NATIONAL TRANSPORTATION SAFETY BOARD
Office of Research and Engineering
Vehicle Recorder Division
Washington, D.C. 20594

GROUP CHAIRMAN'S FACTUAL REPORT OF INVESTIGATION

LAX08PA259

By
James Cash

WARNING

The reader of this report is cautioned that the transcription of a cockpit voice recorder audio recording is not a precise science but is the best product possible from a Safety Board group investigative effort. The transcript or parts thereof, if taken out of context, could be misleading. The transcript should be viewed as an accident investigation tool to be used in conjunction with other evidence gathered during the investigation. Conclusions or interpretations should not be made using the transcript as the sole source of information.

NATIONAL TRANSPORTATION SAFETY BOARD
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August 17, 2009

Cockpit Voice and Flight Data Recorder - 12

Group Chairman's Factual Report
By James Cash

A. EVENT

Location:	Weaverville California
Date:	August 5, 2008, 1941 PDT
Aircraft:	Sikorsky S-61N, N612AZ
Operator:	Carson Helicopters, Helitanker 766
NTSB Number:	LAX08PA259

B. GROUP

A cockpit voice recorder group was convened on August 26, 2008.

Chairman:	James Cash National Transportation Safety Board
Member:	Ralph Dorn US Forest Service
Member:	Robert L. Drake Air Safety Investigator Federal Aviation Administration
Member:	Stuart K. Drost Lead Acoustics Engineer Sikorsky Aircraft
Member:	Steve Metheny Executive Vice-President Carson Helicopters, Inc.
Member:	John M. Harris Chief pilot Carson Helicopters, Inc.

Member: David Gridley
Flight Safety Investigator
GE Transportation, Aircraft Engines

C. SUMMARY

On August 5, 2008, about 1941 Pacific daylight time,[1] a Sikorsky S-61N helicopter, N612AZ, impacted trees and terrain during the initial climb after takeoff from Helispot 44, located at an elevation of about 6,000 feet in mountainous terrain near Weaverville, California. The airline transport pilot, the safety crewmember and seven firefighters were killed; the commercial copilot and three firefighters were seriously injured.[2] Impact forces and a postcrash fire destroyed the helicopter. The helicopter was being operated by the United States Forest Service (USFS) as a public use flight to transport the firefighters from Helispot 44 to another location. The helicopter was registered to Carson Helicopters, Inc. (CHI) of Grants Pass, Oregon, and leased to Carson Helicopter Services, Inc. (CHSI) of Grants Pass. The USFS had contracted with CHI for the services of the helicopter.[3] Visual meteorological conditions prevailed at the time of the accident, and a company visual flight rules flight plan had been filed.

A solid-state combination flight data (FDR) and cockpit voice (CVR) recorder was sent to the National Transportation Safety Board's Laboratory for readout. The CVR group meeting convened on August 26, 2008 and a transcript was prepared for the 2-hour, digital recording (see attached).

D. DETAILS OF INVESTIGATION (CVR)

On August 9, 2008, the NTSB Vehicle Recorder Division's Laboratory received the following recorder:

Recorder Manufacturer/Model: **Penny & Giles MPFR**
Recorder Serial Number: **unknown**

Recorder Description

The Penny & Giles Multi-Purpose Flight Recorder (MPDR) is a dual function recorder storing both Flight Data (FDR) and Cockpit Voice (CVR) recording functions in

[1] All times in this report are expressed in terms of a 24-hour clock and Pacific daylight time unless otherwise noted.
[2] The safety crewmember was a USFS Inspector Pilot.
[3] Initially, the NTSB was informed that the contract was between the USFS and CHSI. For further information refer to the Operations Factual Report.

one self-contained unit. Per Federal regulation, the CVR records a minimum of the last 30 minutes of aircraft operation; this is accomplished by recording over the oldest audio data. When the CVR is deactivated or removed from the airplane, it retains only the most recent 30 minutes or 2 hours of CVR operation, depending on the CVR model. This model CVR, the Penny & Giles MPFR, is a solid-state combination FDR/CVR that records 2 hours of digital cockpit audio in addition to at least 25 hours of flight data. Specifically, it contains a 2-channel recording of the last 2 hours of operation and separately contains a 4-channel recording of the last 30 minutes of operation. The 2-hour portion of the recording is comprised of one channel of audio information from the cockpit area microphone (CAM) and one channel that combines two audio sources: the Captain's audio panel information and the First Officer's audio panel information. The 30-minute portion of the recording contains 4 channels of audio data; one channel for each flight crew and one channel for the CAM audio information.

Recorder Damage

Upon arrival at the audio laboratory, it was evident that the exterior of the recorder had sustained significant heat and fire damage (see Figure 1). The outer case was removed and the interior crash-protected case did not appear to have any heat or structural damage. The undamaged memory board within the crash–protected case was checked for heat or structural damage and none was found (see Figure 2). Due to the extent of the heat damage, the recording memory module was taken to the recorder manufacturer in the United Kingdom for download. The digital FDR data and CVR audio files were successfully downloaded from the memory board.

Figure 1 Burned Exterior of Recorder

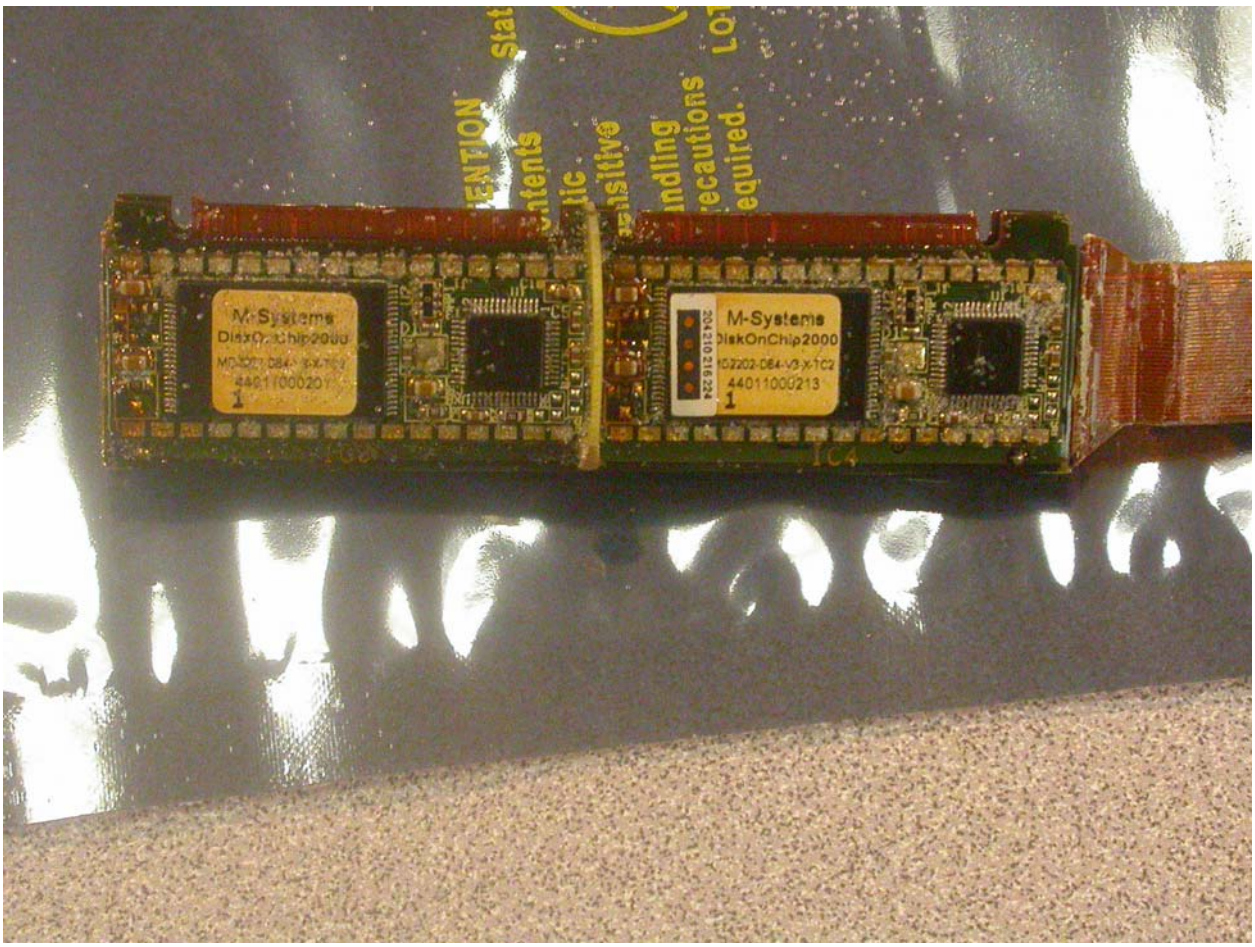

Figure 2 Memory Card

Audio Recording Description

For the 2-hour portion of the CVR recording, the CAM channel recording contained good quality[4] audio information, and the mixed flight crew channel also contained good quality audio information. As shown in the table below, the 30-minute portion of the recording consisted of three channels of useable audio information. Each channel's audio quality is indicated in the table. Notably, channel number three did not contain any audio information (nor was it required by Federal regulations).

Channel Number	Content/Source	Quality
1	Captain	good
2	Ist Officer	good
3	other	N/A
4	CAM	good

[4] See attached CVR Quality Rating Scale.

Timing and Correlation

Timing on the transcript was established by correlating the aircraft's SkyConnect[5] automatic position reporting system transmission time to the corresponding CVR event. Specifically, the CVR time of several takeoffs and landings was linked to the corresponding SkyConnect local time, and all CVR events were offset to reflect the local Pacific Daylight time of the accident. It should be noted that the SkyConnect position reports and times are only reported every 2-minutes during the flight. All of the associated common events found on the CVR and the SkyConnect logs were examined to determine the best local time correlation. While the relative accuracy of the individual CVR comments is generally accurate to ± 1 second, the correlation of any individual CVR comment to local pacific daylight time is only accurate to approximately ± 10 seconds.

Description of Audio Events

The recording and transcript began at 1737:44 PDT as the aircraft is airborne en route to landing site H36 to drop off a load of passengers. The recording continues as the aircraft continues to shuttle passengers between remote site H44 and site H36. At 1854:03 the aircraft departs H36 en route with no passengers or cargo to the Trinity base camp to refuel. The aircraft arrives at Trinity at 1905:22 and shuts down the aircraft's engines shortly thereafter. The same flight crew restarts the aircraft and departs Trinity en route for H44 at 1923:18. The aircraft arrives at forward site H44 at 1935:52 and remains on the ground for several minutes. During the ground operation, ten passengers are loaded on the aircraft. The aircraft starts to pickup into a hover at 1940:46 and the recording ends shortly thereafter at 1941:38.7 seconds PDT.

A summary transcript was prepared of key events heard during the first one hour and 30 minutes of the recording. A verbatim group transcript was prepared of the time from the engine start at Trinity base to the end of the recording.

E. DETAILS OF INVESTIGATION (FDR)

On August 9, 2008, the NTSB Vehicle Recorder Division's Laboratory received the following recorder:

Recorder Manufacturer/Model: **Penny & Giles MPFR**
Recorder Serial Number: **unknown**

1.1. Recorder Description

The Penny & Giles Multi-Purpose Flight Recorder (MPDR) is a dual function recorder providing both flight data and cockpit voice recording functions in one self-contained unit. The FDR function records airplane flight information in a digital format

[5] The SkyConnect system derives time, position, heading, and groundspeed from a GPS receiver on-board the aircraft and automatically reports this information to a ground based server. The accident aircraft's system was setup to make a report every 2 minutes.

using solid-state flash memory as the recording medium. The MPFR can receive data in the ARINC 573/717/747 configurations and can record a minimum of 25 hours of flight data. It was configured to record 64 12-bit words of digital information every second. Each grouping of 64 words (each second) is called a subframe. Each subframe has a unique 12-bit synchronization (sync) word identifying it as either subframe 1, 2, 3, or 4. The sync word is the first word in each subframe. The data stream is "in sync" when successive sync words appear at proper 64-word intervals. Each data parameter (e.g. altitude, heading, airspeed) has a specifically assigned word number within the subframe. The MPFR is designed to meet the crash-survivability requirements of TSO–C123a and TSO-C124a.

1.2. FDR Carriage Requirements

In general, in large turbine-powered helicopters, an FDR must be installed that records a minimum of 17-26 parameters depending on the aircraft size and manufacture date. As a general rule, the FAA has exempted most older turbine helicopters from the carriage requirements such that very few helicopters registered in the U.S. have a flight recorder installed. Newly manufactured aircraft are however usually required to be equipped with an FDR that records a minimum of 26 parameters. Specifically, the accident aircraft, N612AZ, was exempted from the carriage requirements and as such was not required to be equipped with an FDR.

1.3. Recording Description

The FDR recording contained approximately 77 hours of data. The recorder data was examined and converted from raw binary data to engineering units based on the recorder and airframe manufacturers decoding instructions. Very few of the aircraft specific (i.e. engine and flight control parameters) decoded properly using the supplied documentation. Generally the non-aircraft specific parameters, such as altitude and airspeed did however decode into what appeared to be valid data. The FDR recorded data was compared with flight times and takeoff and landing profiles that were obtained from the aircraft position reporting SkyConnect system in an attempt to identify the accident flight. No match could be made between the SkyConnect data and the 77 hours of recorded FDR data. It was concluded that the FDR data that was recovered from the accident aircraft's FDR was recorded at some unknown time prior to the accident flight. No determination could be made to establish exactly when the recording was made.

James Cash
Vehicle Recorder Division

CVR Quality Rating Scale

The levels of recording quality are characterized by the following traits of the cockpit voice recorder information:

Excellent Quality — Virtually all of the crew conversations could be accurately and easily understood. The transcript that was developed may indicate only one or two words that were not intelligible. Any loss in the transcript is usually attributed to simultaneous cockpit/radio transmissions that obscure each other.

Good Quality — Most of the crew conversations could be accurately and easily understood. The transcript that was developed may indicate several words or phrases that were not intelligible. Any loss in the transcript can be attributed to minor technical deficiencies or momentary dropouts in the recording system or to a large number of simultaneous cockpit/radio transmissions that obscure each other.

Fair Quality — The majority of the crew conversations were intelligible. The transcript that was developed may indicate passages where conversations were unintelligible or fragmented. This type of recording is usually caused by cockpit noise that obscures portions of the voice signals or by a minor electrical or mechanical failure of the CVR system that distorts or obscures the audio information.

Poor Quality — Extraordinary means had to be used to make some of the crew conversations intelligible. The transcript that was developed may indicate fragmented phrases and conversations and may indicate extensive passages where conversations were missing or unintelligible. This type of recording is usually caused by a combination of a high cockpit noise level with a low voice signal (poor signal-to-noise ratio) or by a mechanical or electrical failure of the CVR system that severely distorts or obscures the audio information.

Unusable — Crew conversations may be discerned, but neither ordinary nor extraordinary means made it possible to develop a meaningful transcript of the conversations. This type of recording is usually caused by an almost total mechanical or electrical failure of the CVR system.

Transcript of a Penny & Giles MPFR combination CVR/FDR solid-state cockpit voice recorder, serial number unk, installed on an Carson Helicopters Sikorsky S-61N (N612AZ), which crashed on takeoff from forward operating site H44 near Weaverville California.

LEGEND

CAM	Cockpit area microphone voice or sound source
INT	Flight crew intercom audio panel voice or sound source
RDO	Radio transmissions from N612AZ
Helispot 44	Radio transmission from landing site H44 coordinator
Helco	Radio transmission from the Helco coordinator
TRI	Radio transmission from the Trinity controller
-1	Voice identified as the pilot
-2	Voice identified as the co-pilot
-3	Voice identified as the load master
-?	Voice unidentified
*****	Unintelligible word
#	Expletive
@	Non-pertinent word
( )	Questionable insertion
[ ]	Editorial insertion

Note 1: Times are expressed in pacific daylight time (PDT).

Note 2: Generally, only radio transmissions to and from the accident aircraft were transcribed.

Note 3: Words shown with excess vowels, letters, or drawn out syllables are a phonetic representation of the words as spoken.

Note 4: A non-pertinent word, where noted, refers to a word not directly related to the operation, control or condition of the aircraft.

INTRA-COCKPIT COMMUNICATION		AIRCRAFT-TO-GROUND COMMUNICATION	
Time (PDT) **SOURCE**	**CONTENT**	Time (PDT) **SOURCE**	**CONTENT**
[start of recording]			
17:37:44.0	Start of Summary portion of the Transcript aircraft inbound to H36		
17:42:29.9 **INT-2**	power check - 32 degrees there's three knots showin' eighty - okay power's good		
17:43:13.3 **INT-1**	waved off 1st approach to H36 because of a tailwind		
17:44:53.2 **CAM**	Landed at H36 deplaned 5 passengers		
17:51:16.3 **CAM**	takeoff from H36 with 3 crew and 5 passengers destination H44		
17:51:30.8 **INT-2**	co-pilot confirmed power's good		
17:54:04.5 **INT-2**	co-pilot made comment once we get in there (H44) we will be able to hover in ground effect		
17:54:14.0 **INT-1**	captain confirmed that we will be able to hover once we get there		
17:54:26.6 **INT-2**	co-pilot stated we've got fifty minutes of fuel		
18:00:00.4 **CAM**	After touchdown at H44 aircraft lifted again because of the dust.		
18:00:15.9 **INT-2**	co-pilot confirmed power's good		
18:02:52.4 **INT-2**	crew discussed that more water was needed for dust abatement on primary landing spot, decided to try approach to rocky landing site uphill from primary location		

INTRA-COCKPIT COMMUNICATION		AIRCRAFT-TO-GROUND COMMUNICATION	
Time (PDT) **SOURCE**	**CONTENT**	Time (PDT) **SOURCE**	**CONTENT**
18:03:44.5 **CAM**	landing at H44 alternate landing site		
18:05:20.0 **INT-2**	co-pilot asked are you going to have enough power to come out of here vertically and Captain answered "absolutely"		
18:09:12.0 **INT-2**	Load from ground was ten passengers at twenty four thirty five pounds		
18:12:00.3 **INT-2**	co-pilot comment about being just under fifteen hundred pounds of fuel		
18:12:08.0 **INT-1**	burned off a little over a thousand pounds since our power check		
18:14:22.3 **CAM**	departure from H44 with 10 passengers destination H36		
18:14:36.4 **INT-2**	seventy five percent torque everything looks good - there's eight seven power's good		
18:14:59.9 **INT-2**	one hundred and two percent power's good		
18:24:35.2 **CAM**	Landed at H36 deplaned 10 passengers		
18:28:51.0 **CAM**	departure from H36 destination H44		
18:34:59.0 **CAM**	received load from ground personnel at H44 of twenty four zero five weather as “winds are real light out of the south”		
18:35:09.2 **INT-2**	co-pilot comments that that checks, we're well below our -		
18:35:39.1	fuel of eleven hundred and fifty pounds		

INTRA-COCKPIT COMMUNICATION		AIRCRAFT-TO-GROUND COMMUNICATION	
Time (PDT) **SOURCE**	**CONTENT**	Time (PDT) **SOURCE**	**CONTENT**
INT-2			
18:36:32.5 **CAM**	Landed at alternative landing site at H44		
18:42:29.2 **CAM**	takeoff from H44 with 10 Passengers 3 crew destination H36		
18:42:35.1 **INT-2**	power's good showing one oh three - ninety percent torque		
18:49:28.1 **CAM**	touchdown at H36 deplaned 10 passengers		
18:54:03.3 **CAM**	departure from H36 for Trinity Base		
18:59:04.9 **CAM**	crew discussed how much fuel to take on at least a thousand a side and two hundred in the center		
19:02:10.1 **INT-2**	fuel show eight hundred pounds total - four hundred a side		
19:04:02.1 **INT-2**	if we ah topped off the mains that would put us at twenty five hundred if we figure twenty four hundred that would give us twenty five fifty two, he's been pushing us out with twenty four hundred pound loads, that would give us we burn almost 400 pounds of fuel getting there so that would still give us a margin so if we go twelve hundred a side that would give us an hour and forty five minutes		
19:05:22.0 **CAM**	aircraft landed at Trinity Base		
19:08:59.1 **CAM**	Engines were shutdown at Trinity		
19:09:46.8	co-pilot told re-fueler to put twelve hundred a side		

INTRA-COCKPIT COMMUNICATION		AIRCRAFT-TO-GROUND COMMUNICATION	
Time (PDT) **SOURCE**	**CONTENT**	Time (PDT) **SOURCE**	**CONTENT**
CAM-2			
19:13:13.6 **CAM-2**	re-fueler wanted to know if they wanted any fuel in the center? Co-pilot said no that he already had pushed a hundred pounds to the center for balance		
	Aircraft remained on ground at trinity. Crew was in and out of aircraft several times.		

END OF SUMMARY PORTION OF TRANSCRIPT

INTRA-COCKPIT COMMUNICATION		AIRCRAFT-TO-GROUND COMMUNICATION	
Time (PDT) **SOURCE**	**CONTENT**	Time (PDT) **SOURCE**	**CONTENT**
19:18:37 **START OF VERBATUM PORTION OF TRANSCRIPT**			
19:18:37.9 **INT-1**	we can use these electric hats now		
19:18:40.3 **INT-2**	okay rotor brake		
19:18:46.0 **INT-2**	rotor brake is on it is overhead circuit breakers - center fuel closed it is		
19:18:49.2 **INT-1**	transfer's closed		
19:18:49.8 **INT-2**	center fuel transfer switches		
19:18:50.7 **INT-1**	good		
19:18:51.5 **INT-1**	okay check your fuel quantity		
19:18:53.2 **INT-1**	good		
19:18:54.3 **INT-2**	okay compass slaves - engine transmission gauges		
19:18:58.0 **INT-1**	all good		
19:19:00.5 **INT-1**	good		

INTRA-COCKPIT COMMUNICATION		AIRCRAFT-TO-GROUND COMMUNICATION	
Time (PDT) **SOURCE**	**CONTENT**	Time (PDT) **SOURCE**	**CONTENT**
19:19:01.2 **INT-2**	radio avionics and caution panel		
19:19:02.8 **INT-1**	good		
19:19:03.2 **INT-2**	fire king is off anti collision light on		
19:19:05.2 **INT-1**	good		
19:19:05.8 **INT-1**	anti-collision's on		
19:19:06.6 **INT-2**	rotor brake is on master start is on		
19:19:08.8 **INT-1**	master start's on		
19:19:10.3 **INT-2**	igniters on fuel valve		
19:19:11.0 **INT-1**	open		
19:19:12.0 **INT-1**	fuel valve's open		
19:19:13.7 **INT-2**	clear engine start clear on the left oh no we got a truck comin' down		
19:19:17.6 **INT-1**	got the truck		
19:19:23.1 **INT-1**	clear left		

INTRA-COCKPIT COMMUNICATION		AIRCRAFT-TO-GROUND COMMUNICATION	
Time (PDT) **SOURCE**	**CONTENT**	Time (PDT) **SOURCE**	**CONTENT**
19:19:24.1 **INT-1**	we are not clear on the right		
19:19:26.6 **INT-1**	there he goes okay now we are clear		
19:19:29.5 **INT-2**	okay engine start I'm gunna put this down and ah back you up on it		
19:19:34.0 **INT**	((sound of increasing engine noise))		
19:19:34.6 **INT-1**	okay oil pressure's comin' up N-G's comin' up comin' down below one hundred there we go here we go around the horn		
19:19:54.0 **INT-1**	forty five trigger release		
19:19:58.5 **INT-1**	Tee five stabilized good start oil pressure's up		
19:20:02.0 **INT-2**	okay		
19:20:02.9 **INT-1**	number two		
19:20:05.9 **INT-1**	starter's engaged		
19:20:07.9 **INT**	((sound of increasing engine noise))		

INTRA-COCKPIT COMMUNICATION		AIRCRAFT-TO-GROUND COMMUNICATION	
Time (PDT) **SOURCE**	**CONTENT**	Time (PDT) **SOURCE**	**CONTENT**
19:20:08.4 **INT-1**	fuel pressure's comin' up - oil pressure's comin' up		
19:20:11.4 **INT-1**	nineteen percent - twenty percent below one hundred - there we go fuel		
19:20:23.1 **INT-1**	forty five trigger release		
19:20:25.8 **INT-1**	Tee five stabilizing NG good		
19:20:30.7 **INT-1**	oil pressure's good - good light off		
19:20:32.4 **INT-2**	okay		
19:20:33.4 **INT-2**	good start on two- mo-gen		
19:20:35.1 **INT-1**	mo-gen here we go		
19:20:36.8 **INT-2**	transmission oil pressures hydraulic pressures		
19:20:39.6 **INT-1**	okay hydraulic pressure's are all good light's out		
19:20:46.2 **INT-2**	okay adjust flight controls		

INTRA-COCKPIT COMMUNICATION		AIRCRAFT-TO-GROUND COMMUNICATION	
Time (PDT) **SOURCE**	**CONTENT**	Time (PDT) **SOURCE**	**CONTENT**
19:20:48.2 **INT-1**	flight controls are centered good and free go ahead and lock the collective		
19:20:53.6 **INT-2**	okay rotor engagement - strobe on		
19:20:56.5 **INT-1**	strobe light's on pulse		
19:21:00.5 **INT-1**	there it is - the strobe is on okay there it is all lights are on		
19:21:05.3 **INT-2**	okay controls centered check that you have two torques, three pressures and three lights out		
19:21:09.1 **INT-1**	two torques three pressures no lights tail wheel is locked brakes are set		
19:21:13.6 **INT-2**	collective lock is on clear the aircraft and ready to engage		
19:21:17.1 **INT-1**	clear on the left		
19:21:18.0 **INT-2**	and we are clear on the right		
19:21:36.1 **INT-2**	okay we are makin' power		
19:21:37.7 **INT-1**	good chargin' - battery		

INTRA-COCKPIT COMMUNICATION		AIRCRAFT-TO-GROUND COMMUNICATION	
Time (PDT) **SOURCE**	**CONTENT**	Time (PDT) **SOURCE**	**CONTENT**
19:21:38.9 **INT-2**	main battery off		
19:21:39.7 **INT-2**	okay DC gen light is out		
19:21:43.1 **INT-2**	there went the droops		
19:21:48.7 **INT-2**	master battery is on		
19:21:56.6 **INT-1**	generators on		
19:21:58.6 **INT-1**	ground inverter's off transformer rectifier's on		
19:22:04.5 **INT-1**	boost pump's on		
19:22:07.0 **INT-2**	okay GPS set		
19:22:09.8 **INT-2**	okay rotor DC gen caution light's out AC generator's are on		
19:22:12.9 **INT-1**	yes		
19:22:13.4 **INT-2**	tail takeoff light is out		
19:22:14.4 **INT-2**	ground inverter's off		

INTRA-COCKPIT COMMUNICATION		AIRCRAFT-TO-GROUND COMMUNICATION	
Time (PDT) **SOURCE**	**CONTENT**	Time (PDT) **SOURCE**	**CONTENT**
19:22:14.5 **INT-1**	yes		
19:22:15.6 **INT-2**	transformer rectifier’s on		
19:22:16.8 **INT-1**	good		
19:22:16.8 **INT-2**	external power off		
19:22:16.9 **INT-1**	good		
19:22:17.4 **INT-1**	boost pump's on		
19:22:18.6 **INT-2**	good		
19:22:19.8 **INT-2**	radio and avionics on tail takeoff light checked		
19:22:22.0 **INT-1**	good		
19:22:23.2 **INT-2**	okay matched torque		
19:22:24.5 **INT-1**	okay		
19:22:25.2 **INT-2**	takeoff - before taxi		

INTRA-COCKPIT COMMUNICATION		AIRCRAFT-TO-GROUND COMMUNICATION	
Time (PDT) **SOURCE**	**CONTENT**	Time (PDT) **SOURCE**	**CONTENT**
19:22:27.8 **INT-2**	speed selector tail wheel lock collective lock is off		
		19:22:31.9 **RDO-1**	Helibase, helitanker seven six six ready for departure
19:22:35.9 **INT-2**	okay before takeoff		
		19:22:37.1 **TRI**	Trinity base copies the winds are calm no other aircraft in the area depart at your discretion
19:22:41.5 **INT-2**	okay pressures and temperatures are all good		
		19:22:42.1 **RDO-1**	*
19:22:44.6 **INT-2**	we got plenty of fuel for the mission collective lock is off - AFCS is on beeper trim is off		
19:22:52.3 **INT-1**	landing light on		
19:22:55.0 **INT-2**	and on on the right		
19:22:57.1 **INT-2**	throttles coming up		

INTRA-COCKPIT COMMUNICATION		AIRCRAFT-TO-GROUND COMMUNICATION	
Time (PDT) **SOURCE**	**CONTENT**	Time (PDT) **SOURCE**	**CONTENT**
19:23:03.5 **INT-1**	comin' up		
19:23:04.6 **INT-2**	okay power is set you are clear on the right		
19:23:16.5 **INT-2**	power's good		
19:23:18.5 **INT-1**	comin' up		
19:23:22.9 **INT-2**	you're clear all the way around		
19:23:25.8 **INT-2**	clear right		
19:24:02.6 **INT-2**	yup right over the top of those		
19:24:04.1 **INT-1**	yup		
19:24:05.1 **INT-1**	go direct		
19:24:53.7 **INT-2**	once we get on top of the hill I'll call helco		
19:24:55.8 **INT-1**	roger		
19:25:02.5 **INT-3**	hay Bill the next guy will probably have to do the full twelve day shift		

INTRA-COCKPIT COMMUNICATION		AIRCRAFT-TO-GROUND COMMUNICATION	
Time (PDT) **SOURCE**	**CONTENT**	Time (PDT) **SOURCE**	**CONTENT**
19:25:06.7 **INT-2**	say that again		
19:25:07.9 **INT-3**	on the next check I'll probably have to do full twelve day shift with em		
19:25:10.5 **INT-2**	yeah you'll have to		
19:25:13.6 **INT-2**	I'm sure they'll make it worth your while		
19:25:15.4 **INT-3**	yeah		
19:25:16.9 **INT-3**	all the diet coke I can drink right		
19:25:18.5 **INT-2**	yeah		
19:25:18.9 **INT-1**	all the diet coke you can drink absolutely you see how well that has worked for me		
19:25:23.6 **INT-3**	yeah I I see		
19:25:25.8 **INT-3**	for every diet coke you can have a malt right		
19:25:28.2 **INT-1**	heck yes or a bag of M&M's		
19:25:31.9 **INT-1**	as long as you wash it down with a diet coke you're okay		

INTRA-COCKPIT COMMUNICATION		AIRCRAFT-TO-GROUND COMMUNICATION	
Time (PDT) **SOURCE**	**CONTENT**	Time (PDT) **SOURCE**	**CONTENT**
19:25:38.0 **INT-2**	ah if you want to come about another almost ten degrees to the right when you can that's more direct		
19:25:44.3 **INT-1**	okay		
19:25:45.8 **INT-3**	yeah I think they said that they were goin' to have a helco up when you come back instead of air attack		
19:25:48.6 **INT-2**	yeah that's what he said, I was gunna try and get him when we crested this ridge here		
19:26:45.4 **INT-1**	yeah we'll probably have two more loads of people then we got to come back for a third load and get our guys		
19:26:52.1 **INT-2**	okay		
19:26:53.2 **INT-1**	I bet you that's what it's all about		
19:26:55.2 **INT-2**	okay		
19:26:56.4 **INT-2**	so what we can do - is a when we drop the last of the second load of their people we can pick up our five go up to the top -		

INTRA-COCKPIT COMMUNICATION		AIRCRAFT-TO-GROUND COMMUNICATION	
Time (PDT) **SOURCE**	**CONTENT**	Time (PDT) **SOURCE**	**CONTENT**
19:27:05.7 **INT-1**	and pick up the other five and then head home absolutely		
19:27:09.3 **INT-2**	copy		
19:27:15.0 **INT-2**	god, it's beautiful country		
19:27:16.9 **INT-3**	it was before they burned it down		
19:27:20.0 **INT-3**	that's the sad thing they can't go back in and log or replant it		
19:27:23.8 **INT-2**	why is that?		
19:27:24.6 **INT-3**	the environmentalists won't let them go in there and let them log it then with all the snags and stuff nobody can afford to manually go in there and replant it		
19:27:31.8 **INT-2**	yeah		
19:27:32.3 **INT-3**	they won't let you spray any more		
19:27:33.9 **INT-1**	it's crazy		
19:27:35.4 **INT-3**	what is it- it's really		

INTRA-COCKPIT COMMUNICATION		AIRCRAFT-TO-GROUND COMMUNICATION	
Time (PDT) **SOURCE**	**CONTENT**	Time (PDT) **SOURCE**	**CONTENT**
19:27:36.9 **INT-1**	it's sad		
19:27:38.2 **INT-3**	it's a huge resource we're just wastin'		
19:27:40.6 **INT-1**	just wastin' away absolutely		
19:27:42.4 **INT-3**	and on that fire there that they had up by the glacier area up there the jumpers wanted to jump it and it was just a single snag there when they first saw it and they said naw it's a let burn now they put probably hundreds of thousand of dollars in air tanker drops and helicopter time		
19:27:59.1 **INT-2**	that's too bad		
19:28:00.7 **INT-1**	doesn't make much sense		
		19:28:07.7 **RDO-2**	helco seven six six
		19:28:11.3 **RDO-1**	Trinity Helibase seven six six is in contact with helco at this time frequency change
		19:28:13.8 **HELCO**	seven six six this is helco

INTRA-COCKPIT COMMUNICATION		AIRCRAFT-TO-GROUND COMMUNICATION	
Time (PDT) **SOURCE**	**CONTENT**	Time (PDT) **SOURCE**	**CONTENT**
		19:28:15.8 **RDO-2**	seven six six is off of trinity enroute to Helispot forty four showing six minutes enroute
		19:28:24.7 **HELCO**	and four your information seven six six is ah I was asked could you advise willow Helibase after your last load to H forty four please over
19:28:35.2 **INT-2**	do what		
19:28:36.2 **INT-1**	yes advise willow Helibase of our last load to H forty four		
		19:28:40.4 **RDO-2**	seven six six wilco
		19:28:43.4 **HELCO**	thank you clear
19:28:46.1 **INT-1**	did you tell him to speak English		
19:28:48.3 **INT-2**	I'm sure glad that you speak something else other than English		
19:28:52.5 **INT-2**	I didn't understand what he was tryin' to tell us		

INTRA-COCKPIT COMMUNICATION		AIRCRAFT-TO-GROUND COMMUNICATION	
Time (PDT) **SOURCE**	**CONTENT**	Time (PDT) **SOURCE**	**CONTENT**
19:28:55.0 **INT-3**	that was those Australian people they brought over for the fires		
19:28:59.7 **INT-3**	they only have a couple of days left		
19:29:01.5 **INT-2**	you dump trinity?		
19:29:03.3 **INT-1**	I dump I dump trinity yes		
19:29:07.4 **INT-1**	thank you		
19:29:36.7 **INT-3**	that guy that is a helco he's from Perth oh and I said what do you do there he said my family are farmers, and I said what do they farm, and he said wait and shape. and I said what the hell are wait and shape and he said you know wheat and sheep - you know wait and shape		
19:29:50.9 **INT-1**	ah that's funny		
19:29:52.6 **INT-3**	you know wait and shape are kind of a weird way to describe a product but that's the way people talk		
19:29:58.9 **INT-1**	that's funny		

INTRA-COCKPIT COMMUNICATION		AIRCRAFT-TO-GROUND COMMUNICATION	
Time (PDT) **SOURCE**	**CONTENT**	Time (PDT) **SOURCE**	**CONTENT**
		19:30:04.5 **RDO-1**	Helispot forty four helitanker seven six six
19:30:15.7 **INT-1**	still eight miles out		
19:30:17.1 **INT-2**	yup		
		19:30:18.7 **Helispot 44**	and seven six six forty four on air to ground
		19:30:22.9 **RDO-1**	Hello Mat seven six six we're inbound right now eight miles out be at your location maybe in three minutes
		19:30:33.7 **Helispot 44**	seven six six forty four copies about eight - wind are the same out of the south about three to five and we're ready for you seven six six
		19:30:46.3 **RDO-1**	alright
19:30:47.2 **INT-2**	same approach		
		19:30:48.6 **RDO-1**	same approach same landing spot everything will be exactly the same we'll be there in about three minutes

INTRA-COCKPIT COMMUNICATION		AIRCRAFT-TO-GROUND COMMUNICATION	
Time (PDT) **SOURCE**	**CONTENT**	Time (PDT) **SOURCE**	**CONTENT**
		19:30:58.0 **Helispot 44**	forty four copies
19:31:01.4 **INT-2**	okay I'm going to do the before landing now?		
19:31:03.6 **INT-1**	please		
19:31:04.2 **INT-2**	before landing throttles are set		
19:31:06.6 **INT-2**	fuel panel is secure		
19:31:08.9 **INT-2**	got plenty of fuel for this mission makin' the three turns pressures and temperatures		
19:31:18.0 **INT-?**	sound of double mike click		
19:31:19.1 **INT-2**	are all reading normally		
19:31:21.0 **INT-2**	avionics - we are up air to ground we got helco		
19:31:24.7 **INT-2**	GPS is set tail wheel switch is locked parking brake is set before landing complete		
19:31:30.8 **INT-3**	that sun is a miserable #		
19:31:32.1 **INT-1**	yes		

INTRA-COCKPIT COMMUNICATION		AIRCRAFT-TO-GROUND COMMUNICATION	
Time (PDT) **SOURCE**	**CONTENT**	Time (PDT) **SOURCE**	**CONTENT**
19:31:33.6 **INT-1**	look right into the sun that helps doesn't it		
19:31:36.6 **INT-1**	that bites		
19:31:38.6 **INT-1**	why am I down to four thousand		
19:31:40.4 **INT-1**	yeah I know		
19:31:41.5 **INT-2**	we're going for that saddle right there		
19:31:42.3 **INT-1**	roger		
19:32:11.5 **INT-1**	boy I'm glad Pastor cleaned the windows		
19:32:14.9 **INT-2**	yeah I know we're a little warm here but we're on the bottom edge of the green		
19:32:19.1 **INT-1**	roger		
19:32:20.5 **INT-1**	pretty normal with our transmissions they're always at the bottom edge which is kind of hot		
19:32:26.6 **INT-2**	yeah the oil is pretty thin right now		

INTRA-COCKPIT COMMUNICATION		AIRCRAFT-TO-GROUND COMMUNICATION	
Time (PDT) **SOURCE**	**CONTENT**	Time (PDT) **SOURCE**	**CONTENT**
19:32:28.2 **INT-1**	yeah		
19:32:29.6 **INT-2**	if we turn that up that should turn that down right		
19:32:35.4 **INT-2**	is that right?		
19:32:36.2 **INT-1**	yes		
19:32:37.1 **INT-2**	I'm almost thinkin' that we need to up that a little bit		
19:32:41.8 **INT-1**	yup		
19:33:02.1 **INT-2**	okay - we got an hour		
19:33:05.2 **INT-1**	okay I think we can do three trips in an hour and be home		
19:33:08.4 **INT-2**	I'm thinkin' we can		
19:33:09.3 **INT-1**	yup		
19:33:28.7 **INT-1**	the world wants to disappear on us		
19:33:31.4 **INT-2**	yup we're at six thousand feet now		

INTRA-COCKPIT COMMUNICATION		AIRCRAFT-TO-GROUND COMMUNICATION	
Time (PDT) **SOURCE**	**CONTENT**	Time (PDT) **SOURCE**	**CONTENT**
19:33:33.4 **INT-1**	yup		
19:33:34.0 **INT-1**	we're just gunna come to the right so we can get better visibility		
19:33:36.6 **INT-2**	yup and that's where it's showin' it is it's right off -		
19:33:39.2 **INT-1**	okay yah got it		
19:33:40.6 **INT-2**	okay stop turn it should be right off your nose		
19:33:43.0 **INT-1**	okay I want to come here a little bit more to the right here for the visibility sake		
19:33:47.0 **INT-2**	yup		
19:33:47.6 **INT-1**	we'll just cut right to the edge of the smoke here until I can pick up the ridge		
19:33:51.6 **INT-2**	and you can fly past it and come back around		
19:33:54.0 **INT-1**	yup		

INTRA-COCKPIT COMMUNICATION		AIRCRAFT-TO-GROUND COMMUNICATION	
Time (PDT) **SOURCE**	**CONTENT**	Time (PDT) **SOURCE**	**CONTENT**
19:33:54.6 **INT-1**	and do a left hand left hand traffic		
19:33:57.4 **INT-2**	copy		
19:34:02.4 **INT-1**	okay I can see it now		
19:34:010.0 **INT-2**	should be right out at our ten o'clock		
		19:34:15.6 **RDO-1**	okay forty four seven six six we're starting our approach to your location
19:34:21.3 **INT-2**	should be right over in here		
19:34:23.8 **INT-1**	yup		
19:34:29.6 **INT-1**	smoke here we'll be able to see em right away		
19:34:32.2 **INT-2**	yeah should be right down in there		
19:34:33.7 **INT-1**	yup		
19:34:36.3 **INT-1**	okay we're slowin' down there they are		

INTRA-COCKPIT COMMUNICATION		AIRCRAFT-TO-GROUND COMMUNICATION	
Time (PDT) **SOURCE**	**CONTENT**	Time (PDT) **SOURCE**	**CONTENT**
19:34:39.8 **INT-1**	okay down wind left down wind slowin' down		
19:34:42.1 **INT-2**	okay yup		
19:34:43.0 **INT-2**	and just be advise we at twenty -		
19:34:45.8 **INT-1**	we're gunna be heavier		
19:34:46.0 **INT-2**	three hundred pounds of fuel so we're right at the edge		
19:34:49.1 **INT-1**	okay		
19:34:51.2 **INT-1**	what's the OAT again?		
19:34:52.6 **INT-2**	we are at twenty degrees		
19:34:54.5 **INT-1**	so it's gotten cooler		
19:34:55.9 **INT-2**	we've got ah we're good on the approach comin in		
19:35:00.9 **INT-2**	we've got ah quite a bit of performance with the drop in temperature		

INTRA-COCKPIT COMMUNICATION		AIRCRAFT-TO-GROUND COMMUNICATION	
Time (PDT) **SOURCE**	**CONTENT**	Time (PDT) **SOURCE**	**CONTENT**
19:35:06.0 **INT-1**	okay		
19:35:08.9 **INT-1**	low recon still looks good, they've got those bags set out for sling loads - but keep an eye on those		
19:35:15.3 **INT-2**	okay yup got them they shouldn't be a factor		
19:35:22.2 **INT-1**	okay got my spot picked out		
19:35:24.0 **INT-2**	okay		
19:35:24.5 **INT-1**	everything looks good they've watered it more		
19:35:27.4 **INT-2**	you're clear on the right		
19:35:35.6 **INT-2**	you're clear right below		
19:35:36.9 **INT-1**	and here we come straight down here		
19:35:41.1 **INT-3**	you're at eight feet		
19:35:44.2 **INT-3**	five		
19:35:47.1 **INT-3**	three		

INTRA-COCKPIT COMMUNICATION		AIRCRAFT-TO-GROUND COMMUNICATION	
Time (PDT) **SOURCE**	**CONTENT**	Time (PDT) **SOURCE**	**CONTENT**
19:35:48.9 **INT-3**	one		
19:35:52.0 **INT-3**	left's down		
19:35:54.7 **INT-1**	good solid aircraft's is not rolling it felt solid		
19:36:01.6 **INT-1**	okay		
19:36:02.2 **INT**	((throttle reduction))		
19:36:11.3 **INT-2**	okay throttles beeper trim collective lock AFCS is off		
19:36:26.2 **INT-2**	we've got plenty of tank clearance		
19:36:30.8 **INT-1**	is that Erin over there or Matt		
19:36:33.2 **INT-2**	it has to be Matt cause Erin wears a red hat		
19:36:35.4 **INT-1**	Oh I got yaw		
19:36:46.0 **INT-1**	yeah that's Matt		
19:36:47.0 **INT-2**	I don't see another group of guys?		

INTRA-COCKPIT COMMUNICATION		AIRCRAFT-TO-GROUND COMMUNICATION	
Time (PDT) **SOURCE**	**CONTENT**	Time (PDT) **SOURCE**	**CONTENT**
19:36:49.0 **INT-1**	yeah there in the trees on my side		
19:36:50.5 **INT-2**	oh okay got it		
		19:36:53.0 **RDO-1**	Hay Matt we've got two more loads after this total?
		19:36:59.9 **Helispot 44**	Ah seven six six that's affirmative two more after this
		19:37:04.6 **RDO-1**	okay it does not appear to be a problem the last load that's just you guys we got one more load of ah personnel and then one load of you guys and that's it correct
		19:37:21.1 **Helispot 44**	that's affirmative seven six six one more load of hand crew and one more load of hand crew leadership and the rest of the fly crew
		19:37:30.4 **RDO-1**	okay - okay I got ya I understand now
19:37:30.5 **INT-2**	so it will be a full load		
		19:37:35.9 **Helispot 44**	also seven six six ah there possibly might be a medium available do you think we need to get them in the mix or can we get ah everybody off the hill

INTRA-COCKPIT COMMUNICATION		AIRCRAFT-TO-GROUND COMMUNICATION	
Time (PDT) **SOURCE**	**CONTENT**	Time (PDT) **SOURCE**	**CONTENT**
19:37:46.1 **INT-2**	should be able to get them off		
		19:37:46.5 **RDO-1**	I think with the time remaining we have enough time to get everybody the next two trips will be no problem
		19:37:54.7 **HELCO**	I copy
		19:37:57.9 **RDO-1**	you brought all your overnight gear didn't ya
		19:38:01.0 **Helispot 44**	oh you bet ya we're always prepared
		19:38:04.8 **RDO-1**	I know
19:38:13.7 **INT-2**	okay they are expediting back here everything is lookin' good so far they just about got all the gear inside everybody's seated they're just checking the last couple of seatbelts		
		19:38:31.2 **RDO-1**	ah Matt what is the weight on this load?
		19:38:36.5 **Helispot 44**	the weight on this load is twenty three fifty five - two three five five and there is some saws onboard so there is haz-mat onboard
19:38:47.2 **INT-2**	got it		

INTRA-COCKPIT COMMUNICATION		AIRCRAFT-TO-GROUND COMMUNICATION	
Time (PDT) **SOURCE**	**CONTENT**	Time (PDT) **SOURCE**	**CONTENT**
		19:38:47.8 **RDO-1**	okay thank you
19:38:50.3 **INT-2**	okay so		
19:39:18.5 **INT-2**	okay at thirty two degrees we were good for twenty five fifty two so we're two hundred pounds under we are twelve degrees		
19:39:22.9 **INT-1**	okay		
19:39:26.1 **INT-1**	colder		
19:39:26.6 **INT-2**	we're ah almost thirteen degrees colder		
19:39:29.4 **INT-1**	and two hundred pounds lighter		
19:39:31.0 **INT-2**	and two hundred pounds lighter we're good to go		
19:39:32.3 **INT-1**	excellent		

INTRA-COCKPIT COMMUNICATION		AIRCRAFT-TO-GROUND COMMUNICATION	
Time (PDT) **SOURCE**	**CONTENT**	Time (PDT) **SOURCE**	**CONTENT**
19:39:43.3 **INT-3**	just a little bit longer they all want the tender touch of the female		
19:39:47.1 **INT-2**	copy - can't blame them for that		
19:39:49.1 **INT-3**	nope		
19:39:49.5 **INT-2**	they're boys aren't they		
19:39:50.4 **INT-3**	yup		
19:39:54.5 **INT-2**	kind of like gettin' their mothers touch		
19:40:13.5 **INT-2**	okay collective lock is off, Ramage is closing the door		
19:40:17.0 **INT-1**	okay		
19:40:17.4 **INT-2**	he's headin' back to his seat okay ah got the thumbs up from the ground crew door's closed- confirm door's closed Ramage is gettin' seated		
19:40:26.9 **INT-2**	okay beeper trim is off AFCS is on collective lock is off throttles coming up		

INTRA-COCKPIT COMMUNICATION		AIRCRAFT-TO-GROUND COMMUNICATION	
Time (PDT) **SOURCE**	**CONTENT**	Time (PDT) **SOURCE**	**CONTENT**
19:40:31.4 **INT-1**	throttles comin up		
19:40:32.1 **INT-2**	waitin' for Ramage		
		19:40:38.1 **RDO-1**	seven six six we're on the go
19:40:40.4 **INT-3**	okay I'm gunna be all set by the time you pull pitch		
19:40:42.9 **INT-1**	okay we're pulling pitch Jim		
19:40:44.3 **INT-2**	here we go		
19:40:45.9 **INT-2**	you're clear on the right		
19:40:46.9 **INT-1**	pullin' pitch		
19:40:47.7 **INT-2**	okay just nice and smooth here		
19:40:50.1 **INT-1**	yup		
19:41:02.9 **INT-2**	okay there’s seventy five - there's eighty		
19:41:06.4 **INT-2**	there's eighty five		

INTRA-COCKPIT COMMUNICATION		AIRCRAFT-TO-GROUND COMMUNICATION	
Time (PDT) **SOURCE**	**CONTENT**	Time (PDT) **SOURCE**	**CONTENT**
19:41:10.5 **INT-2**	there's ninety showin' ah hundred and three percent		
19:41:18.8 **INT-2**	nope hundred percent Roark		
19:41:22.9 **INT-2**	no ah droopin' Roark		
19:41:24.8 **INT-1**	oh God		
19:41:25.8 **INT-2**	oh #		
19:41:29.1 **INT-2**	fly darlin’		
19:41:30.3 **INT-2**	fly darlin’		
19:41:31.3 **INT-2**	fly darlin’		
19:41:32.9 **INT-2**	fly darlin’		
19:41:34.5 **INT-2**	#		
19:41:35.3 **INT-1**	#		
19:41:35.9 **INT-1**	#		

INTRA-COCKPIT COMMUNICATION		AIRCRAFT-TO-GROUND COMMUNICATION	
Time (PDT) **SOURCE**	**CONTENT**	Time (PDT) **SOURCE**	**CONTENT**
19:41:38.7 **INT**	End of Recording End of Transcript		