I understand Hank.
CAPCOM And Columbia, just for info the upcoming pass and the next one through the South Atlantic should normally be the ones of maximum activity it is night time there and you should have a good arora out to the south and if you do not get the smoke alarm triggered in either one of those passes you probably not going to have it occur.
END OF TAPE

S-13-1 MISSED COMMENTARY TAPE 0068 4 12-91 GMT 19.55.55

CAPCOM It is night time there and you should have a good aurona out to the south, and if you do not get the smoke alarm triggered in either one of those passes you're probably not going to have it occur.
S/C Okay. and Hank for your info I still have not worked the noise level survey. I'll get on that very shortly.
CAPCOM Okay, we'll be ready for the results wheenver you get done

S.C Okay..
CAPCOM Columbia, Houston. We see terminate idle on the wide tracker at your convenience we need to get SPEC 22 up and do a item 3.
S/C I think I caught the OPS transitions it does that itself.
CAPCOM Okay, Crip.
S/C Okay, it's no longer idling.
CAPCOM and for info we sent up some table mantenance to you on three different sets of parameters. They should be onboard now.
S/C Okay, and we'll just forget the DFI recorders on the RCS test. Is that okay?
CAPCOM Say agan.

CAPCOM Hank, when we're getting ready to do the RCS test, since we don't have the DFI recorders, were assuming we're going to proceed on with all tests as called out unless you tell us different.
CAPCOM That's affirmative Crip, we want to go ahead with the tests without the recorder.
S/C You still there Hank?
CAPCOM Roger. We're still there and we'll be sending you a teleprinter message up with the Timbu updates that we've made.
S/C Roger that. We're looking at your message 914. We concur.
CAPCOM Roger.
S/C Message
CAPCOM Columbia, Houston. We've got you about another minute and 20 seconds on Quito and understand that the text-uplink message was in good shape.
S/C The one that came up on the mess memory was okay.
CAPCOM Okay. That's the one we were concerned about. It does, it came through ungarbled.
S/C That's affirm and now we're getting one from the tele-printer its printing out something here.
CAPCOM This should be the updates to your Timbu's.
S/C Okay.
CAPCOM Columbia for info. We're about 40 seconds fro LOS. We see the ASA's ai still on, a Guam is our next site 0859 almost an hour from now. Columbia, Houston in the blind, we still see the ASA's on. We need to get them off.
S/C Weell okay.
CAPCOM And Guam is next at 0859.
S/C Okay the ASA's are off.
CAPCOM Thank you sir.

CAPCOM It is night time there and you should have a good aurona out to the south, and if you do not get the smoke alarm triggered in either one of those passes you're probably not going to have it occur.
S/C Okay. and Hank for your info I still have not worked the noise level survey. I'll get on that very shortly.
CAPCOM Okay, we'll be ready for the results wheenver you get done

S.C Okay..
CAPCOM Columbia, Houston. We see terminate idle on the wide tracker at your convenience we need to get SPEC 22 up and do a item 3.
S/C I think I caught the OPS transitions it does that itself.
CAPCOM Okay, Crip.
S/C Okay, it's no longer idling.
CAPCOM and for info we sent up some table mantenance to you on three different sets of parameters. They should be onboard now.
S/C Okay, and we'll just forget the DFI recorders on the RCS test. Is that okay?
CAPCOM Say agan.

CAPCOM Hank, when we're getting ready to do the RCS test, since we don't have the DFI recorders, were assuming we're going to proceed on with all tests as called out unless you tell us different.
CAPCOM That's affirmative Crip, we want to go ahead with the tests without the recorder.
S/C You still there Hank?
CAPCOM Roger. We're still there and we'll be sending you a teleprinter message up with the Timbu updates that we've made.
S/C Roger that. We're looking at your message 914. We concur.
CAPCOM Roger.
S/C Message
CAPCOM Columbia, Houston. We've got you about another minute and 20 seconds on Quito and understand that the text-uplink message was in good shape.
S/C The one that came up on the mess memory was okay.
CAPCOM Okay. That's the one we were concerned about. It does, it came through ungarbled.
S/C That's affirm and now we're getting one from the teleprinter its printing out something here.
CAPCOM This should be the updates to your Timbu's.
S/C Okay.
CAPCOM Columbia for info. We're about 40 seconds fro LOS. We see the ASA's si still on, a Guam is our next site 0859 almost an hour from now. Columbia, Houston in the blind, we still see the ASA's on. We need to get them off.
S/C Weell okay.
CAPCOM And Guam is next at 0859.
S/C Okay the ASA's are off.
CAPCOM Thank you sir.

PAO This is Mission Control Houston. LOS to Quito Ecuador., the UHF rela station. Fifty-four minutes way from next contact at the tracking statnio on the isladn of guam. We'll return at that time. This is Mission Control Houston. This is Missn Control Houston. The measurement of Columbia's orbit after the OMS-4 burn, which was made during the press conference and the play-back of that was done after the end of the press conference. Current measurement is 149.3 natical miles at appage, ad 147.6 nautical miles at peradee. Forty-eight minutes away from Guam. This is Mission Cotrol at 8 hrs. 10 minutes into the flight of Columbia.

CAPCOM Columbia, Houston through Guam for the next couple of minutes with a real low pass. We may not read you for the whole pass.
SC OK, we read you loud and clear, Houston. The vacuum inerting terminate's been going for 44 minutes and finished the RCS jet test and through a procedural error we proved that the jet fail off does work, but all the rest of the stuff looked okay.
CAPCOM Roger, we copy, and we see the manifold pressure. You're clear to terminate the vacuum inert and to - you can go ahead and inhibit the LH2 pressure on the C&W.
SC Okay. Cleared to terminate vacuum inert and okay to inhibit the LH2 pressure on the C&W. We'll do it.
CAPCOM And you're clear for your item 48.
SC And we'll get the item 48. Thank you.
CAPCOM Columbia Houston, We've noticed that you've had another propellant thermal pod, do you recall what parameter it was that set that off?
CAPCOM Columbia Houston, we're about 50 seconds to LOS.
SC That's negative right now. I 'll have to talk to Crip. He's down below right now.
CAPCOM OK, and one little cleanup, John, over on L-1 there we'd like to get the water pump loop one to GPC.
SC Oh, yeah.
CAPCOM And we're about 20 seconds to LOS. Stateside is next at 9:19.
SC OK.
PAO This is Mission Control Houston, 9 hours 1 minute into the flight of Columbia. Apparently, the flight control checkout went very well aboard Columbia, as reported by Commander John Young. Upcoming over the states some 17 minutes from now - perhaps a little after acquisition we'll be TV pass, a report by John Young of the status of the flight from the flight deck. This TV pass lasts approximately 6 minutes or thereabouts, depending on how long they keep the camera up. We'll return in 16 minutes for stateside pass, an abbreviated stateside pass along the west coast. Mission Control Houston. We're getting a playback on the launch again on the large, color idafore 9 hours 2 minutes elapsed time, 16 minutes to AOS Goldstone.
END OF TAPE

PAO This is Mission Control Houston at 35 seconds away from acquisition through Goldstone, Buckhorn and Tula Peak. Upcoming on this pass will be onboard television status of the flight from John Young on the flight deck.
CAPCOM Columbia Houston, we're with you stateside for 8 and a half minutes. We'll be shipping you state vector at Quito instead of this stateside pass. I've got your supply water dump quantities you'll be needing here a little later, and I got a few more items to discuss with you while we're waiting to get the TV up.

SC Roger that, Hank, and we're standing by to do the TV whenever you guys want to, and go ahead with any items.
CAPCOM OK. We're waiting to get Goldstone up to the TV. The supply water dump that's coming up a little later - it goes about 9:50, and the CAP there on page 2-7, we want to dump tank Bravo to 25 percent, and tank Alpha does not need to be dumped.

SC OK, Bravo to 25.
CAPCOM OK, a few words on your consumable status. Your APU's are right on nominal, maybe just a little bit ahead of time or on the quantities both water and fuel. The RCS, your forward RCS is down about a half a percent, and your aft right and aft left reads down about 2 to 3 percent, so we're coming along real good on consumables.
SC Okay. Boy, I tell you those normal RCS jobbies really get your attention in here. It's much nicer flying on the verniers.
CAPCOM OK, that's a good input. We're going to have a handover here, and when we come out, I'd like to find out where the freeze dry dump is on the tape. OK, handover's complete. Crip, if you could tell us where the freeze-dry is.
SC Roger that it's our recorder two, track number 4, in reverse 52 percent done at 814.
CAPCOM We copy. And we're ready for the TV any time.
SC OK, Hank, I'm coming at you with a flight deck camera. I got a picture of John up here in the CDR seat, and you might tell me how your reception is.
CAPCOM OK, we've got a good picture, Crip.
SC OK, the TV status report flight so far has gone as smooth as can possibly go. We've
done every test that we're supposed to do, and we're up on the time line, and the vehicle has just been performing beautifully, much better than anyone ever expected it to do on a first flight, and no systems are out of shape. Just an example, we did three star-tracker alignments in less time than it takes to do one star-tracker alignment in the mission simulator, and all the RCS jets have been fired, and the vehicle is just performing like a champ, real beautiful. And it's delightful up here in zero gravity, I might add. Of course, we owe this to a lot of people. There's one in particular I'd like to pay my respects to who, if he were here now, would really be having a lot of fun. He was man for the country, there aren't many like him, Tiger Teague, I guess y'all all know him. And, of course, there's many other people we could probably give thanks to if we started down the

line
END OF TAPE

SC just a lot of people. There is one in particlar I would like to pay my respects to who if he were here now would really be having a lot of fun. He was the man for the country and there are not many like him Tiger Teague, guess you all know him and there are probably many other people could probably thank to if we started down the line of all the folks we owe we would be here till tomorrow, but we certainly want to thank everyone who has helped get this thing airborne and we take great pride in doing so well right now.
CAPCOM Ok John, we sure do appreciate those comments.
SC I think I will switch to the back now and Crippen is going to tell you how things went in the back of the ship.
CAPCOM and Crippen for info your mother and Jenny and the girls are all in the viewing room watching.
SC Oh my gracious. Ok, we are switching over to the aft camera here now we are showing the aft deck. How does that picture look to you?
CAPCOM It is coming in real good.
SC Ok Hank, I would like to echo John's words as I usually do, I guess being the so called rookie on this flight I had a thrill from the moment of lift off all the way up to what we are doing now. It has really been super, the spacecraft has worked as advertised all the way along, there may be a few minor nuisance problems, but nothing of significance. I guess the major one, you guys are working on down there is dealing with some of our instrumentation. But, I think we have got something that is really going to mean something to the country and the world. This vehicle is performing like a champ, like all of us who have worked on it so long knew that she worked. I guess then in acknowledging people that have done alot for the program, I think it is only right that we mention a couple of guys that gave their lives a few weeks ago in our countdown demonstration test John Bioenstat and Forest Cole. They believed in the space program and it meant alot to them I am sure they would be thrilled to see where we have the vehicle now. We , I had to talk to those guys. But it is been fun, and we think that the rest of the mission (garbled) . looking foward to working with you guys and looking forward to landing at Edwards in a couple of days from now. And unless you got some questions Hank, I guess that does it.
CAPCOM That was good timing. I think you must have practiced we were just about to lose you at Goldstone
SC Just accident. That does not scare you. (Garbled). really zero gravity.
CAPCOM We would like to know one thing, is it a little easier to get between the mid deck and the flight deck than it is in SMS?
SC Oh yea. It is quite a bit easier. Although then there is some learning Hank, learning curve in being able to maneuver things around a little bit so that has taken a little bit of time extra I think it took a little bit more time than the added flexibility of getting back and forth . I can dash down there and

back real quick, like to through a switch or something like that or just go back and find a teleprinter message but if I have got to go and get
something out of locker or connect something up or something lik that it usually takes me just a little bit longer. and I think that is just a little learning curve.
CAPCOM OK, WE copy that, and it is, you have got a go to turn off the APU fuel pump valve cooler .
SC ROGER that.
CAPCOM OK, we have started to get an echo there, so I hve gone back to air to ground one only and we have a question for you Crippen . We have got about one minute left. When you got through cleaning out the cabins and screens you went back to fan A instead of bravo was there a reason for that?
SC WELL, you had better ask John. He was driving the fans. fan bravo is on right now Henry, what do you all show.
CAPCOM I got that backwards. We want to go back to the original configuration unless you have some other reason .
SC Ok, you got fan alpha. Tell Stevie McLendon we just got his test in for him.
CAPCOM Ok, we are just about twenty seconds from LOS we will be coming up on Quito next at 9:32 there, we would like to question you about the water alert and the propelant thermal pot alert you got and find out if you can give us the parameters that caused it?
SC Nope, we are not going to be able to help you there I am afraid .It is gone away.
CAPCOM OK, we will talk to you at Quito.
END OF TAPE.

PAO This is mission control, Houston, we've had loss of signal through Tula Peak. Quito Equator coming up in 2 minutes 52 seconds. At which point another teleprinter message will be passed up on a routine onboard instructions, lock data, etc. There will be a replay, I understand of the just completed status report by the crew on television. After Quito LOS at 9 hours 30minutes into the flight of Columbia. This i mi is mission control, Houston.

CAPCOM Columbia, Houston, through Quito for the next 61/2 minutes. We have a state vector coming your way. We'll also be shipping you a teleprinter message with block data for orbit 12, we're changing flights to rhoda, and we need to change your GNC variable parameter downlist if you could give us a CRT, with GNC SPEC 1.

SC You want GNC Spec 1.

CAPCOM That's affirmative sir.

SC Okay, got the DPS utility on Dev 1

CAPCOM Columbia, Houston, Are you ready for the IMU accelerometer cal?

SC Okay, DAP is of, we're in pulse and flash evaporator is off

SC And Crippen's holding still.

SC Trying too.

CAPCOM We need manual on the DAP.

SC I'm sorry about that, did you get it?

CAPCOM Are the recorder's on? The DFI recorder's wideband?

SC Okay, wideband, we have not got the wideband let's see Do they want, do you want a cal on that? Before we do it? We didn't get that count in.

CAPCOM We ought to be OK, just let her rip and we're ready to receive.

SC OK

SC OK, would you like a cal afterwards?

CAPCOM It's not required, Crip.

SC OK.

CAPCOM And the teleprinter message is coming your way. And y say you don't recall the parameter that kicked off the propellant thermal pod here, oh some....

SC Yeah the propellant one I do. I had repoted that one earlier. Just a second, let me get it back up. Yeah, it was, we had a test helium ox 1, both the left and right tanks went out at one time and the current time the right take is out high. On the right pod.

CAPCOM OK CRIP, I hate to trouble you, but could you say that one more time please.

SC Yes Sir. Its the OMS Pod test, helium/ox 1 On the right pod, it'scurrently out of limits at 92, the left pod is currently reading 85 and it had already been out out of limit high.

CAPCOM OK, WE Copy that.

SC And also at one point of the OMS crossfeed bulkhead mid out low and then it came back up.

CAPCOM OK. WE GOt that and, we would like to confirm that you

inhibited the LH2 manifold pressure.
end oftape.

clear
CLEARED

UNFORMATTED MODE

SC point of the day, we had the OMS crossfeed the bulk bulkhead mid outflow and then it came back up.
CAPCOM Ok, we would like to confirm that you inhibited the LH2 manifold pressure.
SC THAT is affirmative. Parameter 79
CAPCOM Ok, what we are trying to do is get all of the items crossed out so we hope we won't, you won't get awakened tonight.
SC Ok, also, it looks like I have got ducer that is off scale low on the propellant thermal. It is GSC's servicing panel for the right pod and it is reading off scale low.
CAPCOM Ok, we copy that and we do not think that that is going to be a problem.
sc All right, that is just sitting there steady so it has not been coming in and out.
PAO Columbia Houston, we are just about one minute until LOS. Botswana is next at 10:01 UHF. And Columbia Houston in the blind, we need to get the DFI wide band mission off. Columbia Houston in the blind, check your DAP rate. Columbia Houston in the blind the DfI wide band mission recorder off.
SC Ok Houston.
PAO And check your DAP rate.
CAPCOM This is Mission Control Houston LOS through Quito. Cleaning up some of the flight plan items that were lingering , some of the checkouts aboard the spacecraft, calibrations of one kind or another. Also, some report by Crippen on what appears to be a temperature transducer riding a little high in the right pod OMS pod on the helium and oxygen tank cluster No. 1. That along with some of the other indications are expected to be faulty transducers. We are some nineteen minutes away from reacquisition through the voice relay station at Botswana at which time we will return at nine hours forty one minutes this is Mission Control Houston.
SC Ok Hank, I am coming at you with the flight deck camera (garbled).
CAPCOM This is Mission Control again. We have a playback onboard tv just completed during the state side pass.
CAPCOM Ok, we have got a good picture Crippen.
SC (Garbled) The flight has gone as smooth as it could possibly go. We have done every test that we are suppose to do and we are up on the time line and the vehicle has just been performing, performing beautifully, much better than anyone ever expected to do on the first flight and no systems are out of shape. Just an example, we did three star tracker alignments and in less time than it takes to do one star tracker alignment in the mission simulator. And all of the RCS jets have been fired and the vehicle is just performing like a champ. Real beautiful. And it is delightful up here in zero gravity I might add. Of course, we owe this to alot of people, there is one in particular I would like to pay our respect to, cause if he were here now, he would really be having a lot of fun. He was the man for the country and there are not many like him, Tiger Teague,

I guess you all know him, and of course there are many other people we could pay our respects to if we started down the line of all the folks we owe, we would be here until tomorrow. But we certainly want to thank everyone who has helped get this thing airborne and we take great pride in doing so well right now.
CAPCOM Ok John, we sure do appeciate those comments.
SC I think I will switch to the back now and Crippen is going to tell you how things went in the back of the ship.
CAPCOM And Crippen, for your info, your mother and Jenny and the girls are all in the viewing room watching.
SC Oh my goodness. Ok, we are switching over to the aft camera here.
END OF TAPE.

CAPCOM Your mother and Jenny and the girls are all in the viewing room watching.
SC Oh my gracious. Ok, we are switching over to the aft camera here, now we are showing the aft deck. How does that picture look to you?
CAPCOM Coming in real good.
SC Ok Hank, I would like to echo John's words as I usually do, I guess being the so caled rookie on this flight I had a thrill from the moment of lift off all the way up to what we are doing now. It has really been super, the spacecraft has worked as advertised all the way along. A few minor nuisance problems, but nothing of significance. I guess the major one, you guys are working on down there is dealing with some of our instrumentation. But, I think we have got something that is really going to mean something to the country and the world. This vehicle is performing like a champ, like all of us who have worked on it so long knew that she worked. I guess then in acknowledging people that have done alot for the program, I think it is only right that we mention a couple of guys that gave their lives a few weeks ago in our countdown demonstration test John Bioenstat and Forrest Cole. They believed in the space program and it meant alot to them. I am sure they would be thrilled to see where we have the vehicle now. Our hat is off
But it has been fun, and we think that the rest of the mission (garbled) looking forward to working with you guys and looking foward to landing at Edwards in a couple of days from now. And unless you have got some questions Hank, I guess that does it.
CAPCOM That was good timing. I think you must have practiced, we were just about to lose you at Goldstone.
SC Just accident. If that does not scare you. (Garbled).
CAPCOM This is Mission Control Houston about forty seconds away from acquisition through the voice relay station in Botswana South Africa. We will stand by for any comm that comes down from Columbia at this point . The crew should be in their evening meal at period at this time.
CAPCOM Columbia Houston, How do you read?
SC Loud and clear Houston.
CAPCOM Did you get the DFI wide band recorder off we had a little early dropout on the comm last time.
SC Yes, we got it off. We assumed you were through with it the accelerometer cal so we turned the flashes back on.
CAPCOM OK, on the last data pass we also saw that the suppressed bit for the wide tracker had gotten set again so whenever it is convenient, also do the IMU align on the SPEC we need to do the item 15 twice to get the shutter open and back to auto.
SC Ok, I do to one open and then a zero to get it back to auto right.
CAPCOM Ok, we need that to be ready for the next alignment.
SC Oh, you guys are really planning the ??.
CAPCOM The coms got sort of a hollow effect to it now, would you say your last?

SC It was a humorous remark, Henry. That was a John Young humorous remark. Cripden is down there using the (garbled).

SC John Young
Crip is down there using (garbled)
CAPCOM OK, whatever that last thing is there sounds pretty bad.
SC It's the best he can do.
SC Henry, how you read me?
CAPCOM I read you loud and clear, now Crip.
SC I'm talking at you an the middeck speaker mike. John Young humorous remark.
CAPCOM Not sure I copied that either. We've got about 40 seconds to LOS and did you happen to get the sound level data taken
SC (garbled)
CAPCOM Columbia, Houston, that last bit was totally unintelligible and we might see you at India at 1012, its a very low angle pass if we don't see you there, Hawaii is coming at 1048.
SC OK, we'll see you there.
PAO This is mission control, Houston, loss of signal through Botswana, 5 minutes to extremely low elevation angle pass, over indian ocean station. in 4 minutes and 50 seconds, the calm was fairly rugged during that passover Botswana. Much of the downlink voice from Columbia was totally unreadable. We'll be back at Indian Ocean station in four minutes and 30seconds. At 10hours seven minutes, elapsed timemission control, Houston.
CAPCOM Columbia, Houston, through India for 2 1/2 minutes,how do you read?
SC Read you loud and clear Henry. How us?
CAPCOM READing you much better now, Botswana was a little ratty.
CAPCOM DID you folks happen to see aurora on this last pass through the south atlantic?
SC You're down in a barrel there, but we haven't had a chance to look for any aurora. We didn't have any power warning lite, if that's what you mean.
CAPCOM If it's convenient, like somebody to callup SM Spec 89 and give us a readout on a OMS pod test helium OX number 1 right and the same for the left and get those temps.
SC That's in work. What temperature did you want Crip? Henry?
CAPCOM OHMS pod test helium ox number 1 right and left.
SC The number 1 is reading 93. The left is 84.
CAPCOM WE COPYSC Hank, I can give you the sound level meter surveys if you like.
CAPCOM We've got about 45 seconds. if you can shoot it in at that time. And Hawaii's next at 1048. We'll listen.
SC Roger, I'm giving you the alpha reading for the following location. The location alpha, the reading was 60DB. For reading bravo it was 66. For charlie it was 67. For delta it was 67.
CAPCOM WE copied that.
SC we're all healthy if you need that Hawaii pass for something besides medical you got it.
end of tape.

SC For charlie it was 67, for delta it was 67, over
CAPCOM We copied that.
SC OK and we're all healthy so help. If you need that Hawaii pass for something besies medical, you got it. medical, you got it.
CAPCOM We're about 3 seconds from LOS, Hawaii's next at 1048.
SC OK
PAO This is
Mission Control, Houston, we've passed their (garbled) India Ocean station, were 31 minutes, now from next pass through Hawaii. Missed the states this time around. Start picking up Santiago Chile on this 8th orbit, back in 31 miutes. This is
iMission Control Houston.
CAPCOM Columbia, Housthroughn to Hawaii for the next 2 1/2 minutes.
SC Loud and Clear Henry.
CAPCOM Read you loud and clear and we got a few little items for you, we told you earlier about the increased solar flare activity on aurora and we have a request to take several photos. and have that data for you if your ready to copy.
SC Go ahead, Henry.
CAPCOM Take time would be approximately 1118 MET looking south immediately after the sun disk is below the horizon. Want you to use the 70mm camera , the 80mm lens, CH01 film, f stop of 2.8, 1 second focus to infinity a.d take two to three exposures, that film is the one with the yellow decal, I think what you used on the payload bay doors.
SC Does this take preference over the COAS cal verification.
CAPCOM That's a negatie. We were thinking you might could whip that in before you did the COAS cal. You're state vector is good it should be good through the sleep period. And for info IMU Number 2 is your best IMU.
SC Thank you.
SC Hank I missed that did you say navstate is good should be good through the sleep period.
CAPCOM That's affirmative, sleep period, plus.
CAPCOM We're about 1 minute to LOS Santiago was next, at 1113. One other little clean up for the sleep period, we noted that the APU1 TANK fuel line heaters are beginning to act a litle erratic, so in order that we don't get alarm during the sleep period back on A12, we would like you to take APU tank fuel line water system heater 1B to 1A. Auto. In other words, take 1 Bravo off and 1A alpha to auto.
SC S OK
CAPCOM COLUmbia, Houston as you go LOS we see the suppression bit set onthe wide tracker again, you'll have to run through your item 15 procedure again,and if you have trouble keeping the shutter open, just go ahead and leave it manually open until you get through with alignment.
End of tape.

CAPCOM We don't think will be a concern during the entry and the structural integrities will be maintained. Now they base this analysis on based on the wind tunnel data that they had previously determined a local heating and hat transfer analysis and from this they calculated the remaining slip service analysis they calculated the remaining slip service ad graphite apoxic campaign in temperatures. And Alos the used the data from the test they made here at JSC on the ARC jet. Anyhow, the bottom line is that we think there isno real problem at all with the pieces of tile or tiles that seem to be missing that we think might be missing off of the pod there ad we don't pla to make ay chages to the entry flight plan because of the tile loss.

S/C OK, Henry. You could have saved all that and made the Mission Press comments.

CAPCOM Sounds good enough. We don't think there is a problem either.

S/C Hank. Also, you guys had me switch that heater, awhile ago, on APU 1. I had to pump up to about 120 degrees into alarm awhile ago and then come right back down after we'd already switched gears. Just for your informaton.

CAPCOM OK, we copy that and we have a teleprinter message coming up to you that we would like for you to take a look at at your earliest convenience. Have you heard the thing pecking away up there?

S/C Yeah, we certainly have. I think you've got several down there I hadn't had time to go look at it. Ah, but coming up on this photograph time and it's nice and dark out there, you don't want me to take anything unless I see something, do you?

CAPCOM Surging your last.

S/C It's coming up on the time of taikng the photographs you requested of the aurora activity, ad I can't see anything byt] dark right now. I'm assming that you don't want me to take ay photographs with just pitch black.

CAPCOM That's affirmative. Picture of black don't do us much good.

S/C A little lightening going on down there ad I can see some cities. But I don't think I see any aurora activities.

CAPCOM OK, we copy that and we suggest that you guys ought to clean up that teleprinter traffic as soon as you can get to it.

SC Well okay Hank. I got to take pictures, we got to get teleprinter active, I got to take stars.

CAPCOM OK as long as there is nothing but black out there you don't need to take any pictures. Botswana is our next site at 1135 and we are about 45 seconds from LOS.

SC Oke doke.

CAPCOM This is mission control Houston. LOS through Santiago Chili 15 mins. away from LOS at Botswana. Crippen was standing by with a loaded camera to shoot Aurora out the window but it was pitch black outside and he saw no future in shooting blackness so he decided not to take any pictures. Of course the ground agreed with that. I suppose in the Southern Hemisphere that would be

Aurora Australis instead of Aurora Borialis. If I remember my geography or whatever that category falls into. At 1120 MET 14 mins. away from Botswana. Mission Control Houston.
PAO Houston contact, air to ground UHF. Sunnyvale contact air to ground 1.
SUNNYVALE CONTACT Houston contact, Sunnyvale contact on 1.
PAO Roger, stand by for and modulation check. India contact Houston contact air to ground UHF.
Thank you.
India contact Houston contact air to ground UHF.
India contact Houston contact air to ground UHF.
Houston contact, sunnyvale contact.
HOUSTON CONTACT
(garbled)
END OF TAPE

CAPCOM We don't think will be a concern during the entry and the structural integrities will be maintained. Now they base this analysis on based on the wino tunnel data that they had previously determined a local heating and heat transfer analysis and from this they calculated the remaining slip service analysis they calculated the remaining slip service ad graphite apoxic skin temperatures. And Also the used the data from the test they made here at JSC on the ARC jet. Anyhow, the bottom line is that we think there isno real problem at all with the pieces of tile or tiles that seem to be missing that we think might be missing off of the pod there ad we don't plan to make any changes to the entry flight plan because of the tile loss.
S/C OK, Henry. You could have saved all that and made the Mission Press comments.
Sounds good enough. We don't think there is a problem either.
S/C Hank. Also, you guys had me switch that heater, awhile ago, on APU 1. I had the pump in temp up to about 120 degrees and triggered alarm awhile ago and then come right back down after we'd already switched heaters. Just for your informaton.
CAPCOM OK, we copy that and we have a teleprinter message coming up to you that we would like for you to take a look at at your earliest convenience. Have you heard the thing pecking away up there?
S/C Yeah, we certainly have. I think you've got several down there I hadn't had time to go look at it. Ah, but coming up on this photograph time and it's nice and dark out there, you don't want me to take anything unless I see something, do you?
CAPCOM Say again your last.
S/C It's coming up on the time of taikng the photographs you requested of the aurora activity, ad I can't see anything byt] dark right now. I'm assming that you don't want me to take ay photographs with just pitch black.
CAPCOM That's affirmative. Picture of black don't do us much good.
S/C A little lightening going on down there ad I can see some cities. But I don't think I see any aurora activities.
CAPCOM OK, we copy that and we suggest that you guys ought to clean up that teleprinter traffic as soon as you can get to it.
SC Well okay Hank. I got to take pictures, we got to get teleprinter activity, I got to take stars.
CAPCOM OK as long as there is nothing but black out there you don't need to take any pictures. Botswana is our next site at 1135 and we are about 45 seconds from LOS.
SC Oke doke.
CAPCOM This is mission control Houston. LOS through Santiago Chile 15 mins. away from LOS at Botswana. Crippen was standing by with a loaded camera to shoot Aurora out the window but it was pitch black outside and he saw no future in shooting blackness so he decided not to take any pictures. Of course the ground agreed with that. I suppose in the Southern Hemisphere that would be

Aurora Australis instead of Aurora Borialis. If I remember my geography or whatever that category falls into. At 1120 MET 14 mins. away from Botswana. Mission Control Houston.
END OF TAPE

PAO This is Mission Control, Houston 11 hours 34 minutes, mission elapsed time, about 45 seconds till reacquisitions through Botswana and almost continuous pass into the India Ocean, Station slight drop out there between the two, this will be almost the final contact before the crew gets into their sleep period. Still have Hawaii and Santiago to go after this and then the crew at 13 hours ground elapsed time is scheduled to turn out the lights, put on their blindfolds, put in their earplugs. 7 seconds to AOS Botswana.
CAPCOM Columbia, Houston through, to Botswana for the next 7 minutes, I got a couple of items for you.
SC OK, go.
CAPCOM Richard was looking at the circuit breaker on DFI PCM RECORder in the SMS, we're trying to think ahead. We don't know whether we're going to be able to use that or not but if it were possible that they had a way to pop that circuit breaker in while you were in the seat, we may be able to use it on entry and punch it in at the right place. And he went over and he found that with a swizzle stick he could indeed reach around behind the seat and push that circuit breaker in and what we are suggesting is tomorrow maybe during the rehearsal after you get suited up if you got time you might scoot up there and strap into the seat and use that swizzle stick and see what you can do with it.
SC OK, go.
CAPCOM Columbia, Houston, did you copy all that regading the circuit breaker.
SC Yes, we did. I don't know whether, I guess we can try it, Hank I guess I missed most of that, since I'm the one that has to do it. You're suggesting sticking in that cicuit breaker for the recorder with a swizzle stick after we're strapped in the seat, Is that affirmative?
CAPCOM That's right Crip, we don't know that we'd want to do that yet, we don't have a plan, but we thought that duringtomorrow's rehearsal if it was convenient to find out whether you could do that or not when you were suited, it would at least give us a data point, from which to work. Richard went over and tried it and in the SMS and he could do it, he could reach it with the swizzle stick by turning around in the seat unsuited, now of course and popped it in , he doesn't know how it would work out with a suit on.
SC OK
End of tape.

CAPCOM in the SMS. He could do it . He could reach it with the swissel stick by turning around in the seat unsuited of course, and pop in it. He does not know how it would work with the suit on.
SC Ok, it is not possible just to go ahead and turn the master DFI recorder off, is it I mean master DFI power you are worried about it resetting the recorder or what?
CAPCOM It is just for the recorder ops and we still do not have a measureable plan for it Crippen, we were just thinking that it was convenient to get to that data point it might influence the final plan.
SC Ok, I suggest , are you guys on tomorrow when we do the suit ingress or is ?? on?
CAPCOM I think that we come on at just about that time.
SC Well, ok, somebody had better remind me of that at that time. Also, Hank,I have got all of the necessary traffic out now and we have looked everything over.
CAPCOM OK, real good. We have got a few minutes left here, I though you give you a little bit of the status here on where we are we think, some of these things you are aware of and they are really little knits which I am happy that they are only knits. On eagle we have got the DSC/OF1 and 4 B power supply that is that circit breaker in the O 15 that is popped, and we still hve not decided whether we want to try and do that or not. We have looked back and there may have been some temporary current spikes that could have been a short, we are not sure. You are aware tha the fuel cell requires manual purge because the flow limits are not exactly right in the auto purge, and we must correct that before the next flight. On the aft mainC there we have got that one transduer that is reading off high, reading about 173 amps is what we show, I think he said one hundred and ninety something but any how, it is the only one there that is not right. On the com side of the house, you are aware that our UHF seems to be atitude dependent, at least for the down link. And then we have got the DFI/PCM recorder stuck in continuous record. At EECCM side we have the FES feedline heater on A 1A is bad, and I think it was that way before it was lifted off. ON GNC we still have got problem with the wire tracker seems to be getting the surpressed bit ?? bit every onece in a while and you have to ue that Item 15 to reset it. We are not sure why it ishappening. On the consummables, you are in fat city. Everything is normal or close to it, and that is real good as far as we are concerned. We have got some fuel and oxiderizer gaging problems on the OMS which you are aware of, and most of those are not very big, I think that just about sums it up unless you got some questions.
SC Hank, I cut you out when you were talking about com, you said something about down link which I did not get, would you review with me the com stuff?
CAPCOM Not a biggy there Crippen what we already know, is that is seems that the down link or voice from you is influenced by the vehicle attitude. In other words, when you are heads

down, we do not seem to be able get a good signal. If we had a UHF antenna in that payload bay, we would be in good shape.
SC We are incidentally receiving you just excellent on all of them. It does not seem to make any difference on you all coming up.
CAPCOM That is affirmative. I think that there is no problem with the up linking you receiving us, it is just that we have a hard time receiving you sometimes. That is UHF only of course.
SC Yes Hank, we understand.
CAPCOM We are about forty seconds from LOS . The Indian Ocean comes up next at 11;43.
SC OK Hank, see you there.
CAPCOM Columbia Houston we are with you again through IOS next eight minutes and be advise that we have a key hole about four minutes into this pass.
SC Ok.
CAPCOM Columbia Houston, one thing that we are curious about is if you have had your UHF on have you picked up any inerference on the UHF link anywhere?
END OF TAPE.

CAPCOM Columbia, Houston, one thing we are curious about, have you had your UHF on, have you picked up any interference on the UHF link anywhere.
SC We picked up only momentarily, Hank, and it went right away. It wasn't even loud enough to hear. And I haven't heard anything.
CAPCOM We copy.
CAPCOM Columbia, Houston, if it's convenient could you give us a CRT on GMC's. Spec 1, we want to change (garbled) downlist for a quicklook, a snapshot and then we'll put it back.
SC We'll put it on CRT2. Okay, you have it up.
CAPCOM Thank you.
SC Hank, one item (garbled) would be interested in I didn't get a chance to double confirm them, but do you know what the max KW we saw on the ascent today was.
CAPCOM The highest number we saw during ascent Crip was 24.5.
SC Alright!!
CAPCOM Going into Kehoe Columbia.
CAPCOM Columbia, Houston, you probably been seeing tne loads yourself but we've been aveaging about 15KW, I guess. The most (garbled) in orbit, in fact all in all, we've been running somewhat under what we predicted pre-flight. I think it's probably due to the thermal balance, we don't seem to be having as many heaters on as you notice from all the alerts you got, things have been running warmer than we anticipated.
SC My wife's hair dryer takes more juice than that.
CAPCOM The CRT's yours.
SC Okeedoak. Ten wives would take m
SC Okeedoak. Ten dryers would take more juice than that, that's what I meant.
CAPCOM Roger, we copy that.
CAPCOM Columbia, Houston, we are one minutes to 1 LOS, Hawaii's next at 1221 and for info we just sent up ? and ? to bias. For info, the largest bias was 64.7 microgees on the number 2 ?.
SC That sounds great Henry. I didn't know guys could measure 60 microgees.
CAPCOM It measured 60.7.
SC Oh.
CAPCOM It registered 60.07.
PAO This is Missio Control, Houston, LOS from the India Ocean station, 28 minutes to next station at Hawaii. Apparently a long pass over Hawaii, elevation 68 degrees or 60, it's hard to tell from this distance. Some discussion there on the performance of the fuel cells during the just completed India Ocean task and preceeding Botswana pass, currently the last datashows that the fuell cells are generating a total of 14.17 kilowatts and 462 amps. I guess that's the way that's read. Unless that should be 46.2, there's a missing decimal in there. Back in 27 minutes at Hawaii. This is Mission Control at 11 hours, 53 minutes. On the lunchtime. End of Tape.

PAO This is Mission Control Houston 45 seconds until acquisition through the Hawaii tracking station. Relatively high angle pass of 7-1/2 minutes. Should be getting acquisition in less than a minute. Stading by at 12 hours 20 minutes elapse time into the voyage of spacecraft Columbia.
CAPCOM Columbia, Houston through Hawaii for the next 7-1/2 minutes and we've got some TIMBU's coming up to you ad c couple of more items.
S/C OK, Hak
nk. We're standing by for the TIMBU's and we can that voice for message 6 is at 12:07 on the tapes ad we're standing by for your play-back.
CAPCOM Roger, we copy that.
S/C And go ahead Hank.
CAPCOM Standby on the--OK, we've a good RF lock now and we would like to get started and we've got the IMU align results that we would like to get from you.
S/C Ck, ad what was the last, you wated the IMU alignment results?
CAPCOM Yes, we just wanted to get the rsults from IMU align, and we do have a good RF link.
S/C OK, its playing
CAPCOM and the TIMBU is onboard.
S/C OK, the IMU's were torqued at 1059.45 and this is XYZ prime, use 1,2,ad 3. minus 09 minus 07 plus 06 plus .14 plus .06 plus .07 plus .02 minus .05 minus .27 at 10.59.45.
CAPCOM OK, we copy that.
S/C The coas align cal will verify that because the angle error was 01 and the
torque angles were all less than .05 of a degree.
CAPCOM Roger, copy that.
S/C At least I think it will help verify
CAPCOM Columbia, Houston. We've been waching the OMS cross feed lines temps and they're going a little low. On the A-14 we would like to get the OMS cross-feed line heater b-auto on--B-auto.
S/C OK, do you wat to leave A-auto on also. Is that right?
CAPCOM Standby 1. Hold on on that Crip.
S/C OK. B-audo coming back off.
CAPCOM Columbia, Houston. Have you got aything you have for us before Santiago, wic is the next pass, last transmission of the evening?
S/C No sir, I don't think so. Can't think of aything.
CAPCOM OK, are your goingto keep the air-to-ground, I mean the UFH on tonight. I assume you're going to turn air-to-ground 2 off because of the noise.
S/C Roger that. Pla to sleep wth air-to-ground 1 and UHF.
CAPCOM Roger. We copy that. Columbia, Houston, GNC request that you display DAP errors durig the sleep period.
S/C What do you mean? Do you want to just leave an

orbit display available or what? Oh, DAP errors. OK, sure, we'll give you that.
CAPCOM Thank you sir. We've got your dump and we thank you. We've got about 1 minute to LOS. We think we're in pretty good shape for the sleep period. Santiago is the next pass at 12:48. We're going to give you the first couple of minutes of that pass to the surgeon--wats to talk to you and then we'll tag up with ya for the night.
S/C Go ahead.
CAPCOM Columbia, Houston. As you go overhill you can power down the data tape.
S/C Say again that one.
CAPCOM Roger. You can shut down the dump.
S/C Roger that.
PAO This is Mission ontrol Houston. Loss of Signal in Hawaii -- 18 minutes away from the final pass of the evening in which the crew will be awake.

END OF TAPE

PAO This is Mission Control Houston. Loss of signal in Hawaii 18 minutes away from the final pass of the evening in which the crew will be awake at Santiago. Tidying up the spacecraft now for the sleep period. Crippen will be monitoring the air to ground with headset on. We'll return in 18 minutes for the Santiago pass at 12 hrs. 30 mins. elapsed time. Mission Control Houston.

This is Mission Control Houston, about 13 seconds from acquisition through Santiago Chili. Final pass of the evening before Crippen and Young bed down for the night. There will be a last exchange here between spacecraft communicator Hank Hartsfield and the crew on Columbia. 10 mins. away from the beginning of the sleep period. Standing by, this is a 5-1/2 min. pass.
CAPCOM Columbia, Houston we are back with you for about 4 min.
SC Okay Hank and we got our fuel cell purge on the road we're running a couple of items a little bit behind the I still got to get that line changeout done, and I got the purge heater still on to bake it out. I guess based on the 55 min. time I was planning on turning it off at about 1340 unless guys advise me I can turn it off earlier than that.
CAPCOM Okay, we'll look at that. We have decided that we have to get that OMS crossfeed lines heater to B auto. We also want to leave A auto on.
SC OK we will do that.
CAPCOM We also see that the suppressed bit is set again on the wide tracker. That is just for info. No action required
SC I am afraid that GNC is just not going to get any data off that burger. We will give you before we go over the hill we will reset it for you. You got any other goodies for us Hank?
CAPCOM 30 minute bakeout would be good enough on that heater for the purge and purge did nlook good to us. Just for info we did get a bias calculated by IU no. 3. We will have to do IU 1 and 2 tomorrow after we get alignment but it was small, the worse case on the gyro was .03 degrees per hour which is about 1 sigma
SC Fantastic. Sounds good. OK your bits reset there, you ought to get some data I reckon.
CAPCOM We are recording data only now no voice. And I guess we owe you guys one super AT A BOY for the day, I this is fantastic you went through a pretty long hard day and you're essentially right on schedule which I is going to be close to being a first with a spaceflight vehicle. for first day activity.
SC SIM SUPV didn't hardly anything in on us. Do you want me to reconfigure audio center back here in the back then?
SC That's the real SIM SUPV and we appreciate it if she don't put anything in on us anymore.either.
CAPCOM This is not a sim you do not need to reconfigure anything back there.
SC OK I didn't know. I thought it was real that I had to take the audio center switches off.
CAPCOM He is commanding the voice off. It is all squared away.
SC OK I had gotten so used to doing it in the sims, I

thought that I had to do it in flight.
CAPCOM There is a couple of things different. You also noticed the IMU 3 was a good IMU I mean a common IMU.
SC Roger that. OK Hank, let's see if I have anything else here that I need to talk to you about. I assume I am going to do this SM checkpoint because you guys had hit us with a couple of them today.
CAPCOM Yes sir. We would really like you to get that because we really send up a lot of Timbu's trying to get all of these heaters squared away. And we will be following that up with a teleprinter message that tell you everything we have done. It sure has been fun working with you today and we look forward to seeing you in the morning. I hope you get a good nights rest. We have about 20 seconds to go.
SC OK it has been fun working with the bronze team. You guys did super for today. See you manana.
CAPCOM Thank you. See you tomorrow guys.
PAO This is Mission Control Houston. LOS through Santiago Chile final pass of the evening. Both the ground and the crew reported a good purge on all three fuel cells. And the drift rate on the IMU's is quite low. Spacecraft communicator Hank Hartsfield passed up what he called
END OF TAPE

PAO THE ground and the crew reported a good purge on all three fuel cells and the drift rate on the IUS's is quite low. Space communicator Hank Hartsfield passed up what he called a Super Attaboy for a good job done today by Young and Crippen flying this new spaceship. Fifteen minutes until acquisition at Botswana. However, the crew will have the audio turned down and will be attempting to go to sleep. At 12 hours 55 minutes into the flight of Columbia, this is Mission Control. This is Mission Control, Houston, at 13 hours three minutes into the flight of Columbia. During this just-completed final pass over Santiago, the Flight Surgeon on the Bronze team, Dr. Mike Dungo, did have a brief, private medical conversation with the crew early in that pass. He reports that the crew is in excellent condition. No medications were asked for by the crew nor were any prescribed. He said that it couldn't have gone better if he had written a script for it. their medical condition at this point. Seven hours and 45 minutes until the crew awakes. Five minutes out of Botswana. However, we are not expecting any air to ground at that time. This is Mission Control at 13 hours and four minutes. This is Mission Control Houston at 14 hours and two minutes GET. The final pass of the evening the crew over Hawaii the crew is asleep at this time, six hours and seven minutes forty seven minutes remaining in their sleep period. All going well aboard Columbia, systems-wise and crew-health-wise. Next station in 20 minutes, Santiago, Chile. This is Mission Control at 1402.
END OF TAPE.

PAO The change of shift briefing has concluded. Slightly less than three and one half hours remaining in the sleep period for astronauts Young and Crippen. The downlink data continues to come down from the Orbiter to ground stations indicating that the onboard systems are still performing the nominal tolerances. Cabin temperature inside Columbia is 77 degrees, humidity is 27 percent and steady. Mission lapse time is 17 hours twenty two minutes and twenty six seconds. This is Shuttle Mission Control in Houston.

PAO This is Mission Control Houston . Mission elapsed time is now eighteen hours 26 minutes. The Orbiter is just crossed the Asian continent and in its 13th orbit of the earth just approaching the Pacific Ocean. Astronauts Young and Crippen remain asleep with slightly less than two and one half hours remaining in the sleep period . Orbiter presently is on the daylight side of the earth approaching darkness. The cabin temperature inside Columbia is 76 degrees and steady and humidity is 28 percent. This is Mission Control Houston.

PAO This is Johnson Space Center Mission Control. There will be a PAO announcement in approximately one minute. This is Mission Control Houston . Mission lapsed time is now nineteen hours thirty seven minutes. The Orbiter the Columbia is in revolution number 14, the Mediterrean Sea just a approaching Italy, just had a pass at Madrid tracking station at which time we just acquired some real time data from the vehicle. Astronauts John Young and Robert Crippen still asleep. A little over one hour and ten minutes remaining in that sleep period. Data, downlink data from the Columbia indicates that all systems onboard continue to be tnominal. Humidity inside the cabin is 27 percent, cabin temperature is 76 degrees and steady. The mission lasped time is nineteen hours 38 minutes, this is Shuttle Control houston.

END OF TAPE.

PAO Steady. Mission lapsed time is nineteen hours thirty eight minutes this is Shuttle Control Houston .
PAO This is Mission Control Houston. Mission lapsed time is now twenty hours fourteen minutes. The crew has about thirty five minutes remaining in its sleep cycle, but downlink data we are presently acquiring over the Orroral Valley station indicates that the crew is awake and has activated the CRT's is inside Columbia. We have the capability for acquisition of signal with the astronauts through Orroral Valley the flight directors, however, will give the astronauts the option of initiating the air to ground transmissions at this point since it is still in there sleep period. We have two and one half minutes remaining in the Orroral Valley pass. During the sleep period the mission operations controll center has been active with Flight Director, Niel Hutchinson and his crew going over the list of anomalies and preparing to uplink some teleprinter instructions to the crew and changes in the flight plan. The DFl recorder which has been faild on will be controlled with circuit breakers and the flight controllers plan to do some further trouble shooting with that system. Astronauts Young and Crippen have remarked that the cabin temperature was a little bit to cool . Cabin temperature reading at present is 75 degrees. It is probable that some adjustments in the water flow will be made in an attempt to bring that cabin temperature up to something a little more comfortable. There remains four reaction control jets four reaction control system jets, which need to be hot fire tested. These may have been fired previously, but that firing occured during the period of bad downlink data which may have clouded the view o that firing. In any case, that those four reaction contrl systems jets will be fired again and will be fired again to verify there performance. Some uplink changes will be made to the flight plan including the change in the upcoming reaction control system burn new some camera set-up time and some other tasks, details of the schedule will be made available at the earliest opportunity. there still remains over 32 minutes in the sleep time, again, however, data from the vehicle indicates that the crew or at least on e of the crew members are awake. We have just lost signal passing out of the Orroral Valley range and the next acquisition of signal would be in about 26 minutes, so that would be earliest point at which we would have voice contact with the crew in the event that they do chose to initiate contact before the sleep period has expired. Mission lapsed time now twnety hours eighteen minutes , this is Mission Control Houston.
END OF TAPE.

PAO This is Mission Control Houston. Ground elapsed time is twenty hours forty three minutes just moments away from conact with the Columbia to the ground station in Quito Ecuador. And although there is about five minutes remaining in the sleep period there is a possibility that the ?? control team may send up something of the nature of some wakeup music for the air crew coming shortly. the duration this pass at Quito is about six and one half minutes and we do have acquisition signal to Quito now so air to ground transmissions may resume shortly.
PAO Mission Control Houston, data indicates that the crew is up and working and they were just coming here to transmit some wakeup music.
SC All right. Good morning, gents, how is the silver team this morning.
CAPCOM Well, we are just fine. We had a grand night. Things are looking good and we do have a question. We were wondering if you guys are shivering up there or is the temperature pretty good?
SC Well, it certainly got a little chilly last night. I was ready to break out the long undies . If you guys have got a way to warm up the cabin a little bit, we would probably be interested in hearing about it? Also, for the GAP, I do not know if he noticed when we came over the hill there, but apparently I did not do my item to before I was through, we did not get to freeze until I dumped so I had it coming down again.
CAPCOM Roger Columbia, stand by a second. Columbia Houston, we think that we took the recorder away from you and you will probably have to do it again.
SC Ok, well I am all set up to do that. We will just get it after we go LOS then.
CAPCOM ROGER, that will be great.
SC Also, we did not understand where we messed up that RCS test, but if .
END OF TAPE.

CAP COM Columbia, Houston, We think we took the recorder away from you, and you will probably have to do it again.
SC Okay, well I am all set up to do that. We will just get it after we go LOS.
CAP COM Roger, that will be great.
SC Also, we did not understand where we messed up that RCS test. But if we did not test all the jets, we probably ought to go back and get them, there might be (garbled) words on that.
CAP COM Columbia, we don't think you messed it up, we just didn't get the data. We do have a procedure that we will catch that for you.
SC Okey, dokey
CAP COM There are going to be some time line changes today in the cap. They don't start the 24 hours MET so we have a message that is being ginned up that will request all those changes for you and we do have a procedure that we will get up to you shortly soon as I can get it for warming the place up. And we don't need a SM checkpoint in the cab at about 21 hours there.
SC Okay
CAP COM And Columbia we are 35 seconds from LOS. We will see you at Bermuda at 20 plus 54 and we will have that warmup procedure available then.
SC Okay looking forward to that. Okay is the recorder available (garbled)
SC Never mind we will check it.
CAP COM Columbia, just about to go around the end of tape so if you will wait a few minutes, you will have it.
SC Roger that.
Mission Control Houston We will acquire signal again in just under 3 minutes at Bermuda. The duration of that pass will be 2 minutes 35 seconds. Mission elapsed time is 20 hours 52 minutes This is Mission Control in Houston.
CAP COM Hello Columbia, talking to you through Bermuda. We have you for about 2 minutes.
SC Roger, Houston.
SC Sound pretty good (garbled)
CAP COM Roger, and this is kind of a short pass so I think we will keep you cool until we get to Madrid, ECOM is wondering if we didn't have any parameters out of limits and we did notice you got a fault message prior to (garbled) that probably woke you up, and we were wondering what you thought when you checked that out.
SC Down there, it had gone away when we looked it up.
SC It did not wake us up(garbled)
CAP COM Roger.
SC I am assuming that the (garbled)
CAP COM That is affirmative we are Columbia and we are 30 seconds from LOS, we will see you at Madrid at 21.04.
SC Okay, 21.04.
This is Mission Control Houston, we will have acquisition signal

again at 6 1/2 minutes on the Madrid Tracking Station. The duration of that pass will be on the order of 7 minutes. CAP COM had to ask the crew what was the nature of the alarm which apparently woke them up this morning. Astronaut Bob Crippen responded that the alarm went off when he was giving a waste management facility onboard the Columbia and that the alarm infact did not wake them up (garble)
CAPCOM This comtec Houston comtec header on one
SC Responding comtec
PAO it is lunch time 20 hours and 58 minutes. This is Mission Control Houston.
CAPCOM Houston contact test one, two, three, two,
End of Tape

This is Mission Control in Houston coming up on the air to ground track over Madrid the aircrew has been configuring the cabin, in their wake periods. Adjusting window screens, lighting activities of that nature following sleep periods. Should have acquisition of signal momentarily. This is Mission Control Houston.
CAPCOM Columbia, Houston, talking to you through Madrid we have you for about 7 mins.
SC Okay loud and clear.
CAPCOM Roger and we have a state vector coming your way. And there is also a teleprinter message on its with some photo information and I have a procedure here to try to get you warmed up.
SC OK
CAPCOM What we would like you to do is go down the mid deck MD44F, that is in the floor there and check the cabin temp control valve in the full heat position. And if it is not the full heat
SC I have already done that, it is in full heat.
CAPCOM Alright then we are going to go on we want you to call up spec 88 and then on panel L1 we would like to check the water loop to bypass mode to manual. and then manual increase until water loop 2 interchanges flow to 700 pounds per hour. and what we are doing is bypassing some of the water out of the cabin heat exchanger trying to warm it up really.
SC OK I understand you want to get the flow to 700, is that correct?
CAPCOM That's right. The water loop2 interchanger for the 700 pounds per hour. Yes it's reading pretty high.
SC Right now I am reading 1024.
CAPCOM Roger.
SC Also Don I can go ahead and give you the position ofthe GPC3 dump.
CAPCOM ROGER. Go ahead.
SC With recorder 1, track 12 and is track 12 in reverse, 87 percent of it done at 20 hrs. 52 mins. 40 seconds. And it looks to me like we are right over Rotterdam.
CAPCOM That is affirmative.
SC (garbled0
CAPCOM Roger. And just one more thing Crip on that cabin temp you can by adjusting the flow you can hopefully get the temp comfortable to where you like it.
SC OK
CAPCOM And I do have your CRT timer set up that should be coming up to you about this time.
SC OK. You have a time for us.
CAPCOM Say again your last Crip.
SC You have a time for the CRT timer.
CAPCOM Roger, for RCS 1 it is item 17 plus 22.
END OF TAPE

SC Do you have a time for the CRT timer?
CAPCOM Roger, ok, for RCS1 it is Item 17 plus 22 plus 20 plus 00. For RCS 2 it is Item 17 plus 2 plus 42 plus 00. For RCS3 it is Item 17 plus 3 plus 42 plus 00.
SC Ok, I copied for 1 is 22 plus 20 plus 00. For RCS 2 at 2 plus 42 plus 00, RCS3 it is 3 plus 42 plus 00.
CAPCOM And that is correct.
SC Okeedok.
Now we have got seven hundred and eight pounds an hour on the interchanges.
CAPCOM Roger, we would like it right there.
CAPCOM Columbia Houston, we are thirty seconds from LOS , we will see you at Yarragadee in 21 plus 38.
PAO This is Mission Control Houston . Mission lapsed time is twenty one hours and eleven and one half minutes. We have had loss of signal oer Madrid. The next ground station will be Australia which we were to acquire in about twenty six and one half minutes and that will be air to ground contact of very close to eight minutes in duration. During that pass Columbia Commander John Young rightly observes that the spcecraft was over Rota Spain which was a launch cntingency landing sites during yesterday accent phase Flight controllors transmitted instructions to the crew rerouting the flow of water used for heating the crew cabin and it is expected an improvement in the cabin temperature should occur and be obvious by the time we acquire the signal again over Yarragadee. Temperature in the cabin has been flucuating between 75 and 76 degrees. And we will check that temperature again during the next acquisition of signal. Data also indicated that the astronauts had activiated the food warmer in the galley indicating that they are preparing for breakfast. Mission elapsed time is 21 hours thirteen minutes, this is Mission Control Houston.
PAO This is Mission Control Houston. The mission lapsed tme is twenty one hours thirty seven minutes. Neil Hutchinson and this team of flight controllers was the ascent team during the launch of Columbia and accordingly this group of men where not able to visually watch the launch .
END OF TAPE.

PAO ..Columbia and accordingly this group of men were not able to visually watch the launch during this loss of signal period, they have been playing oack the video tape of the launch phase. Incredibly it is only just now these men in here are enjoying the visual sense of awe that much of the nation and the world saw twwenty one and a half hours ago. We are just moments away from reacquiring signal at Yarragadee Australia. This is Mission Control Houston.
APCOM Hello Columbia talking to you through Yarragadee we have you for seven and a half minutes.
SC Sounds clear there Houston.
CAPCOM Roger and I have the pad for your RCS test sequence number one on 2-42 of your cap.
SC OK Dan, ready to copy.
CAPCOM Roger, on the burn attitude: Roll 179, pitch 164 yaw 320 the target HA or 145 HP is plus 144 delta V total is 0001.8 T goal is 3 seconds down in the notes it projects (garble) check that box I'm going over to item 21 is 207600 item 27 TIG is 000/222000.0 item 36 - 0001.8, 37 plus all zip, 38 is all zip, and the post burn attitude is NA.
SC OK I'll (garble) that they are as follows burn attitude is 179164320, 145 by 144. 1.8 3 seconds till 07600 (garble) 22 hours 20 minutes no seconds -1.8 all zip all zip post burn attitude not applicable and it's a plus X translation.
CAPCOM Roger and interconnect the note that the interconnect to RCS from the left OMS.
SC OK. We are in that configuration right now.
CAPCOM Roger.
SC I see it Daniel I have a couple for you.
CAPCOM Roger we are ready to copy.
SC OK as you can see I've got the fuel cells purge going right now. When I was doing the heater reconfig, I discovered down on ML 86 bravo that we had both water line heaters ob's closed so I have opened A and we are running on bravo only. I don't know whether you will want to consider opening changing those around to verify that alpha is working later.
CAPCOM Roger, we copy. And Columbia Houston can we get an alignment report.
SC OK the torqueing angles were -.08 + .21 -.17 -.28 +.05 .01 -.20 - .06 -.13 the time was 21:32:52 and star error was 200 so I guess that that is a good angle.
CAPCOM Roger, we copy.
SC That was IMU's 1, 2, and 3 respectively.
CAPCOM Roger.

End of Tape

CAPCOM Columbia, Houston. You broke up a little bit. We copied the time and then something 200, but we missed what was in between.

SC Did you get the torqueing angle?

CAPCOM Yes, we did.

SC All angles (garbled faint)

CAPCOM Columbia, we are not reading you. We will catch the rest of this at Orroral in about 3 min.

PAO This is Mission Control Houston. We nominally should still have about a minute left of acquisition of signal from the Yarragadee station. But as you can tell, the communications were breaking up pretty badly toward the end so we will resume that discussion at the Orroral station. In just about a minute that pass to Orroral will be just under 6 minutes in duration. During that pass the crew reported that they were proceeding with the fuel cell purge and read back the data on the alignment of the inertial measurement unit. CAPCOM had called up figures to the crew for the next reaction control system burn. We should resume contact momentarily from Orroral Valley. This is Mission Control Houston.

CAPCOM Hello, Columbia. We are talking to you through Orroral. We have you for 5 and a half min.

SC OK, Daniel.

CAPCOM ROoger, our question on that--We copied the torquing angles, we copied the execution time. However, after the execution time there was something that came through garbled followed by 200. Now that's where our question lies.

SC John said that the had very small diangle difference and consequently we thought it had a good angle.

CAPCOM Roger, we copy that, thank you.

CAPCOM Columbia, Houston. For your water supply dump numbers for alpha and bravo, there will be no dump at this time.

SC Roger.

CAPCOM And you are 30 sec to LOS. We will see you at MILA at 22 + 23.

SC Alright.

PAO This is Mission Control Houston. Mission elapsed time, 21 hours 52 min. We had a loss of signal at Yarragadee. The next acquisition of signal will be in about 30 minutes from now. That last exchange

tetween Columbia commander, John Young and CAPCOM, Dan Brandenstein. The mitigating actions taken to warm the Columbia's cabin have apparently been ineffectual to this point. The cabin temperature remains 76 degrees and stable. It is possible that the increase in temperatures, if indeed there is an increase, may be slow in coming. We may have more data on that on the next acquisition of signal. This is Mission Control Houston.

CAPCOM Hello, Columbia, we are talking to you through tne States. We have you for 10 minutes.

SC OK. We have a problem with the reg pressure on the system 1. 02 is going up and we can't seem to stop it.

CAPCOM Roger, we copy.

SC Plus X residual was .11

CAPCOM Roger, we copy.

End of tape.
p

SC Plus X residual was .11.
CAPCOM Roger, we copy.
SC Daniel, are you still there?
CAPCOM Roger, we're still there and we're trying to sort out this reg pressure for you.
SC Okay, we appreciate that. And we'll maneuver to the gravity gradient attitude disc.
CAPCOM Roger, Columbia, and we have you for five minutes and 40 more seconds.
SC Dan-O, what do you think about opening the O 2 N 2 control valve on system 1 right now? That should drop her down at least.
CAPCOM Columbia, we . . .
SC Okay, never mind. That's not the right thing to do.
CAPCOM Columbia, we think possibly a check vl valve is leaking here but we are going to continue to look at it and we have no concern with that pressure going up --you can't damage anything so we'll just keep working on it.
SC kay. You think my current configuration is okay?
CAPCOM That's affirmative. And we think that pressure could go up as high as the N 2 reg pressure.
SC Has the N 2 reg pressure up to 200?
CAPCOM ItWs at 214. It's at 214.
SC 214.
CAPCOM Columbia, Houston. We are 30 seconds from LOS. We'll see you at Madrid at 22 plus 38.
SC 2238. Okay.
CAPCOM This is Mission Control Houston. The MET is 22 hours 34 minutes . That discussion between the CAPCOM and Bob Crippen related to a problem in the pressure control system in system 1 the oxygen pressure had been increasing to an unusually high rate. It appears that there may be a leaky valve between the oxygen and hydrogen systems and that that predsure may stabilize and the substances on either side of that valve will neutralize. Next acquisition of signal will be at Madrid in slightly more than three minutes . the duration of that signal will be slightly more than seven minutes in length. MET is 22 minutes 35 seconds - Mission Control, Houston. MET is 22 hours and 35 minutes, Mission Control, Houston. T
CAPCOM This is Mission Control, Houston. We have acquisition of signal at Madrid. Madrid, we have you for six and one half minutes.
SC Okay. ou guys want to close the en vent doors here?
CAPCOM Stand by. I'll see if they are ready.
SC They're doing a great ? aboard. Dan, that pressure is up to 200 now.
CAPCOM Roger, we are watching it, Columbia. And, Columbia, we are ready to close the vent doors.
SC Okay, they are coming closed.
CAPCOM Roger. Columbia, Houston, you are now GO to open the vent doors.
SC I'll Roger that.
CAPCOM And, Columbia, the vent doors look good.
SC Roger. That's good news.

END OF TAPE

CAPCOM ...and Columbia the vent doors look good.

SC Roger that. That is good news.

CAPCOM Columbia we are ready for a free drift at any time you would like to do it.

SC OK. It is in work. OK. We are in free drift and all our RJDs are off.

CAPCOM Roger, Columbia. Columbia, Houston. We are about 30 seconds to LOS. We will see you at IOS at 22.58 and we are still scoping out that high reg pressure.

SC OK. What do you think, John.....I can't hear you, I'm sorry.

PAO Mission Control Houston. We have had a loss of signal at Madrid, Our next acquisition of signal will be in just under 12 min. from the Indian Ocean station. That will be a pass of 5 min 42 sec. in duration. The flight control team is continuing to look at possible causes of the increasing oxygen pressure in the pressure control system. Mission Elapsed Time 22 hours 46 minutes. This is Mission Control Houston.

PAO This is Mission Control Houston coming up on acquisition of signal at Indian Ocean station.

CAPCOM Hello, Columbia. We have you for 4 min and 50 sec through Indy and right off, we'd like to go down on MO 10W and system 1, O2 reg inlet closed. We would like to close that. We think you probably have a stuck oxygen regulator and we would like to close that and then keep an eye on the pressure for a while.

SC But I did close it. That is what I told you. That was the two things I had done to try to get rid of it. I had opened up 14 and a half reg and I had closed the O2 system reg inlet.

CAPCOM Roger, Columbia. And we will take a look at it again. And we would like to do the IMU accel cal.

SC OK, Dan. Tell me what you want on the configuration right now. Do you want the 14 and a half reg closed again on system 1?

CAPCOM Columbia, we would like you to leave it as it is.

SC OK. Yes, the two things that are different down here, Dan, is] that I do have the 14 and a half reg for system 1 open and I have the O2 reg inlet for system 1 closed. That is the non-nominal configuration.

CAPCOM Roger Crip. Thank you. We did not copy that earlier. It

could have been a comm drop out.

SC Missing a good breakfast.

CAPCOM Well, glad you enjoyed it.

SC You guys have tacos for breakfast?

CAPCOM We haven't had any breakfast yet. It won't be long, tho.

SC OK. I figured it was time for your donut run.

CAPCOM No, not today--watching my weight.

SC John is about to wear out this Haselblad here with all the good photos he is getting.

CAPCOM I am sure glad we got that extra film on board. Huh?

SC Youbetchem. It has worked out great. Incidentally, Dan, one thing I meant to ask you. After I did that last GPC 3 freeze dry dump, I would like to hear the results. I would also like to talk Randy out of an item 48.

CAPCOM Columbia, you are go for the item 48. He said we had one invalid frame in that dump and it looked good.
SC OK.

CAPCOM OK Columbia. The data looks good. They have not processed it yet. We are 30 sec from LOS. So this is our last pass for the day. We will wake you up again tomorrow and will turn you over to the Crimson Team
now.

END OF TAPE

CAPCOM He we had one in valid frame and that dump and it looked good.
SC OK.
CAPCOM OK, Columbia. The data looks good. They haven't processed it yet. We are 30 seconds from LOS this is our last pass for the day and we'll wake you up again tomarrow. And we'll send you over to the Crimson Team now. They'll see you at Yarragadee at 23:12.
SC 23:12 appreciate that super wake up music this morning. I was sure enjoying it you'll have a good evening and a good morning.
CAPCOM Ya I think it is the morning.
SC Or what it is.
CAPCOM We'll see you later.
PAO This is Mission Control Houston we have had loss of signal at the Indian Ocean station next site to acquire will be Yarragadee and approximately 8 minutes. The duration of the Yarragadee pass ill be 8 minutes and 25 seconds. The Silver Team headed by flight director Neal Hutchinson now turns over flight control of the Columbia to flight director Don Puddy and the Crimson Team. Mission Elapsed time is 23 hours 4 minutes this is Mission Control Houston.
PAO This is Mission Control in 23 hours and 11 minutes mission elapsed time. Columbia is approaching acquisition throgh the Yarragadee, Australia tracking station the Crimson Flight Control Team led by flight director Don Puddy has completed the handover from the Silver Team. CAPCOM on this team is astronaut Joe Aller. We'll standby for Yarragadee.
CAPCOM Good morning Columbia this is the Crimson Team through Yarragadee, we'll be with you for 8 minutes. How do you read? over.
CAPCOM Good morning Columbia this is the Crimson Team through Yarragadee, how do you read over.
SC Good morning Crimson Team we read you loud and clear. How you doing Joe
CAPCOM OK good morning you are very very weak. We've got nothing nothing special for you. Except to say we are happy with the PCS config asit is right now.
SC Good morning Joe how you guys doing it's about time you all came to work.

CAPCOM We've just been watching and enjoying. We are proud of the Silver Team though. They did a grand job and so did you. We are thinking of having them bronzed, in fact. OK, John and Crip, you are very weak, and we may have some comm problems if we don't get much to you this pass, we'll be back very shortly through Orroral Valley.

End of tape.

CAPCOM OK. John, Crip you are very, very weak. We may have some comm problems. If we don't get much to you this pass we will be back to you very shortly through Orroral Valley. Columbia, that is not comm problems, you are just weak in your transmissions to us.

SC (faint) it is ... looking at tnis... called the O2. Oh, you were happy with it. I missed that part..

CAPCOM OK. Crip. We are happy with the current PCS configuration. We are looking at that reg pressure and we will keep you advised on that.

SC Ok. You sure are easy to please.

CAPCOM Well, we may not be when we get some data here in a few minutes. But we are keeping a careful eye on it. There is nothing that can break as we watch it so we are not particularly worried.

SC It seems to have leveled off at around 215 or so.

CAPCOM OK. We copy that. Thank you.

PAO This is Mission Control. Yarragadee is a UHF station which is voice communications only. We received no telemetry data through UHF stations. The next station where we will receive data is from Orroral Valley, which is a few minutes away.

SC I finally got around to my first cup of coffee. Sure tastes good.
cCAPCOM Roger that.

SC Not really a cup tho. ... said something else.

CAPCOM Crip you are dropping out here. Columbia, Houston. We are 30 sec from LOS. We will be gone for a minute and a half and be back with you at 23 + 22.
PAO This is Mission Control at 23 hours 20 minutes MET. Columbia has loss of signal at Yarragadee. Orroral Valley will acquire in about a minute. We will stand by for acquisition of station there.

CAPCOM Hello, Columbia. This is Houston back with you through Orroral Valley. We will be with you for 3.5 min and can report that the IMU cal has been completed.

SC OK. Fine and dandy. You got any other traffic for us?

CAPCOM Not much, Crip. You are loud and clear on this pass. Curious to know if you have message 11 aboard. It is a pretty major change to timeline and prepare to answer questions, when and if.

SC OK. I'll tell you what. John is down on the mid deck now. He

will check that out for us. Meanwhile I got a little slim dusty and waltzing Matilda for our friends down under here.

CAPCOM Let her rip.

SC (music - Waltzing Matilda)
Too bad it is always dark when we are going over. We can't get a good view of it.

CAPCOM Aw, but they got a good sound of it. I think the S-band will never be the same again.

SC Probably not. probably not.

End of tape.

CAPCOM Columbia, we are about 30 secons from LOS. We'll be back with you at 23 plus 54.
SC Roger, 2354.
CAPCOM And we enjoyed the music, Bob. Thank you.
SC Oh, we enjoyed it. We just wanted to share some with you.
CAPCOM This is Mission Control. Columbia has passed out of range of the Orroral Valley station. During this time the crew serenaded the folks down under with Waltzing Matilda. Columbia now starts a long haul over the Pacific Ocean with next acquisition at Tula Peak New Mexico in six and a half minutes. Twenty
New Mexico in twenty six and a half minutes. Twenty-three hours 27 minutes MMMM MET this is Mission Control Houston.
CAPCOM This is Mission Control at 23 hours 53 minutes MET. Columbia is approaching the West Coast of Mexico on it seventeenth orit. The first station to acquire will be Tula Peak New Mexico. This will be a fairly long pass involving Tula Peak, Merritt Island station, and Bermuda. During the Merritt Island pass, we will have television from Columbia. The television will be transmitted while the crew is conducting flight control systems checks. We should have acquisition in about two or three seconds.
CAPCOM Hello, Columbia, this is Houston back with you through Tula. Ji We'll be with you for 14 minutes. Over.
SC Hi, Joe. We're in OPS 8 and got SPEC 41 up just to complete the RCA ADTA test. Also, got TV set upfor Dr. Fendell.
CAPCOM Okay, Crip, we thank you verymuch. And as we're started on those, I've got a message to read to the two of you -
those, I've got a message to read up to the two of you: Orroral Pass says thanks to you for the hometown music.
SC That's real fine. And Joe, we were a little bit confused about the time given on message 10. With respect to that, we were in the dark at those times so photo . . . .
END OF TAPE.
Y

SC And Joe we were a little bit confused about the times given on 10. With respect to that, we were in the dark at those times so photo issue would not have been applicable.
CAPCOM Okay, Crip, let us look back at that and see what the problem may have been.
SC Okay. And thus far into the test we have dicovered no anomolies with regard to the STS (garbled) checkout here.
CAPCOM Okay, very good. And Clumbia we've got good TV down here now.
SC Okay. And I like to (garbled) at 12:00.
CAPCOm Roger,that.
PAO We've got a picture of Commander John Young in his seat, conducting flight control system checkout, part of his flight data file floating in the foreground. C
CAPCOM Crip, I've got an answer for that message 10 question when you're ready.
SC Okay, go ahead.
CAPCOM Okay, we were trying to be too helpful and gave you a time which was incorrect. Whenever you can fit them in, go ahead and take them. And when the light looks more or less reasonable to you.
SC Alright, will do so. We got some pictures of that already but we'll take a couple of more.
CAPCOM Roger. And Columbia we got a terrific view of a checklist with a CDR now appearing from behind it. Thank you Crip.
PAO Bob Crippen now moving one of his shoulder straps out of the way there.
CAPCOM Go for it, Bob. Columbia, if you'll look down you'll see Cape Kennedy perhaps. There was a tremendous launch from there yesterday. Which youmay not have seen.
SC Oh, we saw it. Well let's see, we're coming over...yeah, I got the runway and gthe VAB in sight.
CAPCOM Very good, it was exactly 24 hours ago. You been up for one da now.
SC Just whipped out a quick photo of that baby of which there has probably been 10,000 taken.
CAPCOM It might be one of the better ones, though.
SC Not with me taking it. I need an Instamatic.
CAPCOM Okay, John and Crip, and that is excellent television, excellent television we're getting.
SC Yeah, those are really super cameras. I knew we was going to make John a star here.
PAO John Young now conducting the Rotational Hand Controller checkout.
CAPCOM Crip, the TV is so good that GNC is looking at the numbers on your CRTs there.
PAO This is Mission Control. We've lost television when we had loss of signal at Merritt Island Station. We still have acquisition through Bermuda for data and voice fo another three minutes. The lighting and zoom for this TV pass has been controlled by the ENCO, Ed Fendell on this shift from the Mission Contro Center. We'll have

additional flight control system checkout, television through Madrid
in about 8minutes.
CAPCOM Columbia, Houston.
SC Go ahead.
CAPCOM Okay, I've got a configuration...
END OF TAPE

CAPCOM Columbia, Houston.
SC Go ahead Joe.
CAPCOM Ok I've got a configuration change on your RCS OMS heaters.
its back on 814. The OMS cross feed line alpha and bravo are both in auto. And Crip if you could sneek back there and turn A to off and leave B in auto, we'd appreciate that.
SC OK. We will, our last configuration we received from the ground was to have both of them on auto and we will go ahead and get A off at this time.
CAPCOM There's no hurry, and we understand that. We just want wo look at B alone in auto to see how it is doing. I've also got another item 17 for the bottom of page 2-40 in the Cap and that is for that fourth RCS test. When and if you want that one.
SC That one is quite a ways off, why don't you just hold off on that one right now cause we have those books back in the ack.
CAPCOM Roger that's no big deal. We're with you for one more minute. And we'll be back next through Madrid at 14 minutes after the hour.
SC Roger that.
PAO This is Mission Control at one day 8 minutes mission elapsed time Bermuda has loss of signal. Madrid except Columbia in just under 6 minutes. During this last pass we had excellent elevation from the flight deck of Columbia the crew performing flight control system checkouts. They have discovered no problems during this checkout so far. At exactly 24 hours from launch Columbia passing over the Kennedy Space Center again and Young and Crippen were able to see and took pictures of the Shuttle runway at KC. This is Mission Control Houston.
PAO This is Mission Control at one day 13 minutes mission elapsed wime. Columbia about a minutes away from acquisition though Madrid we anticipate continutation of television during this pass in about 5 minutes worth. Standby for the Madrid pass.
CAPCOM Hello Columbia this is Houston back with you through Madrid we'll be here for 5 minutes how do you read over.
SC Loud and clear Joe and we are back at OPS two.

TEnd of tape.

CAPCOM Columbia, this is Houston back with you through Madrid. We will be here for 5 min. How do you read? Over.

SC Loud and clear Joe. And we are back in OPS2. John is getting those photos for you and I am about to do this config for orbit after backing out of the STS checkout.

CAPCOM OK, Crip. We copy that. We have got TV pictures again which look good. Wonder if you all have any comments on the FCS checkout. We saw no anomalies down here.

SC We had one anomaly. When we were doing the dedicated display checkout portion of it, the first time we did the high test, everything appeared nominal. But when we did the secondary on the low test, John's HSI was about 5 degrees off in heading. We went back to the high test to recheck it and the HSI part did not drive at all. We tried that back and forth several times and his card now--it would not move out of a setting of about 025 on the heading. So appears he might have a problem with his HSI.

CAPCOM OK Crip. We copy that and we will think about it. We got a beautiful picture of the earth below through your windows now.

SC Roger that. That's a fantastic view. We will leave that on for you for a while.

CAPCOM Columbia, how is your cabin temp been for you today.

SC Yeah, it helped out a lot when we changed that water flow. It has warmed up considerably. I have not checked the temperature recently on the meter. But I have had to back out of my jacket.

CAPCOM Roger. That is what happens when you start working hard I guess.

SC I wouldn't really call this working hard. Joe, this would be a good time for me to copy down the TIG of that RCS 4.

CAPCOM OK, Crip. Good. We are 1 min from LOS and the RCS 4 item 17 is as follows: Item 17 + 5 + 12 + 00. And we will see you next in about 11 min.

SC Roger that. 10-4. 5 hours, 12 min. Thank you.

CAPCOM Roger We will see you 30 min after the hour.

PAO This is Mission Control...

SC Joe, one other additional request. If you could zap me up another copy of that timeline change, I would appreciate it. So John and I each had a copy.

CAPCOM Roger that.

PAO This is Mission Control. Signal hung on just a bit past the predicted time. Now I do have loss of signal at Madrid. The next station will be the Indian Ocean station and _____ islands, in 10.5 minutes. During this Madrid pass we had some TV shots out the window showing the earth, cloud formations. Commander reported an anomaly with the horizontal situation indicator on his side of the cockpit during this checkout. Looking at that here at the Control Center and will pass on any suggestions to the crew when they come up with..... At 1 day, 21 min. MET This is Mission Control Houston.

PAO This is Mission Control. We expect a change of shift briefing with Neil Hutchinson and the silver team at approximately 6:30 am today, in about 5 min. The briefing will be in room 135 in the JSC News Center. During the change of shift briefing, we will tape air-to-ground communications and play them back after the briefing.

End of tape.

...and play them back after the briefing.

PAO This is Mission Control. During the Madrid pass Pilot Bob Crippen reported the temperature had increased and the cabin was more confortable. The temperature at that time was 79 degrees farenheit.

End of tape.

CAPCOM This is Mission Control at one day one hour seven minutes MET. Columbia is right over the Pacific Ocean now about 16 and one half minutes away from acquisition on the West Coast, Buckhorn Station. We acquired about ten minutes worth of tape at the Indian Ocean station, Yarragadee, and Orroral Valley, during the change of shift news conference. We'll play that back and we'll also play back the elevision from the last pass over the United States and Madrid. There will be a 30 second dropout in the television between the two stations.
CAPCOM Hello, Columbia, Houston, ACOOOOOOO AOS through IOF, and we're sending that message over to you, Crip.
SC Okay, fine. Thank you very much.
CAPCOM We're with you for x six minutes on this pass. Nothing particular to send up to you but we're standing by.
SC Oh, we're just out here enjoying the view. Joe, on this TV garbled 4 which we have scheduled for 0100, I was wondering if there is a constraint to waiting to 0100 because of the lighting. They have boh some daylight and some dark stuff that they wanted on that thing. I could just go ahead and get started on it now if there wasn't any concern about that.
CAPCOM Okay, understand the question. Stand by one. and Crip, any time will be fine. Have at it.
SC Okedoke.
CAPCOM Columbia, Houston. We're with you for 30 more seconds and] we'll be back in about ten minutes.
SC OKAY, JOE, see you then. Where we gonna meet you now?
CAPCOM Well, let's see. That will be through Yarragadee.
SC Okay.
CAPCOM And that will be at about 48 after the hour.
CAPCOM Hello, Columbia, this is Houston back with you through Yarragadee. We'll be with you fix six minutes. Over.
SC We didn't print very good on. . .
END OF TAPE.

CAPCOM Hello, Columbia. This is Houston back with you through Yarragadee. We'll be with you for six minutes. Over.
SC We didn't print very good on these flight plan updates.
CAPCOM Columbia, this is Houston. through Yarragadee. Youre very weak, John, if that's you transmitting. We'll be with you perhaps a bit stronger at Orroral Valley shortly and we'll be fine-tuning your state vector at that time.
SC We'll wait till then.
CAPCOM Okay, Crip,and you're stronger then. We've got nothing special for you.
SC What was the yaw angle of that star maneuver that you got in in the flight plan? It is'nt printed out very good. It's either a zero or a 9, which one is it?
CAPCOM Okay, we understand. Stand by. John, if it's the one at 6 hours and 20 minutes on that message that number is a 9.
SC Okay, thank you.
CAPCOM And, John, just for completeness, let me read through those three aligned numbers. The roll is 241, pitch is one nina six, and yaw is zero zero nina.
SC Fine. They al l print okay. It just looked like the tail got left off the nine there. So I didn't know whether it was a zero or nine. Just wanted to make sure, that(s all.
CAPCOM Okay. that's it. John, for completeness here, on that ang dif, two lines down it's the tail left off of those nines as well? Those numbers should be 91.9.
SC Nine one point nine. Thank you. Those printed okay.
CAPCOM Okay, we must hae have taken a hit on that one number.
SC Yeah, I think it is the function of the on-board machinery.
CAPCOM It probably was just getting warmed up.
SC A lot of nines in that meassage are worn out.
CAPCOM That's alm also possible.
SC And, just as a point of information, we have gone to the 250 meter lens for out the window pictures from now on. We have been taking them with 70's and we decided to shift over when we are taking those other photos so we'll get a little closer to things.
CAPCOM Okay, John. We understand and we'll make a note of that. Thank you. Columbia, we're 30 seconds from LOS and we'll be back with you in two and one half minutes.
SC Roger.
CAPCOM Columbia, this is Houston. We're with you for four minutes through Orroral Valley now.
SC Okay, and Cecil B. Crippen is in
SC Okay, and Cecil B. de Crippen is in the back trying to win an Emmy on the payload door bay doors there.
CAPCOM He just may do it.
SC That's aoout all that's going on.
CAPCOM Okay, John. Thank you, and we're gonna send you up a shiny new state vector here. . . . And Columbia's new state vector is on board now.
SC Okay, that was fast.
CAPCOM Columbia, Houston. We're with you for fifty more seconds.

We'll be back nxt over the continental U. S. in 26 minutes.
SC Okay, understand Bucknorn in 26 minutes.
CAPCOM That's firm, John. And, John, we do not hae have any update to the pad you are carrying on board now.
SC Okay, thanks much.
END OF TAPE.

PAO This is Mission Control at one day one hour 24 minutes mission elapsed time Columbia is approaching acquisition through the Buckhorn, California station beginning a passover the continental United States during this pass we will have television from the payload bay cameras television will be transmitted through the Goldstone, California tracking station and the Merritt Island, Florida tracking station. The cameras will be remotely operated cfrom the Mission Control Center by the INCO the integrated Communication Systems Engineer, Ed Fendell.
CAPCOM Columbia Houston talking to you through Buckhorn now, will be with you for 17 and a half minutes.
SC Howdy Rick.
CAPCOM Good Morning.
SC How are you doing today Dr. Howe.
CAPCOM Doing good. We are looking forward to this TV you are going to be piping to us.
SC Oh ya getting to be a regular Secil B. DeCrippen with the TV. He one word that Joe passed to John awhile ago that we didn't quite understand. We did not have a RCS 2 pad onboard.
CAPCOM OK we will have that coming up to you over the States here what we were trying to convey was that the timer update was not changing and that was one thing that was called over he Orroral pass.
SC Roger, OK we understand that.
CAPCOM And Columbia Houston we have a message number 13 comming up to you this pass it will be the weather for subsequent revs
SC OK we hear it. It's hardly any doubt when you've got one coming up.
CAPCOM OK and its a little bit out of sequence since we don't have message 12 up to yet but we will be getting that one up to you also eventually.
SC OK.
PAO This is Mission Control second CAPCOM on this shift is not communicating with the crew and that is astronaut Rick Halk.
CAPCOM And Columbia Houston during our previous TV scenes that you shot for us. Crip we noticed your right

End of Tape

PAO ...crew and that is Astronaut Rick Hauck.

CAPCOM And Columbia, Houston. During our previous TV scenes that you shot for us, Crip we noticed your right, I believe it was your right, perhaps it was your left, shoulder strap floatng around. It might be worthwhile to double check that it is velcroed.
SC It won't stay in place.
CAPCOM OK. We just want you to keep your eye on that D-ring then.
SC Roger that. You mean the one he keeps getting his foot tangledin?
CAPCOM I think that is the one, John.
SC Rick, how's my old state vector hanging in there today? Sounds like it was pretty good last night.
CAPCOM We will give you an update on that Crip as soon as we can but we are beginning to pick up some TV right now. A little fuzzy, but we'll see shortly, I imagine.
SC Wait a minute. I don't know how you guys are getting any TV. What did you all expect TV of right here?
CAPCOM WEDve got some Mission Control TV. Crip called out there in the Cap T-19. Mr. Fendell is working some of your payload cameras.
SC Oh, that TV. OK. I knew I wasn't doing anything for you.
CAPCOM ROGER.
SC Ed can do a much better job, anyhow.
CAPCOM Columbia, Houston, we've completed a handover through out friends at Tula Peak. How do you read?
SC Rick, your last was unreadable.
CAPCOM Roger. Talking to you through Tula Peak now. Over.
SC Roger, Tula Peak. Understand.
CAPCOM Columbia, Houston. Our crew procedures folks suggested that you might want to tape down that shoulder strap, Crip.
CAPCOM Roger. Columbia, Houston. We've got an IMU cal bias coming up to all three IMUs. That is a very minor tweak to them.
SC OK. We'll stand by.
CAPCOM Roger. Be advised we see no need to update your block data that looks good what you have in the books right now.
SC OK. Thank you.
CAPCOM Columbia, Houston, now through Bermuda. We are looking at some real pretty pictures as you pass over the northeast of the United States and I do have a flight note on your PCS system 1 that we'd like you to accomplish to troubleshoot. Over.
SC Roger, we are standing by to do that.
CAPCOM OK. Right now we would like to open on MO10W your 02 regulator inlet system 1 and call up spec 66 so you can monitor 02 reg pressure system 1. When you flip that switch, we'd like yoD to observe that and if 02 reg pressure system one goes above 235 to 240 we'd like t close the MO10W switch reg inlt system 1. Over.

CAPCOM What you are doing Crip is troubleshooting whether that 02

regulator is functioning properly, once we have that information, if we have not isolated it, we have some other procedures for you. Over.
SC OK. You want the reg inlt system 1 to be opened up. And you want us to monitor the reg pressure and if it goes again above-- or say again the number you want us to shut it?
CAPCOM Roger. If it goes above 235 to 240, we want you to close it and that is the pressure that the nitrogen would be regulating at.
SC OK. Well, I'm going to open it up at this time and you guys can help me watch it.
CAPCOM Roger.
SC OK. It's open.
CAPCOM Roger.
SC I think we just passed over Long Island there.
CAPCOM Roger. We've dropped out our TV now.
End of tape.

SC OK. It's open.

CAPCOM Roger.

SC I think we just passed over Long Island, then.

CAPCOM Roger. We have dropped out our TV now. I think we got a good shot of some of the scattered clouds up over the northeast.

SC Rog. I've been filming--lots of clouds around the world.

CAPCOM Roger.

SC Getting a beautiful shot of Cape Cod up here.

CAPCOM I wish we could see it. Lenore would really like that one.
SC Well, to my uneducated eye, it would appear that opening up that
SC _____ would really like that one.
reg inlet made no difference in the reg pressure.

CAPCOM Roger. We concur and will get back to you with further words on that. Currently, we can leave that switch open.

SC Ok. That is back to nominal position, that sounds good. Rick, about when can we expect an RCS 2 pad from you?

CAPCOM Well, how about 1 sec from now. We got it ready for you.

SC Alright, let's see if we are ready for it. OK If you got time, we've got the tme.

CAPCOM OK. Here it comes, with a minute under 2 minutes to go... Burn attitude 239. Post burn attitude is 48.6, 169.0, 304.2, and attitude time is 3 hours 14 min. Read back?

SC Burn att 239.226.324.144 by +144. Delta V total 3.3. VEGO .06 sec. Multi axis burn late 207.557 TIG 1 day,2 hrs 42 min 0 sec. Delta VX is -0.8, Y + 0.4, Z -3.2. Post burn att is 48.6, 169.0, 304.2, in time is 3.14.

CAPCOM Read back is good and we will see you in 6 minutes over Madrid.
PAO This is Shuttle Control. Columbia hasdpassed out of range of Bermuda. Madrid will pick it up in 5.5 min. We got television from the payload bay cameras during this pass over the United States. The interior of the payload bay, the cameras were pointed out the open doors and we got a shot of the northeastern United States, as Columbia passed over that region. We passed up a procedure to troubleshoot the oxygen regular that is believed to be causing the problem in the pressurization control system. A crew tried that and found that they made no difference in the regulator pressure. Not

considered to be a severe problem. Reported a beautiful view of Cape Cod as they crossed the coast. We passed up a pad for the reaction control system test. The #2 burn about an hour or so from now. Felt to be a change of velocity for that burn is 3.3 fps, duration is 6 sec. Multiaccess reaction control system. At 1 day, 1 hour, 45 min., this is Mission Control Houston.

End of tape.

PAO ... is 6 sec. The multi-access reaction control system burn. At 1 day, 1 hour, 48 min. this is Mission Control Houston. Columbia approaching acquisition through Madrid. There will be overlapping coverage through Dekar. We will play back the payload bay television after loss of signal at Dekar.

CAPCOM Columbia, Houston. Back with you through Madrid for 4 min.

SC OK. Loud and clear Joe.

CAPCOM OK. Your pad is good for RCS 2.

SC OK. Joe, what is the concensus on this gravity gradient attitude? It looks pretty darn good to us. We rolled around a little bit. I think I saw as much as 60 degrees at one time, but seemed like we 24

CAPCOM OK. Sounds good. Probably an old Navy trick, using a sea anchor.

SC Right.

CAPCOM Columbia, it looks good to us as well. Columbia, we are UHF only now through Dekar for 30 more sec. and we will be with you next through Yarragadee in 30 min.

PAO This is Mission Control. Dekar has loss of signal. Columbia on its 13th orbit now. Ground track is diagonally down across Africa. Next contact will be through the Yarragadee station in Australia in 28.5 min. We will play back the television from the payload bay cameras now at 1 day, 1 hour, 54 min. this is Mission Control Houston.

End of tape.

PAO This is Mission Control at one day two hours 22 minutes elapsed time. We are standing by for communications through Yarragadee.
CAPCOM Hello, Columbia, this is Houston back with you through Yarragadee for six minutes. How do you ra read?
SC FINE, JOE. That's just one of my little computers that told me I had you for six minutes.
CAPCOM Okay. They never lie.
SC Well, we're sitting here in OPS 3 all squared away just a little bit early. Took our burn out of the road. We got the radiators all stowed.
CAPCOM Okay, Crip. We copy that and if you've got time on your hands, and a pad handy, I can read up to you the RCS test sequence number 3.
SC Stand by one, Joe.]
CAPCOM ROG. No hurry.
SC Well, I've just been getting a pen and getting organized. Okay, I just got it. Both John and I standing by to copy.
CAPCOM Okay, RCS test sequence number three. The burn attitude solution numbers are 342, 136, and 323. Target: 144 by 144 Delta V 2.6 and Tgo is 05. It's a multi-burn axixs--make that a multiaxis burn with a footnote do the burn in your RCS 2 post burn attitude. The RCS 2 post-burn attitude. The weight 207480 Tig 001 / 034200.0. Delta V's are plus 0.7 all balls and minus 2.5. The post-burn att 311.2182garbled and garbled.
END OF TAPE.

CAPCOM is 0.7 all balls and - 2.5 postburn att 311.2182.7and 013.0 the end attitude time is 4 hours and 44 minutes , over.
SC OK Joe coming back at you attitude three fourths solution attitude 342, 136, 322, 144 by 144 delta V total is 2.6 that is 0.3 seconds multi-axis burn with (garble) in the post RCS 2 postburn attitude weight is 207480 K time is one day 3 hours 42 minutes 0 seconds delta V are +0.3 all balls and -2.5 the in time, correction, the postburn att is 311.2,182.7,013.0, in time is 444, over.
CAPCOM Ok Crip three corrections the burn attitude solution in the yaw is 323, 323, the Tgo is 5 seconds
SC 323
CAPCOM Roger that. Tgo is 5 seconds and the last correction the delta VX is +0.7 over
CAPCOM Columbia this is Houston over.
SC Ok Joe a couple of those I already (garbled) ran back down on the yaw for the burnout is 323 the delta VX was +0.3 what else do you have +0.7, 0.7
CAPCOM Roger that Crip and the Tgo is 5 seconds. Ok Crip the Tgo is 5 seconds over.
SC (garbled)
CAPCOM Columbia this is Houston we are having trouble copying you no com problem but we needa little stronger signal which will get Orroral Valley in a couple minutes and we'll finish the corrections there. Over.
PAO This Mission Control Yarragadee's had loss of signal but Orroral Valley will pickup Columbia in about 30 seconds we'll standby.
CAPCOM Columbia this is Houston over
SC Hello Joe how do you read now.
CAPCOM Ok Crip you are loud and clear we're going to send some tinboost to you on water quatities this pad.
SC Ok fine I'll give you back those corrections you gave me while ago. The yaw attitude was 323, the Tgo was 05 and the delta VX was +0.7.
CAPCOM Ok Bob that's correct and the end attitude time we think is right but its 4 hours and 44 minutes over.
SC Roger its 4 hours and 44 minutes.
CAPCOM Ok Columbia we are showing you about 7 degrees out in yaw and its an RCS burn coming up and we are showing OMS selected at the moment.
SC OK we yea your right your right. Thank you.
CAPCOM And that yaw fix itself on the reload for the RCS.
SC Roger that.
CAPCOM Ok Columbia it looks right on the money to us. We're with you for 2 minutes here.

End of Tape

CAPCOM OK Columbia. It looks right on the money to us. We are with you for 2 more minutes here. John and Bob, the teleprinter message you might hear rattling on its way to you is DFR recorder troubleshoot procedure.

SC OK Thank you.

CAPCOM Roger. And Columbia, on that message. After you have had a chance to read it, we indicate what talk-back should read several times through it. It is not clear that it will read that, and in any case, proceed on with that procedure. Go right ahead with it. The talk-back positions are just hopes on our part.

SC OK. Joe is there something you want us to proceed with in ACS or when we get it and understand it and we got a go to do it?

CAPCOM OK. Columbia RCS 2 you want to be in roll 048.6 169 and 304.2.

SC Stand by one. You are implying we are not in the correct attitude.

CAPCOM That's a firm. It is a multiaxis burn. You want to be in that post burn attitude which is 48.6169 and 304.2.

SC OK Joe. I guess we are confused. I guess we did not understand that you wanted us to go to the post burn attitude. You want us at the post burn attitude right now?

CAPCOM Multiaxis burn always uses post burn attitude. Columbia we are in the blind. If you can't do it that way, do it in the plus axis.

PAO This is Mission Control. Orroral has loss of signal with Columbia. Next station is Hawaii in 14.5 min. During this combined Yarragadee, Orroral pass in Australia, we passed up the information for the crew for the third reaction control system test. They are about 5.5 min away now from performing the second RCS test, that time coming at 1 day 2 hours 42 min. 5 min 20 sec. from now. The thiird test will be performed at 1 day 3 hours 42 min. The delta velocity of the third one will be at 2.6 fps with a burn time of 5 sec. These short RCS systems test do not effect the orbital parameters. The expected orbit after both of these burns is 144 x 144 NM. Over Orroral we sent up on the teleprinter a message that was some trouble-shooting procedures. Still working on the development flight instrumentation recorder which refused to quit running yesterday, shortly after launch. That problem is still being worked.

Columbia out over the southwest Pacific Ocean now. At 1 day, 2 hours, 8 min, MET this is Mission Control Houston.

PAO This is Mission Control at 1 day 2 hours 48 minutes elapsed time. Columbia is about 2 minutes away from acquisition at Hawaii we'll get a report on the RCS test at Hawaii also during this pass the payload bay doors will be closed and will remain closed for about 2 orbits and then will be opened back up again. The last station we had a showing a cabin pressure of 14.64

farenheit and the humidity was 28 percent.
CAPCOM Hello Columbia Houston back with you through Hawaii over.
SC Ok We read you loud and clear and we are maneuvering to the post burn attitude.
CAPCOM Ok John copy that. And standby for a burn report when convenient.
SC OK it was nominal on time, the residuals were less than two tenths
CAPCOM Ok very good we thank you and we've got a couple of notes for you Mr. Board reports that the IMU calbyasis that he provided to you earlier were perfect I think he may be bragging. but probably not. We've got a reading on the on the problem that you ran on the cabin reg inlet sys one and can report that the thereis a very small leak past the 02 N2 controler valve and some possible back flow through a check valve its no problem at all and want to underline the fact that the PCS system one is fully operational over.
SC I sure thank you.
CAPCOM And John and Crip if you would though we'd like to put it back at the proper configuration and that's on MO10W. We'd like the cabin reg inlet sys one to close please.
SC OK we'll get as soon as we get done with this (garble).
CAPCOM Roger that no hurry.

End of Tape

CAPCOM Roger that, no hurry. Columbia, Houston, we are with you for 40 more sec and we see you approaching the proper attitude for RCS 3.
SC Roger that.

CAPCOM OK. We will be back with you through Buckhorn in 3 min.
SC OK How much longer you with us here?
CAPCOM About 10 more sec, Bob.
SC OK.
PAO This is Mission Control, 1 day 2 hours 55 min MET. Columbia is out of range of Hawaii, but Buckhorn station in California will pick up the spacecraft in 2 min. During the pass over Hawaii we informed the crew that the pressurization control system problem is now defined as a leak in a valve--oxygen, nitrogen controller valve. It is not considered to be serious and the pressurization control system #1 is considered fully operational--that is the system with the leak--still considered fully operational. The crew reported the reaction control system test burn #2 was nominal.
This is Mission Control. We have data from Buckhorn now.

CAPCOM Columbia, this is Houston back again with you through Buckhorn. We will be here for 17 min. Over.

SC OK. We are in attitude.

CAPCOM OK John it looks good. We have got a request for you on your side. We'd like to re-balance the cabin temp against the AV bay temps by asking you to increase the flow in water loop 2 exchanger. We would like that flow at about 1200 to 1300 pounds per hour. So if you would, go to decrease on the bypass valve.

SC We will do that. About how much do you want?

CAPCOM It is about 50 to 60 sec. We want it 1200-1300.

SC We will get that for you.

CAPCOM OK.
SC Joe, are you still there?

CAPCOM We sure are and it looks good to us, Crip.

SC I can report on the payload bay doors. They look like the latch is back out to latch 12, look like they were going to be the closest. I would have estimated that 12 would probably hit about and inch and a half below Charlie. Up forward here the were all hitting about alpha.
CAPCOM OK, Crip. We understand that.
SC OK. We got Rogers jolly dead in sight. It looks clear out there today, all the way to the coast.

CAPCOM Roger that. Hang on weather.
SC Joe, I'm assuming the results of us running that interchanger flow up is that we are going to get darn cold again. What are we going to do, just keep cycling back and forth?
CAPCOM Crip, we think somewhat opposite. We are taking some more heat out of the AV bays and putting it into the cabin that way. We think at worst you will stay about the same.
SC OK. This is about the flow we had before when we got so cold.
CAPCOM OK. Just keep us posted on how comfortable you feel, or if we need to change that again.
End of tape.

CAPCOM OK just keep us posted on how comfortable you feel and or if we need to change that again.
SC Ya.
CAPCOM And John and Bob its not exactually what it was before. We think it will be ok but as I say please keep us advised on it.
SC Ok it was previously hotter than it usually 950 setting.
CAPCOM Rog that's what we are thinking as well. Columbia this is Houston.
SC Go ahead Joe.
CAPCOM John we've got a call from Building 4 its Monday morning here and they want to know they should go ahead and start the pilot's meeting without you.
SC Pilot's meeting. I never knew whether there was any it made any difference whether I was there or not Is it Monday morning already.
CAPCOM Would you believe that and tell John his transmission was garbled and we'll talk about it later.
SC He's been accused of that before. We're coming across Cape Cod once more e.
CAPCOM Roger that.
SC OK we've just coming back off.
CAPCOM Roger Bob, cycle the controller off and back on if you would.
SC I'll do that. This is just like the simulator. For those guys who are worried about it Joe I'm managed to get by D-ring shoulder strap fastened (garbled).
CAPCOM OK very good we'll rest a little earier.
SC Ok we've run the cabin heat exchanger inlet temp now with that high flow and it doesn't create us any problem. Powering up positive flash evaporator (garbled)
CAPCOM Roger that Crip we've got a transient running through the loops here we are watching it.
SC Yea its coming back down.
CAPCOM Columbia Houston we're one minute from LOS andjust to double check did you copy your comments about that PCS system one being fully operational. Over.
SC That's affirmative we did and let me see, you asked us to close the 14 and a half ereg down there and I don't believe that e got that done yet.
CAPCOM Rog that's correct Crip and no hurry we just want it back in standard configuration and however that system is completely usable when and if we need to use it.
SC We'll do that.
CAPCOM Rog we will be going over the hill in 20 seconds here and we'll be back through Dekar in 4 minutes.
PAO This is Mission Control Columbia is out of raggedat the Bermuda station next station is Dekar with vehicle overlapping

coverage through Ascension Island. We'll pick Dekar in about 3 and a half minutes. 1 day 3 hours 18 minutes this is Mission Control Houston.
End of Tape
33;g-string;D-ring
36

SC garbled. I tell you, it's going to be tough to go back to work in garbled after finding out how really neat it is to move around in this vehicle.
CAPCOM I think you may be spoiled.
SC You got it.
CAPCOM I think we may be spoiled. I can report that Mr. Kranz has given the S:IS suits the day off so we hope it's smooth sailing from here on.
SC Joe, do you still read me okay?
CAPCOM Roger, that clear will be here for three more minutes.
SC And I understand that I do hae have a GO to perorm to see if I can pick up procedure garbled.
CAPCOM That's affirm, Crip. We'd like to do it whenwe get data if that's possible. If it looks lik e it won't fit in though, I guess press right on with it.
SC No, that's fine. I just as soon wait till you guys are there to watch the garbled.
CAPCOM All righty. Why not? aMaybe the next best place will be Hawaii which is coming up in about half an orbit. I've got a footnote you can in the back of your head or on a piece of paper someplace about block data times and perigees, adjust times when you are ready for that.
SC Let me know what it is and I'll tell you whether I'm ready for it or not. We're just going to move them
CAPCOM Just a mental footnote that the onboard block data times are good if you subtract four minutes from them. That's the take times, and the perigee adjust times are good if you just subtract five minutes from them, and the Delta V total on the perigee adjust should be nine feet per second. That will be get you in the agreed-upon 95 nautical mile perigee.
SC kay. Four minutes from the block data, from perigee adjust, and
SC Okay. Four minutes from the block data, five minutes from perigust, and nine zero foot per second.
CAPCOM That's firm.
SC Okay.
SC Joe, we are showing the Mid 1 combat garbled for Bravo. It's going up pretty warm. It's showing 112 degrees. right now
CAPCOM Okay, Crip, we copy. We see 111 degrees so that must be
END OF TAPE.

SC Joe we are showing the mid one on that feed line heater for bravo going up pretty warm its showing 112 degrees right now.
CAPCOM Ok Crip we copy we see 111 degrees so that must be pretty] close to right.
SC Just because we both see it don't make it right.
CAPCOM Well we are going to watch and we will get back to you on it and your burn solutions look good to us and attitude looks good.
SC Okey Dok.
CAPCOM And we're 10 seconds from LOS we will be back through Botswana in 7 minutes.
PAO Mission Control 1 day 3 hours 32 minutes elapsed time Columbia has moved away from acquisition to ascention next station will be Botswana the UHF station. Botswana in 6 and a half minutes. The backup flight crewmen are in the control center have been for several hours astronaut Joe Engle and Dick Truly both have been down around the flight director console and CAPCOM console. At 1 day 3 hours 32 minutes elapsed time this is Mission Control Houston.
This is Mission Control 1 day 3 hours 38 minutes elapsed time standing by for acquisition through Botswana.
CAPCOM Hello Columbia this is Houston back with you through Botswana for 6 minutesover.
SC Roger that. Ok Joe we are in OPS 3 now and loading our target.
CAPCOM Ok Crip Thank you.
SC I tell you its going to be tough to go back to work in the SMS One-G Trainer after finding out how really easy it is to move aro[illegible] in this vehicle.
CAPCOM I think you may be spoiled now.
SC You got it.
End of Tape

CAPCOM Hello, Columbia. This is Houston back with you through Botswana for six minutes. Over.
SC It sure is a pretty day down here in Botswana.
CAPCOM Enjoy the view, John.
SC Fantastic. For your information, Joe. It's starting to get pretty cold in here again.
CAPCOM Roger. Columbia, this is Houston. We are one minute to LOS. We'll be back in 13 minutes through Yarragadee.
SC Roger. That's a long time. We're back in Ops 2 getting ready to go to the post burn attitude.
CAPCOM Okay, Columbia. We weere hoping you would tell us that and we'll see you in about 13 minutes. Thank you. John and Crip, if you get extra time you might check under the mid-deck floor. That heat exchanger valve should be in the full hot position. We are a little puzzled over some thermal data we've got down here and the fact that it's getting cold.
SC The same condition we had last night.
CAPCOM Okay.
SC The valve was in full hot and we're still freezing.
CAPCOM This is Mission Control. Botswana has lost its signal. Yarragadee will pick up Columbia in 12 minutes. It is one day three hours 45 minutes MET. This is Mission Control, Houston.
PAO This is Mission Control at one day three hours 56 minutes MET. Columbia is over the Indian Ocean u going upward in range of the Yarragadee Tracking station very shortly. Columbia is in orbit number 19.
CAPCOM Hello, Columbia. Houston back with you through Yargragadee. How do you read?
SC Hello, Houston. This is CDR. How do you read?
CAPCOM Hello, CDR, you're weak but readable. How's the temperature?
SC Garbled. How are you doing?
CAPCOM Columbia, is the fictional crew aboard today?
SC Just the present crew. They deided to speak up.
CAPCOM If you keep acting like that, we'll turn the temperature down even colder.
SC John's out putting on his long underwear right now.
CAPCOM Crip, did you all look at that valve? under the middeck floor?
SC We think it may not be pinned hot and the automatic system might be changing it on you.
capcom We're going to suggest if you can tolerate it a little longer, pin it full hot and we'll track it and if that does not work, just turn water loop one on.
SC Wait a minute. John says it looks like it's on full cold now.
CAPCOM Aha. Okay.
END OF TAPE.

we'll track it, and if that does not work, just turn water loop one to on.
SC Wait a minute. John says it looks like it's in full cold right now.
CAPCOM Aha! Okay.
SC OK, you want us to just pull it, pin it over to the right?
CAPCOM Roger that. We think, let's just hold it there for a little while, see what that does.
SC OK.
CAPCOM And, John and Crip, when you do that, turn the cabin camp control switch to off after that valve is pinned.
PAO This is Mission Control. The voice that came down from Columbia AOS on this pass was that of Dick Truly, the pilot of the backup crew that led Joe Allen, the Capcom to ask if the fictional crew was abord. Apparently, the crew took some taped voices of their backup crew into orbit with them, planned to play a little practical joke.
SC OK, Houston, how do you read now?
CAPCOM Columbia, this is Houston. You're still weak, but readable. Go ahead.
SC That old backup crew sounds better on the radio than they do in person.
CAPCOM Roger. That's often the case. And, Columbia, we'll be with you for 2 and a half more minutes here. Next see you over Hawaii in about 20 minutes time and be interested to know how your temperature is tracking. If you can avoid going to the water loop 1, it'll help us understand our data a bit better.
SC OK. I accidentally hit the air changer flow to water loop 1 --accidentally, so we probably ought to set it to some other value. What's your best guess it ought to be set to?
CAPCOM Go ahead, Columbia, go ahead and leave it where it is right now and let us track it for a little while.
SC Water loop 1 of course is not run but every however many minutes it is that it's turned on by GPC.
CAPCOM Columbia Houston, we're 30 seconds from LOS, and, John, if your question was about adjustment on water loop 1, it should be sitting around 950 to 1000.
SC OK. You might look at it next time you get a chance, because I accidentally hit it while I was trying, going for (garbled).
CAPCOM OK, we understand, and we'll see you in 17 minutes.
PAO This is Mission Control. Yarragadee has lost signal. Columbia's ground track over Australia is too far north to reacquire through Orroral on this orbit. The next station to see Columbia will be Hawaii in 17 minutes. This pass opened with the radioed voices of the backup crew from Spacecraft Columbia. Both of the backup crew members, Joe Engle and Dick Truly, were in the control center standing next to the Capcom when that report came down. At one day, 4 hours, 6 minutes mission elapsed time, this is Mission Control Houston.
END OF TAPE

PAO This is Mission Control, 1 day 4 hours 32 minutes elapsed time. Hawaii standing by to acquire the signal from Columbia.
CAPCOM Hello Columbia, this is Houston. We're back with your for 7 minutes. How do you read?
SC Loud and clear Houston.
SC Ok, and Joe we can pull off that DFI stuff, or at least get it started here if you like. Also, I want to inform you, if ECOM We had a momentary data glitch on water quantity B in the

supply that dropped it to off-scale low. That occurred at 4 hours 15 minutes and 30 seconds the first time and then glitched back again at 42 seconds.
SC Appears to be nominal now.
CAPCOM Ok Crip we copy that and we'd make Mr. Fendel happy if you could do that test pretty soon. Also, John, we're going to be late in coming up with the pad for the RCS 4 burn a little later than maybe you'd like. You do the burn in current atitude however, so the pad should be a pretty easy one when we do get it to you.
SC Ok, understand.
SC Joe if you've got the go, we'll go ahead and initiate this DFI stuff at this time.
CAPCOM Ok, please do.
END OF TAPE

SC (garble) DFI is set at this time.
CAPCOM Ok, please do.
SC Ok, we're stopped. Recorder main C talk back is barberpole
CAPCOM Roger, we copy.
SC Playback reverse tlkback is grey.
CAPCOM Ok.
SC Playback forward talkback barberpole then grey
CAPCOM Ok, very good.
SC Stop, talkback is barberpole.
CAPCOM Roger
SC Ok, main C recorder crrcuit breaker is cycled every 2 seconds.
CAPCOM Roger that.
SC 4 25 40

CAPCOM Roger, we're logging it too. Ok, Crip, thank you for that. We're running the clock to help you keep track of the 33 minutes. No sense in spending all your time worrying about that, we'll try to watch it for you. And we're with you for 3-1/2 more minutes on this pass.
SC Okey dokey. Is the burn time 105 12 still?
CAPCOM That's affirm and we'll have sme numbers for you shortly. Just to repeat you'll do the burn and current attitude though.
SC ok.
CAPCOM Columbia, we're thirty seconds from LOS. And we'll see you next through Buckhorn in about 3 minutes.
SC ok.
CAPCOM How's your cabin temp doing?
SC Its better. Its coming right up of course
CAPCOM Ok, good.
PAO This is Mission Control. Hawaii has loss of signal. Buckhorn will acquire Columbia in 1-1/2 minutes. This is Mission Control at one day, four hours, 32 minutes elapsed time. Columbia is approaching the northwest coast of the United States. A long pass over the continental United States. Columbia is now on orbit number 20.
CAPCOM Columbia, Houston, back with you through Buckhorn for 19 minutes over.
SC Roger that. Loud and Clear.
CAP You're loud and clear as well.
F
CAPCOM Columbia, Houston, if now's a good time I've got a partial pad for your RCS test sequence 4. No hurry, you'r option.
SC Ok, stand by one. Why you're having a hard time getting our attention is that we've got a beautiful view of the southwest here.
CAPCOM Why don't you enjoy that a few more minutes Crip. I'm just going to give you ery bottom of the pad. And there's no

hurry.
SC Really the main thing we need out of it is the page you've already given us all we need is the Delta V. And we'll be in good shape.
CAPCOM Roger, go ahead and enjoy the view.
SC Out of curiosity Houston what are you calling the weather at White Sands and at Edwards.
CAPCOM Wait one. Columbia Houston.
SC GO AHEAD
CAPCOM Ok, troops Edwards is calling for clear, observation is clear, although there may be very high thin back there which -- I don't know whether you could have seen that or not. Northrup on the other hand has severl decks of broken clouds at the moment.
SC Had some over there by Holloman, but I think it's moving out. We can see all the way down the lava field to the base of (garbled). I've got a picture of it too.
CAPcom Ok, John and Crip we copy that. Just for planning purposes. The forecast for tomorrow is about the same at both places, altough Northrup may go a bit more broken than what
SC OK
end of tape
D
D52;tme;time

D68
D70;sme;some

CAPCOM OK John and Crip, we copy that. Just for planning purposes the forecast for tomorrow is about the same at both place, although Northup may go a bit more broken than what you're looking at today.
SC OK, and Edwards is clear and real
CAPCOM That's our kind of IFR weather, right?
SC You bet ya
CAPCOM OK, John the winds forecast for Edwards tomorrow about 10 knots out of 240 degrees.
SC Sounds good
CAPCOM I think that is ready made to order.
SC I'm ready to copy the pads
CAPCOM OK Columbia, this is an incomplete pad for the RCS test sequence four. Down at the bottom there, it is a multy access burn and you're to execute the burn in your current RCS post burn attitude. Also at the bottom of the page, your post burn attitude for the test four sequence is 246.3, 207.6, 004.7 and the end attitude time is one day, 6 hours, and 14 minutes, and we'll get the other data to you as it becomes available. We're with you on this past for seven more minutes.
SC OK, it's above the access burn, post burn attitude at 246.3, 207.6 and 004.7 and the end of burn time is 6.14 and the rest is coming later.
CAPCOM That's right, thank you.
CAPCOM Columbia, this is Houston
SC Go ahead
CAPCOM OK, as you go out over the Atlantic, when you get a moment we've got some added notes from Cecil B. to Cripen for the TV setup to occur at 5 hour and 45 minutes, and give a call when you're ready or that. If you want Bob, you could put the notes in the TV setup page.
CAPCOM Columbia, Houston, with complete pad when you're ready.
SC OK, go ahead.
CAPCOM Ok, at the top now, the burn attitude for the solution numbers 145327004. The targets 144 by 144 delta V 2.0 T-go 04. The weight 207416. Tig is 5 hours and 12 minutes. Delta V -0 niner plus 13 and plus 1.2. The post burn attitude and the in attitude time are the same, over.
SC Roger, could you say again you delta V's, was that -.09?
CAPCOM Delta V's are -0.9 plus 1.3 and plus 1.2, over
SC Ok, come back at you the burn attitude 145327004 to target 144 by 144, 2.0 4 seconds of burn time. 207416 the delta. 5 hours 12 minutes delta V is -.9 plus 1.3 and 1.2.
CAPCOM OK, John read back is correct, and once again do the burn in the current attitude.
SC Alrighty.
CAPCOM And Crip we have 2 minutes remaining here if you want to take those TV set up notes, they're not very long.
SC OK, go ahead.
CAPCOM OK, just four of them Bob, this is for that TV zero 3 camera setup. The first one is

CAPCOM Crip, we have 2 minutes remaining here if you want to take those TV set up notes. Their not very long.
SC OK, go ahead.
CAPCOM OK, just four of them Bob. This is for TV 03 camera set up. The first one is insure no overhead lights in the field of view. The second one is turn all the middeck floodlights to on. The third one is attach the AUX light to the velcro on MO42 Foxtrot. And the final for the emmy award is you need the camera focused, the full near. We're 1 minute from LOS. We'll be back in 6 minutes. Over.
CAPCOM Columbia , Houston, John on your side we'd like you to freon loop number 2 and put it in RAD flow. Over.
SC Ok.
CAPCOM And, going over the hill here we've run 26 minutes now on the DFI recorder. So, we've got 7 minutes to go. We'll give you another reminder when you come up over Dekar. Over.
SC OK.
CAPCOM John, freon loop 2 ? to auto A please. Over.
PAO This is Mission Control. Dekar is the next station with overlapping coverage through Ascension Island. This pass over the United States John Young asked about current weather at Edwards and Northrup, weather at Edwards is good. Northrup, some cloudiness and high winds have been reported there. Very good weather is forecast for landing day tomorrow. Information for the fourth reaction control system test firing was passed up. That's the delta velocity is 2 feet per second. Duration of the burn, 4 seconds. Ignition time is 1 day 5 hours 12 minutes.
CAPCOM Columbia, this is Houston, back with you through Dekar for 10 minutes.
SC Okey Doke.
SC Ok, we're at 302 the burn is all fit up and the targets look okay.
CAPCOM Ok, very good. And, Crip was there any question you had about that TV set up at this time.
SC No sir.
CAPCOM Ok.
CAPCOM Columbia we're coming up on the 33 minute egg timer time for your DFI recorder. Mark.
SC Ok, it's still green, so it didn't turn itself off.
CAPCOM Ok, we copy that, it's still gray. Bob thank you.
SC It went to stop and it didn't stop.
SC Now we'll open the circuit breaker.
CAPCOM Columbia, this is Houston.
SC Go ahead Houston.
CAPCOM Ok, John and Crip want to modify your RCS 4 burn...
END OF TAPE

CAPCOM Columbia, this is Houston.
SC Go ahead, Houston.
CAPCOM OK, John and Crip, I want to modify your RCS-4 burn pad as follows. It is to be a zero delta V maneuver. Over.
SC Roger, we understand. Zero delta V. (garbled)
CAPCOM And you can move into the post-burn attitude at any time.
SC OK, we'll sure do it. We will proceed.
CAPCOM Roger that.
SC You can certainly hear these big thrusters going off up here in the nose. They really move this vehicle.
CAPCOM Roger.
SC It's really sporty.
CAPCOM Roger. Understand you can hear the thrusters. Thank you.
SC At night you can see them, and you can feel them, too, of course. In fact, doing an RCS burn in here, an OMS burn you get plenty of acceleration if your use to not doing it.
CAPCOM Sim Sup will be disappointed to hear that. Columbia Houston, we're curious to know if your cabin temp has been changing any. And we're asking more from a comfort point of view more than what the temperature itself reads.
SC It seems to be warming up, but then again it seems to be not too warm right now. It was warmer earlier.
SC Right now it's certainly warmer than when we complained about it while ago.
CAPCOM OK. Columbia, we're looking ahead toward your sleep period tonight, and we're thinking we may ask you to have both the water loops on to increase that temperature a bit more even.
SC OK.
CAPCOM Columbia Houston, Crip, continue your comment about the procedure on the DFI recorder. Did you report that talk-back finally did change?
SC Only after I went to stop.
CAPCOM OK, and then, so you did go to stop and then opened the circuit breaker, the last step on the page?
SC Roger that. I went to stop, the talk-back went barberpole and I opened the circuit breaker.
CAPCOM OK, thank you very much. Columbia, we're 30 seconds from LOS. We'll be back in 5 minutes through Botswana.
SC OK, Houston, we'll be there.
PAO This is Mission Control. Ascension Island has lost the signal. Next station is Botswana in about 4 and a half minutes, continuing to troubleshoot the Development Flight Instrumentation recorder, found out during this pass that that recorder still will not stop automatically. The crew has to stop it and pull the circuit breaker. The

INCO will continue to study data and come up with other troubleshooting procedures. Also, during this pass we changed the RCS No. 4 firing change in velocity to zero that had been 2 feet per second, that was changed to zero. That test scheduled in 2 minutes, 15 seconds. That's before we will have acquisition at Botswana. The crew reported that they can hear, see and feel the Reaction Control System thrusters

firing. One day, 5 hours, 10 minutes, this is Mission Control Houston.
END OF TAPE
pn
pn

PAO This is Mission Control at 1 day, 5 hours, 13 minutes elapsed time. We're standing by to talk to Columbia through Botswana
CAPCOM Columbia Houston, see you through Botswana for just under five minutes, over.
SC How do you read?
CAPCOM Loud and clear.
SC Did you find it there John.
CAPCOM Crip, was that for us? over.
SC I was talking to John downstairs, got the wrong button.
CAPCOM Roger
SC Story of my life
CAPCOM Columbia Houston, have a note for you, panel R-2 reconfiguration if that's handy to you, over.
SC Give me about 3 seconds here.
CAPCOM Roger
SC Go ahead
CAPCOM OK, on panel R-2, your ET umbilical door mode switch, we would like it to go to GPC and that would preclude a micro switch failure from causing the motors from driving against the torque limiters. And if you have one of your yellow plastic switch covers handy, you might slip it over it.
SC OK, thank you.
CAPCOM Columbia Houston, we've got 50 more seconds in this pass, we'll see next at Yarragadee at 5 hours and 31 minutes, over.
SC Sounds good, 5 31. What are we supposed to be doing now, have I got time to shave.
CAPCOM It sounds like it John.
SC He's trying to talk to me again Rick, wrong button again. But you're right, he's got time to shave.
CAPCOM It sounds like it John. Roger just we'll delay that.
SC Quit using that Navy talk.
CAPCOM You guessed it.
PAO This is Mission Control, Columbia has moved out over the Indian Ocean out of range of Botswana station now. Next station to see will be Yarragadee Australia in 12 minutes.
At 1 day, 5 hours, 19 minutes, this is Mission Control Houston. This is Mission Control at 1 day, 5 hours, 31 minutes elapsed time. Columbia will be within range of the Yarragadee station in about 10 seconds.
CAPCOM Hello Columbia this is Houston through Yarragadee for 7 minutes, how do you read?
SC Loud and clear Houston.
CAPCOM OK, John you're loud and clear as well.
END OF TAPE

CAPCOM Ok, John you're loud and clear as well.
And Columbia, we're going to ask for another RCS maneuver using the current attitude, it will be a body access manuever and we'll have more information shortly.
SC Ok.
CAPCOM Columbia this is Houston over.
SC (garbled)
CAPCOM Ok, looking ahead up there over Guam we're going to ask you to enter connect to the right OMS and also to bump up the pressure in the left OMS. We're also sending one line teleprinter message to you there we'd like you to glance at before you get to Hawaii and finally, we'll be with yo" for 3 more minutes here and I'll give you a pad for this next burn shortly.
SC Ok.
CAPCOM Columbia Houston. Columbia this is Houston, over.
CAPCOM Hello Columbia this is Houston do you read.
SC We're here.
CAPCOM You're weak but we're basically in the blind. We'd like a body access burn at the time 5 hours 42 minutes and 35 seconds and the Delta V's as follows: Delta V body X + 4.4; Y +3.4; and Z of -2.1. And that means burn the body VG's to those values. And do the burn in OPS 2 please. over.
SC Houston, you're cutting out.
CAPCOM Ok, Columbia the VG's count up and we want X to count up to +4.4; Y +3.4 nd Z-02.1. Over.
And that's done with the ops 2 major mode display.
SC That whole thing was completely broken. We didn't hear a word you said there.
CAPCOM Ok, John at the time of 5 hours, 42 minutes and 35 seconds, we want the body access burn s of Delta V X 4.4; Y of 3.4; and Z of -2.1 ,over .
And that's in OPS 2 and we'll see you shortly through Guam.
PAO This is Mission Control. Yaragadee has loss of signal . Columbia is near the end of the 20th orbit but will begin orbit number 21 just about acquisition time at Guam in 5 minutes, 10 seconds. D"ring the next pass over the Continental United States, there will be television from Columbia while John Young and Bob Crippen converse with Vice Presient George Bush. That's scheduled for the next pass over the Continental United States. At 1 day 5 hours, 42 minutes elapsed time, this is Mission Control Houston.
CAPCOM Columbia Houston through Guam do you read , over? Columbia this is Houston through Guam for 4 minutes. How do you read?
SC Loud and clear Joe. Read you loud and clear this thrust monitor is not working right at all. It's not giving us the right velocity. I thought that we all knew it was not satisfactory for doing burns.

CAPCOM ...for 4 minutes how do you read?
SC Loud and clear Joe.
SC We read you loud and clear. This thrust control monitor is not working right at all. It's just not giving us the right velocity.
SC Yeah, I thought we all knew that it was not satisfactory for doing burns.
CAPCOM Ok, we did know that it was only semi-acurate.
SC (garbled)
SC Ok doing all that we end up having to pressurize the OMS tank. And, we also ended up failing off sensor reject because they were using the translation here.
CAPCOM Ok we understand that Crip.
SC I'm going to go back and reselect them.
CAPCOM Ok, very good.
CAPCOM Columbia, Houston, we're with you for 3 more minutes here Going to send some (garbled) to you and you have a one liner on the teleprinter.
SC Ok.
CAPCOM And, Crip, when convenient switch to the right OMS IF YOUwould.
SC Ok, we'll do that.
SC Joe the next time somebody wants to do something like that I could have gotten a in OPS 3 and we could have done it cleaner.
CAPCOM Ok, we understand. And we learned a lesson from that one as well.
CAPCOM Columbia, the reselected jets look good.
SC Joe, what do you want us to do about attitude?
CAPCOm Columbia go ahead and maintain post-burn attitude the currnt one please.
SC Roger, we'll do that. ?
CAPCOM Columbia, Houston, we're with you for 40 more seconds here and we'll see you next through Hawaii shortly pass through Hawaii. Sorry to rush you that way. We're trying to squeeze a little more for the press conference to follow and we're looking forward to that.
SC We're looking forward to lunch.
PAO This is Mission Control. Guam has loss of signal. Comm not to good over that station this pass. Now on orbit 21 Hawaii acquires Columbia in 7 minutes. At 1 day 5 hours 52 minutes elapsed time this is Mission Control Houston.
END OF TAPE

CAPCOM Hello, Columbia, Houston with you through Hawaii for 2 and a half minutes. How do you read?
SC Loud and clear Houston
CAPCOM Columbia, this is Houston with you for 20 more seconds. We'll go into a keyhole, be with you momentarily, and then see you Konas about 5 minutes after that.
SC OK, Joe.
PAO This is Mission Control.
CAPCOM Columbia Houston for 30 more seconds now would you turn on the Minus Z star tracker for warm-up, please?
SC We'll do that. We're just sitting here enjoying hot pastrami, correction, hot corned beef sandwiches, courtesy of John Young.
CAPCOM Oh, my, oh, my! OK, we'll be back in about 6 minutes, and be looking for television.
PAO This is Mission Control. Hawaii's had Loss of Signal. Buckhorn will acquire in 3 and a half minutes. And we will have television when we get to Goldstone. This will be television of the crew and Vice President Bush. We're three minutes away now from acquisition by the west coast. We'll stand by.
PAO Mission Control. Buckhorn has acquisition now.
CAPCOM Hello, Columbia Houston, back with you through Buckhorn for 16 minutes. How do you read?
SC Get you loud and clear.
CAPCOM Roger. You're loud and clear as well.
SC And we have a telephone message coming down.
Joe, are you guys receiving TV at this time?
SC And we've got
CAPCOM Crip, we're a little early. We'll pick it up at Goldstone, and let's see, that'll be a few more seconds yet. Stand by.
END OF TAPE

CAPCOM That'll be a few more seconds yet, stand by.
PAO We're receiving television now.
CAPCOM Okay, Columbia. We're getting a TV picture now and see you floating over into position now, looks pretty good.
SC Right.
CAPCOM John and Crip, we have a telephone call coming into the space network from the White House for the crew members of the spaceship Columbia. We wouldlike to patch them through, if you would please, Mr. Vice-President, go ahead.
SC Absolutely.
Hello, Mr. Vice-President. Yes, sir. We're just having alot of fun up here.
BUSH Hey, listen. I'm glad to talk to both you and Crip. How's he behaving?
SC I'm trying to behave pretty well, Mr. Vice-President.
BUSH Well, Crip, this is far away from when we were doing our rnning down there and I've just come from seeing the President.
SC (garbled)
BUSH How's it going up there? Everything (garbled) alright?
SC The spaceship is just performing beautifully.
BUSH Well, that's great(garbled)...I think that your trip is just going to ignite the excitement and the forward thinking for this country so I really just wanted to cal up and wish you the very best.
SC We certainly apreciate it, Mr. Vice-President. Thank you very much sir.
BUSH The only thing wrong is I don't get to see you in Houston, Texas, I don't think. I don't think that they're going to let me come down there and I had planned to be there when you got bac on Sunday.
SC Well, we (garbled) to see you Mr. Vice-President.
BUSH Well, we'll want you up here, I guarantee you that and congratulations on what you're doing. How's Crips heartbeat doing?
SC Gone down to about nothing I think.
BUSH Oh, really. I couldn't understand that. I though he was a calm guy out there, you know and now look at him.
SC Right, right.
BUSH It's great talking to you and I'll let you go back to work.

What's the next thing you've got to do?
SC Well, we have some more flight plan RCS jet tests to run tonight and we're also going to find out thta, if we can don our suits that we're going to use for entry and strap into the seats without any problem.
BUSH Oh, that's great. I'm sure it'll go well. Sitting right behind my desk is that model you gave me down there and also the picture of you two guys. It was there before this phone call, too.
SC Oh, we appreciate it Mr. Vice-President.
BUSH Alright, back t work, but it's great talking to you. and best of luck. We'll be watching that re-entry andthe landing with great interest on behalf og the whole country I'll tell you

everybody will be.
SC Thank you sir. Thatnk youvery much, sir.
BUSH So long Bob. So long John. Good talking to you. Best of luck.
SC Yes sir.
SC Hello, Houston. We're back with you.
CAPCOM Roger, Columbia. You've got your normal CAPCOMs back now.
SC Okay. The only bad part about it Joe is we're going to have to come down.
CAPCOM Well, don't come down in that attitude.
SC Oh, it's a pretty good attitude.
CAPCOM We're getting a terrific television picture now. Beautiful.
SC I'm not sure of the scenery you just got but whatever. That's a great camera. It really puts out a nice picture. Even Crippen ca run it sometimes.You know people were worried about the mid-deck, (garbled) float around, boy it's just great.
CAPCOM Crip, all of us very much rookies down here wondering how you're enjoying zero-gravity flight. You look like you're....
END OF TAPE

SC You people were worried about the mid-deck you can get in there and float around -- this is great.
great.
CAPCOM Crip, all of us very much Rookies down here are wondering how you are enjoying zero-gravity flight. You look like you're enjoying it.
PAO This is Mission Control, we've handed over to Tula Peak and lost the picture at Goldstone.
. We expect to reacquire television at Merritt Island station.
PAO This is Mission Control, we do not expect television through Merritt Island, Flight Director said we will go back to normal operations.
SC Hello, Joe, are you tagged back up with us again.
CAPCOM Roger, we're right here, be here for 7 minutes, Bob.
SC OK, it sounded like you dropped out there. Be advised for GNC that 603 we had, 603 58 to be specific, we had a display aft message and he's the only one that really got any good visibility into it unless I go ahead and do some reads, but we're not activating any of those switches at the time. Its probably no serious consequence anyhow but he might take a look at it.
CAPCOM OK, Crip, we understand that and we see that fault message down here as well.
SC OK, are we go to maneuver to this IMU align attitude
CAPCOM Wait one.
CAPCOM Go ahead and maneuver to that attitude when you're ready. Columbia, we may have been in a handover right then, you are go to the maneuver to that attitude.
SC Roger, we have that in work.
CAPCOM OK. And Crip we're curious after seeing that good TV, just wondering how you're finding zero-g by now. It looks like it's more fun than you can describe.
SC You got it baby.
CAPCOM OK, thank you.
SC Restraints and everything to work down there in the middeck and you don't need any restraints, its everything you just say right within your fingertips. Don't even need any back here on the aft deck, to work out the window.
CAPCOM Very interesting.
SC Sure would be nice to have some cordless mikes up here, that's the only thing you got to worry about staying connected and not getting yourself wrapped around something.
CAPCOM Roger, we copy that.
SC Joe, I screwed you all up a while ago, I did not get my paper tagged down on my teleprinter, we had a bunch of things going on and you sent up some messages, none of which came through clearly because of that The last clear message I hd was the one line you gave me about the sixth telecon we just had.
CAPCOM OK, Crip, it may be better than you think. We have not sent a message since then. So thanks for keeping it straight.
SC Somebody was sending me something.

CAPCOM Rog, I probably reminded you once too often of that one you've already gotton. No big deal at all. And we're with you for 3 more minutes here.
SC What I was saying was, something was sending a lot of traffic on the teleprinter there.
CAPCOM We're going to look into that, it might be a bit more of a mystery.
CAPCOM Columbia, Houston, with regards of the teleprinter message, if any of your ATU's have air-to-ground 2 in transmit receive you may be hearing yourself turn around on the teleprinter.
SC You call it the one John plugged into down here on the middeck had it.
CAPCOM Columbia, Houston, we'll be going LOS in 30 seconds be back with you through Ascension in 14 minutes.
SC Roger that.
PAO This is Mission Control. The next station will be Ascension ~s Island a short pass there, about 3 minutes.
Bob Crippen

SC Yeah, people were worried about the middeck (garbled), this is great.
CAPCOM Crip, all of us very much Rookies down here are wondering how you are enjoying zero-gravity flight. You look like you're enjoying it.
PAO This is Mission Control, we've handed over to Tula Peak and lost the picture.
. We expect to reacquire television at Merritt Island station.
PAO This is Mission Control, we do not expect television through Merritt Island, Flight Director said we will go back to normal operations.
SC Hello, Joe, are you tagged back up with us again.
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SC OK, it sounded like you dropped out there. Be advised for GNC that 603 we had, 603 58 to be specific, we had a display aft message and he's the only one that really got any good visibility into it unless I go ahead and do some reads, but we're not activating any of those switches at the time. Its probably no serious consequence anyhow but he might take a look at it.
CAPCOM OK, Crip, we understand that and we see that talk message down here as well.
SC OK, are we go to maneuver to this (garbled)
CAPCOM Wait one.
CAPCOM Go ahead and maneuver to that attitude when you're ready. Columbia, we may have been in a handover right then, you are go to the maneuver to that attitude.

pao
PAO Columbia has loss of signal. Next station will be Ascension Island. A sort pass there about 3 minutes. Bob Crippen indicated during this pass that he's had no problem adjusting to lack of gravity. He said that he is enjoying zero-g very much. Both crewmen reported no restraints needed the work in either mid or aft decks. That had been a question prior to flight. They seemed to think that they can perform their duties on those decks without restraints.

Ascension is about 12 minutes away at one day 6 hours, 25 minutes mission elapsed time. This is mission control, Houston.

PAO This is mission control at one day, 6 hours, 37 minutes elapsed time. Columbia is coming within range of the tracking station on Ascension Island now.

CAPCOM Columbia this is Houston through Ascension for 3 minutes, How do you read.

SC Loud and clear

CAPCOM Ok, Crip you're loud and clear. We're going to send a new state vector upto you this pass. And we've got some good news to go with it. We've looked at your freeze dried GPC dump and find no miscompares at all.

SC Very good.

CAPCOM Got a couple of config requests for you. We'd like the high load dump heater to off when convenient and also, on R 13 would you check the rad controls switches. We think they might still be in RAD deploy position and they should be off.

SC Ok, you're right on that one I just saw that and we corrected it. Sorry about that. I'm checking off the ducting heaters now, is that right?

CAPCOM The high load duct heaters Bob.

SC High Load is off at this time.

CAPCOM Ok, and like to give you 2 reminders -- we'd like for you to do the SM2 check point per the cue card whenever it's convenient for you. No hurry. And thelast one for you Crip, when you get your suit on you might want to check to see whether or not you can push that DFI recorder circuit breaker behind you when you're in your seat there. It might save you some trouble later on -- It looks like that may be the procedure that we'll be asking you to use tomorrow.

SC. Ok, Joe, and I'll make a note to myself and if you happen to be talking to me while I'm in my seat well why don't you holler at me about that again.

CAPCOM We'll certainly do that. And we're with you for a minute longer here. Be looking for you to start the PTC test shortly.

SC Roger, that. we're in attitude now

PAO This is mission control, Ascension has loss of signal. Next acquisition through Botswana in 9 minutes.

CAPCOM Columbia, we'll see you in .....

END OF TAPE

CAPCOM —And with this pass we are handing over to a very able bronze team. We'll watch the fun from the back room and look forward to being with you tomorrow.
PAO This is Mission Control. Botswana has had Loss of Signal. Next acquisition through Guam in 25 minutes. Here in the Mission Control Center, the bronze team of flight controllers, led by Flight Director, Chuck Lewis, is preparing to take over the shift from Don Puddy and the crimson team. The Change of Shift News Conference is scheduled for 2:00 p.m. Central Standard Time in room 135 at the JSC News Center. One day, 6 hours, 54 minutes elapsed time, this is Mission Control, Houston.
CAPCOM Columbia Houston, the bronze team's back with you through Guam for the next 7 minutes. How are things going?
SC This is the CDR talking to you through his helmet in his boots and I'm all locked in here.
CAPCOM Okay, copy that, and where are you, Crip, in your suit activities.
SC Crippen is down in the payload bay putting his suit on. I mean down in the middeck, excuse me.
CAPCOM Columbia, Houston, we're running a comm test on low data rate now. Does this voice sound any different to you than high data rate voice?
SC It sounds, the background sounds scratchy, but other than that, it sounds okay.
CAPCOM Roger. We copy that. It does sound a little scratchier and a little hollow, too, because you've got your helmet on.
CAPCOM Columbia, Houston, we're one minute to LOS. Stateside is next at 7:42, and just a reminder to Crip, when you get ready to ingress the seat, don't forget to take that swizzle stick and give a go at that circuit breaker.
SC OK, I'll tell him, Henry. He's still downstairs off comm.
CAPCOM And, John, when we come up stateside, if it's convenient, we're going to be asking you for the IMU torquing angles. If it's not convenient, that's no problem. I just thought you might have them ready there to do it.
SC OK.
PAO This is Mission Control Houston, one day, 7 hours, 26 minutes into the flight of Columbia. During that just completed pass at Guam, Commander John Young reported that he indeed completed suiting up and was strapped into the seat on the flight deck, while Bob Crippen was still on the mid-deck getting suited up in the suit donning and doffing test. Also, as part of this exercise, they will attempt to--
END OF TAPE

PAO ...Bob Crippen was wstill on mid-deck getting suited up] in this suit donning and doffing test. Also, as part of this exercise they will attempt to manage the circuit breaker with a so called swizzle stick for the DFI recorder that seems to be running amuck. Next station upcoming will be Buckhorn, Goldstone, etc. on the states. We're estimating the change of shift briefing with the outgoing fight directors, Don Puddy at 2pm SCST in the Johnson Space Center Newsroom. He will be accompanied by Johnson Space Center Deputy Director of Flight Operations Gene Kranz. That will time out to just shortly after last station pass ocross the states and Quito Ecuador. 13 minutes away from west coast stations at 1 day 7 hours 28 minutes this is mission Control Houston.

PAO This is Mission Control Houston 30 seconds away from reacquisition through the states. Beginning at Buckhorn, Goldstone, Tula and almost overlapping into Quito Ecuador. Following this stateside pass at approximately 2 pm CST the change of sift press conference will take place in Johnson Space Center newsroom.

SC HELLO Houston, how do you read, Columbia?

CAPCOM Columbia, Houston, read you loud and clear. We should be with you at stateside and Quito for about the nxt 20 minutes.

SC Ok, Hank, John has already completed his suiting activity and I just finished mine and I wanted to make sure I got a comm check with you over through the suit. You sound good how about me.

CAPCOM Read you loud and clear Crip. And, did you have a chance to try the swizzle stick on the circuit breaker.

SCA Oh, good reminder, because I was just about to forget it.

SC John just reminderd me again.

CAPCOM Columbia, Houston, your state vector is good we will not be sending you one hero. John whenever it is convenient we'll be standing by for the IMU torque alignment

SC Hank, he's just climbing out of his seat and so forth, why don't we get those to you in a litle while.

CAPCOM Ok, no problem. Whenever it is convenient.

CAPCOM Columbia, Houston, just as a reminder, there is a callout in the 740 in the CAP reagarding the primary RCS PCT test.

CAPCOM I thing all you got to do there is just go beyond our norm.

sc I'm sorry Hannk....

END OF TAPE

CAPCOM 7 40 in the cap regarding the primary RCS PCT test.
I think all you got to do there, is go B out of norm.
SC I'm sorry, we're all tied up, say again.
CAPCOM Roger, I think just call up the normal jets for the rest
of the PCT test and you'll be alright. Just be out of norm.
SC Do you need that now?
CAPCOM Whenever you can work it in.
SC OK, well, I'm trying to check out your swivel stick for you.
Henry.
CAPCOM Yes sir, go ahead.
SC I might accidentally do it, but I can't do it now. I can
just barely lay the top of the swivel stick on top of it but I can't
get any pressure on it. I got my neck, I rotated 180 degrees to do
that.
CAPCOM OK, do you have your coat hook ready to hook up on top or did
CAPCOM Ok, do you have your coat hook ready to hook up on top or did
you loosen those.
SC No, I got them connected.
CAPCOM Richard suggested that you might be able to undo those and
make it.
SC Oh yeah, I can do that. (garbled) I don't understand
what it is you're all asking. When is it you were thinking you
might ask me to do that?
CAPCOM Somewhere along about tig -4 minutes.
SC Huh Huh (MEANING NO)
SC I got APU's to start and a burn to get off.
I'd be happy
to get them after the burn or something.
CAPCOM OK, Crip, don't bother trying to work at it any more now,
We were just seeing about how difficult it was.
SC It was extremely difficult in this suit.
CAPCOM OK, we copy that, why don't you just press ahead.
SC How's the old bronze team doing today?
CAPCOM Doing real well, looks like you folks have patched along
real good too.
SC OH yeah, we're just going right and left here.
. Did Jan make it back from launch.
CAPCOM That affirm.
SC What does she think of all that?
CAPCOM She thought that was super, about that thing she's seen.
SC I think these normal jets are really impressive, it sounds
like somebody out firing howitzers outside the window.
CAPCOM OK, we really like that about the howitzers
SC They shake the whole house. I think I'm going to drop
com here unless you guys got something for me. When not going to
have either of us on the headsets for a couple of minutes. I got
a headset on as soon as I can, If that'll be ok.
CAPCOM OK, one more quickie before you pop off here. The reason
why we are hung up on this DFI, we're trying to get the entry data
from from pass to pass and we don't know exactly where we are on this DFI
tape to know how much we've got. We also, so you might be thinking

about it, you might want to get out you orbit OPS and crew systems checklists, but we're considering a changeout of the BFI recorder in order so that we can have that data for re-entry.
SC OK, I understand and I want data as much as anybody, but I feel that time to put in that circuit breaker a couple of minutes before the burn, jeopordizes what we're trying to do.
CAPCOM OK, and we copy that and there will be a management meeting this afternoon to try to decide which way we want to go with this thing.
SC OK. Can I drop here for a minute or something.
CAPCOM Yeah, go ahead, we got about 2 minutes, we might drop out shortly, we'll pick right back up in Quito, we'll be with you until 8:02. Columbia, Houston, we're going to be down for 10-20 seconds for a long handover.
SC ...
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D61;

CAPCOM We'll just have to get back with you, Crip, on when we plan to dump that. We're coming up on a long LOS is the reason I had to get that to you. Our next contact will be stateside again at 0917.
SC Roger. 0917.
CAPCOM And also, Crip, at your convenience, we recommend the SM checkpoint.
SC It hasn't been convenient yet. How about bedtime? I get one normally there.
PAO This is Mission Control Houston, LOS through Quito. Change of shift briefing commencing momentarily in the news center. We'll record all air-ground and play it back after the conclusion of the press conference. We go now to the JSC newsroom.
PAO OK, good afternoon. We're ready to start. These gentleman are here to participate in the change of shift briefing. From my right, Mr. Tom Mosier, from the JSC Structures and Mechanics Division, Flight Director on the
END OF TAPE

PAO This is Mission Control Houston. During the just completed press conference we've had one pass across Botswana, which we will play back at this time.
SC You there?
CAPCOM Roger. We're still with you for about the next 4 minutes.
SC Okey-doke.
CAPCOM Columbia Houston, I've got something I need to get to you and it requires you copying down an attitude, if it's convenient.
SC OK, what's your attitude?
CAPCOM OK. Roll 147.5, pitch 106.1—
SC Hank, you're going to have to start over. Stand by. OK, go ahead now.
CAPCOM OK, roll, pitch, and yaw, in that order. 147.5, 106.1, 335.0. After you've completed your RCS FTOs, and that's about 9 hours into the flight plan there, 9 hours and 12 minutes, which is about on page 2-29 there in the cap, we want you to go to this attitude at V auto burn, and we want you to repeat message no. 006 instructions that's in that message for the sunlit side of the vehicle.
SC Hank, I understand you want to duplicate again what we did in 006 entirely, including the subject and everything.
CAPCOM That's affirmative, but on the sunlit side of the vehicle. We didn't get one side there.
SC OK.
CAPCOM And as soon as you can get that in, pick up the cap with the maneuver that's called out there and press on.
PAO This is Mission Control. That completes the playback of the Botswana pass recorded during the just completed change of shift press briefing, 26 minutes away from next AOS, which will be Goldstone, Buckhorn, west coast stations. However, we'll come up live for those and some time after LOS we'll be having a briefing on landing and spacecraft safing procedures from Dryden Spaceflight Research Center, at 1 day, 8 hours 50 minutes elapsed time, Mission Control Houston.
PAO This is Mission Control Houston, 1 day, 8 hours 56 minutes Mission elapsed time. There will be a playback of the downlink video from Columbia that includes the two-way conversation between the crew of Columbia and Vice President Bush at 57 minutes past the hour, some 30 seconds from now, and we'll stand by for that to come over the tube.
CAPCOM Right. John and Crip, we have a telephone call coming into the space network from the White House for the crew members of the spaceship Columbia. We would like to patch them through, if you would, please. Mr. Vice President, go ahead.
VP BUSH Absolutely. Right.
SC Hello, Mr. Vice President.
VP BUSH How are you doing?
SC Yes, sir. We're having a lot of fun up here (garble).
SC I'm trying to behave pretty well, Mr. Vice President.
VP BUSH (garble) space ship is just performing beautifully. I think your trip is just going to ignite the excitement and the forward thinking for this country.
END OF TAPE

SC (garbled)
SC Spaceship is just performing beautifully.
VP BUSH I think your trip is just going to ignite the excitement in the forward thinking for this country, so I really just wanted to call up and wish you the very best.
SC We surely do appreciate it Mr. Vice President. Thank you very much sir.
VP BUSH The only thing wrong is I don't get to see you in Houston, Texas, I don't think, cause I don't think they are going to let me come down there. I'd planned to be there when you got back there on Sunday.
SC Well, we'll come and see you Mr. Vice President.
VP BUSH Well we'll want you up here I can guarantee you that, and congratulations on what your doing. How's Crip's heartbeat doing?
SC It's gone to about nothing, I think
VP BUSH IOh really. I couldn't understand that, I thought he was a calm guy out there and now look at him.
SC Right, right.
VP BUSH It's great talking to you and I'll let you go back to work. What's the next thing you've got to do?
SC We have some more flight plans RCS jet preps to run tonight. And, we're going to also find out if we can don our suits that we're going to use for entry and strap into the seats without any problem.
VP BUSH Oh, that's great. I'm sure it will go well. Sitting right behind my desk is that the model you gave me down there, and also the picture of you two guys. And it was there before this phone call too.
SC We appreciate it Mr. Vice President
VP BUSH All right, back to work, but it's great talking to you. And best of luck, we'll be watching that reentry and landing with great interest on behalf of the country I'll tell you everybody will be.
SC Thank you sir.
SC Thank you very much sir.
VP BUSH So long Bob, So long John, good talking to you . Best of luck.
SC YES sir.
SC Hello Houston we're back with you.
CAPCOM Roger Columbia, you've got your normal CAPCOM back now.
SC OK.
SC The only bad part about it Joe is we're going to have to come down.
CAPCOM Well don't come down with that attitude.
SC Oh, it's a pretty good attitude.
CAPCOM We're getting a terrific television picuture now. Beautiful.
SC I'm not sure of the scenery you just got, but whatever. That's a great camera, it really puts out a good picture. Even Crippen can run it sometime.

SC Tell the people worried about the middeck you can get in there and float around. Boy it's just great.
CAPCOM Crip, all of us very much rookies down here were wondering how you're enjoying 0 gravity flight. You look like your enjoying it.
END OF TAPE

PAO One more time. This is Mission Control Houston, 1 hour 9 minutes, 37 seconds now into elapsed time, 1 day, 9 hours, 37, I guess it should be. We've accumulated some tape over the states and over the just completed Quito pass, which we recorded in anticipation of the feed from Dryden on a post landing press conference, landing operation press conference. Let's roll all of that tape now and get it out of the way.

CAPCOM Columbia Houston through Buckhorn for the next 6 and one half minutes. We've got a few items for you.
If you'd like to give us the status first, we'll wait.

SC OK, we're still working that message 6 item.

CAPCOM Roger, we copy. I have a couple of items that are listen items only, if you can listen while you work.
Columbia Houston, can you listen now?

SC Okay, Hank, I guess I can listen up.

CAPCOM OK, our management has met and talked about this DFI problem and we have concluded that the data that we would get on that is very important to have. What the DFI recorder would have for entry is the thermal from EI through blackout exit, and that's pretty important to us. And after studying the thing, we're not even sure that that thing is even working, even though we're getting a great talk-back. We've got that much concern about it, so independent of your swizzle stick operation, what we want to do is change out that recorder to as I indicated to you earlier. What we're doing now is modifying the flight plan. Stand by, we're going to have a handover here.

SC I'm still listening Hank.

CAPCOM OK, we're out of handover now. What we're thinking of doing is shifting a few items to starting at about 10 and a half hours into John's side of the house there, and give you about an hour fifteen to do that change-out, and we may delete the 16 mm camera activities that come up about 10:45, 11:45, there in the flight plan, if it's necessary to do that.

SC Hank, I'll tell you what. You're going to have to delete something out of the flight plan if you want us to do another hour and a half's worth of work.

CAPCOM We understand that, Crip, and we're in the process of trying to get that. We will send it up in a message to you. The alternative is to try to do it in the morning and first thing, and I'm not so sure that's such a good idea. We'd like to have it squared away and understand where we are this afternoon, if possible.

SC Yeah, if we're going to do it, we ought to do it this evening.

CAPCOM OK. I thought that you'd concur in that. In any event, we are going to take some things out of the flight plan and make time for you to do that, if you concur. And we'll have a message coming to you that'll spell out the details. There are a few short mods to that PCM recorder changeout that we'll have to get to you that'll also be in the message. If there was a chance that you wanted to get started early, in laying out your tools and equipment, there's only one change in that parts of things before you really get to doing some disconnecting.

SC OK, you're breaking up a little now. Are you suggesting

that you want me to copy and (garble) down?
CAPCOM That's a negative. That's a negative. We just wanted to, if you've got a chance to get that procedure out and review it to see if there were any questions, it's on page 3-26 in the in-flight maintenance section there of the crew systems. Also, a different subject here, another one of these listen jobbies, you had a message here earlier on display switch A, Alpha, that you were concerned about. I think we understand that a little better now. There's a software note out on that. When you do an IO reset and you get a temporary comm fault on an item, —
SC I understand that, I understand that.
CAPCOM OK, where the culprit is in the aft, back there, is an element for the rendezvous radar, which we don't have, and before the algorithm there could sort out that it didn't have that thing, it had already— the comm faults had already occurred, and that's what caused it. It's nothing to worry about- there's absolutely nothing wrong. I would caution you, however, that it could occur again.
END OF TAPE
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CAPCOM ...didn't have that thing, the comm faults had already occurred and that's what caused it. It's nothing to worry about there's absolutely nothing wrong. I would caution you, however, that it could occur again.
CAPCOM Columbia, Houston. We're about 45 seconds away from LOS. Quito is next at 9:31 and at that point I have your supply water dump quantity. And a little note on prop. A little small delta to the capp that I can get to you if you'll be ready for that.
SC Ok.
CAPCOM Columbia, Houston through Quito for the next 4 minutes. Your state vector is good we won't be shipping one and I got a few items for you here.
SC Ok Hank.
CAPCOM Ok, I guess one to get out of the way. We're trying to help you out and get the cabin a little warmer and we think we can do that if you'll bring up water loop 1.
SC Now wait a minute we don't want it a little warmer right now.
CAPCOM Oh, is it too warm now.
SC It's pretty warm.
CAPCOM Ok, if it does get uncomfortable tonight, if you were to turn water loop 1 on in addition to water loop 2 that should warm up the cabin a little bit.
SC Ok.
CAPCOM I have your dump quantities. Supply water tank Bravo we want to dump XO 30%, tank Alphas okay. The waste water tank dump to 80%.
SC Ok. Supply Bravo to 30%, waste to 80%.
CAPCOM That's affirmative, and we're shipping a teleprinter mess ge to you on the changes to inflight maintenance for the DFI recorder.
SC Roger that.
SC Hank, mentioning the tank Bravo, there, I had reported once that it happened a subsequent time today that we had a little, looked like a transduceer yet on tank Bravo and it's quantity went to zero which rang an alarm. I just want to ask you guys whether we ought to inhibit that tonight.
CAPCOM Ok, we'll certainly do that Crip.
CAPCOM Columbia, Houston, we see a 1 degree deadband. I think the capp calls for 2 degrees at about 91390 capp.
SC Ok, we'll double check it.
SC Hank, that (garbled) is at about 912 on the ops recorder.
OM Ok, we copy that and I do have a one small CAP change for thats on 231 at Page 231 at 1110.
SC Alright.
CAPCOM At 1110 there or just part of that, its got a litle item about interconnect return ops 2 and 3. We'd like to move that to 1220 in the CAP, which is over on the next page.
SC Ok.
CAPCOM We've got about 1 minute LOS. We had wanted to get the IMU torque items. We still don't have those things. I don't know

whether we can whip them out this quick or not. They're probably not available to you that quick.
SC John is down there trying to get the message off the recorder.
CAPCOM Ok, we've got a ground problem Crip, apparrently we didn't get our teleprinter message up to you. If you wanted to start the (garbled) on that flight maintenance, you'll want to get some of your tools out. You can do everything on the first page up through step 7 and step 5, it's get the tools out, that's one thing you want to do, is make sure you get out, is your cookie sheet, the cold plate proctective cover.
SC Ok. Why can't I just go ahaed and start on it?
SC What is it your checking...
END OF TAPE

CAPCOM have the cold plate protective cover.
SC OK. Why can't I go ahead and just start on it?
What is it you're changing?
CAPCOM What we're really changing is the order in which we disconnect the connectors there on step 8. That's where the changes are. And we'll give you that change at Botswana verbally maybe, if we can bypass the (garble) that's the only big item. The main thing is we want to make sure we protect that cold plate with that cookie sheet, and then the order in which we do the connectors, and if you'd like, you can go ahead and get started on that.
CAPCOM Columbia Houston, we're about to go LOS. We might see you at Santiago at 9:39, and if we don't, we'll catch you at Botswana at 9:58. Columbia Houston, we might have you 20, 30 seconds here through Santiago. Tell you real quick here that if we do lose you, we'll pick you up at Botswana at 9:58.
SC OK, Hank, and I think I've got that 2 degree deadband squared away.
CAPCOM OK, and as soon as we can, we are going to try to get a teleprinter message up that will spell out the detailed flight plan changes. There's a TV coming up in which you're supposed to do the LIO change out, and CO2 absorber replacement and we thought you could, if it's no big deal, substitute in there a TV of you doing some of the recorder changeout, which would also be a first, I guess, of photos of in-flight maintenance.
SC OK, you guys have had it so rushed today, I've got one camera set up, and you can have the one camera.
CAPCOM That'll be just super.
PAO This is Mission Control Houston. That cleans up accumulated tape from the passes over the states, Quito, Santiago. We're 7 minutes away from reacquisition through Botswana voice relay station. One day, 9 hours, 50 minutes elapsed time, Mission Control Houston.
PAO Mission Control Houston, about 5 seconds away from Botswana voice relay station and standing by.
CAPCOM Crip, you're dropping out. Columbia Houston (garble) from LOS. We'll be gone for a minute and a half and be back with you at 23 plus 22.
PAO This is Mission Control at 23 hours and 20 minutes Missin elapsed time. Columbia has Loss of Signal at Yarragadee. Orroral Valley will acquire in about a minute. We'll try for acquisition then.
CAPCOM Hello, Columbia, this is Houston back with you through Orroral Valley. We'll be with you--
SC OK
CAPCOM The only way I see to pull out the panel it requires regular torque tip screw head, of which there are the same amount. There are 12 on each panel to pull out, so I'm not sure they didn't get screwed up, but I can go ahead and pull those, so it doesn't make any difference. I just wanted to make sure we were all in synch there.
CAPCOM Why don't you press on, Crip, and do that, and I could give you the other changes for step 8 if you want right now, while you've got your book there.
SC Go ahead with them changes, Henry.

CAPCOM OK, on step 8 what we want to do is change the order of removing those connectors so that we don't - reduce the possibility of pulling the pins or the wires, and the order we want is ask follows: 8, 7, 6, 1, 3, 4, 5.
SC OK, you want me to disconnect in the following order:
J8, J7, J6, J1, J3, J4, J5
CAPCOM That is affirmative, and the only other thing we had to change
END OF TAPE

SSC Would you like to disconnect in the following order: J-7, correction J8, J7, J6, J1, J3, J4, J5.
CAPCOM That is affirmative, and the only other thing that we had to change in the procedure was when you get down to step 10 where you are actually going to pull the recorder out. Incidentally, there are 12 fasteners there instead of 10 and both steps 10 and 11. That's a net, but when you get ready to pull it out there, step 10 want to make sure you use your cookie sheet to protect that cold plate, by placing under or between the box and the coal plate when you remove it.
SC He said God Damned it OK.
CAPCOM OK, Crip, I've got a clarification here on what that step is referring to. What you're going to pull is the whole white panel there and that's the fasteners that are around the outside edge of that whole front panel.
SC What are you talking about?
CAPCOM And that includes the part with the two little screens on it.
SC That's affirmative. I'm pulling the ones Frank told me to pull. Harry, do you want these target angles now.
CAPCOM Yes sir, we got about 55 seconds, shoot them to me.
SC OK, -00, -00, +07, +09, +04, +00, -.18, +06, -04, 106, 29 09 with the torquing time, and those are the virgin angles..
CAPCOM Yes sir, we copy, thank you. And we're about to go LOS, we should have you in Indy at 10:08. If we have any trouble there, Hawaii is at 10:45.
SC OK.
CAPCOM And we will be, if you can set it up there, looking for the TV in Hawaii.
CAPCOM Columbia Houston through India for the next 5 1/2 minutes.
SC OK, Hank.
CAPCOM OK, we're reading you and I think we got squared away on that procedure, I think they probably put those hook tips in there and pictures that we had and then we wrote the procedure, it was probably a temporary closeout. Columbia, Houston, we got a teleprinter message coming up that we'll have your temp changes on it. Columbia, Houston, I think the message should be on board now. Columbia, Houston, how do you read?
SC Loud and clear Hank, but we're not going to be able to talk to you and do this also.
CAPCOM OK, I wasn't sure, every once in a while I got some static when I talk to you, did you happen to get the teleprinter message.
SC Yeah, we got it.
CAPCOM OK, real good.

y

CAPCOM Columbia, Houston. No need to acknowledge. We're about 1 minute from LOS. Hawaii is next at 10:45.
PAO This is Mission Control Houston. Loss of signal through Indian Ocean statoio and the preceding pass through Botswana. Next station will be Hawaii in approximately 21 minutes. At 1 day 10 hours 14 minutes elapsed time this is Mission Control Houston here.
PAO This is Mission Control Houston. Due to some minor glitches in our comm system, part of the Botwwana pass earlier in this revolution were blanked out, so we'll play back the entire pass at this time. Go.
CAPCOM Columbia, Houston through Botwwana for the next 6 minutes.
SC Hello there Houston, how's everything going?
CAPCOM Real good John. How's it with you?
SC Houston, how do you read Columbia, over.
CAPCOM Ok, read you loud and clear now.
SC Hank, how do you read PLT?
CAPCOM Reading you loud and clear Crip.
SC OK Hank, if you've got Frank James in the area, I've got a question in regards to this procedure with the recorder.
CAPCOM Ok, we'll get him and we've got a couple of changes to that procedure that, I don't know whether we're going to be able to get them up or not. We're having trouble at Indy, but I can voice them to you real easy.
SC OK, Well I think I got some
CAPCOM Why don't you go ahead with your quetions and then we'll get the answer from him.
SC OK, IT implies that to take out these fastners that hold these two panels in, it requires a 5/32nd socket. Or socket driver, rather.
SC It says a 5/32nd allen-head driver.
CAPCOM Roger, we're looking at the step 6.
SC Ok., the only way I see to pull out the panel is , requires a regular torque tipped screwhead, of which the same amount, 12 on each panel to pull out. So, I'm not sure they didn't get screwed up, but I can go ahead and pull those. So it doesn't make any difference. I just wanted to make sure that we were all in sink there.
CAPCOM Why don't you press on Crip and do that and I can give you the other changes for step 8 there if you want, right now, while you got your book there.
SC Go ahead with the changes Henry.
CAPCOM Ok, on step 8, what we want to do is change the order of removing those connectors, so that we don't, so we reduce the possibility of pulling the pins and the wires. And the order we want is as follows: 8...
END OF TAPE

CAPCOM —so that we don't, we reduce the possibility of pulling the pins from the wires, and the order we want is as follows: 8, 7, 6, 1, 3, 4, 5.
SC You would like me to disconnect in the following order? J7, correction, J8, J7, J6, J1, J3, J4, J5?
CAPCOM That is affirmative.
And the only other thing that we had to change the procedure was when you get down to step 10, where you're actually going to pull the recorder out, incidentally, there are 12 fasteners there, instead of 10 in both step 10 and 11 that's a fit, but when you get ready to pull it out there in step 10, want to make sure you use your cookie sheet to protect that cold plate, by placing it under - between the box and the coldplate when you remove it.
SC Yeah, I understand ——OK.
CAPCOM OK, Crip, I've got a clarification on what that step is referring to. What you're going to pull is the whole white panel there, and that's the fasteners that are around the outside edge of that whole front panel.
SC (garble)
CAPCOM And that includes the part with the two little screens on it.
SC Affirmative. I'm pulling the one Frank told me to pull. Henry, you want me to talk in angles now?
CAPCOM Yes, sir. We've got about 55 seconds. Shoot 'em to me.
SC OK. Minus zero zero, minus zero zero, plus zero seven, plus zero nine, plus zero four, plus zero zero, minus point one eight, plus zero six, minus zero four, one zero six, 29 with a (correction)2909 was the torquing time, and those are very good angles.
CAPCOM Roger, sir, we copy. Thank you. And we're about to go LOS. We should have you at Indy at 10:08. If we have any trouble there Hawaii is at 10:45.
SC OK.
CAPCOM And we will be at Houston, set it up there looking for the TV in Hawaii.
PAO This is Mission Control Houston. That completes playback on the Botswana pass. We're 20, —18 minutes out from Hawaii, at which time there should be a television downlink from the spacecraft. However, in all likelihood, the activity will not be in the carbon dioxide absorber replacement, but some of the inflight maintenance having to do with changing out recorders. We'll be back at that time. It is now 1 day, 10 hours, 26 minutes into the voyage of spacecraft Columbia. Mission Control Houston.
CAPCOM Columbia Houston through Hawaii for the next 5 and a half minutes.
SC OK, Hank, and we've got a small problem, or a big problem, depending on how bad you want DFI.
CAPCOM OK. Go ahead
SC Well, both John and I have been working pretty solid since the last time I talked to you, and well, we don't have out half the fasteners yet, and I'm afraid I'm just not going to be able to

CAPCOM Ok, go ahead
SC Both John and I have been working pretty solid since the last tme I talked to you and well, we don't have out half the fasteners yet. Now, I'm afraid I'm just not going to be able to get them — some of them out. They're just torqued in ther so dearn tight that we just can't get enough leaverage here to break them. I'm not even sure if I was in one-g I could break them. So, the bottom one, I've got every

screw out except two of them right at the top and you know I could do some drastic action like bending the can on tis little angle maybe to get at it. The top one I'm having a little more problem with. And, I'm just not sure this is going to be productive because we are going to end up sending at least 4 or 5 hours trying to do it. and even then I'm not sure we're going to be able to hack it.
CAPCOM Ok, we can appreciate that. Stand by one.
SC Did you ever get one of those nuts or bolts on your car that just wouldn't let loose?
CAPCOM I'M well familiar with it, I've broken a few that way. Well, we appreciate it. I think we'd better give up on it insted of trying to press on with it unless somebody comes up with a Eureka in the next few minutes. Why don't you just put it back in the configuration you hand it Crip and we'll just call it quits on that. And for info, we are sending up some paper magnums for you to try and square awy your C&W on the evap temps and water supply quantity.
SC Ok, Hank
CAPCOM Also we are trying to ship you a teleprinter message.
SC Ok, Hank. Looks like you might have lost something Crip.
Aw, you're going into Lio. I see.
SC Right right
CAPCOM Also we re trying to ship you a teleprinter message.
SC Ok, Hank. Looks like you might have lost something Crip.
CAPCOM Crip, we were wondering if you were whistling while you were working there.
SC Aw yeah, I was really whistling a while ago when I was trying to get those screws out.
CAPCOM Columbia, Houston, your teleprinter message should be onboard.
CACOM COLUMBIA Houston, 40 sedonds from LOS at Santiago is next at 11 11.
SC Ok, Hank, see you there.
PAO This is Mission Contol, Houston. LOS of signal through HAwaii where we watched a live TV pass from the spacecraft Bob Crippen attempted to get at the recorders for changing them out, however, he was unable to get enough torque on the screws to get the cover off. So, he continued to change out the carbon dioxide canisters. which are filled with litho hydroxiee. Continued with the operation as called for

in the flight plan. Nineteen minutes awy from reacquisition through Santiago, Chile. We'll return at that time at one day, 10 hours, 51 minutes into the flight ofColumbia. This is Mission Control Houston.
PAO THIS IS Mission Control Houston, 8 minutes away from Santiago. This is Mission Control Houston
Santiago. We have ready at this time a playback of the video tape recorded during the recent TV pass over in Hawaii. We'll play that back at this time and then go live over Santiago.
END OF TAPE
CAPCOM Ok, go ahead
SC Both John and I have been working pretty solid since the last time I tlkked to you nd well, we don't have out half the fasteners yet. Now, I'm afraid I'm just not going to be able to get them -- some of them out. They're just torqued in ther so dearn tight that we just can't get enough leaverage here to break them. I'm not even sure if I was in one-g I could break them. So, the bottom one, I'e got every scrw out except two of them right at the top and you know I could do some drastic action like ending the can on tis little angle maybe to get at it. The top one I'm having a little more problem with. And, I'm just not sure this is going to be productive because we are going to end up sending at least 4 or 5 hours trying to do it. and even then I'm not sure we're going to be able to hack it.
CAPCOM Ok, we can appreciat that. Stnad by one.
SC Did you ever get one of toe nuts or bolts on your car that just wouldn't let loose?
CAPCOM I'M well familiar with it, I've broken a few that wy. Well, we appreciate it. I think we'd better give up on it insted of tryint to press on with it unless somebody comes up with a Eureka in the next few minutes. hy don't you just put ib back in te configuration you had it Crip ad we'll just call it quits on that. And for infor, we are sending up some paper magnums for you to try and square awy your C6W on the evap temps and water supply quantity.
SC Ok, Hank
CAPCOM Also we are trying to ship you a teleprinter message.
SC Ok, Hank. Looks like you might have lost something Crip.
Aw, you're oing into Lio. I see.
SC Righ, right
CAPCOM Also we re trying to ship you a teleprinter message.
SC Ok, Hank. Lookslike you might hve loe smething Crip.
Aw, you're going
CAPCOM Crip, we were wondering if you were whistling while yu were working there.
SC Aw yeah, I was really whistling a while ago when I was trying to get those scrws out.
CAPCOM Columbia, Houston, your teleprinter message should be onboard.

CACOM COLUMBIA Houstcn, 40 sedonds from LOS atSantiago is next at 11 11.
SC Ok, Hank, see you there.
PAO This is Mission Contol, Houston. LOS of signal through HAwaii where we watched a live TV pass from the spacecrft Bob Crippen attempted to get at the rcorders for changing them out, however, he was unable to get enough torque on the screws to get the cover off. So, he continued to change out the carbon dioxide canisters. which are filled with litho hydroxiee. Continued with the operation as called for in the flight plan. Nineteen minutes awy from reacquisition through Santiago, Chile. We'll return at that time at one day, 10 hours, 51 minutes into the flight ofColumbia. This is Mission Control Houston.
PAO THIS IS Mission Conrol Houston, 8 minuts awy from Santiago. This is Mission Control Houston
Santiago. We hve redy at this time a playack of te video tape recorded during the recent TV pass over in Hawaii. We'll play that back at this time and then go live oer Santiago.
END OF TAPE

SC We're going to be able to hack it.
CAPCOM OK, we can appreciate that, stand by one.
SC (garbled) You get one of those bolts on your car that just wouldn't let loose.
CAPCOM And we're all familiar with it, I've broken a few that way. Well, we appreciate, I think we better give up on it instead of trying to press on with it, unless somebody comes up with a Eureka here in the next few minutes, why don't you just put it back into the configuration you had it Crip and we'll just call it quits on that. And for info, we all (garbled) sending up some table lengths for you to square away in C&W on a evap temp and water supply quantity.
SC Thank you Hank.
CAPCOM Also, we are trying to ship you a teleprinter message.
SC How's that Hank?
CAPCOM It looks like you might of lost something Crip. Oh you're going into lio I see.
SC Right, right.
CAPCOM We were wondering if you were whistling while you were working there.
SC Oh yeah. I was really whistling a while ago when I was trying to get those screws out.
CAPCOM Columbia, Houston, your teleprint message should be on board.
CAPCOM Columbia, Houston, 40 seconds from LOS, Santiago is next at 11:11.
SC OK, Hank, see you there.
PAO This is Mission Control Houston. That completes playback of the Hawaii television downlink of changeout of the carbon dioxide canisters aboard Columbia. We're about a minute away from acquisition through Santiago. We'll stand by for word that that station has picked up Columbia. One day, 11 hours, 10 minutes and standing by Mission Control Houston.
CAPCOM Columbia, Houston through Santiago for the next 6 minutes. We have a state vector coming your way and it should be good through the sleep period and also table maintenance items.
SC Ok Hank.
CAPCOM The guys working the com site at Santiago asked me to relay to you their best wishes.
SC OK, fine and dandy. Hope they get to see the Columbia coming by many more times.
CAPCOM For info, IMU #1 is your best time used.
SC #1, Roger that.
CAPCOM Columbia, Houston, have you got anybody on the flight deck there that could pull a couple of breakers for us.
SC John is headed that way.
CAPCOM Columbia, Houston, The state vector in Timboo is on board. and for another quick update, the weather at Edwards is going to be excellent tomorrow, in fact it's so good that Richard is going to stay here in the MOCR and watch the landing from here.
SC All right. It certainly looks super today. Houston, Columbia do you read over?
CAPCOM Yeah John, read you loud and clear.

CAPCOM —What we want you to do is watch your HSI card as you do this and see if it moves. If it's okay, that card should slow around to north, and your corners all should null up.
SC OK. The HSI never moved.
CAPCOM OK. No joy. Well, that confirms it for us. You can go ahead and push the breakers back in.
SC OK.
CAPCOM And just a reminder, John, you probably should go ahead and get the Z tracker on so it can be warming up for your IMU alignment coming up here. And as soon as you can work it in, you need to get that maneuver going, too. No need to reply, Columbia, but we're going to plan to dump the VTR at Hawaii at 12:18. That's a little over an hour from now, and we're going to use the same procedures which we used the last time, which worked out real well. So just set up for the playback at Hawaii, and when the INCO is all set up, we'll give you a go to start the playback.
SC Okey-doke.
CAPCOM Columbia Houston, we're about one minute from LOS. Botswana is next at 11:32.
SC OK, Hank, see you then.
PAO This is Mission Control Houston going over the hill from Santiago. Among the many messages, telegrams received in here in Mission Control is one to the Acting Administrator of NASA, Dr. Alan Lovelace, "Congratulations to the entire NASA team on a super launch. Please pass along to John and Bob our congratulations and best wishes for a safe return." Signed by Representative Eddie Bullen, Massachusetts, who is chairman of the House Appropriations Subcommittee on Housing and Urban Development and Independent Agencies. In approximately 5 minutes or so there will be a playback of a video tape that was dumped from Hawaii pass back on rev 9. That video tape has now been retrieved. It involves close-ups out the windows overlooking the cargo bay, looking back toward the OMS pods. It's just additional video tape examining those areas with the lens apparently zoomed out to a tighter shot. We'll advise when that playback is ready. At 1 day, 11 hours, 18 minutes, this is Mission Control Houston.
PAO Mission Control Houston here. That tape from orbit 9 over Hawaii, it will be rolling in approximately 6 seconds.
SC .02 minus .05 minus .27 at 10:59:45.
CAPCOM OK, we copy that.
SC And the COAS align cal will verify that because the angular error was 01, and the torquing angles were all less than .05 of a degree.
CAPCOM Roger. Copy that.
SC At least, I think it helped verify it.
CAPCOM Columbia, Houston, we've been watching the OMS cross feed line temps and they're going a little low. On A14 we would like to get the OMS cross feed line feeder B auto on auto B.
SC OK. Do you want to leave A auto on also, is that right?
CAPCOM Stand by one. Hold on for a minute, Crip.
SC OK. B auto coming back off.

CAPCOM Columbia Houston, have you got anything for us
SC No sir, I don't think so. Can't think of anything.
before Santiago, which is the next pass, lass pass of the evening?
SC No, sir. I don't think so.
I can't think of anything.
CAPCOM OK
END OF TAPE
before Santiago which is the next pass, the last pass for the
evening.

CAPCOM Columbia, Houston, have you got anything you have for us before Santiago which is the next pass , last pass for the evening?
SC No sir, I don't think so. Can't think of anything.
CAPCOM OK, are you going to keep the air-to-ground, I mean the UHF on tonight, I assume you're going to turn the air-to-ground two off because of the noise.
SC Roger that. Trying to sleep on with air-to-ground one and uniform.
CAPCOM OK, we copy that.
PAO Mission Control Houston, that completes the playback of the television recorded yesterday at Hawaii. A closeup examination of the OMS pods. We'll be back in 6 minutes for Botswana pass. Mission Control, 1 hour, 11 minutes 26 seconds.
PAO This is Mission Control Houston, about 40 seconds out from Botswana voice relay station and overlapping near
Dm19
station. The final pass of the evening at the Indian Ocean. Crew winding down the day's activities as they come up on their final sleep period in space. Sleep period to begin at 1 day 13 hours, about an hour and a half from now.
CAPCOM Columbia, Houston through Botswana for the next 7 minutes.
SC Hank, you read me ok?
CAPCOM OK, Crip we read you now.
SC You guys have apparently been having a little bit of problem there with receiving our UHF, I didn't know whether you had me or not.
CAPCOM No sir, we're reading you and while I got you here, I think I'll give you a quick rundown on the consumable status. The RCS, the forward RCS is about 3% below our predicted nominal, still well above the mission completion redline. The Aft left is down 4% and the right down 3% from what we predicted, but that's going to get better because we're interconnected and will continue to improve. Our left OMS is 1% above predicted and the right OMS is almost 3% above the predicted value. We will stay with the right OMS interconnect until sleep period, go to normal configuration for sleep and then we'll return to the interconnect the first thing tomorrow morning and stay in that configuration until about TIG minus 4 or 5 minutes.
SC OK.
CAPCOM Columbia, Houston, you dropped out if you tried to transmit you're going just about right over the site now, so it's probably not too good a com.
SC Ok, we got the IMU alignment results if you, or if you copy well enough to get it.
CAPCOM Ok, we read you pretty good that time, why don't you go ahead and try to give it to us.
SC OK, XY ON IMU's 1, 2, and 3 respectively. -05, -04, -01, -01, +03, +02, -.09, +.07, -.02, execution time was 11:30:30
END OF TAPE
overlapping pass over Indian Ocean

SC Minus 01; plus 03; plus 02; minus 09; plus .07; minus .02; execution time was 11 30 30.
CAPCOM Ok, we got that John. Thank you. Columbia, Houston we're about 1 minute to LOS — Indy is next at 11 41. Columbia, Houston through Indy for the next 8 minutes.
SC Ok, Hank, we got you little echo in there. And I can hear you're getting ready for a teleprinter message
CAPCOM That's affirmative. We're got one about to come your way.
CAPCOM Columbia, Houston, EGIL says he sees you warming your chow.
SC I'm sorry say over again.
CAPCOM EGIL just saw the signature for the food warmer.
SC Ah, ha, figured this out huh?

CAPCOM Columbia, Houston, is aybody on the flight deck?
SC Roger that.
CAPCOM When we gave that proecdure to John a while ago on the HSI we neglected one last step. What we'd like for you to do if you can over on F-6 there to throw the instrument power on and see if the HSI moves when that switch goes on, what we're looking for if any for the CDI or the glycol indicator, varian pointers, or the compass card itself move.
SC Ok, I'll have to wait until after we finish this COAS cal.
CAPCOM Ok, no problem. Columbia, Houston, we received a message here in the MOCR. It's from Representative Eddie Bowlin. The Chairman of the House of Arpropriations Subcommittee on housing and urban development and independent agencies and he sends his congratulations to you for a super launch and best wishes for a safe return.
SC That's my guy. We appreciate those fine remarks.
END OF TAPE

CAPCOM Columbia Houston, the teleprinter message should be on board.
SC OK, Hank.
(garble) recognize, get the southern cross now. Looks a lot better in the real world.
CAPCOM Your comm is breaking up real badly. They're probably having some trouble at the site. They've had a little trouble with Indy today. Could you say again please?
SC (garbled)
CAPCOM Columbia Houston, we didn't read you. The last transmission about a minute ago. We've been having trouble with the satellite link between Indy and Sunnyvale.
SC Aha! Don't blame the wrong people, or somebody will be sure and tell you about it.
CAPCOM Hey, you came in loud and clear then.
SC Okay.
CAPCOM I understood you to say you were having no trouble recognizing the stars, is that correct?
SC No, I was just commenting that I could even find and knew what the Southern Cross looked like.
CAPCOM Super.
SC First time I ever saw it for real. Looks a lot better than it does in the simulator. Although they do a pretty good job with it.
CAPCOM Columbia Houston, we're about one minute to LOS. Hawaii will be next at 12:18, and we'll be setting up there for the VTR dump.
SC Hank, I'm sorry. I missed your last, say again.
CAPCOM Roger. Hawaii is next at 12:18, and we will be set up for the VTR dump.
SC Roger that 12:18 Hawaii for the VTR.
PAO This is Mission Control Houston, Loss of Signal for the final time this evening through the Indian Ocean station. We're expecting a dump from the Video Tape Recorder aboard Columbia in some 29 minutes during the upcoming Hawaii pass. This is not in the crew activity plan, but it's a non- scheduled TV dump from the video tape recording. It is not a live pass. We'll be back in 28 minutes for Hawaii in 1 day, 11 hours, 49 minutes into the flight of Columbia. This is Mission Control Houston.
END OF TAPE

PAO This is Mission Control, Houston, about 40 seconds away from AOS through Hawaii, next to the final pass before sleep period begins. We're expecting a downlink video tape plaback

through Hawaii.
CAPCOM Columbia, Houston, through Hawaii for the next 8 minutes. We have IMU gyro biases coming up they're real small for IUM's 1 and 2. Medium on IMU 3, the worst being the X axis for the .018.
SC Ok, Henry, sounds good. Whenever you guys have got data set up we are standing by to play on the VTR..
CAPCOM We need command on the TV switch.
SC Ok, sorry about that, you've got it now. Apologize to Briscoe I didn't mean to do that to him.
CAPCOM Did you happen to flip that contoller bias on and see what happened to HSI — I mean that I beg your pardon switch.
SC Roger, Hank we checked that out and still no joy.
CAPCOM Ok, we copy that. Ok, we're ready for the dump.
SC Ok, we're coming at you.
CAPCOM And we've got a couple of items for you, here Crip. If it is convenient.
SC Go ahead.
CAPCOM Ok, because the orbit is slightly non-nominal per what we had preflight, we need to bias a TIG on your block data per nominal procedures and the bias should be -6 minutes
SC Roger Stand, bias by TIG by -6 minutes for block data.
CAPCOM Roger and is anybody on the flight deck. Are you eating?
SC Ah well, that's where we work at. We are on the flight deck. Ain't got around to chow, we'll get there.
CAPCOM Ok, we need to repress the left and right propellant tanks on theOMS, so we cna lock up the maximum pressure for a blow down capability.
SC Ok, I'll go ahead and do that while you guys are watching.
CAPCOM Wait a minute, stand by one.
SC Ok.
CAPCOM What we need to do Crip is t terminate the interconnect and then we'll take a look at it.
SC Ok, roger. Can I just terminate it and sit here in free without going back to theRCS.
to the RCS. Hank will you be able tolook at it tis pass?
capcom
CAPCOM Stand by one Crip.
Go ahead and drop the interconnect as long as you're in free.
SC Roger that. Ok, we terminated it.
CAPCOM Ok, stand by one. We need to pulse in the yaw axis and we need to get the tank isols.
tank
SC Say it again, Hank. You want me to go and go ahead back to the RCS.
CAPCOM That is affirmative.
SC Ok.

CAPCOM We still see a discrete in the yaw, we need to get it back to pulse.
SC OK, Sorry about that.
CAPCOM Ok, Crip go ahead and repress with the helium vap isols.
SC Ok on the — do you want both systems or just the right.
CAPCOM We'd like to repress both the left and right open them up for 5 seconds and then close them.
SC Ok, that's cmp
SC Ok, that's complete.
CAP COM And we need to get the Y...
END OF TAPE
D
D

D53;
M0149:172;4-3-81 GMT 00.01.34;any;any
M0149;1
M

CAPCOM Ok Crip, go ahead and repress for the helium vap isols
SC Ok, on the, you want both systems or just the right?
CAPCOM We'd like to repress both the left and right, open them for about 5 seconds and then close them.
SC Ok, that's complete.
CAPCOM We need to get the Y tracker in the star track mode.
SC Ok.
CAPCOM Columbia, Houston. We have about 2 minutes left in the pass. Santiago is next at 12:46. And the first part of that, a couple minutes of that are going to be with the surgeons for med conference. You have anything else for us?
SC No sir (garble). You want us to go ahead and talk to you or will we get to talk to you after we talk to the doctors?
SC We feel mighty healthy Henry.
CAPCOM Ok, well we'll get to talk to you there, but we had some dinner music for you. We'd thought you'd be eating dinner at this time. It's courtesy of contraband and I think it's appropriate to the pace that you've kept today. If you'd like to here that as you go over the hill.
SC What we'd like is pre-dinner music. We'll almost there.
CAPCOM Ok, well we'll let it come your way.

Dinner music played - Boogie Woogi: Bugle Boy of Company B

SC Let's hear it for the Contraband.
SC Far out.
CAPCOM And as you go over the hill there you can get the, shut down the TV VTR.
SC (garbled)
PAO This is Mission Control Houston. As Columbia went over the hill for the final time at Hawaii after dumping a video tape playback. The control center here played up a piece of music by a group called Contraband. Which is made up mainly of flight controllers from the Johnson Space Center control center. That group started out life at one of the annual chili cookoffs here. And played at the Christmas party, and seems to be still be surviving after various occasions. One of the communicatons engineers, Granvill Pennington who is on the silver team with Neil Hutchinson as the INCO position, is the acting director of this group. We'll be back in 16 minutes for the final pass of the evening before the crew goes to bed. through Santiago. At 1 day 12 hours 29 minutes mission elapsed time. Mission Conrol Houston.
PAO This is Mission Control Houston. We're anticipating a playback of the video tape dump that came down from Hawaii from spacecraft Columbia in about 15 minutes. It'll be some 5 minutes after loss of signal through Santiago. If anybody is planning to re-record this dump should have their machines all set up and ready to roll in about 15 minutes from now.
END OF TAPE

CAPCOM This is the dump, should have their machines all set up and ready to roll, about 15 minutes from now.
PAO This is Mission Control Houston, 30 seconds away from acquisition through Santiago Chile voice relay station. The early part of this upcoming pass will be taken up private medical communications with the surgeon. Who again tonight is Dr. Mike Dungo and we should have the loop back for the final couple minutes of the pass and spacecraft communicator Hank Hartsfield will put the crew to bed for their final night in space, their final sleep period in space. Preparations upcoming tomorrow after wake period for the re-entry and landing. Should be AOS at this time and the surgeon will hand the loop back to the spacecraft communicator, once the private medical conference is complete. About five minutes after LOS at the Santiago pass, the video tape recording dumped at Hawaii earlier in this orbit will be replayed for those who missed it and want to re-record it. Mission Control at 1 day, 12 hours 46.
CAPCOM Columbia, Houston through Santiago how do you read?
Columbia, Houston, how do you read?
SC Loud and clear there Houston.
CAPCOM Oh, we read you now. Thought we had a problem there.
SC How do you read Hank, do you read ok?
CAPCOM Read you loud and clear now.
SC We could hear the surgeon all the way through but he couldn't hear us.
CAPCOM I don't know what happened there but we apparently they weren't getting up. We've only got one thing here before we put you to bed. We noticed that one of the sensors that feed in the OMS cross feed heaters is starting to creep on us and to preclude you from getting an alert during the night, we recommend that on O14, I think that should be A14 on the RCS OMS heaters, OMS cross feed lines A auto and B auto, get both of them on.
SC We got it Hank. How much longer you going to be with us.
CAPCOM OK, we got a little over a minute here guys and on behalf of the Bronze Team, it's sure been a pleasure working with you troops, you've done a super job, we think it's been a tremendous effort on your part and we all look forward to seeing you tomorrow, in fact we're excited about it, we understand you're buying.
SC Well, you might be right. Hey, tell the surgeons that that little bit of dermatitis I had from the sensors was only on that day that we scrubbed. I haven't noticed it since, so maybe flying is good for it. So I don't need any cream or nothing else and that John and I will be able to go to sleep we think without any medication.
CAPCOM OK, he copied that and we got about 20 seconds left. Hope you have a good nights rest and if anything comes up, it's a long wait, you have to go all the way back around to Santiago again at 14:20.
SC All right, and we're sorry we couldn't fix that recorder for those guys and we'll be willing to consider not strapping all the way in, and doing something like that, if we can help them, but I prefer to plug it in like post the de-orbit burn.

CAPCOM OK, we copy that. If you get cool during the night, remember to turn water loop one on.
PAO This is Mission Control Houston, LOS through Santiago. The flight surgeon attempted to call the crew, but he could not hear their response, they heard him, so the loop was handed back to spacecraft communicator Hank Hartsfield. Crippen reported that they would need no sleeping pills for this evening's sleep period, and that he had not experienced the stomach uneasiness since the and that he had not experienced the stomach uneasiness since The day before launch, and they were feeling quite well. We're almost well we are one full orbit away from the next station contact which will be Santiago this time again. The ground track misses all the stations. An hour, 27 minutes until next station contact. About 4 minutes away now from playback of the video tape recording that was dumped from the spacecraft over Hawaii early this orbit. This is Mission Control Houston, 1 day, 12 hours, 15 minutes.
D

PAO And they were feeling quite well. We're almost, well, we are one full orbit away from next station contact, which will be Santiago this time again. The ground track misses all the stations. An hour and 27 minutes until next station contact. About 4 minutes away now from playback of the video tape recording that was dumped from the spacecraft over Hawaii earlier this orbit. This is Mission Control Houston, 1 day, 12 hours, 53 minutes of ground elapsed time.

SC Go ahead.

CAPCOM OK, because the orbit is slightly non-nominal for what we had preflight, we need to bias a Tig on your block data per nominal procedures, and the bias should be minus 6 minutes.

SC Understand bias Tig by minus 6 minutes for block data.

CAPCOM Roger, and is anybody on the flight deck now, or are you eating?

SC Well, that's where we work at--we're all on the flight deck. We haven't got around to chow yet. We'll get there.

CAPCOM OK. We need to repress the left and right propellant tanks on the OMS so we can lock up the maximum pressure for our blow down capability.

SC OK. I'll go ahead and do that while you guys are watching.

CAPCOM Wait a minute. Stand by one.

SC OK.

CAPCOM What we need to do, Crip, is terminate the interconnect, and then we'll take a look at it.

SC OK. I just terminate it and sit here in free without going back to the RCS?

Hank, will you be able to look at it this pass?

CAPCOM Stand by one, Crip.

Go ahead and drop the interconnect as long as you're in free.

SC Roger that.

OK, we terminated it.

CAPCOM OK, stand by one. We need pulse in the yaw axis, and we need to get the tank isols.

SC Say again, Hank. Do you want me to go ahead and go back to RCS?

CAPCOM That is affirmative.

SC OK.

CAPCOM We still see a discrete in yaw. We need to get it back to pulse.

SC OK. Sorry about that.

CAPCOM OK, Crip, go ahead and re-press for the helium vap isols.

SC OK. You want both systems or just the right?

CAPCOM We'd like to re-press both the left and right, open them up for 5 seconds and then close them.

SC OK, that's complete.

CAPCOM And we need to get the Y tracker in the star track mode.

SC OK.

CAPCOM Columbia Houston, we've got about 2 minutes left in the pass and Santiago is next at 12:46, and the first part a couple of minutes of that are going to be with the surgeon from med conference. If

you, do you have anything else for us?
SC No, sir. You mean we're not going to get to talk to you, or will we get to talk to you after we talk to the doc?
SC We feel mighty healthy, Henry.
CAPCOM OK, well, we'll get to talk to you then, but we had some dinner music for you. We thought that you'd be eating dinner at this time. It's courtesy of Contraband, and I think it's appropriate to the pace that you've kept today, if you'd like to hear that as you go over the hill.
SC Oh, we'd like it as some pre-dinner music. We're almost there.
CAPCOM OK. Well, we'll let it come your way.
END OF TAPE

PAO This is Mission Control Houston. Crew now in their sleep period and their final nap aboard the spacecraft Columbia before coming home tomorrow. We're now estimating the change of shift briefing with the off going Flight Director Chuck Lewis to be at 8:00 PM CST in the small briefing room in the building 2 news center JSC. Right now, the spacecraft is coasting across Africa. An hour and 12 minutes before next acquisition at Santiago, Chile. We're not expecting any further contact tonight from the crew until wake up. Some seven hours 41 minutes from now. To repeat again, the change of shift briefing will be about 50 minutes from now at 8:00 PM Central, in the JSC news room. Mission Control Houston at 1 day, 13 hour 8 minutes.

PAO This is Mission Control Houston, mission elapsed time is 1 day, 13 hours, 21 minutes. During the mission operations control room in Houston, we're in the process of changing flight control teams, Chuck Lewis, and the Bronze Team, Bill Acerson, _____ for Neil Hutchinson, and the silver team. We expect to have the change of shift briefing at 8:00 PM CST, approximately 30 minutes from now. The astronauts of course are still in their sleep period. Mission elapsed time is 1 day, 13 hours, 32 minutes, this is Mission Control Houston.

PAO —you are transmitted by Columbia as it goes over the ground stations, the cabin temperature inside Columbia has fluctuated between 77 and 78 degrees, 2 degrees higher than it was during the sleep period last night. Cabin humidity is 34 percent and steady. Mission elapsed time 1 day, 14 hours 48 minutes. This is Mission CControl Houston.

PAO This is Mission Control Houston, mission elapsed time is 1 day, 15 hours, 54 minutes, still in the sleep period for astronauts Young and Crippen. Just under 5 hours remaining. Columbia is on orbit 28 now, having just crossed a terminator in the darkness and approaching the tip of South America. Vehicle velocity is 25,421 fps presently. Cabin temperature on board Columbia is 77 degrees and steady. Humidity is at 34 percent. Downlink data continues to be fed to tracking stations, even now while the astronauts are sleeping. That data indicates that systems are continuing to perform nominally on board Columbia. Mission elapsed time, 1 day, 15 hours, 55 minutes. This is Mission Control Houston.

CAPCOM Columbia Houston.

SC Hello, Houston, read you loud and clear. Over.

CAPCOM Roger. We see your message and I think we got it scoped out. If you go on panel A-12 and turn APU heater gas generator fuel pump 2 to A-auto.

SC Fuel pump 2 to A-auto.

CAPCOM Roger. Apparently, bravo has gone south on us.

SC In A-auto already. He's already done that. Are you at Ascension there Houston?

CAPCOM That's affirmative, Columbia.

SC OK, well, we're on heaters A-auto. Crip did that first thing.

CAPCOM Roger, Columbia. Our switch scan shows that the switch is still in bravo.

SC The switch scan shows the switch still in bravo.

CAPCOM That's affirmative. Columbia Houston, I recommend you cycle the switch.

SC OK. That's done now.

CAPCOM And, Columbia, we show it now per nominal.

SC OK.

CAPCOM And, Columbia, the temp's rising.

SC Sure is. See you guys tomorrow.

CAPCOM Good night, Columbia.

PAO This is Mission Control, Houston. Mission elapsed time is 1 day, 16 hours, 15 minutes. An alarm sounded on board Columbia, awakening the crew, informing them that it was a temperature problem in one of the auxiliary power units. The crew selected a different heating mode from B to A, which initially had no effect on their temperature change. Here in the Mission Operation Control Room the data indicated that switching to the B mode had not, in fact, occurred.

The crew was then instructed to recycle the switch. That recycling did engage the A mode heater, and the temperature at this point appears to be returning to a nominal level. Subsequently, the crew has returned the Columbia to sleep configuration. In orbit 28 we presently are in

an Acquisition of Signal period at the Ascension Island station. The vehicle now just crossing the coast of Africa --
END OF TAPE

CAPCOM . . . crossing the coast of Africa in the 28th orbit of the earth. The temperature of that auxiliary power unit, APU No. 2, continues to improve, returning to nominal level. MET one day 16 hours 16 minutes. This is Mission Control, Houston.
CAPCOM This is Shuttle Mission Control with a status update report. MET is one day 17 hours 22 minutes. About three and a half hours remaining in the astronauts' sleep period. Columbia is on the 28th orbit of the earth just over the Pacific Ocean presently approaching the coast of South America. The comfort factors on board the Columbia in the crew station the cabin pressure is 14 psi cabin temperature is 77 degrees and steady. in that it has been consistent this ee evening in that it is approximately three degrees higher than it was during yesterday, last night at this time . Cabin humidity is 33 per cent and is also steady. Temperature of the auxiliary power unit, No. 2, which was running a little cold earlier in the evening, has moderated and returned to normal since the crew moved the heater switch to a differentmode. Contii Continue to perform with a nominal constraint. MET is one day 17 hours 24 minutes. This is Shuttle Mission Control.
CAPCOM Mission Control, Houston. MET one day 18 hours 35 minutes. Columbia is on orbit 29 presently just norheast of Australia, just over the northeast coast of Australia. We are presently halfway through an hour-long loss of signal garbled 30 minutes over the states. Over Quito, Ecuador,actually, in about 32 minutes from now. Just about slightly more than two hours remaining in the crew's sleep period. MET is one day 18 hours and 36 minutes. This is Shuttle Mission Control.
CAPCOM This is Shuttle Mission Control. MMM MET is one day 18 hours and 29 minutes. Just a few moments ago, a recorded air-to-ground transmission. . .
END OF TAPE.

GM0156

PAO This is Shuttle Mission Control, elapsed time, its 1 day 18 hours, 29 minutes. Just a few moments ago a recorded air to ground transmission from an earlier pass was inadvertently sent out over the air to ground loop due to an open circuit in the mission operations control room that transmission was neither live uplink for the crew, it was something that had been recorded sometime earlier and played back at that moment. The circuits were not configured for voice so that thatsdission was not uplinked the crew Young and Crippen are still asleep, just a little under an hour and a half remaining in the sleep period. Columbia is now over the Mediterranean Sea which is ? somewhere off the coast of North Africa doing downlink information from the vehicle to the Madrid tracking station. All systems on board the vehicle tend to be nominal. This is Mission Control Houston at 1 day 19 hours, 30 minutes.

PAO This is Mission Control Houston. Mission elapsed time, 1 day, 20 hours, 11 minutes, we just recently had acquisition of signal over the Madrid Station, there are about 40 minutes remaining in the sleep period, however downlink data from Columbia indicates that the food warmer has been turned on and that the Crew has punched up two of their cathode ray tube displays. Accordingly, it is obvious the crew is awake although there is forty minutes remaining in the sleep period. Flight Director Neil Hutchinson has elected not to initiate voice contact with them at this period. To allow them to wake up leisurely. Duration of the Madrid pass will have acquisition of signal for another 2-1/2 minutes remaining. Mission lapsed time 1 hour, 1 day , 20 hours, 12 minutes. This is Mission Control Houston.

PAO This is Mission Control Houston, mission lapsed time 1 day 20 hours, 15 minutes, that pass was in fact at Orroral Valley. We had loss of signal over that station. The next voice pass will be Quito, Equador in about 26 minutes, that pass will be duration of 6 minutes 19 seconds. When the crew awoke they found teleprinted message which had been uplinked recently which says in part that all consumables are in nominal. No major systems problems, shows a forecast for good weather at Edwards Air Force Base for landing, and plans for nominal end of mission entry. Again the downlink indicates that the crew is awake cooking breakfast and reviewing displays inside the flight cabin. Mission lapsed time 1 day 20 hours, 16 minutes. This is Shuttle Control Houston.

CAPCOM This is mission control Houston, mission lapsed time is one day twenty hours forty minutes, and there is still about ten minutes remaining in the astronauts sleep period, but it has been apparent to the ground conrtroller that astronauts Young and Crippen have been awake for at least 30 minutes that we know of. We are just about a half a minute away from acquisition of signal at the Quito Ecudaor ground station and I think we may anticipate wake up action to be initiated by the flight control team. During this pass we should acquire air to ground transmission capability with through the Quito Ecuador station just momentarilly. Mission lapsed time, one day twenty hours and forty one minutes. Columbia is on its thirty-first orbit of the planned 54.5 hours 36 orbit mission. this is Shuttle Control Houston. (Wakeup music).

CAPCOM Good morning Columbia, this is Houston and we have a real time 482 for you.

SC A real time that is the best.

CAPCOM That is affirmative, a real time 482 , and in that last wake up song we would like for you to scratch out the splash down and insert touchdown.

SC Oh, ok, we would appreciate that.

SC Now hear this, now hear this, revelle revelle up all idlers clean sweep dive, 4 knots. That means Crippen.

SC John runs a tight ship.

CAPCOM It sure sounds that way.

SC How is the silver team doing this morning?

CAPCOM We are doing just great and how are you doing?

SC Okeydock, thanks for helping us out with that little APU cooling problem last night. I was so asleep in the middle of that I could not think. I came back here as swore I threw switch two and got one instead.

CAPCOM Roger.

SC We got all of your teleprinter messages off there. We appreciate that. You guys aren't doing nearly as good as you do in the sims as far as quanity.

CAPCOM WELL, we ran out of things half way through the night.

SC Oh, did you go buy for the donuts this morning ??

CAPCOM Roger.

SC John even had the coffee made when I got up this morning.

CAPCOM OH, that is good. We are noticing that APU2 that same problem that we were having last night heater gas jet fuel pump on no. 2, the temp is coming down again.

SC Ok.

CAPCOM We are going to keep an eye on that for a few seconds for you here.

END OF TAPE.

SC John even had me coffee made this morning when I woke up.
CAPCOM Well, that's good. We noticing that APU2, that same problem we had last night heater gas jet fuel pump number 2 is temps coming down again.
SC OK
CAPCOM And we're going to keep a look, an eye on that for a few seconds for you here. We have 2 minutes and 10 seconds, yet til LOS and when you get down a little bit further the check point is not required this morning.
SC OK, I appreciate that. I want to know how you got Truly to give up the trip out to the west coast?
CAPCOM We got him handcuffed and hog tied to a console down here.
SC Ah, yes, he's been there before.
CAPCOM Well, it looks like you're going to have a real pretty day for entry, so we figured that we'd keep him handy here.
SC Sounds good. Tell Richard that I can even recognize the southern cross, I couldn't believe it. It's right out our window right now.
CAPCOM You get a gold star for star recognition.
SC John does all that, he just points them out to me.
CAPCOM Crip, we feel that APU gas heater is down, we'd like you to switch back to Bravo and give that one a try while we can still watch it.
SC OK. They're on Bravo.
CAPCOM Roger, and we are 30 seconds from LOS. We'll be seeing you at Bermuda at 20+50, that's day 1 20+50 and we'll keep an eye on it when we get over there.
SC OK. OK Dan that was a great wakeup call or whatever it was.
CAPCOM I'm glad you enjoyed it.
PAO This is Mission Control Houston, mission lapsed time 1 day, 20 hours, 48 minutes, during that pass, it was determined that the problem with auxiliary power unit number 2, the heater to that auxiliary power unit currently still inoperative, that's the same unit which woke the crew up out of their sleep period in the middle of last night. Just before loss of signal CAPCOM Brandenstein instructed Bob Crippen to switch that back to heater unit number B, which was the unit which malfunctioned last night. We personally out of sight of a ground station will acquire a signal in about 1-1/2 minutes at Guam and at that point we will be able to get a better detemination on whether the switch to that other heating unit will have helped out that auxiliary power situation, should have acquisition of signal at Guam in just a little over a minute. This is Mission Control, Houston.
CAPCOM Hello, Columbia, we have you for 4-1/2 minutes through Bermuda and we're looking at that temp and it still looks like its going down ?
SC ?
SC Hey, Dan, also I'd like to know have I got to go to interconnect RCS to the right OMS?
CAPCOM That's affirmative, Crip.

SC OK, I'll pick that up in just a minute.
CAPCOM Columbia, the reason we are doing that is, the guidance people want to shave a couple hundreths off the YCG.
SC All for a clean shave, a couple hundredths plus minus a half inch.
CAPCOM That's affirmative.
End of tape.

CAPCOM Columbia Houston, we are about 30 seconds from LOS so we'd like on the APUGG bed temp we would like to go back to heater alpha again please and we are still trying to scope it out, and we will be talking to you in Madrid at 21 plus 02.
SC Ok Dan we copy.
CAPCOM This is Mission Control Houston, mission lapsed time i s one day twenty hours fifty six minutes. Had LOS at Guam next voice station will be Madrid which we will acquire in about five and onehalf minutes the duration of that pass six minutes forty five seconds. Just before LOS CAPCOM Dan Brandenstein instructed the crew to switch back to heater A, on the auxillary power unit. The orbiter has three auxillary power units which power the Orbiters flight controll system actuators main engine thrust vector control actuators and a utility actuators The temperature problem is in the APU 2 the temperature is in beds number one and three, 398 degrees and 460 degrees respectively. And in APU number 2 the temperature is 264 degrees significantly lower than the other 2 APU's. The concern is that if temperature in that APU bed gets far below nominal it may be difficult to or impossible to start. The APU's are sized, however, though so that any two of the three systems can perform all flight controls functions.
And then we will have acquisition of signal at Madrid in three and one half minutes and at that point we will be able to determine whether or not the process of switching back to Heater No. A will have any positive effect on the temperature in the APU bed No. 2. Mission lapsed time now one day twenty hours fifty eight minutes. Thi is mission control Houston.
CAPCOM This is Mission Control Houston, we are just ten seconds away from acquisition of signal over Madrid. this is Mission Control Houston.
CAPCOM Hello Columbia, we are talking to you through Madrid, we will have you for six minutes and ten seconds.
SC Hello Dan.
CAPCOM Hello. And we are still looking at the that GG bed temp and it looks like it is not coming up for us.
SC That is what it looks like to us also.
CAPCOM This is Mission Control Houston. The temperature in APU No. 2 heater bed continues to drop. It is no 260 degrees farhenheit.
CAPCOM Columbia to Houston, state vector looks great, so we will not be updating it this pass, and we are still looking at that APUGG bed temp.
SC Ok Daniel. And there is no clouds in sight, I took great pictures of it.
CAPCOM ROGER,Columbia, I understand, it sounds like you are taking pictures. On that GG bed temp there is a secondary circuit that temp should stabilize between 85 and 100.
SC Ok, we will keep an eye on it.
CAPCOM And Crippen, we are going to continue to work this and come up with some entry start proceedures.
SC Ok,

End of tape.

CAPCOM Crip, we going to continue to work this and come up with entry start procedures.
SC OK
CAPCOM Columbia, we are 20 seconds from LOS, we'll be talking to you at Yarragadee at 21+50
SC Roger, we got a nice view of Italy thismorning. There's old favorite Naples down there. Off the Napoli ?
CAPCOM This is Mission Control Houston, we have had loss of signal t
at the Madrid Station, those last remarks from Columbia pilot Bob Crippen,indicating visual sight of Italy. Mission lapsed time, 1 day 21 hours 8 minutes. The cycling back and forth between heaters A and B on APU number 2 have proved to be ineffectual. Temperature in the APU #2 bed when we loss signal was 262 degrees F. However, the flight control team here at Mission Operations Control Room in Houston is confident that we will be able to start APU and are now working up start procedures as a system which will inhibit the APU bed from getting below 85 to 100 degrees and with some modified starting procedures, that should be adequate to get that APU operating for entry. Again this is one of three APU's which are required for entry to power Columbia aerodynamics surfaces and 2 of those 3 units would be required would be mandatory for entry,and once again confidence is high that will be possible to start that malfunctioning APU. Columbia is now in orbit 31, presently over the Mediterranean, have acquisition of signal at Yarragadee Australia in approximatly 25 minutes we'll have signal at Yarragadee for slightly more
than 8 minutes. Mission lapsed time, 1 day 21 hours ten minutes. This is MissionC6ntrol Houston.
This is Mission Control Houston, mission lapsed time is 1 day 21 hours, 29 minutes. Continuing inquiry into the natureodf the problem of the APU, continues looking encouraging, test data indicates that the APU have been started with the, bed temperature has been as low as 50 degrees and lower, it has the effect of limiting the lifetime utility of the APU and APU motor starts and build up to speed remains kind of sluggish, at that temperature but neverthelds we'll certainly be operative. Will have acquisition of signal in about 4-1/2 minutes of Yarragadee, Australia early on in that communication the CAPCOM will uplink that information to the flight crew. Mission lapsed time is 1 day 21 hound 30 minutes. This is MissiondControl,Houston.
This is Mission Control, Houston,dwe'll have acquisition of voice contact through Yarragadee momentarily.
End of tape.

CAP COM We are 20 seconds from LOS, we will see you at ORR at 2 minutes.
SC Well, that is good. I hope that we are all smiling.
CAP COM Loss of signal at Yarragadee, acquisition again at ORR in about 30 seconds. That was John Young's remark about the esthetic qualities of Australia, temperature in the APU over 2 bed apparently has stabilized at about 262 degrees, and that is well within the tolerances of starting that unit. Again earlier test data indicated that it would start of 50 degrees and lower. Mission elapsed time 1 day, 21 hours, 44 minutes. This is Mission Control Houston.
CAP COM Columbia, we are talking to you through ORR and we have you for about 4 and 1/2 minutes.
SC Roger(garbled)
This is Mission Control Houston. Temperature in the APU number 2, that is now 220 degrees.
SC Can Rick see those angles?
CAP COM Roger, we can see them real good, Crip, and we are about 40 seconds from LOS and we will see you at MIL at 22 plus 19

SC 22.19 at MIL
CAP COM Roger
SC Torquing now, torquing
CAP COM Roger, we copy
SC Dan, do you have any dump values for me for water?
CAP COM That is affirmative, there will be no dump for Alpo or Bravo.
SC (Garbled)
CAP COM There are no dumps required at all for the water
SC Okey, doke
This is Mission Control Houston at loss of signal at Yargagadee, acquisition of signal in 29 1/2 minutes at MIL. Mission elapsed time, 1 day 21 hours, 49 minutes. Columbia is on orbit number 32 of this plunned 36 orbit mission. This is Mission Control Houston.
This is Mission Control Houston. Flight Director Don Puddy and the crimson or entry team of flight controllers are in the mission operations control room preparing to take over their console positions at approximately 4:30 this morning CST. This will be the last planned change of flight control teams. Mission elapsed time 1 day, 22 hours, 19 minutes. We will momentarily have acquisition over the period of 8 minutes.
END OF TAPE

PAO Nineteen minutes. Momentarily we will have acquistion of signal over the states for a period of 3 minutes.
CAPCOM Hello Columbia. Talking to you through Mila. We have you over the states for 11 plus 20.
S/C Okay , loud and clear.
CAPCOM Roger. Read you the same and the only thing we have to pass at this time is the CRT timer setup whenever you're ready to copy.
S/C OK. Go ahead Daniel.
CAPCOM Roger. For entry day, item 17 plus 5, plus 21, plus 30.
S/C OK. TIG time is 5 hrs. 21 minutes and 30 seconds. 30 seconds.
CAPCOM Roger. That's correct.
S/C You'll have to excuse me, I'll have a hard time talking with my mouth full of dried apricots.
CAPCOM Sounds delicious!
S/C Ah yeah, but we had sausage, egggs, mush flakes, as John cals them.
CAPCOM Well, you'll be happy to know that we had midnight burritos.
S/C Midnight burritos. I knew it would come to that. John completed that RCS checkout and to the best of our knowledge al those jets fired properly.
CAPCOM Roger.
S/C Dan, you do have the dope on the IMU alignment, don't ya?
CAPCOM That's affirmative.
S/C Okay. Now I know what I'm eating. That was dried peaaches not dried apricots.
CAPCOM Oh. Big difference there, I guess.
S/C Right. You certainly sound enthusiastic Dan.
S/C Especialy after beng up all night.
S/C What I want to know, does the real thing boat simulation as far as you guys are concerned?
CAPCOM It sure does. Not only is it a lot more fun but we get too see neat movies during the night of you guys having a good time up there.
S/C Oh. We'l it's miles ahead as far as we're concerned...o- miles above. Dan, do you know if they have looked at any of that accelerometer data we had on launch and some of those ocillations we had, right there at or after shutdown before sep and before, during, or after the dump.
CAPCOM Standby one.
S/C No big thing. I just wanted to know dumps were in the places that I reeemembered they occured so I wanted ya'll to know that. Ca this like pulses back and forth or up ad down, ad it might have been ligke the tank unloading or something like that.
CAPCOM Roger. We saw some dynamics during the main engine stow, but that was the only thing we saw.
S/C Maybe that's what it was.
CAPCOM And we do have a question. Over ORR, before your wake-up call, we were wondering what the, recall what the, AT equipment you have on. We're trying to get a signature of what was running there. Question is, was it a vacuum cleaner?
S/C Negative. We had the food warmer on.

CAPCOM Roger.
That's what it was. We must turned on the food warmer.
S/C Sounds like you guys are getting ready to send a teleprinter message. Might also comment Daniel that we documented it with photos, but we did pickup some streaking on the forward windows stage and staging.
CAPCOM Roger.
S/C for landing, but there is a little bit of streaking and specks picked up as a reslt of that.
CAPCOM Roger. We copy.
S/C Oh. Well it's miles ahead as far as we're concerned... or miles above. Dan, do you know if they have looked at

END OF TAPE

SC Shot, forward window, that is staging.
CAPCOM Roger
SC landing, but there is a little bit streaking and specs picked up as a result of that.
CAPCOM Roger, we copy.
SC ? That's really something.
CAPCOM Columbia, Houston we didn't copy that, that was pretty much down in the mud.
SC I was just saying that I hope ?
CAPCOM Roger, we copied that Columbia
SC Dan, have you, heard one message come up do you have some more traffic coming up, I'll just wait if you do.
CAPCOM Standby Crip, we are checking.
CAPCOM Columbia, Houston, we did not send a teleprinter message recently.
SC You didn't?
CAPCOM No, and we, we are going to send something, but we didn't get the right tone, so that might explain what you heard.
SC OK, thanks.
CAPCOM Columbia, Houston we're 30 seconds from LOS, we'll see you at Madrid at 22:35.
SC Bye-Bye
CAPCOM This is Mission Control, Houston, mission lapsed time 1 day, 22 hours, 31 minutes and loss of signal over the United States Mainland, Columbia is now in orbit 32 in the middle Atlantic acquisition of signal approximately 4 minutes at Madrid. Temperature in the APU number 2, that temperature has dropped down 186 degrees. Mission lapsed time, 1 day 22 hours and 31 minutes. This is Mission Control,dHouston.
CAPCOM Mission Control, Houston, mission lapsed time 1 day, 22 hours, 33minutes. Preparing for handover from the Silver team to the Crimson team, we have the mission operations conrol room. Outgoing Flight Director, Neil Hutchinson will be available for press conference at 5 am CST in the news center, bldg. 2, for press conference at 5 am CST in the news center, bldg. 2, rm 135, here at Johnson Space Center. The time again will be 5 am CST. This will be the last change of shift briefing for the Flight Director of the entry team. Reacquisition of signal in one minute at Madrid. Mission lapsed time, 1 day, 22 hours, and 34 minutes. This is Mission Control, Houston
End of tape.

CAPCOM Hello Columbia talking to you from Madrid. We have you seven minutes.
SC (garbled). Hello Dan.
CAPCOM Roger, reading you the same.
SC Are you still with us there Dan?
CAPCOM Yes we are, we have you for five and one half minutes yet.
SC Ok, there it goes again. You might note that I was doing a playback of VTR tape and we did yesterday on the monitor here, and I noticed that I am getting the camera over temp indication periodically and I do not have any cameras on. I am not sure what that phenominum is but it should not be anything to worry about.
CAPCOM Roger, we copy Columbia. Just stand by one second. And Crippen, Ed was wondering if you were doubling your tv tape, tv work.
SC I will be in just a second, does the CAP need it?
CAPCOM No, he does not need it, he was just asking.
SC Ok. I was just trying to find a clean position on this on this particular cassette.
CAPCOM Roger.
SC Also, an interesting feature while I am doing this is that under the camera command the light down there, the ALP and the gamma, has just been sitting there flashing back and forth in all kinds of combinations. I do not think that we are going to watch any Monday night football on this playback machine up here.
CAPCOM Laugh.
SC What with all of those lights flashing and the camera over temp light on. I could probably find something better to put on the VPR.
CAPCOM And Columbia, we believe if when you finish you turn the VC" off it all goes out and your problems will be solved.
SC I do not have any problems.
CAPCOM Ok, the tv manifestations will be gone.
SC Ok. Sorry, I think that I found it. There, that ought to make everybody happy.
CAPCOM Roger.
SC When do you guys go off duty Dan?
CAPCOM Well, it will not be much longer now.
SC You sound like you are looking forward to it.
CAPCOM Well, not really, but we are looking forward to the entry. In fact, this is the last pass of STS 1 for the silver team and you guys sure gave us a thrill on that launch and we really enjoyed working with you the rest of the hop. I hope that you have a safe flight home and we will see you tonight.
SC Well, that is mighty kind of you Dan, the silver team really done it. You guys do good work.
CAPCOM Well, there was a lot of people stroking pretty hard and it looks like we had a good machine to work with. So, we are twenty seconds from LOS the crimson team will pick you up at Indy at 22 plus 54. See you guys later.

SC Ok, we are just might glad that you did not have to practice any of those things that you do not know much about there. And, we will see you tonight or in the morning.
CAPCOM Roger.
END OF TAPE.

CAPCOM This is Mission Control, 1 day 22 hours, 53 minutes, mission lapsed time. Columbia approaching acquisition through the India Ocean Station, shift has changed in the mission control center. Crimson team on duty with Flight Director Don Puddy, CAPCOM's astronauts Joe Allen and Rick Helk.
CAPCOM Columbia, this is Houston, Good Morning.
SC ?
CAPCOM Columbia, this is Houston, Good Morning from the Crimson Team. How do you read over.
SC Loud and clear, how do you read?
CAPCOM OK, Crip, we read you, we might have some minor com problems here, they have had some bad weather around IOS and we've got some com links that may not be quite up to par. We'll be with you for 5 minutes on this pass and are we running a day 2 or day 3 timeline today.
SC ? Today.
CAPCOM Say it again bob, it's broken.
SC ? Double ?
CAPCOM Roger that it maybe peculiar only to IOS nothing to worry about, we are broadcasting now transmitting on air to ground 1 only, how does this sound?
SC Much better.
CAPCOM Alrightee, we're with you for 4 minutes and nothing special to pass up to you other than a good morning.
SC Don, ?
CAPCOM We are looking forward to today. We were told that this is not a simulation today, do you agree?
SC ? you are right
CAPCOM OK John, we'll see you. Later on today, I assume you are coming back. Pulling that lousy duty with us.
CAPCOM Columbia we are 30 seconds from LOS
CAPCOM We'll see you next, in Yarragadee in about 8 minutes.
SC Yarragadee in 8.
end of tape.

PAO This is Mission Control at 1 day 23 hours 35 minutes elapse time. Columbia is out over the Pacific Ocean now. Next acquisition wll be through Tula Peak, New Mexico in fourteen minutes. We taped the Yarragadee in the OPR valley Australia passes during the change of shift newsbriefing. We have seven minutes 44 seconds worth of tape accumulated, we'll play that back now.
CAPCOM Hello Columbia, Houston back wth you through Yarragadee for 7 minutes, over.
SC Come on Joe, you're loud ad clear.
CAPCOM Okay Crip, you're about uh, you're clear a little weak but cetainly readable.
SC Certainly If INCO's watching, Im just about to do this wideband auto cal..
CAPCOM Press on with that , we don't get data until OPR valley but have about it?
SC Oh yea, forgot.
Sounds like you guys arranged some pretty weather.
CAPCOM Roger that we try to please.
SC Are we over the hill there Joe?
CAPCOM Uh, no, Columbia we're with you another minute and a half. You'll be pleased to hear that no gyro bias updates will be required when we come AOS over OPR Valley. We'll give you a reminder, and that is we need a manual fuel cell purge, sometime before the morning's over. We'll go LOS here in a minute, be back in a couple of minutes for an Royale Valley Pass, we'll say we'll check in with you and check out with you there but overwise we will be quiet and let you get about the business of FCS checkout.
SC Sounds okay, thank you. And you guys are also working on a change to the STS repressurization and helium purge..hydrogen purge procedure. Is that right?
MC That's correct Bob, we'll have a message about that comin up to you before much longer and its not particularly complicated.
SC Well it better not be, I won't be able to do it.
MC Infact, I even understand it, its on a message 26 delta at the top of the page, and I think we will not have it changed to that

SC Okay, Is the 26 delta the one I've got on board?
MC Oh it should be on board, Bob.
END OF TAPE
PAO This is Mission Control at 1 day 23 hours 35 minutes elapse time. Columbia is out over the Pacific Ocean now. Next acquisition wll be through Tula Peak, New Mexico in fourteen minutes. We taped the Yarragadee in the OPR valley Australia passes during the change of shift newsbriefing. We have seven minutes 44 seconds worth of tape accumulated, we'll play that back now.
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SC Sounds okay, thank you. And you guys are also working on a change to the STS repressurization and helium purge..hydrogen purge procedure. Is that right?
MC That's correct Bob, we'll have a message about that comin up to you before much longer and its not particularly complicated.
SC Well it better not be, I won't be able to do it.
MC Infact, I even understand it, its on a message 26 delta at the top of the page, and I think we will not have it changed to that

SC Okay, Is the 26 delta the one I've got on board?
MC Oh it should be on board, Bob.
END OF TAPE

SC Is 26 Delta what I've got on board?
CAPCOM IT SHOULD BE on board, Bob.
CAPCOM Columbia, Houston back with you through Orroral Valley for three minutes just checking in.
SC Okay, Joe, and I've gone back through my messages and it looks like I ought to have Delta 26 on board but I don't seem to have it so it might have gotten mispaced somewhere. I don't remember reading anything about it so you'd better give it to us again and maybe it would be wise for us to review what we are supposed to have on board.
CAPCOM Roger. That sounds like a good idea. We'll send up another copy to you. Crip. How's the echo affect right now? It should be much better. It is better on the ground.
SC Yeah, I can't hardly notice any echo at all. Echo echo.
CAPCOM Roger that Roger that.
SC Good morning, Joe. I got a flight plan overview jobby that was on 27Bravo. And I got 14 Charlie which is TIM8U changes
CAPCOM Roger. Crip, the message we're talking about is 26 Delta. It may well be lost in the mail and we'll just send it to you.
SC Okay, I had 24, which is every was entry weather, a 28, which is entry weather, 27 Bravo, I got no 26.
CAPCOM Okay. No problem.
SC Also, am I to understand right now that we anticipate no modification of APU start procedures due to the cold GG bed bit?
CAPCOM Bob, that's basically a correct statement. It is probable that you will have to use start override to get it started but otherwise no problem at all. And we have test data that shows an APU starting with temperatures much colder than what you all will be carrying at the time you start them.
SC Okay, but I do understand you want me to try a normal start initially?
CAPCOM Bob, the plan now is we want you to start override the first try even.
SC Okay.
CAPCOM Crip, on that subject, then as a reminder that means you will have to lead the start by about three and a half minutes.
SC Roger. I was just thinking the same thing.
CAPCOM Okay, we're going over the hill now. Be back in about 30 minutes.
SC Okedoke, and apparently you just sent me some traffic on the teleprinter.
CAPCOM This is Mission Control. One day 23 hours 44 minutes elapsed time. That's the end of the replay of the tape of the Yarragadee and Orroral Valley Passes. Columbia is five minutes away from acquisition at Tula Peak. The Flight Director, Don Puddy, has received a weather briefing. Edwards weather is excellent today. The coast and the approaches to the coast and all of the San Joaquin Valley are clear. Winds are 15 knots or less variable from 20,000 feet down. Very good weather for today's landing at Edwards Air Force Base. Columbia is now in a 147 by 143 mile orbit.
END OF TAPE.

PAO This is Mission Control, Columbia's orbit is 147 by 143 with an orbital period of 1 hr. 29 min. 49 sec. We are 3 min. away from continental United States pass. This is Mission Control Houston. This is Mission Control. Clocks have been started here in the Control Center counting down to deorbit maneuver ignition into entry interface. The time that Columbia will reach sets of orders earth's atmosphere at approximately 400,000 ft. We are showing we are 5 hrs. 33 min. from deorbit maneuver ignition. That's counting to an ignition of 53 hrs. 21 min. 30 sec. That time may be adjusted later prior to deorbit but that is the time projected at the moment. That igntion at that time would bring entry interface at 6 hrs. and 15 sec. from this time. We are about 45 sec. away from acquisition at Tula, stand by.

CAPCOM Hello, Columbia, Houston, back with you through Tula Peak for 15 min. Over.

SC Ok, Joe. We are right here in the middle of the dedicated display checkout. Everything is going normal as far and including when we did the high chewck. John's HSI moved correctly.

CAPCOM Eureka, that's good news and we will watch and listen as you proceed through that.

SC That was what SIM SUPV calls an intermittent.

CAPCOM Roger that.

SC Okay, be advised that the HSI appears to be working normally. Along with all the other dedicated displays.

CAPCOM Super. SIM SUPV's done it again, took the failure out on us.

SC Right. Ok, Joe we have completed all the checks and unless you have a reason for us to hold up a OPS 8 I think I will just go ahead and just take it back to OPS 2.

CAPCOM Stand by. Ok, Crip, go ahead to OPS 2. We are happy.

SC Okay. Now, we will do that, and is there anything productive to be gained out of going to this auto maneuver to tail sun attitude early. Called out for at -440.

CAPCOM Wait one. Columbia, we can do that. We do need to do the accelerometer cal first though and if you want to do the cal now then we will let you go to the other attitude.

SC Okay, you guys got time to do it now.

CAPCOM Rog, we're ready if you are.

SC Okay, let us set up for it. Okay, we are go.

CAPCOM Columbia, Houston. Crip, as a reminder keep the downlist constant as we do this cal.

SC Yeah, I am not going to change it.

END OF TAPE

CAPCOM Columbia, Houston. Crip as a reminder, keep the down list constant as we do this cal.

SC Yeah, I'm not going to change it until you guys finish up and then we will do the changeover.

CAPCOM You got it.
SC What are we coming across right now, Joe? GN&C reports you are going across his home country and so does your trusty PLT backup report that.

PAO Mission Control. That home country is Louisiana.

SC I finally see it. I see Tyndall down there. See the Cape, in fact I can see the runway from here.

CAPCOM Columbia, Houston, we are with you for 6 more minutes. Crip, Joe Henry is curious. You said you could see the Cape and with the runway, you were looking at the Cape or the one at Tyndall.
SC At the Cape. Pretty far south down there but you can pick it out and the VAB. Yeah, we ca see it. I don't know if the picture will show it up but we can see it.
CAPCOM Very good. On your next pass over the US do your own weather flight and we will try to remind you to look over the edge as you come over Califoria.
SC OK. We will take over for Weather West.
CAPCOM Crip, Weather West just reports that next flight he is going to take over from you.
SC OK. It sounds like a deal. You guys notice a slight buzz in the transmission now?
CAPCOM Roger that. You are getting a squeal in your background, I think. Maybe..
SC I wasn't talking about the squeal, I was talking about the speaker downstairs on too high. I'll get it down,ID is just that TACAN effect that we have noticed before when we are using the HIUs. This is no big deal, but it is there.
CAPCOM OK. As you go through the checkot here, you will be interested in a data report from yesterday. During your checkout yesterday, your TACAN locked very easily on St Petersburg as you went overhead and they locked on from a range of about 250 miles out.
SC AH, Maybe that is why we saw it. John and I were seeing some funny lock here and we couldn't understand what it was. What did we lock on to?
CAPCOM Channel 111, St Petersburg.
SC OK. I told those guys we could use them for orbit Nav. I locked on to something strange today, too.
CAPCOM Roger, you are locking on things today and we are looking at the data. We think we might have some ambiguity in the stations we are locking on, but we will report back a little later. We are

with you for 4 more minutes, Columbia. We are finished with the cal.
SC Roger. I want to proceed on back into OPS 2 and when I get there, we'll do auto maneuvers to tail sun attitude.
CAPCOM Roger. We concur.
CAPCOM Columbia, stand by. We are no-go for transition. We need a THC doublecheck here.
SC OK. Just a second. Let's go back and look at the controllers spec.
CAPCOM Wait 1, Columbia, wait 1. Columbia, we need to look again at contact #3 on the THC.
SC. You are right, we did not get it reselected. Thank you. Okeydoke, we got it. Got any other problems?
CAPCOM Bob, we copy. We are with you 2 more minutes. Stand by Mr. Borg is being very conservative today. He is looking the last time and then we will give you the go-ahead.
SC OK. Well, Dr. Borg is always that way. Tell him I never did get my good Cajun music.
End of tape.

CAPCOM ...is being very conservative today. He's looking the last time and then we will give you the go ahead.
SC Okay, Dr. Borg is always that way. Tell him I never did get my good Cajun music
CAPCOM Well, then the day is not over. We are happy, go ahead with the procedure.
SC Roger, that.
CAPCOM Columbia, we are 30 sec. from LOS, we will be back in 6 min. through Madrid.
SC Rog, see you later.
PAO This is Mission Control. Bermuda has loss of signal. Madrid will acquire in about 5 min. The crew is continuing to conduct flight control system checkouts prior to entry. Early this mornings checkout ordered that the commander's horizontal situation indicator is now moving correctly. That's the compass card that was scuffed during the test, yesterday. It's now moving. Crew reported they could ... This is Mission Control. The crew reported they could see the runway and the Vehicle Assembly building at the Kennedy Space Center during this last pass. The reference to weather west in conersations, that is the reference to backup pilot Dick Truley. That was his call sign when he had planned to fly a weather flight in a T-38 at Edwards today. He has since changed his plans. He is still know as weather west. And the crew was told in earlier and earlier orbits that there had been a TACAN lockon at St. Petersburg and they are getting lock-ons with other stations today. The Guidance officer here is checking with the stations now. TACAN, acrynom for Tactical Error Navigation, a system that is used during entry and lardings. Normally used below 145,000 ft. supplies range at varying measurements to the spacecraft from ground stations. It is also to navigational a system that is used for air navigation throughout the world. We are about 1 min. and one-half away from Madrid, we will stand by for communications there.
CAPCOM Columbia, this is Houston. Back with you through Madrid. We will be with you here for about 6 min.
SC Okay, we read you loud and clear.
CAPCOM And John and Crip, we are sending message 18 ECCO which is your switch list deltas, it is not particularly long you will be pleased to know and you should have message 26 delta onboard as well.
SC Okay, 18 ECCO and 26 delta. And we hear 18 ECCO coming up. And, does the accelerometer cal look Okay to you.
CAPCOM We copy the question, wait one. Columbia, we are still looking at that data. We will give you a reading when we get it back.
END OF TAPE

SC And does the accelerometer cal look Okay to you.
CAPCOM We copy the question, wait one...
Columbia, we are still looking at that data. We will give you a reading when we get it back.
SC The old flash evap been coming through for us.
CAPCOM Say that again, please.
SC I said that old ?? been doing its thing good.
CAPCOM Sure has, we agree. Columbia, we are 30 sec. from LOS. We will back with you in 12 min. through Indi.
SC Okay, see you in 12 at Indi.
PAO This is Mission Control. Madrid has loss of signal. Indian Ocean station will acquire Columbia in 11 min. Countdown clock toward deorbit ignition shows 5 hrs. 4 min. and 32 sec. At a Mission Elapsed Time of 2 days 17 min. this is Mission Control Houston. This is Mission Control. We have acquisition of the Indian Ocean station now.
SC Okay Columbia, Houston, back with you through Indi for 7 min. Over.
SC Roger, loud and clear.
CAPCOM You are loud and clear as well. I've got some good news when you are ready.
SC Okay, the good news.
CAPCOM Okay, and I am sure this is not followed by bad news. Number 1, from Mr. Boig reports the IMU excelled Cal shows that the IMUs are perfect, number 2, Crip, for your trusty CDR we have got some new rocket data in-house from Eddie and it shows that no roll phasing will be required during the last portion of the reentry.
SC Well, we looked to the winds the other day. I think they are about light to variable, almost up here.
CAPCOM Roger, that. And Columbia, for the recording secretary there will be another message sent up to up shortly. Message 29 which is the post-landing checklist changes.
SC Okay, thank you. Hey, Joe.
CAPCOM Go ahead.
SC Did you put modification with regard to delete of the load test and so forth in that particular message?
end of tape

SC Joe
CAPCOM Go ahead.
SC Did you put the modification with regard to deletion of the load test, etc. in that particular message?
CAPCOM Bob, we thought those changes were put in the Ascent checklist to be transferred over into your entry checklist. We have not included them in this message. We could certainly do that if you want another copy.
SC No. I just gotta go dig out the ascent checklist. I was just wondering whether or not. OK. Thank you, I'm fine

Houston, Columbia. We anywhere close to flying over the Indian Ocean station now?
CAPCOM You are a little south of it right now, Columbia.
SC OK. That is what I thought.
CAPCOM Columbia, we are going over the hill in 20 seconds and we will see you next Yarragadee at about 10.
SC Roger, Yarragadee at 10.
PAO This is Mission Control. Indian Ocean station has loss of signal. Columbia now heading toward Australia where it will acquire at Yarragadee in 9.5 min. At 2 days, 35 min. Met, this is Mission Control Houston.
End of tape.

PAO This is Mission Control at 2 days 44 min. MET. Columbia coming up on acquisition at Yarragadee now.
CAPCOM Columbia this is Houston. We are checking in with you through Yarragadee. Be here for 6 min.
SC Roger that, Joe. And we think we got all your messages down. A new recording secretary is thinking about updating the books.
CAPCOM Good idea. Columbia, Houston.
SC Go ahead, Joe.
CAPCOM Roger, Crip. A question for you. We are trying to remember. Youall lifted off with a caution warning cabin press limit set at 15.4 at we think you changed it back to 15.2. We want to confirm that.
SC Rog. That is affirmative.
CAPCOM OK. Thank you.
CAPCOM Columbia, we are 30 sec. from LOS. We will be back shortly through Orroral Valley.
PAO This is Mission Control. Yarragadee has loss of signal of Columbia. Moving south of Australia, across the Indian Ocean. It will just nip across the southeastern coast of Australia, down there at Tasmania. It will have communications through Orroral Valley at about 45 sec. We will stand by. Columbia now on the 33rd orbit.
CAPCOM Columbia, this is Houston with you for 4 minutes through Orroral.
SC Roger that. When you came up there we got a term message. I really don't see anything that looks bad right now.
CAPCOM OK. Crip. We see that also. We will look at it. Columbia, we got a state vector coming up to you.
SC (garbled_
CAPCOM The vector is onboard. Columbia, we are 20 sec from LOS. We will see you next through Buckhorn in 23 min. You are looking good going over the hill.
SC Roger that.
PAO This is Mission Control. Columbia is out of range at Orroral now. Starting a long pass over the Pacific Ocean without contact with any station. The Columbia misses Hawaii on this orbit. Next contact through Buckhorn in California in 22 min. A 2 days, 58 min MET,this is Mission Control,Houston.
End of tape.

PAO This is Mission Control. Two days 1 hour 20 minutes elapse time, Columbia is approaching acquisition through Buckhorn in its 34th orbit a short time ago. We should have television from the payload bay camera during Goldstone acquisition during this pass. Cameras are going to be remotely operated from the Mission Control Center by the integrated communications systems engineer Ed Fendell. We should have AOS now, we'll stand by.
MC Columbia, this is Houston, through Buckhorn and we're picking up some tv out of the payload bay and it looks gorgeous, over.
SC Okay, that's great.
MC And right off the (bat if you can give us SPEC 1. we like to send up some variable parameters and these be those associated with TACAN change indicators and RCS jet parameters, over.
SC Okay, you have it on the GNC, you want it on the SM?
MC GNC, please.
SC Okay, you have it on DEU 1.
MC Roger on 1.
PAO CAPCOM Rick Howe talking to the crew now.
MC And Columbia Houston, as it come up over the southern coast of Baha we're hoping that the lighting conditions will be good so that the folks from the Southern parts of the state can see you pass over.
SC Oh, that's great. Okay, and we're on both PCS's are on and we'll done the ARS water loop 1-2 entry configuration and I left it closed at about 975-980.
C Okay, that looks good to us, and you might be looking out your windows when you have a chance to see the Rosylan Lake there.
SC Roger that.
MC And John wll you take the high load duct heater and to Alpha Slant Bravo, over.
SC Sorry, duct heater has already been at Alpha Slant Bravo for quite a while.
MC Okay, that's my mistake, take it to Bravo, please.
SC Okay, it's in Bravo.
PAO Columbia Houston, the CRT is yours, the variable parameters are on board. And Columbia Houston we project leaving the prevalves open do not close the prevalves, we've got plenty of helium.
SC Roger, leave the prevalves open.
PAO Columbia Houston, everything is looking super you've got a go for OPS 3 transition and for payload bay door closing.
SC Roger go fo payload bay door closing and OPS 3 transition.

End of tape

CAPCOM Columbia, Houston, everything is looking super. You have a go for OPS 3 transition and payload bay door closing.
SC Roger, go for payload bay door closing and OPS transition.
CAPCOM Columbia, Houston, we will be sending up message No. 31 and No. 21 bravo during this pass, and when you have a chance, at your convenience, we would like to verify that you have message No. 29.
SC Okay. We will verify for you we have...
PAO This is Mission Control. We will have more television after Columbia is acquired by the Merritt Island, Florida, tracking station. Crew has a go for payload bay door closing at the closing scheduled for a little more than an hour from now. Shortly the crew will start putting on air pressure suits. We are 3 hrs. and 53 min. away from deorbit burn ignition.
CAPCOM Columbia, Houston, when you have a chance we have some changes to the entry checklist pre-bank table. And that is deferrable.
SC Okay, I think we better defer it a little while, we are trying to get into our suits here.
CAPCOM Very good. Columbia, Houston, as a verification could you verify that the MO 10 W steps of the pcs entry config were done. And, if you are still busy suiting up and cannot answer, that is fine. And Columbia, Houston, we have 3-1/2 more min. of AOS time, have nothing to pass. Columbia, Houston, we have got 1 min. to LOS and again if you are suited up and can't respond, that is fine. The 2 valves we would like you to verify on MO 10 W, however, are the 14.5 psi cabin regulant systems. Two of them to close. Okay, Columbia, we are getting a relay from Bermuda that you heard our last transmission, we are not hearing it here in the center, but we don't think that is a problem. We will see you in about 5 min. at Dekar.
PAO This is Mission Control. Bermuda has lost its signal. Columbia is out over the mid-Atlantic heading towards acquisition through Dekar in about 4-1/2 min. At 2 days 1 hr. 40 min. elapsed time, this is Mission Control Houston.
PAO This is Mission Control at 2 days 1 hr. 44 min. elapsed time. Columbia approaching Dekar's range now, stand by.
CAPCOM Hello, Columbia. This is Houston, back with you through Dekar for 6 min. How do you read? And Columbia, if you are still occupied with your suits, no matter, press on. And we will just report in with you here. We are with you for 6 more min. Columiba we are 30 sec. from LOS. We will see you next Botswana in 11 min. That is a couple of minutes after the hour.
END OF TAPE

CAPCOM We are 30 sec from LOS. We will see you next at Botswana in 11 min, that is a couple of minutes after the hour.
PAO This is Mission Control Houston. Dekar has loss of signal. Quiet pass. The crew is busy donning their pressure suits. The de-orbit ignition time is 3 hours 29 min, 17 sec from now. That set an elapsed time of 2 dayss, 5 hours, 21 min 30 sec. The Delta V, or the change in velocity of that maneuver will be 297.6 fps. Duration of the burn 2 min, 39.5 seconds. Columbia will be flying tail first. There will be a retrograde maneuver, burning both the OMS engines. Entry interface expected to occur at an elapsed time of 2 days, 5 hours 49 min, 1 sec. at an altitude of approximately 400,000 feet at a range from the landing site at Edwards of about 4400 miles. Blackout will begin at 2 days, 5 hours, 51 min, 44 sec at an altitude of approximately 330,000 feet and a range of 3,700 miles. Blackout will end at 2 days, 6 hours 7 min, 37 sec at an altitude of 173,000 feet and a range of about 495-500 miles. In actuality, the last tracking station to see Columbia will be Guam on that entry orbit and we will not have communications with them until we get to Buckhorn on the west coast. This elapsed time sequence shows landing at 2 days, 6 hours 21 min and 33 sec. Columbia is now about 7.5 min away from acquisition through Botswana at a elapsed time of 2 days 1 hour, 55 min. This is Mission Control Houston.
End of tape.

PAO This is Mission Control at two days two hours and two minutes MET. Columbia is over Africa coming within range of the Botswana station.
CAPCOM Hello, Columbia. This is Houston, through Botswana for three minutes.
SC
CAPCOM Columbia, this is Houston. The radio checks through Botswana. We'll be with you for three minutes. And be advised there's a lot of static on the line.
SC Okay, Houston. We read you loud and clear. Over.
CAPCOM Okay, John. You're loud and clear and the static is much better now.
SC I guess we can' t do that over Botswana.
CAPCOM We missed part of the transmission, John. Say it again-- what we can't do over Botswana?
SC See if I have missed any of the switches on the middeck.
CAPCOM Okay, we do have a question. About the PCS configuration on MO 10 W, we want to know if the 02 SYS 1 inlet valve is still open?
SC Okay, I'll go check it. I'm pretty sure . . .
CAPCOM IT'S the reg inlet valve on sys 1 that should be closed.
SC Okay, let me go check that.
CAPCOM And, John, I misspoke on that. It should be open. The reg inlet valve should be open.
SC I'm pretty sure they are. I'll go down and look for sure.
CAPCOM Columbia, this is Houston. Columbia, Houston. We're with you for 50 more seconds. And to clarify the nomenclature, the cabin reg inlet valve should be closed and the O 2 reg inlet valve should be open. Over.
SC We're looking at it now.
CAPCOM Columbia, we'll see you in 13 minutes through Yarragadee.
PAO This is Mission Control. Columbia is out of range of Botswana now heading over the Indian Ocean toward Yarragadee. Acquisition there in 13 minutes. A playback of the television that was transmitted from the payload bay camera over the last pass at continental United States will begin now at two days two hours seven minutes, this is Mission Control, Houston.
CAPCOM Columbia, this is Houston through Buckhorn, and we're picking up some TV out of the payload bay and it looks gorgeous. Over.
SC Okay, that's great.
END OF TAPE.

PAO This is Mission Control at 2 days 2 hrs. 19 min. elapsed time. Columbia is over the Indian Ocean. 10 sec. away from acquisition through Yarragadee.
CAPCOM Hello, Columbia, this is Houston back with you through Yarragadee. We will be here with you for 6 min. Over.
SC Read you loud and clear.
CAPCOM Okay, Columbia, you are loud and clear as well. We would like a verification when it is convenient back on panel R11 want to doublecheck that the DFI wide band mission recorder power is on. That is just a doublecheck on.
SC Okay. Okay, Joe, how do you read me.
CAPCOM Okay, Crip, you are a little weak but you are clear. Go ahead.
SC Okay I am just reporting we are down through the DPS configuration, standing by for the dump. I can verify on R11 wideband mission power is on.
CAPCOM Okay, Crip, I appreciate that. Another question about messages on board. We are still would like verification that you got message 31 which is about Lakebed conditions. All good news. A message 21 bravo latest listing of the TIMBU's we've sent, and finally message 29 which has to do with with DFI recorder reconfig once the wheels stop. Over.
SC I ca verify. We have all those on board.
CAPCOM Very fine. Thank you.
SC Joe, do I understand that we have a go for payload bay door closing?
CAPCOM Roger, Columbia. You have a go for payload bay door closing.
SC And, we are still going initiate this dump over ORR Is that right?
CAPCOM That is affirm and we will try to be very prompt in giving you the calls and on both the initiated and the redump initiate.
SC And I will try to be prompt on responding then! Hey Joe I have got the radiator coming closed at this time.
CAPCOM Roger, that.
SC And I have got it stowed.
CAPCOM Okay, very good.
SC ??
CAPCOM Columbia, we are 10 sec. from LOS. We will be right back through Orroral Valley with a configure AOS call and go ahead on that dump.
SC Roger, and when I do that tell me you've got data locked on before I let go.
CAPCOM Roger that.
PAO Orroral will have acquisition in less than 30 sec. Bob Crippen has stowed and latched the radiators over Orroral. The crew will dump the memory of the general purpose computers for comparison on the ground. Payload bay doors closing will be started. The left door scheduled to be closed and latched after Orroral LOS, between Orroral and Hawaii.
END OF TAPE

PAO Orroral will have acquisition in less than 30 sec. Bob Crippen has stowed and latched the radiators. Over Orroral the crew will dump the memory of the general purpose computers for comparison on the ground. Payload bay doors closing will be started. The left door is scheduled to be closed and latched after Orroral LOS, between Orroral and Hawaii. Orroral has AOS.
CAPCOM Columbia, Houston. Orroral Valley, configure AOS.
SC Roger. We are configured AOS. I am standing by to dump.
CAPCOM Roger,Columbia. We have got good data. Go ahead with dump 1. Columbia. A TIMBU is on the way. And that is an advisory that the dump seems to be going well.
SC Roger.
CAPCOM Columbia, you are go for the second dump.
SC We are coming at you.
CAPCOM Roger, that.
SC OK.Houston, the port door is coming closed.
CAPCOM Roger that, Crip. Thank you. Columbia, Houston with an over-the-hill call. We will be back in 15 min through Hawaii.
SC Roger that.
CAPCOM And going over the hill the CRT is yours. The dump was completed
SC Roger that.
CAPCOM And downlist GPB is #1.
SC OK. I'll get it in a second.
PAO This is Mission Control. Columbia is out of range at Orroral Valley now. Next acquisition through Hawaii in just under 14 min. The left payload bay door is being closed as we lost signal. When we get to Hawaii, we should see the final closing and latching of both doors. This is Mission Control Houston at 2 days,2 hours, 31 min MET.
End of tape.

CAPCOM Hello, Columbia. This is Houston, through Hawaii. Configure OAS, please and we will be with you for 7 min.
SC OK. We are configured for AOS.
CAPCOM OK. Thank you very much and we are looking at some pretty good payload bay door data down here.
SC Fantastic data. Those doors closed up and locked, just as they was supposed to. And we are sitting down here to our snack time.
CAPCOM Roger that. John or Crip can you give us a word on the latching if you happen to remember it?
SC It was just as nominal as it could be.
CAPCOM We were thinking with reference to page 3-33.
SC OK. Are you talking about where the thing came down--it looks just about like it did yesterday. It was about 1.5 inches on latch 12 below Charlie.
CAPCOM OK. Very good. We copy.
SC I could't visually really notice any difference in what I saw yesterday. It was also difficult to see back at that far end of the bus.
CAPCOM Roger, that.
SC You guys going to be having some pads for us or anything like that shortly?
CAPCOM We sure do,in fact when you are ready, we are ready, Crip. We also see your left display message and that is to be of no concern.
SC Left display message. Oh, yeah. That was just associated with when we doing the NSC stuff. I swear the one we had on the aft was not like that.
CAPCOM OK. And cleaning up other miscellaneous things. We can confirm that the O2 reg inlet is open as we wanted it to be and we are assuming that you'all did doublecheck the 14.5 psi cabin reg inlet as closed.
SC Yeah. That is a firm. Those were out of configuration nd we got one from the call you made from Bermuda where we were talking to the comtecs and we went back in and got the reg inlets.
CAPCOM OK. Very good.
SC OK, Joe. Did you want to shoot a dell pad to us?
CAPCOM Would you believe that the first real dell pad is on itsDway to you now if you are ready.
SC Let her come.
OK. Burn at 138094007. Target 146 x 000. 297.6 237. , 146 and 146. 85, and NA. Inertial Att 204 299 036. The pre-bank is right 000.07
End of tape.

CAPCOM a inertial ATT 204, 299, 036. The pre-bank is right 000, 07, and 02. That altimeter is 30.10, b=4 at 05, 54, 04. ?? 18450. Left-hand turn to Eddie 23, the winds are all out of 270 for 50, 40, 30, and 20 at 35 knots, 45 knots, 30 knots, and 15 knots, at 7k160 at 05. On the surface variable at 5 knots. And would you believe that in the remarks the CG at MACH 3 1098.6 and 0. Read back.

SC Okay, Joe. You messed me up a little bit on how you were saying the winds there. Come back at me on velocities now.

CAPCOM Okay, Crip. My fault. It's, ah--I will just read them from the top now. 270 at 35, 270 at 45, 270 at 30, 270 at 15, 160 at 5, and light and variable.

SC Okay, and I'm coming back at you from the top. 138, 094, 007, 146, by 000 297.6, 237, 400, 146, 146, 85, na, 204, 299, 036, all balls 07, 02, 3010, 05, 54, 04, 18, 450, left a 23, wind 270, 35270, 45270, 30270, 15160, 05, variable at 5, 298.6.

CAPCOM Read back is correct. We are 30 sec. from LOS, and the long waited OMS propellant pad cross Q is 9 percent in the left and 1.7 percent in the right. Over.

SC Copy, 9 on the left, 1.7 on the right.

CAPCOM That's affirm. And Columbia we are going over the hill now we will see you next through Buckhorn in 10 min.

SC Roger that.

PAO This is Mission Control. Hawaii has lost the signal, Buckhorn will pick up in about 45 sec. Passed up the deorbit pad to the crew over Hawaii, that's the orbit maneuvering system burn delta V of 297.6 fps. We are targetting for an orbit of an apogee of 146 nautical miles and a paragee of 0. We will pick up at Buckhorn in just a few seconds, we will stand by.

CAPCOM Columbia, Houston, back with you for 18 min. Please configure AOS.

SC You were gone so shortly, I didn't have the time to configure LOS.

CAPCOM Roger that, and we can report that there were no miscompares on the second dump. We had a data dropout on the first dump, but the second one was perfect.

SC Fantastic. That's why we did two of them. You guys are getting super down there.

CAPCOM Better you say that then us, Crip. And a quick question, we are hoping you can verify that things went well with the rad heat sink FTR.

SC That's affirm, except...

END OF TAPE

CO Columbia Houston back with you for 18 minutes, please configure for AOS.
SC (garble) shortly I did have to time to configure LOS.
CH Okay, roger that, and we can report that there were no miscompares on the second dump. We had a data drop out on the first dump but the second dump is perfect.
SC Fantastic, we did too, you guys are gettin good super down there.
MC Better you say that than us Crip. And, uh, a quick question we'll hoping that you can verify that things went well with the rant heat sink STSR.
SC That's fine except for being able to run the PCM DFI Recorder.
MC Rgg we understand that, we're going to send targets and state vectors to you this pass. And a quick request, we'd like you to keep a watchful eye on the top sun attitude.
SC Okay, Okay, we'll do our darndess you guys hollor at us if you see us out just a little bit to you now.
MC We're showing at off about 7 degrees now, Crip.
SC OK
MC And that's in roll. And we'd like it to hold it for + to + or - 5 if you could.
SC We aim to please.
MC And while you'r moving around, you may in checking del pad we read up to you against the numbers you have on board notice that the pitch is some what different, that is because of the early TIG we're going to use to optomize your down moding capability.
SC Okay, I had'nt got to checking down that far, and I probably would'nt have noticed it anyway, but I apreciate you letting us know.

MC It's not that big a difference Crip, its about the only thing that is different from on board pad though.
SC Joe, where do you show us at right now?
MC You just crossed the coast line in land, I would guess Northern California.
SC Okay.
SC That's right, we see the Great Salt Lake and Ellington Airforce Base.
MC Alright. Columbia Houston, we're ready for an item 39 and 40 whenever its convenient and we also have the top sun attitude to go in to page 3-37 when you're ready to copy those no hurry.
SC Okay, go ahead with those attitudes.
MC Okay, the only ones different from those given is the roll, and it now should read 173 and to confirm pitches 94 and yaw is seven.
SC Okay, 173, 94 and 7.
MC That's affirmative.
SC Okay, Houston, I think the problem here with this attitude is that the flash evaporator is putting us up against a dead band, I could be wrong about that but the highload's
MC Okay, John we copy that it could well be. Columbia Houston

you report that your on board solutions are good in both prime and backup.
SC Roger, we're gonna do it.
MC Columbia, the attitude looks very good to us now.
SC Looks like we're going right over Chicago. Or are we lost in space again?
MC No, we think you're probably right.
End of tape

CAPCOM Columbia, the attitude looks very good to us now.
SC It looks like we are going right over Chicago. Or are we lost in space again.
CAPCOM No we think you are probably right. John, Mr. Puddy wants to change that. He claims we know exactly where you are.
SC I figured the flight director knew. As long as I don't see any fires down there, right,Bud?
CAPCOM Somewhat different subject, Crip. Wondering if you were able to get those pages out of the ascent checklist to go with the post landing changes.
SC We did them.
CAPCOM OK. Very good. And I have a footnote for your OMS propellant which I forgot to pass. It is a reminder that the crossfeed Q's are to be taken from the OX, not the fuel side.
SC OK.
CAPCOM And Bob, I've got a pre-bank table change to make whenever it is convenient. No hurry at all and they are minor changes But give a call whenever you are ready to copy them.
SC Stand by one.
CAPCOM Roger. It is page 3-9 whenever you are ready.
SC AOK Joe, send them to me.
CAPCOM OK. Three entries as follows: The first one under the delta HP4 at the top there, it should read 45 degrees instead of 50 degrees. The second one is for the Delta HP of 22. It should be 90 degrees instead of 95 degrees. And finally, on the far right side of the page, the delta HP for the pre-bank of 180 should now be 31 degrees instead of 30 degrees. Over
SC Roger. OK. I copy for a delta HP of 4, pre-bank is 45 degrees for a delata HP of 22 miles, pre-bank of 90 degrees for delta HP. 31 miles, the pre-bank is 180.
CAPCOM That is correct. Crip, the only other note we are carrying down here is a reminder with regard to instructions on IMU dilemma in the pocket checklist and it is just a reminder that if that dilemma does appear and it is RGA, don't be impatient but wait 30 sec before deselecting anything.
SC Alright. You can bet your life on that.
CAPCOM I bet you might even wait 35 sec. Am I right?
SC At least 31.
CAPCOM And Columbia, Houston. With regard to the OMS burn coming up here, we anticipate your doing the OMS burn on secondary for the right OMB. Want to underscore that. And John, a suggestion, you may in doing the gimbal check you might want to do the primary gimbal check first, then the secondary gimbal check on the right engine and just leave it there in secondary.
SC OK. Will do it.
CAPCOM Columbia, we will be with you for 4 more minutes. Going out over the ocean, Crip, if you need still other things to do. we have got tri-CG updates for your calclulator if you want them. If you prefer not, we will just leave them on the ground for later.
SC I have gotten to know previously by just deltaing everything

1 day. Is that pretty close? I'd just as soon hang with that.
End of tape.

CAPCOM Columbia, we'll be with you for four minutes going out over the ocean. Crip, if you need still other things to do, we've got dry CG updates for your calculator if you want them, or if you prefer not, we'll just leave them on the ground until later.
SC Okay. I got a note previously about just garbled everything one day. Pretty close. I'll I guess we'll hang with that.
CAPCOM That will be just fine, Crip.
SC Fine. Joe, you still there?
CAPCOM Roger, that for two more minutes.
SC Okay. Certainly, John and I appreciate the way you guys have handled it today and not talked to us an awful lot cause this running around the vehicle getting it ready to go takes an lot of time and to have to stop and talk kinda slows you down a little bit. We certainly appreciate the way you guys handle it. It's super.
CAPCOM Thank you for the words.
SC YEAH, We found out we never quite practised everything in the garbled even though we think we do. We are still on time.
CAPCOM We are Columbia, we are 30 seconds from LOS will be back in four minutes through Dakar.
SC All right. See you there.
CAPCOM Columbia, configure LOS. See you shortly.
SC Bye bye.
CAPCOM This is Mission Control. Bermuda has lost the signal. Columbia out over the Atlantic Ocean heading toward acquisition to Dakar in about three and one half minutes. All crew activities proceeding on schedule for deorbit and landing today. Payload bay doors are closed and latched. Computers have been checked and no miss compares have been found in the program. The crew is in a snack period now. We're two hours five minutes 51 seconds way from the deorbit burn. Two days three hours and 15 minutes MET, this is Mission Cnntrol, Houston.
CAPCOM This is Mission Control at two days three hours 18 minutes Dekar should acquire Columbia in about five seconds. We'll have overlapping coverage through Ascension on this 35th orbit.
CAPCOM Hello, Columbia, Houston back through Dekar for ten minutes. Over.
SC Hellc, Joseph.
CAPCOM And, Crip, no problem at all. We are just looking at the stringing which is fine. You might want to double-check your CRT 3 assignment though, and another reminder to Go to start override at six and a half minutes.
SC Roger. I've got that in the checklist. I'll double check those CRT 3 in just a secnd. .. . Okay, CRT 3 is being driven by GPC 3. Fendell think that's correct?
CAPCOM It sounds right.
END OF TAPE.

SC My congratulations supporting because I like the maneuver we got to make between top sun and getting our first star here. My kind of maneuver.
CAPCOM Okay, we will pass it on. Columbia, Houston, we are processing ASC data now, please configure AOS and we are with you for 5 more minutes.
SC Okay, Joe, we should be able to talk into the machine now.
CAPCOM Roger, Crip, thank you. And on page 3-35 there you have a note there about fuel cell heater, it is not necessary to turn that on early.
SC Well, a little slow since I already got it on.
CAPCOM Okay, just as good.
SC My boss here taught me that you should always stay ahead if you can.
CAPCOM Columbia we are 30 sec. for LOS, please configure LOS and we will be back in 4 min. through Botswana.
SC Roger, Joe, see you then.
PAO This is Mission Control. Ascension Island has had loss of signal, Botswana in 4 min. Over Botswana Columbia will be maneuvering to proper attitude for inertial measurement unit alignment. The last one before entry. At 2 days 3 hrs. 30 min. Mission Elapsed Time this is Mission Control Houston.
CAPCOM Columbia, Houston, back with you through Botswana for 6-1/2 minutes. Over.
SC Roger, Joe, and we are maneuvering to alignment attitude.
CAPCOM Very good. Columbia we are 30 sec. from LOS. We will see you next at Yarragadee in 13 min.
SC Roger, Joe. Just about at attitude here for a little star align.
CAPCOM Roger.
PAO This is Mission Control. Botswana has lost the signal with Columbia. Columbia's next station is Yarragadee in 12 min. We are 1 hr. 39 min. and 27 sec. away from deorbit burn. Our Mission Elapsed Time of 2 days 3 hrs. 42 min., this is Mission Control Houston.
END OF TAPE

PAO This is Mission Control at 2 days 3 hrs. 53 min. elapsed time. We are standing by for communications through Yarragadee.
CAPCOM Columbia, Houston, back with you through Yarragadee, how do you read. Hello Columbia, this is Houston throu h Yarragadee for 8 min. on UHF only. How do you read? Over.
SC Loud and clear.
CAPCOM Okay, Columbia, we hear you weak but fairly clearly.
SC Houston, Columbia. Do you read this? Over.
CAPCOM Hello Columbia. This is Houston. We read you. Over.
SC Okay, would you like the torquing angles. We've completed them OK.
CAPCOM Yes sir, we sure would and you are weak, so read those slowly, please.
SC Okay. IMU 1, delta XY and Z, .05, -.04, .07. I'm into XYZ plus 00, -.09, +.02. On entry +.07, -.10, +.03. Torquing time was 2034517. And the alignment verification was the same torquing angle for the same fashion -.01, +.03, -.03, -.04, -.04, -.01, +.03, +.02, +.04. We didn't torque those, of course.
CAPCOM Okay, John, we copied that. ..rks very much.
SC Also the star trackers are deac, doors are eclosed, fuel cell purge is in progress.
CAPCOM Roger, that. Sounds good.
SC And we are maneuvering pretty slowly through top sun alt.
CAPCOM Roger, Columbia. Very good.
SC Fuel cell purge is complete. All switches in GPC.
CAPCOM Roger, we copy.
END OF TAPE

SC Purge is complete. All switches are in GPC.
CAPCOM Roger. We copy. Columbia, this is Houston. We are about 1 minute away from LOS. We will see you next at Hawaii in 19 min which is close to TIG - 1 hour. Over.
SC OK.
PAO This is Mission Control. Columbia is out of range of Yarragadee now, passing over the northern part of Australia. Next acquisition through Hawaii, in about 15.5 min. Flight director, Don Puddy, considers the crew about 20 min ahead of the timeline. The GN&C systems engineers says that an analysis of the last IMU alignment shows that the Columbia's attitudes are outstanding. We are 1 hour 16 min and 40 sec from de-orbit ignition. A MET of 2 days 4 hours, 4 min. This is Mission Control Houston.
CAPCOM Hello, Columbia. Houston back with you through Hawaii. Please configure AOS and we will be here for 6 min. Over. Columbia, this is Houston through Hawaii. Your topsun attitude looks very good to us. We are going to send some timbus to you now and gyro and accel biases to the BFS. Please configure AOS. ver.
SC (garbled)
CAPCOM Roger, we copy your configured AOS. You are very weak, Crip. Try it again.
SC ...is configured AOS... and John.
CAPCOM OK. John, you shouted that one down and that is much better, thank you. Columbia, you will be pleased to know that we think we found a possible failure of the DFI recorder. We think, in fact, that it may be working and want to make doubly certain you push in the circuit breaker before climbing in.
SC We will certainly do that. That is good news. How much time do you think you have left on it? About 10 hours?
CAPCOM Don, we got more than enough to cover every S turn you are going to make.
SC OK.
End of tape.

CAPCOM And Columbia you will be pleased to know that we think we found a possible failure of the DFI recorder. We think it may, in fact, be working and want to make doubly certain you push in the circuit breaker before climbin in.
SC We will certainly do that. That's good news. How much time do you think you have left on it? About 10 hrs?
CAPCOM John, we have more than enough to cover every S turn you're going to make.
SC Okay.
We thought we would do that gimbal check over the states so that yall could watch it to see if you see any thing funny.
CAPCOM Roger, we would surely appreciate that.
Columbia, Houston, we are with you for 3-1/2 min. more here. The TIMBU's are on board and the gyro and accel biases are on board for the BFS, and be aware we are only getting UHF. You might want to recheck the COM config.
SC Okay, Houston. How do you read now on the air-to-ground 2. Over.
CAPCOM Okay. Much better Columbia, thank you.
SC You weren't reading A/G 1, I guess, huh?
CAPCOM I think it is Mr. Fendell's attempt to get one last panel in command.
SC Okay.
CAPCOM But don't do it.
SC Okay, Joe. Your DFI recorder is going and talkback's grey.
CAPCOM We copy that. Thank you Crip. Columbia, Houston, we are one minute from LOS. EGIL reports the fuel cells look good and the attitude is good as well. The OMS are balanced and on the CONIS pass you can reestablish the nominal RCS configuration Crip and we can double check it for you.
SC Okay, you want me to reestablish this over statesside, you mean?
CAPCOM Roger that. You don't have to wait until Tig -30 and we can just look at it before you go LOS then.
SC Good idea. We will do that.
PAO This is Mission Control. Hawaii has loss of signal. Next station will be Buckhorn in about 2-1/2 min. Two days 4 hrs. 27 min. Mission Elapsed Time. This is Mission Control Houston. This is Mission Control. News centers should now be receiving a television transmission of runway 23 at Edwards. This is Mission Control at 2 days 4 hrs. 29 min. elapsed time. Buckhorn should have acquisition in about 10 sec. We will stand by.
CAPCOM Columbia, this is Houston through Buckhorn for 19 min. How do you read?
SC Loud and clear, Joe. I tell you what, while you are watching we'll go ahead and get reconfigured.
CAPCOM Okay, very good. You are both loud and clear. And John and Crip you are go for seat ingress.
SC That's good. Okay, we are semi ingressed.
CAPCOM Roger that. And be advised you have a final solution onboard and it looks very good to us. We will give you a new state vector as shown in the checklist, but just a fine tuning. And you can anticipate no updates to your pads. Over.

SC Okay, and you want item 39 and 49 when we get the vector. Right.
CAPCOM That's affirm, and we will call for that when we are ready. We will send no IMU gyro bias.
SC Okay, I need to ask Larry down on the POCC console what is showing for the right ...
END OF TAPE

CAPCOM That's affirm and we'll call for that when we're ready and we'll send no IMU gyro bias.
SC Okay, Joe, I need to ask Larry down on the POCC console what he shows for the right RCS tank iiso valve. I've got a barberpole on the talkback.
We've had problems with that one,I think, in tests before.
CAPCOM Okay, Crip. We're looking at that now. Let me pass on an advisory to tell you about something that probably won't happen. That is, if you get multiple leak messages, it's quite possible they will be on absolutely normal jets. The jets are running a littel cooler than we expected and it is possible you could e get multiple messages from them. If that happens, just re-elect the jets. No problem.
CAPCOM Okay, but only if I get multiple leaks?
CAPCOM Roger. that.
SC Got your feedback on this tank valve.
CAPCOM Okay, and, Crip, we see down here the iso valve on the right RCS to be open.
SC Okay, my talkback in indicating barberpole both the fuel and the oxygen on one slash twos on the right side open.. Is that affirmative?
CAPCOM Roger. Bob, that's affirmative. We show them both open.
SC Okay, I'm assuming that that manifold isusable then. We're going to go back to auto.
PAO This is Mission Control. We have a live picture on television of Columbia taken through the precision optical tracking elescope at Anderson Peak, Big Sur, California, an Air Force telescope. This is the same equipment that NASA once used to track Apollo spacecraft. The telescope will be used as an attempt to get pictures of Columbia during the reentry period as it comes across the coast.
CAPCOM Columbia, Houston.
SC go ahead Houston.
CAPCOM Roger. Crip, we think we may have a stuck-on motor on those open valves and no problem, but if you will go ahead and put the tank ISL valve to GPC, it will just take the power off the motor.
SC Got it, GPC.
CAPCOM Okay. And that did the trick. Thank you very much.
PAO This is Mission Control. Television in the news centers now depicts the crowd at Edwards, and at Dryden Flight Research Center. There's a six-mile long string of traffic waiting to enter the base. It's obvious from the television pictures that thousands more vehicles are already on the base.
CAPCOM Columbia, this is Houston. Over.
SC Go ahead, Joe.
CAPCOM Roger, Bob, to finish the story on the valve. We don't get an open indication unless they are full open and we have got solid indication on those, and in addition, when you went to GPC, we saw an MCA status change so just solves the stuck-on motor problem. And we're totally convinced that that would be no problem at all for you. When you're comfortable in the seat and have your deorbit flight rules in front of you, I have the smallest of all

changes to make to that.
PAO This is Mission Control. The television pictures in the news centers now show the Convoy Commander now briefing the people.
SC Joe, I guess garbled. . . Hello, are you still there?
CAPCOM Roger. Go ahead.
SC Okay, you say you got a modification on the flight rules?
CAPCOM Rog, a very easy one, Crip. A third of the way down under ECLS, you have . . .
END OF TAPE.

PAO This is Mission Control. The television picture in the news centers now shows the convoy commander briefing his people.
CAPCOM Roger, go ahead.
SC OK. You said you had a modification on the flight rules?
CAPCOM. Roger. A very easy one, Crip. A third of the way down under ECLS you have 4 rules there--we just want you to delete the last 2. Those are the ones about the AV bay fans. In other words, fan failure, just press on.
SC OK. When do you want to run this gimbal check. Is now OK?
CAPCOM Now would be fine, John, go ahead.
SC OK. That right primary gimbal has done well.
CAPCOM We copy that.
SC You still want to run in on the secondarys? That would be OK. Why don't we switch back?
CAPCOM Yeah, let us look at it all John. John to answer your question, the right pitch looks good but it is running at about half rate, so we prefer to run in secondary.
SC Alrighty. Half rate and Secondarys it will be.
CAPCOM It is still a good set of gimbals, tho, and if you need to go over there, don't hesitate to do it.
SC We won't and you have got a lot of background static there. Crip is off comm right now going on his hard hat.
CAPCOM We copy,John and I just said that don't hesitate to go over to primary if you have to, they are still good gimbals.
SC I understood that, I was just saying you have a loud squeal.
CAPCOM Columbia, we are going to send a new state vector to you now.
SC Standing by. I guess we got it.
CAPCOM You got the primary John, secondary--I'm sorry--the backup is on its way.
SC OK. Looks like its got here.
CAPCOM Roger that. They are both on board. Guidance is waiting for 39 and 40--at your convenience.
SC OK, there is a new look.
CAPCOM We're looking.
SC (garbled) TIG time come down. Joe, how do you read me through the suit now?
CAPCOM OK, Crip, you are loud and clear.
SC Okeydoke. I'm (garbled) fresh comm now Joe.
CAPCOM Roger, John, go ahead. Columbia, your onboard solutions are good. Both prime and backup and GN&C reports config looks good.
SC Roger. We understand, Joe. Joe if Dr. Susan Tilden is listening, my G suit is working like a champ today.
CAPCOM Columbia we copy that. We are trying to get it quiet n the MOCR here.
SC OK. You have lost control again.
PAO This is Mission Control. News center televisions now have view of the VIP site at Dryden.
CAPCOM John and Crip, we are 30 seconds from LOS. Want to report that Columbia is in super shape--almost no writeups. We

want her back in the hangar and you have preliminary go for the burn.
SC Okeydoke, Joe. and we concur. Flying like a champ. That is the boss over here would say.
PAO This is Mission Control. Bermuda has loss of signal. The next station will be Ascension Island in about 8.5 min. Columbia has a clean bill of health and a preliminary go for the de-orbit maneuver. The final go for that burn..
End of tape.

CAPCOM You want her back?
PAO This is Mission Control. Bermuda has loss of signal. Next station will be Ascension Island in about 8 1/2 minutes. Columbia has been given a clean bill of health and a preliminary go for the deorbit maneuver. Final go for that burn will come over either Ascension or Botswana. At 31 min. 54 sec. away from that maneuver at this time. It will be performed over Indian Ocean out of range of any tracking station. We will get a report on that burn at Yarragadee. We are 8 min. away from Ascension acquisition at 2 days 4 hrs. 50 min. Mission Elapsed Time this is Mission Control Houston. This is Mission Control. That was a weather report from one of the Shuttle training aircraft, the Gulfstream 2 which is in the Edwards vicinity. Shuttle training aircraft being flown this morning by Charley Hayes and Ted Mendenhall, JSC pilots. This is Mission Control. The monitors in the news center are now showing the convoy and the equipment will be used during the power down of Columbia after landing.
END OF TAPE

PAO This is Mission Control 2 days 4 hours 54 minutes elapse time coming up acquisition through the Ascension Islands.
CAPCOM Columbia, Houston through Ascension Is for 7 min, please configure AOS.
SC Okay, Houston.
SC You got it Joe. I'm standing by to open the tank valves for the APU.
CAPCOM Okay, we're watching that, go ahead. And we are also going finetune the state vector in both prime and backup. While that's happening, you'll be pleased to hear that Mr. Hayes has confirmed that the wind data you have on board is correct.
SC OK. I'm looking at greys on talkbacks on 1, 3, barberpole on #2 as we suspected.
CAPCOM Okay, Crip, we copy that. The APU's do look good to us. And Columbia we as an advisory we see both left and right OMS in secondary and we concur with that configuration
SC Okay, Okay, Joe have I got to go to secure the tank valves.
CAPCOM Rog, you're go and we're ready for item 39 & 40.
PAO This is Mission Control, the picture on the news center monitors is the Shuttle Training Aircraft.
CAPCOM Columbia we're with you for 5 minutes and uh, as an advisory see good biomed data on both of you, now.
SC Well that ought to scare you. Okay to reload the computer?
CAPCOM Columbia the solutions on board look very good to us and you can start to maneuver to burn attitude whenever it is convenient.
SC Okay.
PAO Columbia maneuvering to burn attitude now.
CAPCOM Columbia your burn attitude looks good to us everything aboard looks good to us. You are go for deorbit burn and we'll go LOS is 30 seconds here. We talk to you in Botswana in about 5 minutes.
SC Okay, we understand ready for deorbit burn. Thank you now. That's the best news we've had in 2 1/2 days. And we've had some mighty good news in those 2.5 days. Talk to you in a while, Joe. About looking good, I wonder whether you were including the crew.
PAO There are exceptions to every rule.
SC You got it!
PAO We report the crew looks terrific.
SC Ha Ha Ha you haven't seen us lately.
PAO This is Mission Control. Columbia is out of range at ASC now, leaving the station with a go for the deorbit burn. Botswana, a UHF station will pick up Columbia in about 5 minutes. we don't have data through Botswana but we will have voice communications. We're fifteen minutes 50 seconds away from deorbit maneuver At 2 days 5 hours 5 minutes missioners lapse time this is Mission Control Houston.
End of Tape

PAO This is Mission Control at 2 days 5 hrs. 9 min. elapsed time. Standing by for acquisition through Botswana.
CAPCOM Columbia, Houston, through Botswana for 3 min.
SC Loud and clear.
CAPCOM Roger, loud and clear as well. Columbia we are 30 sec. from LOS. Do a good one, and we will see you at Guam.
SC Okay.
CAPCOM I'm sorry, make that Yarragadee in about 15 min.
SC Okay, see you at Yarragadee. You have so many stations you just can't make up your mind what one we are at.
CAPCOM Roger that.
PAO This is Mission Control. Botswana has loss of signal now. Columbia is in the proper attitude for deorbit. Flying backward. That maneuver scheduled 7 min. from this time. The burn of both orbital maneuvering system engines. Changing the velocity a retrofire burn changing the velocity by 297 1/2 fps. That will start Columbia on a long trip down through the atmosphere. After the deorbit maneuver John Young will pitch Columbia down and bring it to entry attitude. Will get a report on the deorbit burn at Yarragadee a UHF station. We won't get any telemetry data at that station but we will have voice communication. Columbia will be within range of Yarragadee in just under 13 min. We're 5 min. 48 sec. away from deorbit at an elapsed time of 2 days 5 hrs. 15 min. This is Mission Control Houston. This is Mission Control. On the news center monitors chase plane pilots are readying their aircraft at this time. Chase 1, the primary operational chase airplane, is flown by astronaut John McBride, astronaut George Nelson in the back seat. That is the chase that will call out altitudes and speeds under about 40,000 ft. to Columbia. Chase 2 is the photography, television aircraft. The pilot is Dick Gray, a JSC pilot, the photographer is Pete Stanley, also from JSC. Their are backups for both these chase aircraft. Chase 1 backup being flown by astronauts Dave Walker, Mike Molene, and chase 2, the backup pilot is Robert Walker, photographer Bobby Gray. This is Mission Control Houston. This is Mission Control. We are mark i min. from deorbit ignition. This is Mission Control at 2 days 5 hrs. 21 min. mark. Ignition should be starting now.
END OF TAPE

PAO This is Mission Control. We are at mark 1 minute from de-orbit ignition. This is Mission Control at 2 days 5 hours, 21 min. Mark, ignition should be starting now. This is Mission Control here in the Control center. The clock that had been counting down towards de-orbit ignition has been reestablished as a touchdown clock, now reading 58 min 16 sec to touchdown at Edwards. This is Mission Control, 2 days, 5 hours, 27 min MET. Columbia is about 50 sec away from acquisition through the tracking station at Yarragadee Australia. Here at the Control Center the backup crew for this mission, Astronauts Joe Engle and Dick Truly, are behind the CAPCOMs. We will get a report at Yarragadee on how the de-orbit maneuver went. Should have acquisition in about 10 seconds. We will stand by.

CAPCOM Columbia this is Houston through Yarragadee. We are standing by.
SC Burn was on time and nominal. ?? is 110. Three started fine also. We have got two and three running now ??
CAPCOM OK, John, we copied the shortest of all burn reports, and Crip, we understand you have 2 of 3 APUs running now.
SC Yeah, you under fading out there a little bit, but you understood correctly.
CAPCOM Rog. Thank you.
PAO That is nominal at this time to have 2 of the 3 APUs running. The third APU is powered up at entry interface -5 min. We are not at the entry interface -19 min, 22 sec. Mission oControl. Chase planes are taking off now at Edwards.
SC You are awful quiet down there, Joe.
CAPCOM We are just enjoying the view. We will be with you for 2 minutes and you will like to know that 4 chase aircraft have just launched from Eddy and coming up looking for you.
SC Check 6. Yeah, we ought to be there in about 45 min.
CAPCOM That is what they are hoping and we are sure of it. We are with you for 1.5 min longer.
SC Joe, whoever said that space was black, was not kidding you. It is really black.
CAPCOM Rog. You have convinced us.
SC Yeah, but you are so easy. It is my great scientific observation that did it to you.
CAPCOM Now you are bragging.
SC You would never heard a Texan do that.
CAPCOM Certainly not from Porter, Texas Crip. And we are at 30 sec from LOS.
SC Okeydoke. See Guam at about 6 minutes from now.
CAPCOM We agree with that and see you shortly.
End of tape.

CAPCOM Certainly not from Porter, Texas, Crip. And we're 30 seconds from LOS.
SC Okedoke. We'll see Guam, oh, it looks like about five or six minutes from now.
CAPCOM We favor that. See you shortly.
PAO This is Mission Control. Columbia is out of range of Yarragadee now. John Young reported over this station that the deorbit maneuver was on time and nominal and we are now committed to entry into the earth's atmosphere. The last tracking station to communicate with Columbia will be Guam in five and one half minutes. showing twelve minutes and 25 seconds to entry interface, essentially 400,000 feet where Columbia will meet the sensible atmosphere, and another clock counting down shows touchdown in 45 minutes time. Here in the control center, Flight Director Don Puddy has ust informed his team on the Flight Director's loop that after the nosewheel touches down, his team will have exactly 15 seconds to Whoopee and then it's back to business againbecause the crew will not be able to get out of Columbia for approximately 45 minutes after landing until the spacecraft is powered down and all the systems are safed. So this flight control team will still be in business for some time after landing.
PAO This is Mission Control at two days five hours 41 minutes 42 minutes MET. Columbia is about ten seconds away from acquisition through Guam. We'll stand by.
CAPCOM Columbia, this is Houston, through Guam. Please configure AOS. We'll be with you for five minutes.
SC Okay, we'll configure AOS. Tell Gary his vent doors are coming closed at this time.
CAPCOM Roger. We copy, and we're looking at the numbers.
SC After that, for Dr. Fendell, the wideband mission recorder is running.
CAPCOM Roger that, and the doors are closed.
SC Get ready to start up the
CAPCOM Okay, we're ready.
CAPCOM We see the third APU starting up now in telemetry from Guam.
SC Okay, systems pressurized.
CAPCOM We see Roger, we see one up. Looks good.
SC We're just about to go to 304.
CAPCOM Roger that..
SC Okay, and we think we've got the prop system configured.
CAPCOM Roger that. We're looking.
SC And I'm assuming. It looks like no delta V. Okay, we're showing out 80,000 feet doing about 4.5, .442 exactly.
CAPCOM Rog, moving right along, John.
END OF TAPE.

CAPCOM Roger that.
SC Okay, and we think we've got the props just to configure.
CAPCOM Roger that, we're looking.
SC Let us know when it looks like no delta V. Okay, we're showing about 85 miles, doing about .4 1/2—.442 exactly.
CAPCOM Rog. Moving right along John.
SC ?? usage right now looks normal.
CAPCOM Columbia, Houston, no delta T required.
SC Roger, no delta T. (garbled)
CAPCOM Hey Columbia we are 50 sec. from LOS. Everything looks perfect going over the hill. Nice and easy does it John, we are all riding with you.
SC Roger that. ??
CAPCOM Ten seconds until LOS. We will see you at about MACH 12.
SC Bye,bye. Looking forward to that.
PAO This is Mission Control. Guam here has lost its signal. Columbia is 1 min. 32 sec. away from entering the Earth's atmosphere. We are showing 34 min. 21 sec. to touchdown at Edwards Air Force Base. We will be out of communication with Columbia for approximately 21 min. No tracking stations before the west coast. And there is a period of about 16 min. of aerodynamic reentry heating that communications are impossible during this entry however there are no tracking stations to receive any communications either. Columbia in good shape and the crew in good shape for this entry. Two experiments aboard Columbia as part of the Orbiter experiments program managed by NASA's Officer in nautical space technology will be conducted during this entry. One of them is the infrared imagery of Shuttle, the acronym IRIS, will be conducted from a C-141 operated by NASA's Ames Research Center in California using a 36-inch telescope aboard the C-141. They will attempt to get about 4 milliseconds of information from the underside and sides of the Orbiter. Objective is to obtain high resolution infrared imagery during entry from which surface temperatures and aerodynamic heating may be inferred. This C-141 is known as the Gerald P. Kiper airborne observatory. It is named for the late Dr. Kiper, the founder of the Lunar and Planetary Lab at the University of Arizona. He was active in ranger and surveyor missions, Mercury, Venus, and the Pioneer 10 mission to Jupiter. Columbia should see maximum surface temperatures during entry of 2,750 deg. F. on the wing leading edge that will diminish to less than 600 deg. F. on the upper fuselage. At Edwards Air Force Base and the Dryden Flight Research Center enormous crowds are beginning...
END OF TAPE

PAO This is a Pioneer 10 mission to Jupiter.. Columbia should see maximum surface temperatures during entry of 2750 degrees farenheit on the wing leading edge that will diminish to less than 600 degrees farenheit on the upper fuselage. At Edwards Air Force Base and the Dryden Flight Research Center, enormous crowds are beginning to assemble.
PAO This is Shuttle Control, NASA/Dryden. The estimated 75,000 members of the public to view the Shuttle launch at Kennedy Space Center, may be more than doubled during the landing here on Rogers dry lake. An estimated 150,000 visitors are expected at the public viewing site on the west side of the lake bed. This number will be swelled to approximately 170,000 by those at the other viewing sites. A sonic boom should be audible to viewers here. Columbia should go subsonic just about the time it approaches from the west. And consequently the western edge of the lake bed at an altitude of about 47,000 feet. A recovery convoy with 24 vehicles and more than 100 personnel was deployed to a point approximately 2.5 miles south of the expected rollout point 2 hours before landing this morning, and nearly 300 KSC personnel are waiting to get the Shuttle safed and serviced for turnaround and prepared for the flight back to the Kennedy Space Center for the STS-2 mission. This is Shuttle Control at NASA Dryden.
CHASE 1 Houston, Chase 1.
CAPCOM Chase, this is Houston, go ahead.
CHASE 1 (garbled) was set up in orbit pattern for a nominal 23 with a left turn.
CAPCOM Roger. and the de-orbit burn was nominal and the entry trajectory was nominal. However you should be aware, that we may not have calls for you until as low as mach 5 and we will update you as soon as we can. Over.
CHASE 1 Sounds good. Thank you.
CAPCOM Chase, this is Houston, We will give you a nominal call based on time from our clocks that should put you in the envelope and we will update that as soon as possible.
CHASE 1 Loud and clear and the weather is still great.
CAPCOM OK. We saw you. Houston, Out
PAO Aerodynamic coefficient identificatin package called ACIP, the primary objectives of this experiment are to collect aero-dynamic data during launch, entry, and the landing phases of the Shuttle in order to establish a data base for verification of ground based test data. Also it will be used to provide dynamics data in support of other technology areas such as aero-thermal and structural dynamics. Aboard the C-141 from Ames Research Center are Dave Bark, pilot, G. Warren Hall, co-pilot. Wally Stahl, the flight engineer. Also aboard are Scott Grogen-shire, airborne systems operator. M. McClannahan, mission director. Don Owishi, telescope systems operator, Milo Reisner, chief tele-scope operator. Vic Losch, computer technician and Robert Waker, electronic technician and W.F. Ballhouse, Ames Director of Astronautics. We are 12 minutes away...

END OF TAPE

PAO ...systems operator; M. McClennahan, mission director; Don ?? , telescope systems operator; Milo Rizner, chief telescope operator; Vic Lowsch, computer technician; Robert Walker, electronic technician; and W. F. Balshause, Ames director of astronautics. We are at 12 min. away from acquisition of signal at Edwards. The convoy crew is putting on escape suits to protect them from any chemicals that may be leaking from the Orbiter after landing. They are the crew that will safe the Orbiter and help with the power down. Flight Director here has communicated with the convoy commander and they are all ready to go out there. Columbia's reentry expected to produce a] mild sonic boom centered a few miles west of Edwards Air Force Base. Maximum over pressure expected to be about 2 lbs. per sq. ft., which is about half the over pressure experienced in a closed car when the doors slam shut. Engineers will measure the sonic boom around the landing area in order to verify their calculations. In the Control Center the big world map has been taken down and in its place landing displays, one showing the ground track starting out over the Pacific Ocean crossing the California coast about Big Sur, the other a analog on display for velocity. We are about just over 10 min. away from acquisition of signal and the clock shows counting to landing 23 min. 20 sec. from now. Two days 5 hrs. 58 min. Mission Elapsed Time, this is Mission Control Houston. This is Mission Control Houston at 2 days 6 hrs. 3 min. Mission Elapsed Time. We are 5 min. away from acquisition. There has been a power failure at Vandenburg Air Force Base which may affect the radar and telemetry on the early portions of the signal here. We are informed now that the power is back up and they are working to bring official, they are reconfiguring their system to ? NAV radar and telemetry early. This is Mission Control Houston. The AOS clock now reads 2 min. 53 sec. It's counting down to acquisition of signal at Buckhorn tracking station at Edwards. That is the first place where we will get telemetry if Vandenberg is successfull is bringing up their system we may get C-band radar contact ahead of that time. We will not get voice communications or telemetry prior to about 2-1/2 min.
END OF TAPE

PAO This is Mission Control Houston. The AOS clock now reads 2 min. 53 sec. It is counting down to acquisition of signal at the Buckhorn tracking station at Edwards. That is the first place where we will get telemetry if Vandenberg is successful in bringing backup their system we may get C-band radar contact into that time but we will not get voice communications or telemetry prior to about 2-1/2 min. Mark 2 min. to the time we should be able to talk to the crew aboard Columbia. Mission Control to MACH 9 call to chase help set up the phasing for its rendezvous with Columbia. Mark 1 min. Showing an altitude--two C-band radar contacts showing an altitude of 165,000 ft. Range to go 410 nautical miles.
SC Hello Houston. Columbia's here.
CAPCOM Hello Columbia, Houston here. How do you read?
SC Loud and clear, we are doing MACH 10.3 at 180??
CAPCOM We couldn't agree more, John. Your state vector is good. We got good data in-house.
SC Okay. Looks to me like you have all the data nominal. ??
CAPCOM Columbia, you've got perfect energy, perfect ground track.
SC Roger, that.
PAO Columbia now at 9 times the speed of sound. Flight dynamics officer says...
CAPCOM John we show you rolling right. Looking good.
SC Rog, normal roll.
PAO Rolling now.
CAPCOM Chase will be on time.
SC Okay.
PAO Altitude 152,000 ft. range 211 miles. Speed MACH 8.8. Roll reversal complete.
CAPCOM Columbia, we show you out of 151 K. now, 8.4 MACH looking good.
SC Roger that, and I got a solid TACAN lock on TACANs 2 and 3.
CAPCOM Roger that Crip, we are looking.
All three APUs hanging in there, looking good.
SC Roger that, looking good.
PAO We have a live television transmission coming now from Anderson Peak. Approaching the coastline now.
CAPCOM We show you crossing the coast now.
SC Roger that.
PAO 141,000 ft. range 240 miles
CAPCOM Columbia, you want the TACANs, go ahead and take them.
SC Okay, going in.
PAO They are now incorporating tactical aeronaviation system data into the spacecraft. MACH 7, 135,000 ft., range 221 miles.
CAPCOM Columbia, looking quite good.
SC Its quiet in here too. What a way to come to California.
CAPCOM Columbia, you are out of 130 K now on the tracking, 6.4 MACHs, looking good.
SC Roger that. ??
END OF TAPE

CAPCOM Columbia, you're out of a hundred and 30k now on the tracking, 6.4 Mach, looks good.
SC Roger that. Garbled.
CAPCOM And Columbia, you're NAV state with TACAN is perfect.
SC Roger that.
PAO Mach 6, 124,000 feet, range 177 miles.
CAPCOM And, John, we are seeing near zero aileron trim
SC Well, we're just two tenths less than that now.
CAPCOM Roger that. Out of 119k, five point five Mach.
PAO Garbled
CAPCOM Roger, we copy.
SC Garbled. The purge in progress.
CAPCOM Roger that. Out of 112k, 4 point 8 Mach.
PAO Range 130. John Young rolling has manual control now.
CAPCOM We see (garbled) at 21 degrees.
SC Roger that, looking good.
PAO Mach 4.4 107,000 feet. Range 112. Roll reversal complete, control looks good.
CAPCOM Columbia, we see roll reversal complete. Looks good.
SC Garbled.
CAPCOM And you're starting to get a ammonia cooling now.
SC Roger, we concur.
CAPCOM And Columbia, you're out of a hundred k with positive seats.
SC We copy that.
PAO Ejection seats can be used now, below 100,000 Mach 3.
SC Garbled. out and your data is looking pretty good from here.
CAPCOM Roger, that, looking good. We're looking at them, and you're coming right down the chute.
PAO Rudd active now, looking good. Range 73 miles.
CAPCOM Columbia, we're go for air data. You're out of 89 k 2.3 mach.
SC Air data again.
CAPCOM Roger that, we're looking at it.
SC OK, Tacan failure.
PAO Roll reversal to the right.
CAPCOM Columbia, we see you coming right, looking good.
SC Having a hard time seeing the talkbacks on the landing gear (garbled) and insulation valves.
CAPCOM OK, Crip, they all look good to us.
CAPCOM We now have a live television pictu . from the long-range optics at Dryden
CAPCOM Crip, you're right down the track, the tracking data, nav data, and preplanned trajectory are all one line on a plot board here.
SC Roger, we concur.
PAO Now at 70,000 'eet at Mach 1 point eight range 42 miles.
CAPCOM Columbia, we show you very slightly high in altitude, coming down nicely, and the tests is to go to off.
PAO Mach 1.3 at 58,000 feet, range 33 miles.
CAPCOM Out of 56 k, looking good.

PAO Mach 1 at 51,000 feet, range 28 miles.
CAPCOM Columbia, you're going subsonic now. Out of 50 k, looking good.
SC Roger.
PAO Everthing looking good.
CAPCOM Columbia, you're approaching the HAC now. Right on the money.
END OF TAPE.

PAO Range 28 miles.
CAPCOM Columbia, you're going subsonic now aut at 50K. Looking good.
SC Roger that.
PAO Everything looking good.
CAPCOM Columbia, you're approaching the HAC now, right on the money.
SC Roger that.
PAO Now they're getting ready to start the big sweeping turn into the runway.
CAPCOM (garble)
SC Roger.
CAPCOM And Crip, the altimeter is 3009.
SC Roger that.
PAO Thirty-eight thousand feet, range 19 miles.
CAPCOM Columbia, you're coming right around the HAC, looking beautiful.
SC Oh, yeah.
CAPCOM It's got about 30,000...
SC Alrighty (garble).
PAO Control very smooth.
CAPCOM Columbia, you're really looking good, right on the money. And we're seeing 1.3 Gs coming around the HAC.
SC Roger that.
CAPCOM And turningon the final, your winds on the surface are calm.
SC That's my kind of wind.
PAO Twenty-five thousand feet, Mach .6, range 13 miles, 22 thousand feet. Control looking very smooth. We have a television picture now.
CAPCOM You're right on the glide slope, Columbia.
SC (garble).
CAPCOM Right on glide slope, approaching center line, looking great.
PAO This TV is from a chase plane.
Sixteen thousand feet.
CHASE ONE Mark 15.
CAPCOM Airspeed 271 knots. FIDO says it couldn't be any better.
PAO Eleven thousand feet.
CHASE ONE Looks real good over here.
PAO Nine thousand, 280 knots.
CHASE ONE Everything loooks real good.
PAO Five thousand, 290.
Twenty-five hundred feet.
CHASE ONE Clear (garble) they're down, pick up your feet. Five, four, three two one, touchdown. (garble) Welcome home, Columbia. Beautiful, beautiful.
SC Do I have to take it up to the hanger, Joe.
CAPCOM We're going to dust it off first.
SC This is the world's greatest flying macine, I'll tell you that. It worked super.
CONVOY Okay, convoy north, wheels stopped on Columbia, wheels stopped.
PAO This is Mission Control, Houston. The officia touchdown time is 2 days, 6 hours, 20 minutes, 52 seconds. Two days, 6 hours, 20 minutes and 52 seconds.
CAPCOM And from Houston we're estimating at last 26 more minutes on the ammonia. It's looking real good.

END

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