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Entry-Level Jet Single-Pilot Human-in-the-Loop Simulation Research: Study Scripts and Radio Background Chatter Dialogue

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August 2013

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Acronyms and Definitions

ASOS .....Automated Surface Observation System

ATC .....air traffic control

ATIS .....Automated Terminal Information Service

AWOS.....Automated Weather Observing System

CAMI .....Civil Aerospace Medical Institute

FAA .....Federal Aviation Administration

HITL .....human-in-the-loop

IFR .....instrument flight rules

ILS .....instrument landing system

IMC.....instrument meteorological conditions

ISA.....instantaneous self-assessment

KHSP .....Ingalls Field, Hot Springs (Virginia)

KMTN.....Martin State Airport (near Baltimore, Maryland)

KTEB .....Teterboro Airport (New Jersey)

NASA .....National Aeronautics and Space Administration

SME .....subject matter expert

VMC .....visual meteorological conditions

Entry-Level Jet Single-Pilot Human-in-the-Loop Simulation Research: Study Scripts and Radio Background Chatter Dialogue

Barbara K. Burian[1], Shawn Pruchnicki[2], and Dave Fry[2]

Abstract

It can be very challenging to make sure that there is consistency in the way in which flight scenarios are presented to participants during human-in-the-loop simulation studies. This report describes the design process of detailed scripts developed to guide the data collection process during a simulation study examining single-pilot workload management and automation use when flying an entry-level jet (Burian, et al., under review). It also includes a description of the process by which background chatter dialogue between 'other pilots' and air traffic controllers (to be heard on the radio during the flights) was developed. The detailed study scripts and the background dialogue described are both included in this report.

1. Introduction

When conducting an experimental research study, it is well understood that consistency in the ways in which stimulus materials are presented to participants is of paramount importance (Beins & McCarthy, 2012). Without this consistency, differences observed in participant behavior cannot be meaningfully analyzed. Achieving this consistency in human-in-the-loop (HITL) simulation studies, often used in aviation research, can be quite difficult. Careful thought and planning are required so that all pertinent experimenter interactions with the participants during the study are as uniform as possible, such as when experimenters are acting in the role of air traffic controllers (ATC), weather briefers, or pilots during data collection. HITL studies also have additional complexity in that participants may follow through on a variety of decisions they make during the simulation which can affect how and which stimulus materials are presented later. For example, if a pilot participant is presented with a non-normal event as part of the simulation, he or she may chose a wide range of actions in response to that event ranging from ignoring it completely to diverting and conducting an emergency landing. If the purpose of the study is to examine pilot decision-making and actions before and during a diversion, how should the experimenters interact with participants who choose *not* to divert during the simulation? The wide range of possible participant behavior must be considered and accounted for during study design.

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In collaboration with researchers in the FAA Aerospace Human Factors Research Lab at the Civil Aerospace Medical Institute (CAMI) and our other colleagues in the Flight Cognition Lab at NASA Ames Research Center, we recently completed an exploratory HITL simulation study examining the workload management and automation use strategies of pilots flying entry-level jets (Burian, et al., 2013). We developed detailed scripts for ATC subject matter experts and the experimenters to use during data collection; this report describes and includes these scripts. During the study the scripts ensured consistency in our interactions with the participants and provided structure for us when flexibility was required due to variations in participant choices as the simulated flights progressed.

This report also describes and includes the dialogue we developed for 'background chatter' on the 'aircraft' radio for use during the simulation. The Cessna Citation Mustang level 5 flight training device that we used (for simplicity, the 'simulator') was not equipped with pre-recorded background radio 'chatter' between other pilots and ATC. Because this is an essential feature of most flights in the real world and monitoring radio communication is a component of pilot workload management, an item of interest in this study, we developed and recorded our own background chatter for use in our study (Burian, et al., 2013).

In the remainder of this report, we briefly describe the flight scenarios developed for this exploratory study. Descriptions of the processes by which we developed the study scripts, used to guide how we conducted the simulation study, and the background chatter dialogue follow in Sections 3.0 and 4.0, respectively. The actual study scripts and the background chatter dialogue can be found in Appendix A and Appendix B, in turn.

2.0 Study Scenarios

We developed three flight scenarios with the help of an airline pilot/instructor, a Cessna Citation Mustang Mentor Pilot, and ATC experts. The first scenario was designed solely to allow our participants to become familiar with the simulator. Therefore, data from this instrument flight rules (IFR) flight were not analyzed. It lasted approximately 30 minutes, occurred in visual meteorological conditions (VMC) and was conducted after the pilots completed a takeoff and landing at an airport, again, to promote comfort and familiarity with the simulation environment.

During this circuit around the airport pattern, as the pilots completed their crosswind to downwind turns, the pilots were asked to read text off a card they had been given, purportedly to complete an 'audio check.' In truth, the text they were asked to read was used as a 'vocal' baseline for voice analyses of their later communications with ATC during the experimental flight. Previous research has found a relationship between different vocal qualities, such as loudness and articulation rate, and stress or workload (Brenner, Doherty, & Shipp, 1994; Griffin & Williams, 1987; Ruiz, Legros, & Guell, 1990). Therefore, we conducted voice analyses in our study of single-pilot workload management (see Burian, et al., 2013, and Christopher, under review).

The experimental IFR flight consisted of two legs, each lasting approximately one hour, and occurred in instrument meteorological conditions (IMC). The first leg was from Teterboro Airport in New Jersey (KTEB) to Martin State Airport (KMTN) just outside of Baltimore, Maryland. The second leg was a continuation flight from KMTN to Ingalls Field, Hot Springs (KHSP) in Virginia. During both legs the participants were asked to complete a wide range of typical flight tasks, such as perform an instrument departure and conduct non-precision and precision approaches at a non-towered and towered airport, respectively. They also had to complete other tasks such as program and perform an in-flight reroute, meet crossing restrictions, and respond to a non-normal event (i.e., circuit breaker pop). During the

second leg, participants were also asked if they would assist in facilitating communication between a center controller and a 'lost pilot,' portrayed by one of the experimenters, who was trapped under the cloud deck and needed to find an airport to land.

Detailed information about the familiarization and experimental flight scenarios can be found in Burian, et al., (2013).

3.0 Study Script Development

Using high level descriptions of the three full-mission flight scenarios and detailed task analyses of the experimental flights (see Burian, Christopher, Fry, Pruchnicki, & Silverman, 2013), we developed the detailed scripts for our simulation study (see Appendix A). These scripts guided all communications from ATC and other pilots as well as the triggering of all events, such as the circuit breaker pop during the second leg of the experimental flight. Other weather information such as recorded Automated Terminal Information Service (ATIS), Automated Surface Observation System (ASOS), and Automated Weather Observing System (AWOS) was included in the scripts as were reminders to the experimenters to trigger a light in the cockpit prompting the pilot to make an instantaneous self-assessment (ISA) of their current workload (see Burian, et al., 2013). The scripts also included reminders to the experimenters to place a marker in the data capture program, used for audio and video recording, to facilitate the location of specific events in the video during data analysis.

Four separate scripts were developed in Microsoft Excel™ : one for the 'audio check' during the participant's initial circuit around an airport pattern and one for each of three flight scenarios (familiarization and two experimental legs). The three flight scenario scripts were organized by the following phases of flight: preflight preparation in the aircraft, engine start, taxi out, takeoff, climb, cruise, descent, approach, landing, taxi in, and engine shutdown and securing. Once the participants entered the simulator and each scenario was started, they progressed as any regular flight does and the ATC subject matter experts (SMEs) who were assisting with data collection helped to move the scenarios forward by following the line-by-line instructions and their communications with the participants, detailed in the study scripts. Before the scripts were finalized, ATC SMEs reviewed all proposed ATC communications, including those from Flight Watch briefers, to make sure they were realistic and consistent with standard phraseology.

The three flight scripts contained the following nine, color-coded columns of information: 1) aircraft location; 2) active radio frequency; 3) triggers to prompt all ATC calls to the participant pilots; 4) notes and alternate actions that might be necessary on the part of ATC depending upon choices made by the participants; 5) a description of pilot tasks that were being completed (to facilitate situation awareness among the ATC and researchers); 6) exact communications from ATC to the participant; 7) a description of communication expected from the participant in response to an ATC call; 8) exact communication from other 'live' pilots, played by the researchers; and 9) recoded ATIS, AWOS, and ASOS text as well as reminders to the researchers to turn on and off the pre-recorded radio background chatter.

A shaded box in the active radio frequency column indicated that the radio frequency in the aircraft should have been changed, such as when the participant was handed-off to the next controller. ATC SMEs were directed to refer to displays at the experimenter station to ensure that participants had dialed in the new frequency correctly before responding to any radio calls. All communications from ATC and other 'pilots,' played by experimenters, were to be read exactly as written on the script. The alternate information and notes helped to guide the ATC SMEs when pilots made different choices, such as

choosing to cancel their IFR clearance while still airborne vs. after they had landed.

We also had to anticipate a wide range of possible participant actions and have guidance for ATC about how to respond. For example, because weather data which would normally be available in a real aircraft was not available in the simulator (e.g., radar), it was possible that a pilot, at any time during the flight, might chose to contact Flight Watch to inquire about weather along their route or at their destination. Thus, we had to develop realistic scripts for our ATC SMEs to use in that event and make sure they were easily available should they ever be needed. In some cases, supplemental information was provided on a separate card for our controllers to access, as was the case with a listing of ATIS, AWOS, and ASOS reports and other weather information at airports along the routes of flight (see Burian, et al., 2013). In other cases, we used tabs in the scripts and binders containing them to allow easy access to some of this alternate information that might be needed but was not required as part of the scenario (e.g., Flight Watch ATC communication). Colored bands corresponding with those used for the headings of the Alternate/Notes column (lavender) and the pre-recorded weather column (gray) were also used in the first (unlabeled) column in the scripts. These bands were used to highlight alternate ATC actions and communications and facilitate identification and location of pre-recorded weather information (e.g., ATIS).

Although pilots were asked to facilitate communication between a 'lost pilot' and ATC during the second leg of the experimental flight, they could have reasonably declined to help, particularly as this request came, by design, at the same time as they would typically be preparing and setting up the automation for their instrument landing system (ILS) approach into KHSP. Thus, we scripted this section of the flight we called the 'lost pilot scenario' for two different possibilities, one if the participant agreed to help and one if the participant declined.

4.0 Radio Background Chatter Dialogue Development

Some flight simulators can be purchased with pre-recorded background chatter between other pilots and ATC. It creates a relatively realistic radio environment and has the advantage of automatically suspending these communications when either the pilot flying the simulator or the ATC/researcher keys the microphone to talk. No such pre-recorded background chatter was available for the simulator we used at the time we conducted the study. Thus, we decided to develop and tape our own background chatter which was to be manually controlled by the researchers during the experimental flight scenarios. Although there was some communication from 'other pilots,' played by the researchers, during the familiarization flight, no background chatter dialogue for the familiarization flight was developed or recorded.

One of us, a pilot SME (Fry), did the bulk of the work on developing the background chatter and was assisted by two of the researchers (Pruchnicki and Burian). He began by mapping out the routes of flight for the familiarization and experimental scenarios. We identified all of the radio frequencies our participants would be listening to including clearance delivery and ground controllers, and estimated the length of time a participant might have that frequency audible. This was actually more difficult than it might seem. For example, while preparing to depart, participants might leave the radio tuned into clearance delivery long after they have received their clearance as they attend to other tasks in the cockpit. Others might instead spend much of this cockpit set-up time monitoring the ground frequency. Similarly, it was unknown how fast participants might choose to fly the 'aircraft' which therefore required enough background chatter for even the slowest flying pilots as they transitioned from one frequency to another over the course of their flights. Additionally, some segments of the scenarios were to be flown in very 'busy' airspace thereby requiring more background chatter than others.

After we determined the approximate amount of time and amount of background communications that would be needed for each frequency, we developed a list of well over 100 other aircraft, both commercial and private, who would be 'flying' during the same time our participants were. We outlined each of their routes of flight and literally mapped these against the routes of the study familiarization and experimental flights. Part of this mapping involved deciding how fast the other aircraft were traveling and—for those traveling in similar directions as our participants would be flying—whether they were ahead of or behind our Cessna Mustang. This allowed us to determine which aircraft would be on which frequencies at the same time as our participants and when. We also developed a 'back story' for many of the flights and used that when developing actual dialogue between the pilots and ATC. For example, some of these 'other pilots' were not familiar with the area and had to ask ATC to repeat or spell the names of waypoints. Many of the pilots used non-standard phraseology just as is often heard in real life and one pilot even made some errors and was given a phone number by ATC to call upon landing. Developing the dialogue for the chatter was a lot of work but it was also a lot of fun.

After the dialogue was developed, we identified the amount of time that should exist between each communication so that appropriate amounts of silence between radio calls would exist in the background chatter. This was important not only to add a sense of realism but also to allow gaps in communication so that study participants and ATC could contact each other. This timed dialogue for both legs of the experimental flight was recorded with the researchers and others at CAMI playing the roles of the various pilots and ATC. The dialogue we developed for the background chatter can be found in Appendix B.

5.0 Conclusion

HITL simulation studies are powerful research tools. However, for the data they generate to be meaninful, the simulation scenarios or tasks must be well-designed and the way in which the study is conducted must be precise and the same for all participants. Detailed scripts, such as the ones we developed for a recent study, can help to ensure that all participants are treated the same way throughout every phase of data collection. The development of the scripts can be a lengthy process but one that provides great returns during the study. It is through their development that researchers are compelled to consider all the ways in which participants might choose to approach the tasks presented and plan accordingly. The completion of such preparation prior to the start of data collection is essential in helpings to ensure that the actual process of data collection with participants in the simulator runs smoothly.

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Appendices

Appendix A. Study Scripts

The study scripts are shown on the following pages:

Appendix B. Background Chatter Dialogue Scripts

The background chatter dialogue scripts are shown on the following pages:

Appendix A.1 Study Script for Audio Check

“Audio Check” (performed right after turning downwind on circuit around the pattern)

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots - Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
Aircraft has just completed turn on downwind					*We are going to do the audio check now, please key the mic and read the card*			
						"Maintain 5000, Casanaova, J48, Montebello, direct Hot Springs, squawk 1623, Miami depature on 128.65"		
					We are reading you clearly, thanks.			

Appendix A.2 Study Script for Familiarization Flight

Familarization Flight

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots - Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
Preflight Preparation at Aircraft								
			Lo-Alt map for controllers	Pilot completes Cockpit Set- up and Preflight Activities				There is no recorded background chatter for any portion of this flight
Parked at Ramp - Clinton-Sherman	**132.225 ASOS**	Pilot dials in ASOS frequency		Copy ASOS				Clinton Sherman Airport automated weather observation 1655 Zulu, wind 260 at 10, visibility 10 miles, sky clear, temperature 31 Celsius, dew point 14 Celsius, altimeter 3002. Remarks: density altitude 3000.
	121.7 Ground			Pilot dials in and selects Ground frequency				
	121.7 Ground					Pilot calls Ground controller for IFR clearance to Oklahoma City		
	121.7 Ground	**Pilot calls for Clearance**		Request and copy ATC Clearance	*Citation XXXXX is cleared to Will Rogers Airport, Oklahoma City, flying runway heading, radar vectors to AXO0Y, Victor 272, Oklahoma City direct. Maintain 4000 expect 1-1 eleven thousand 10 minutes after departure. Clinton-Sherman departure will be Fort Worth Center on 128.4. Squawk 2145.*			

Familarization Flight

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots - Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	121.7 Ground					*Citation XXXXX is cleared to Will Rogers Airport, Oklahoma City, flying runway heading, radar vectors to AXOOY, Victor 272, Oklahoma City direct. Maintain 4000 expect 1-1 eleven thousand 10 minutes after departure. Clinton- Sherman departure will be Fort Worth Center on 128.4. Squawk 2145.*		
	121.7 Ground	**Pilot reads Clearance back correctly**	*If any pilot readbacks are ever incorrect, fix as required*		*XXXXX, readback correct*			
	121.7 Ground			Pilot Finishes any remaining Cockpit Set up and Preflight Duties				

Engine Start

Parked at Ramp - CSM	**121.7 Ground**			Pilot completes pertinent checklists and starts engines				

Taxi Out

	121.7 Ground			Pilot dials inand selects Ground frequency				

Familarization Flight

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots - Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	121.7 Ground			Request ATC taxi clearance		(pilot contacts Ground and requests Taxi Clearance)		
Parked at ramp - CSM	121.7 Ground	**Pilot contacts ground for taxi clearance**			*Citation XXXXX, taxi to Runway 17 right*			
	121.7 Ground					(pilot reads back taxi clearance)		
	121.7 Ground			Pilot completes any other cockpit tasks and taxi outs				
	121.7 Ground			Taxi out				
	119.6 Tower	**Citation XXXXX switches from ground control to tower frequency**		Switch to Tower frequency				

Take Off

	119.6 Tower					(pilot tells tower ready to takeoff)		
	119.6 Tower	**Pilot contacts Tower and says ready to depart**		Obtain ATC takeoff clearance	*Citation XXXXX Winds 260 at 10, Runway 17 Right cleared for takeoff*			
	119.6 Tower					(pilot repeats clearance to takeoff on Runway 17 Right)		
Lined up on Runway 17R	119.6 Tower			Pilot taxis onto Runway 17 Right, takes off, and begins climb				

Familarization Flight

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots - Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
Climb								
2000 ft MSL, climbing to 4,000 ft MSL	**119.6 Tower**	**Aircraft is passing through 2000 ft. MSL**		Change frequency and check in with Departure controller	*Citation XXXXX contact Fort Worth Center on 128.4*			
	119.6 Tower					(pilot acknowledges instruction to switch to Center frequency)		
	128.4 Fort Worth Center			Pilot selects departure frequency				
	128.4 Fort Worth Center					(pilot checks in with departure controller)		
Climbing to 4,000 ft.	**128.4 Fort Worth Center**	**Pilot checks in with departure controller**			*XXXXX, Fort Worth Center, radar contact XXXX (alt)*			
4,000 ft.	**128.4 Fort Worth Center**	**Aircraft is at 4,000 ft.**		Respond to ATC call with clearance	*Citation XXXXX, fly direct to AX00Y then as filed. Climb and maintain 1-1 that's eleven thousand.*			
	128.4 Fort Worth Center					Citation XXXXX, fly direct to AXODY then as filed. Climb and maintain 1-1 that's eleven thousand.		
	128.4 Fort Worth Center				*XXXXX, readback correct*			
	128.4 Fort Worth Center			Programs routing in G1000				

Familarization Flight

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots - Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
AXODY	**128.4 Fort Worth Center**			Turn at AXODY				
AXODY, climbing to 11,000 ft	**128.4 Fort Worth Center**	Aircraft is at AXODY		Respond to ATC traffic call				
ISA Trigger at AXODY plus 60 sec. Place bookmark in data capture program								
	128.4 Fort Worth Center		Exact comms will vary depending upon if pilot sees fraffic			(pilot acknowledges traffic call; looks for traffic)		
	128.4 Fort Worth Center				*Sovereign 36 Victor, you have crossing traffic eastbound 10 o'clock and ten miles at XXXX xlimbing, a Citation Mustang*			
	128.4 Fort Worth Center						36 Victor has traffic	
	128.4 Fort Worth Center				*Citation XXXXX, traffic has ou in sight*			
ISA Trigger at DUHHA plus 60 sec. Place bookmark in data capture program								
	128.4 Fort Worth Center			Monitor level off at 11,000 ft				

Cruise

On assigned route, 11,000 ft	**128.4 Fort Worth Center**	Aircraft is 15 nm before LIONS		Respond to ATC traffic call	Citation XXXXX you have crossing fraffic northbound at 2 o'clock and 5 miles at 8000, an A320			

Familarization Flight

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots - Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	128.4 Fort Worth Center		*Exact comms will vary depending upon if pilot sees traffic*			(pilot acknowledges traffic call - looks for traffic)		
	128.4 Fort Worth Center				*Frontier 1449, you have crossing traffic Eastbound at 10 o'clock and 4 miles at 11,000, a Citation Mustang*			
	128.4 Fort Worth Center						*Lookin' for the little fella, Frontier 1449*	
Varies	**125.85 (OKC ATIS)**	**Pilot is anywhere on route of flight and dials in and selects OKC ATIS frequency**		Pilot checks KOKC ATIS				Will Rogers Oklahoma City Airport Information BRAVO 1655 Zulu automated weather, wind is 230 at 5 gusting to 14, visibility 10 miles, 25,000 few, temperature 30, dew point 15, altimeter 29.97. RNAV approach to runway 17 right in use, landing and departing runway 17 right. Notices to airmen - read back all runway assignments and all hold short instructions. Tower obstruction to 220 feet AGL SSW of runway 17 right, lights are out of service..Advise the controller on initial contact that you have information Bravo.

Familiarization Flight

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCl Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots - Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	128.4 Fort Worth Center			Begins to prepare for approach into OKe				
	128.4 Fort Worth Center				*Frontier 1449, traffic no longer a factor*			
	128.4 Fort Worth Center						*1449, Roger*	
LIONS, 11,000 ft.	**128.4 Fort Worth Center**	**Aircraft reaches LIONS**		Respond to ATe call	*Citation XXXXX, traffic no longer a factor, descend at pilot's discretion to 8,000. 0klahoma City altimeter is 29.97.*			
ISA Trigger at LIONS plus 60 sec. Place bookmark in data capture program								
	128.4 Fort Worth Center					(pilot acknowledges clearance to descend at pilot's discretion to 8,000)		
	128.4 Fort Worth Center			Decide descent point, begin descent				

Descent

11,000 ft., descending to8,000 ft.	**128.4 Fort Worth Center**			Report leaving 11,000 and initiating descent		(pilot reports leaving 11,000 ft and initiating descent)		
	128.4 Fort Worth Center	**When pilot reports leaving 11,000 ft.**	*If pilot does not report leaving, say nothing*		*Citation XXXXX, roger, thanks*			

Familarization Flight

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots - Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	128.4 Fort Worth Center			Pilot completes checklists, does RAIM Check, and prepares for approach into OKC				
8,200 ft descending to 8,000 ft.	**128.4 Fort Worth Center**	**Aircraft is at 8,200 ft.**		Respond to ATC handoff to Approach	*Citation XXXXX, contact Oklahoma City Approach now on 124.60.*			
	124.6 OKC Approach			Pilot dials in and selects Potomac Approach Frequency				
	124.6 OKC Approach			Contact Approach controller as directed by ATC		(pilot contacts Approach Controller)		
	124.6 OKC Approach	**Pilot checks in with Approach controller**	*Exact language will change depending upon if pilot indicates he/she has OKC ATIS - Bravo*		*Citation XXXXX, (thanks for Bravo), vectors for RNAV 17 right at Will Rogers. Proceed direct to ALXOZ, descend and maintain 4000 (Advise when you have Will Rogers Airport information Bravo)*			
	124.6 OKC Approach					(pilot acknowledges direct to ALXOZ descent to 4000 - reports has BRAVO or says, he/she will get it)		
	124.6 OKC Approach			Continues preparation for approach and landing				
4,000 ft.	**124.6 OKC Approach**			Level off at 4,000 ft				

Familrization Flight

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATel Flight Watch Comms	Mustang Pilot (Study Participant) eomms	Other Pilots - Live eomms	Recorded eomms (ATIS, AWOS, Background ehatter)
Approach								
5 miles from ALXOZ	**124.6 OKe Approach**	**Aircraft is 5 miles from ALXOZ (IAF) waypoint**			*Citation XXXXX, you are 5 miles from ALXOZ, maintain 4000 until ALXOZ cleared for the RNAV 17 right straight-in approach.*			
	124.6 OKe Approachch					(pilot acknowledges cleared for the approach)		
	124.6 OKe Approach			Initiate the approach				
2 nm from IVEYI	**124.6 OKe Approach**	**Aircraft is 2 nm from IVEYI (FAF)**			*Citation XXXXX, contact the tower on 119.35.*			
	124.6 OKe Approach					(pilot acknowledges handoff to Tower)		
IVEYI	**119.35 OKe Tower**			Switch to Tower Frequency		(pilot contacts Tower reports at IVEYI on the RNAV 17 right approach)		
	119.35 OKe Tower	**Aircraft makes contact with Tower**			*Citation XXXXX, wind 230 at 5 gusting to 14, runway 17 right cleared to land.*			
	119.35 OKe Tower					(pilot acknowledges clearance to land, runway 17 right)		
Landing								
50 ft. AGL, aligned with runway 15	**119.35 OKe Tower**			Land airplane and exit on nearest taxiway				
	119.35 OKe Tower	**Aircraft exits the active runway**			*XXXXX contact Ground on 121.9*			
	119.35 OKe Tower					(pilot acknowledges switch to ground)		

Familarization Flight

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots - Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	121.9 Ground			Pilot selects ground frequency				
	121.9 Ground			Obtain taxi clearance from Ground		(pilot makes contact with OKe ground)		
	121.9 Ground	**Pilot contact OKC ground controller for taxi clearance**	*Exact language will depend upon whether pilot makes taxi request with initial contact*		*XXXXX where do you park?*			
	121.9 Ground					(pilot requests taxi clearance to transient parking)		

Familarization Flight

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots - Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	121.9 Ground		*Exact language will depend. If the pilot is able to make the turn at Charlie taxiway, then the clearance will read differently*		*Citation XXXXX, taxi Alpha to parking, hold short at Runway 31.* *OR* *Citation XXXXX taxi Alpha to parking*			
	121.9 Ground					(pilot repeats taxi clearance including hold short instruction)		

Taxi In

Taxiway Alpha	**121.9 Ground**			Taxi on taxiways to ramp				
Approaching runway 31 hold short line	**121.9 Ground**	Aircraft approaching runway 31 hold short line		Get clearance to cross runway 31	*Citation XXXXX, cross runway 31, taxi to parking.*			
	121.9 Ground					(pilot acknowledges clearance to cross runway 31 and taxi to parking)		
	121.9 Ground			Finish taxiing to parking				

Engine Shutdown and Securing

Transient parking, KOKC	**121.9 Ground**			Execute engine shutdown and securing as per Cessna SOP				

Appendix A.3 Study Script for Experimental Flight Leg 1

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) eomms	Other Pilots - Live Comms	Recorded Comms (ATIS, AWOS, Background ehatter)
Preflight Preparation at Aircraft								
			Low Altitude map display for controllers	Pilot completes Cockpit Set- up and Preflight Activities				
Parked at Ramp - TEB	**132.85 ATIS**	Pilot dials in ATIS Frequency		Copy ATIS				Teterboro Information ALPHA 1253Z automated weather, wind is 2200 at 9 gusting to 15, visibility 2 miles in light rain, 500 broken, 800 overcast, temperature 20, dew point 17, altimeter 29.85. ILS runway 24 approach in use. Landing and departing runway 24. Notice to Airmen, readback all runway assignments, and all hold short instructions. Migratory birds are on & near the airport. Advise the controller on initial contact that you have information Alpha.
	128.05 Clr Del		*Background chatter is always paused when ATG or Mustang Pilot makes a radio call - resumed when interchange is completed*	Pilot dials in and selects Clearance Delivery frequency				Recorded Background Chatter for TEB Clearance Delivery Frequency 128.05 **BEGINS**

Experimental Flight Leg 1 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots – Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	128.05 Clr Del					Pilot calls for clearance		
	128.05 Clr Del	**Pilot calls for Clearance**		Request and copy ATC Clearance	*Citation XXXXX is cleared to the Martin State Airport, via the Teterboro 6 Departure, radar vectors BIGGY, J75, MURPH, Baltimore Direct. Maintain 1,500 until passing the TEB 4.5 DME, Then climb and maintain 2,000. Expect FL200 10 minutes after departure, New York Departure on 126.7, Squawk 3405.*			
	128.05 Clr Del					Cleared to Martin State Airport, via the Teterboro 6 Departure, radar vectors BIGGY, J75, MURPH, Baltimore Direct. Maintain 1,500 until passing the TEB 4.5 DME, Then climb and maintain 2,000. Expect FL200 10 minutes after departure, New York Departure on 126.7, Squawk 3405.		
	128.05 Clr Del	**Pilot reads Clearance back correctly**	*If any pilot readbacks are ever incorrect, fix as required*		*XXXXX, readback correct*			

Experimental Flight Leg 1 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots – Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	128.05 Clr Del			Pilot finishes any remaining cockpit set- up and preflight duties				Recorded Background Chatter for TEB Clearance Delivery Frequency 128.05 **RESUMES**

Engine Start

Parked at Ramp - TEB	**128.05 Clr Del**			Pilot completes pertinent checklists and starts engines				

Taxi Out

	121.9 Ground		*Background chatter for one frequency is always terminated when the chatter for a new frequency is started*	Pilot dials in and selects Ground frequency				Background chatter stops for clearance delivery. Since such a short time on ground freq now. No point in starting ground chatter. However, if pilot lingers for an extended period of time on ground, consider starting.
	121.9 Ground			Request ATC taxi clearance		(Pilot contacts Ground and requests Taxi Clearance)		
Parked at Ramp - TEB	**121.9 Ground**	**Pilot contacts Ground for taxi clearance**			*Citation XXXXX, taxi Papa, Lima, hold short of runway 19. Expect runway 24 intersection departure at runway 19. Monitor tower holding short of 19.*			

Experimental Flight Leg 1 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots – Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	121.9 Ground					Taxi Papa, Lima, hold short of runway 19. Expect runway 24 intersection departure at runway 19. Monitor tower holding short of 19.		
	121.9 Ground	**Pilot Reads Clearance Back Correctly**			*XXXXX, readback correct*			
	121.9 Ground			Pilot completes any other cockpit tasks and taxi outs				
	121.9 Ground			Taxi out				
Taxi on taxiway Papa	**121.9 Ground**							
Taxi on taxiway Lima	**121.9 Ground**							
Holding short of runway 19	**121.9 Ground**							
	119.5 Tower	**Citation 510 Charlie switches from ground control to tower frequency**	*If Mustang pilot contacts Tower for Take off clearance during comms with 4 Charlie Tango, tell them to Standby*	Switch to tower frequency (hears an aircraft with a gear problem talking to Tower)	*4 Charlie Tango climb and maintain 1500 looks like your main gear is down but I did not see your nose gear - state your intentions*			
Taxi on taxiway Alpha to runway 24 and holds short of Runway 24	**119.5 Tower**						*uh...Stand by*	

Experimental Flight Leg 1 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots – Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	119.5 Tower				*Pilatus 7 Alpha Foxtrot contact departure, Good Day*			
	119.5 Tower						*Departure for 7 Alpha Foxtrot, goodbye*	
	119.5 Tower				*Caravan 2086G, cleared to land runway 24, one departure prior to your arrival*			
	119.5 Tower						*Cleared to land runway 24, 86 Gulf*	
	119.5 Tower				*Lear 345 Mike Sierra, line-up and wait runway 24, Caravan traffic on a 4 mile final"*			
	119.5 Tower						*Line up and wait, 24, 5 Mike Sierra*	
	119.5 Tower		*After about 5 seconds following 5MS radio call*				*Tower, 4 Charlie Tango - I guess we'd like to go hold somewhere to sort this out*	
	119.5 Tower				*Lear 5 Mike Sierra, wind 220 at 12 cleared for takeoff runway 24*			
	119.5 Tower						*5 Mike Sierra, rolling*	
	119.5 Tower				*Roger 4 Charlie Tango, in that case climb and maintain 2500 turn right direct to PATRN, that's Papa, Alpha, Tango, Romeo, November, and hold as published*			
	119.5 Tower						*Climb 2500 turn right to PATRN and hold, 4 Charlie Tango*	

Experimental Flight Leg 1 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots – Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	119.5 Tower				*Readback correct, Contact approach on127.6, good luck*			
	119.5 Tower						*127.6, thanks, Charlie Tango*	
	119.5 Tower		*Cessna Caravan lands*		*Caravan 86 Gulf, turnright next taxiway, contact ground on121.9*			
	119.5 Tower						*Thanks, 86 Gulf*	

Take Off

	119.5 Tower	**ATC completes comms with 4Charlie Tango**	*If Mustang says needs more time, give it*	Obtain ATC takeoff clearance	*Citation XXXXX taxi on runway 19 and line upand wait runway 24. Be ready to go.*			
	119.5 Tower					(pilot repeats clearance to line up and wait on runway 24)		
	119.5 Tower			Taxi into position and wait on runway				
Lined up on runway 24	**119.5 Tower**	**Aircraft lined up and waiting on runway 24 and Cessna has cleared the active, KTEB**		Receive takeoff clearance and take off	*Citation XXXXX Winds 220 at 9, runway 24 intersection departure, cleared for takeoff*			
	119.5 Tower					(pilot repeatsclearance to take off on runway 24)		
	119.5 Tower			Pilot takes off and begins climb				Recorded Background Chatter for TEB Tower Frequency 119.5 **BEGINS**

Climb

Enter clouds first time at 800ft	**119.5 Tower**							

Experimental Flight Leg 1 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots – Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	119.5 Tower	**Aircraft reaches 1300 ft. MSL**		Change frequency and check in with Departure controller	*Citation XXXXX contact departure 126.7*			
	119.5 Tower					(pilot acknowledges instruction to switch to departure frequency)		
	126.7 (NY Dep #1)			Pilot selects departure frequency				Recorded Background Chatter for first NY Departure Frequency 126.7 **BEGINS**
	126.7 (NY Dep #1)					(pilot checks in with departure controller)		
	126.7 (NY Dep #1)	**Pilot checks in with departure controller**			*Citation XXXXX, NY Departure, radar contact XXXX ft. (alt)*			
1500 ft	**126.7 (NY Dep #1)**			Level off and turn to heading 280				
TEB 4.5 DME	**126.7 (NY Dep #1)**			Initiate climb				
2000 ft	**126.7 (NY Dep #1)**			Level off				
ISA Trigger at 2000 foot level off plus 60 sec. Place bookmark in data capture program								
TEB 10 DME at 2000	**126.7 (NY Dep #1)**	**Aircraft is 10 DME from TEB**		Respond to ATC traffic call	*Citation XXXXX, you have crossing traffic, 2 o'clock and ten miles at 4000, an United 737 going to LaGuardia*			
	126.7 (NY Dep #1)					(pilot acknowledges ATC traffic call)		
TEB 15 DME at 2000	**126.7 (NY Dep #1)**	**Aircraft is 15 DME from TEB**		Respond to ATC call with clearance	*Citation XXXXX, fly heading 2700 to intercept the Broadway (BWI) 208̊ radial to BIGGY as filed.*			

Experimental Flight Leg 1 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots – Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	126.7 (NY Dep #1)					Heading 2700 intercept the Broadway (BWZ) 2080 radial to BIGGY as filed.		
	126.7 (NY Dep #1)				*Citation XXXXX, readback correct, Climb and maintain 6000. Contact New York Departure 132.80*			
	126.7 (NY Dep #1)					Climb and maintain 6000 feet. Contact New York Departure on 132.80		
	132.8 (NY Dep #2)			Dials in departure frequency				Recorded Background Chatter for second NY Departure Frequency 132.8 **BEGINS**
	132.8 (NY Dep #2)	**Pilot makes contact with NY Departure Controller #2**				(pilot checks in with departure #2 controller)		
	132.8 (NY Dep #2)				*Citation XXXXX, roger.*			
	132.8 (NY Dep #2)			Program routing in G1000				
6000 ft	**132.8 (NY Dep #2)**			Level off at 6000 ft				
TEB 30 DME, 6000 ft	**132.8 (NY Dep #2)**	**Aircraft reaches TEB 30 DME (clear of traffic)**		Respond to revised clearance from ATC	*Citation XXXXX, clear of traffic, proceed direct to BIGGY then as filed. Climb and maintain FL200. Contact New York Center on 135.45*			
	132.8 (NY Dep #2)					(direct to BIGGY, then as filed. Climb and maintain FL 200, contact NY Center on 135.45)		

Experimental Flight Leg 1 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots – Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	132.8 (NY Dep #2)				*XXXXX Readback correct*			
ISA Trigger upon beginning of heading change for BIGGY plus 60 sec. Place bookmark in data capture program								
	135.45 (NY Center)			Pilot dials in new frequency				Recorded Background Chatter for NY Center frequency 135.45 **BEGINS**
	135.45 (NY Center)	**Pilot makes contact with new NY Center controller**				(pilot checks in with Center controller)		
	135.45 (NY Center)				*Citation XXXXX maintain FL200, report reaching.*			
	135.45 (NY Center)					(maintain FL200, report reaching)		
On assigned route and climbing to FL200	**135.45 (NY Center)**		*Switch to high altitude charts for controllers as aircraft is passing FL180*	Pilot reprograms G1000, climbs to FL200				

Cruise

On assigned route, FL200	**135.45 (NY Center)**		*If pilot does not report reaching FL200, say nothing*	Pilot reports reaching FL200		(reports reaching FL200)		
	135.45 (NY Center)	**Pilot Reports reaching FL200**			*Citation XXXXX, thank you*			

Experimental Flight Leg 1 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots – Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	135.45 (NY Center)		*If pilot chooses to contact Flight Watch for updated Wx, use Comms at the end of this document if they do not then proceed to aircraft location at COPES intersection on the next page*			(pilot requests temporary change of frequency to contact Flight Watch)		
	135.45 (NY Center)	**Pilot requests permission to go off frequency to contact Flight Watch (or tries to contact Flight Watch without going off Center Frequency)**			*XXXXX cleared off frequency report back on*			
	135.45 (NY Center)					(pilot acknowledges instruction to report back on when done talking with Flight Watch)		

	135.45 (NY Center)			Pilot Switches back to NY Center Frequency				Recorded Background Chatter for NY Center Frequency 135.45 is **RESUMED**
	135.45 (NY Center)					(pilot reports back on frequency)		

Experimental Flight Leg 1 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots – Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	135.45 (NY Center)	**Pilot reports back on frequency**	*If pilot leaves the frequency to check weather, pick- up the scenario at this point*		*XXXXX Roger*			
ISA Trigger upon reaching COPES. Place bookmark in data capture program								
COPES, FL200	**135.45 (NY Center)**	**When aircraft reaches COPES intersection**		Get and respond to ATC call with re-route	*Citation XXXXX, I have an amendment to your routing. Advise when ready to copy.*			
	135.45 (NY Center)					(pilot says ready to copy)		
	135.45 (NY Center)	**When pilot indicates that helshe is ready to copy re-route**			*Citation XXXXX is now cleared to Martin State Airport via J75, Modena (MXE), direct Dupont (DQO), Victor 214 to KERNO, direct to JUGMO direct Martin State.*			
	135.45 (NY Center)					(cleared Martin State via J75, Modena, direct Dupont, V214, KERNO, direct JUGMO, direct Martin State)		
	135.45 } (NY Center)	**Pilot reads back clearance correctly**			*Citation XXXXX, readback correct. Cross Dupont at or below 17,000. Maintain 12,000. Philadelphia altimeter is 29.89.*			
	135.45 (NY Center)					(XXXXX, we will Cross Dupont at or below 17,000, maintain 12,000)		

ExperimentalFlight Leg 1 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots – Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	135.45 (NY Center)			Pilot reprograms G1000, builds VNAV Path Descent to meet crossing restriction				

Descent

FL200, initiating descent to12,000	**135.45 (NY Center)**			Report leaving FL200		(pilot reports leaving FL200)		
ISA Trigger upon initiation of descent from FL 200. Place bookmark in data capture program								
	135.45 (NY Center)	**When pilot reports leaving FL200**			*Citation XXXXX, Roger*			
	135.45 (NY Center)			Pilot completes checklists, does RAIM Check, and prepares for approach into MTN				

Experimental Flight Leg 1 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots – Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
Aircraft is at MXE or closer to Martin State	**ATIS 124.925**	**Pilot is within 50 miles of MTN and dials in and selects MTN ATIS frequency**	ATIS is not available if aircraft has not yet reached MXE	Pilot checks KMTN ATIS				Martin State Airport Information Hotel 1253 zulu automated weather, wind 120 at 13, visibility 3 miles in mist, 800 scattered, 1100 overcast, temperature 19, dew point 17, altimeter 29.90. RNAV approaches are in use. Landing and Departing Runway 15. Notice to airmen, the ILS for runway 33 is out of service. Readback all runway assignments and all hold short instructions. Birds are on & near the airport. Advise the controller on initial contact you have information Hotel.
	135.45 (NY Center)			Select an load approach in G1000				
Descending to 12,000 ft. MSL, over Modena VOR	**135.45 (NY Center)**	**As Aircraft turns over Modena VOR**			*Citation XXXXX, contact Washington Center now on 134.50.*			
	135.45 (NY Center)					(pilot acknowledges instruction to switch to Washington Center)		
	134.50 (Washington Center)			Pilot dials in and selects Washington Center frequency				Recorded Background Chatter for Washington Center Frequency 134.5 **BEGINS**

Experimental Flight Leg 1 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots – Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	134.50 (Washington Center)			Contact new Center controller as directed by ATC		(pilot contacts Washington Center Controller)		
At or below 17,000 descending to 12,000 ft. MSL	**134.50 (Washington Center)**	**Pilot Contacts Washington Center as instructed as turning over Dupont**	*Switch back to lo-Alt charts for controllers*	Descend to 8000 ft.	*Citation XXXXX, cross Dupont at or below 17,000, descend and maintain 8000. Wilmington altimeter 29.85.*			
	134.50 (Washington Center)					(pilot acknowledges instruction to cross Dupont at or below 17,000 and to descend to 8,000 ft)		
Descending to 8,000 ft. MSL	**134.50 (Washington Center)**	**Aircraft reaches 15,000 ft MSL**			*Citation XXXXX, contact Potomac Approach on 119.0.*			
	134.50 (Washington Center)					(pilot acknowledges instruction to contact Potomac Approach)		
	119.0 (Potomac Approach)			Pilot dials in and selects Potomac Approach Frequency				Recorded Background Chatter for Potomac Approach Frequency 119.0 **BEGINS**
	119.0 (Potomac Approach)			Contact Approach controller as directed by ATC		(pilot contacts Approach Controller)		

Experimental Flight Leg 1 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots – Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	119.0 (Potomac Approach)	**Pilot checks in with Approach controller**	*Exact language will change depending upon if pilot indicates he/she has MTN ATIS - HOTEL*		*Citation XXXXX, descend and maintain 3000, (thanks for Hotel}. Expect the Martin State RNAV Runway 33 approach circle to land runway 15 (Advise when you have Martin State information Hotel}*			
	119.0 (Potomac Approach)					(pilot acknowledges descend and maintain 3000 - reports has HOTEL or says, he/she will get it)		
	119.0 (Potomac Approach)			Continues preparation for approach and landing				
ISA Trigger upon aircraft passing 12,000ft. Place bookmark in data capture program								
5 miles from Kerno	**119.0 (Potomac Approach)**	**Mustang Aircraft is 5 miles from Kerno**						**PAUSE** background chatter
	119.0 (Potomac Approach)				*King Air 79 Romeo you have opposite direction converging traffic at 1 o'clock, 25 miles, a Citation Mustang descending to 3000. They will be following you into Martin State*			
	119.0 (Potomac Approach)						*Roger, we will be looking. 79 Romeo*	

Experimental Flight Leg 1 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots – Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	119.0 (Potomac Approach)				*Citation XXXXX, you have opposite direction converging traffic at 11 o'clock and 25 miles, a KingAir, descending to 2000. You will be following him into Martin State.*			
	119.0 (Potomac Approach)			Respond to ATC traffic advisory		(pilot acknowledges traffic call)		
	119.0 (Potomac Approach)							**RESUME** Background Chatter
Aircraft arrives at KERNO	**119.0 (Potomac Approach)**							**PAUSE** Background Chatter
	119.0 (Potomac Approach)	**Mustang arcraft is at KERNO**		Listen to ATC give holding clearance to KingAir	*KingAir 79 Romeo you can expect a short delay into Martin State. Advise when ready to copy holding clearance.*			
	119.0 (Potomac Approach)						*(wait 5 seconds) 79 Romeo ready to copy*	
	119.0 (Potomac Approach)	**79 Romeo pilot is ready to copy hold instructions**			*KingAir 79 Romeo is cleared to JUGMO hold southeast of JUGMO on the 326 degree bearing inbound, left hand turns, maintain 2000, expect approach clearance in 20 minutes.*			

Experimental Flight Leg 1 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots – Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	119.0 (Potomac Approach)						*79 Romeo is cleared to JUGMO hold southeast of JUGMO on the 326 degree bearing inbound, left hand turns, maintain 2000, expect approach clearance in 20 minutes.*	
	119.0 (Potomac Approach)	**79 Romeo Pilot reads back hold clearance correctly**			*King Air 79 Romeo readback correct*			
	119.0 (Potomac Approach)				*Citation XXXXX, you also can expect a short delay into Martin State. Advise when ready to copy holding clearance.*			
	119.0 (Potomac Approach)					(pilot indicates ready to copy)		
	119.0 (Potomac Approach)	**Pilot calls ATC to say helshe is ready to copy hold instructions**			*Citation XXXXX is cleared to JUGMO hold southeast of JUGMO on the 326 degree bearing inbound, left hand turns, maintain 3000, expect approach clearance in 20 minutes.*			

Experimental Flight Leg 1 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots – Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	119.0 (Potomac Approach)					Citation XXXXX is cleared to JUGMO hold southeast of JUGMO on the 326 degree bearing inbound, left hand turns, maintain 3000, expect approach clearance in 20 minutes.		
	119.0 (Potomac Approach)	**Pilot reads back hold clearance correctly**			*Citation XXXXX readback is correct.*			
	119.0 (Potomac Approach)							**RESUME** background chatter
	119.0 (Potomac Approach)			Prepare to fly the hold				
	119.0 (Potomac Approach)	**King Air 79 Romeo enters the hold at JUGMO**	*this happens at the same time as the King Air is cleared for the approach*	Listen to King Air Reports entering the hold			*King Air 79 Romeo is entering the hold at JUGMO 2000*	
	119.0 (Potomac Approach)				*King Air 79 Romeo roger*			
JUGMO	**119.0 (Potomac Approach)**			Mustang pilot crosses JUGMO and begins direct or teardrop entry into the hold		(pilot indicates entering the hold at JUGMO at 3000 ft)		
	119.0 (Potomac Approach)	**Mustang Pilot reports entering the hold**			*Citation XXXXX, Roger*			

Experimental Flight Leg 1 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots – Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	119.0 (Potomac Approach)	**As Mustang aircraft enters the hold**	*This happens at the same time as the Mustang enters the hold*	Listen to King Air be cleared for the approach	*King Air 79 Romeo maintain 2000 until established. Cleared for the runway 33 RNAV approach to Martin State circle Runway 15*			
ISA Trigger upon when aircraft turns outbound after crossing JUGMO (direct entry) or 2nd time heading outbound if a teardrop entry. Place bookmark in data capture program								
	119.0 (Potomac Approach)						*Maintain 2000 until established. Cleared for the Runway 33 RNAV approach to Martin State circle 15, 79 Romeo*	
	119.0 (Potomac Approach)				*King Air 79 Romeo, readback is correct, Contact Martin State tower on 121.3 crossing CINDI.*			
							Over to tower crossing CINDI, 79 Romeo	

Approach

In hold at JUGMO 5,000 ft. MSL	**119.0 (Potomac Approach)**	**Teardrop entry is complete and pilot is going around the hold the first time and is rolling out inbound to JUGMO.**			*Citation XXXX maintain 3000 until established. Cleared for the Runway 33 RNAV approach to Martin State circle Runway 15*			
	119.0 (Potomac Approach)					(pilot reads back approach clearance)		
	119.0 (Potomac Approach)	**Pilot readsback clearance to begin approach**			*Citation XXXXX readback is correct. Contact Martin State tower on 121.3 crossing CINDI.*			

Experimental Flight Leg 1 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots – Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
						(pilot reads back freq change)		
JUGMO	**119.0 (Potomac Approach)**			Initiate the approach				
	119.0 (Potomac Approach)			Level off at 2000 ft				
CINDI	**119.0 (Potomac Approach)**							**terminate** Approach background chatter
	121.3 (MTN Tower)			Switch to Tower frequency and hear comms in progress	*79 Romeo contact Ground on 121.8*			
	121.3 (MTN Tower)						*79 Romeo to Ground on point 8*	
2,000 ft., CINDI	**121.3 (MTN Tower)**			Report at CINDI and inbound		(pilot reports at CINDI and inbound)		
	121.3 (MTN Tower)	**Aircraft reports in with MTN tower**			*Citation XXXXX, circle north east, report beginning to circle, wind is 130 at 12, runway 15 cleared to land.*			
	121.3 (MTN Tower)					(pilot acknowledges landing clearance)		
	121.3 (MTN Tower)							Recorded Background Chatter for Martin State Tower Chatter 1 frequency 121.3 **BEGINS**
exit clouds at 1100 ft MSL	**121.3 (MTN Tower)**			Descend to MDA				
	121.3 (MTN Tower)			Initiates circle to land		(contact Tower and report starting to circle)		

Experimental Flight Leg 1 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots – Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	121.3 (MTN Tower)	**Aircraft reports starting to circle around to Runwy 15**			*Roger*			Recorded background chatter for Martin State Tower chatter 1 terminates and Tower 2 chatter **Begins**

Landing

50 ft. AGL, aligned with Runway 15	**121.3 (MTN Tower)**			Land airplane and exit on nearest taxiway				
	121.3 (MTN Tower)	**Aircraft exits the active runway**			*Citation XXXXX contact Ground on 121.8*			
	121.3 (MTN Tower)					(pilot acknowledges switch to ground)		
	121.8 (Ground)		*There is no background chatter for Martin State ground frequency*	Pilot selects ground frequency				Recorded Background Chatter for Martin State Tower chatter 2 is **Terminated**
	121.8 (Ground)			Obtain taxi clearance from Ground		(pilot makes contact with MTN ground)		
	121.8 (Ground)	**Pilot contact MTN ground controller for taxi clearance**	*Exact language will depend upon whether pilot makes taxi request with initial contact*		*Citation XXXXX where do you park?*			
	121.8 (Ground)					(pilot requests taxi clearance to transient parking)		
	121.8 (Ground)				*Citation XXXXX, taxi right turn on Foxtrot to transient parking.*			
	121.8 (Ground)					(pilot repeats taxi clearance)		

Taxi In

Taxiway Foxtrot	**121.8 (Ground)**			Taxi on taxiways to ramp				

Experimental Flight Leg 1 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots – Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
Engine Shutdown								
Transient parking, KMTN	**121.8 (Ground)**			Execute engine shutdown per Cessna SOP				
Call to Flight Watch at any point during the flight								
	134.725 (NJ, PA) **134.525 (MD, VA)**			Pilot switches to Flight Watch frequency				Recorded Background Chatter for NY Center Frequency 135.45 is **PAUSED**
			Adjust commsas required			(pilot contacts Flight Watch and asks for updated weather at MTN)		
					Citation XXXXX, Flight Watch, say time of arrival at Martin State			
						(pilot gives estimated time of arrive at MTN)		
					Citation XXXXX, standby…			
			Wait, 20 seconds					

Experimental Flight Leg 1 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots – Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
		20 seconds after Flight Watch Briefer tells pilot to standby			*Citation XXXXX, current weather at Martin State is wind 120 at 13, visibility 3 miles with mist, 800 scattered, 1000 overcast, temperature 18, dew point 16, altimeter 29.89. No PIREPS. Forecast for Martin State from 1200 Zulu until 1600 Zulu, wind 120 at 5 visibility 5 miles, 1500 foot overcast. No precipitation. Conditions to improve slightly later this afternoon. Is there anything else you need?*			
			Flight Watch response to questions, etc. as necessary			(Pilot thanks Flight Watch, asks any questions, etc.}		
		Pilot says helshe has all info needed			*Citation XXXXX, do you have time to give me a PIREP*			
						(Pilot either says yes, and gives PIREP or says no and declines}		
		Pilot finishes giving PIREP	*If pilot gives a PIREP*		*Citation XXXXX, thank you very much*			
Return to cruise portion of flight or where ever you left the script								

Appendix A.4 Study Script for Experimental Flight Leg 2

Experimental Flight Leg 2 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
Preflight Preparation at Aircraft								
			Low altitude maps for controllers	Pilot completes Cockpit Set- up and Preflight Activities				
Parked at ramp - MTN	**124.925 ATIS**	Pilot dials in ATIS frequency		Copy ATIS				Martin State Airport Information India 1353 zulu automated weather, wind 120 at 8, visibility 3 miles in mist, 800 scattered, 1100 overcast, temperature 20, dew point 17, altimeter 29.88. RNAV approaches are in use. Landing and Departing Runway 15. Notice to airmen, the ILS for runway 33 is out of service. Readback all runway assignments and all hold short instructions. Birds are on & near the airport. Advise the controller on initial contact you have information India.

Experimental Flight Leg 2 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots · Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	121.8 Clr Dell Ground		*Background chatter is always paused when ATC or Mustang Pilot makes a radio call - resumed when interchange is completed*	Pilot dials in and selects Clearance Delivery frequency				Start Background Chatter for Clearance delivery
	121.8 Clr Dell Ground					(Pilot calls for clearance)		
	121.8 Clr Dell Ground	**Pilot calls for Clearance**		Request and copy ATC Clearance	*Citation XXXXX is cleared to Hot Springs/Ingalls fly runway heading, radar vectors to PALEO, direct Nottingham (OTT), direct Casanova (CSN), J48, Montebello (MOL) direct. Maintain 2000. Expect FL200 15 minutes after departure. Potomac departure will be 119.0, Squawk 1623."*			

Experimental Flight Leg 2 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots · Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	121.8 Clr Dell Ground					Citation XXXXX is cleared to Hot Springs/Ingalls fly runway heading radar vectors to PALEO, direct Nottingham (OTT), direct Casanova (CSN), J48, Montebello (MOL) direct. Maintain 2000. Expect FL200 15 minutes after departure. Potomac departure will be 119.0, Squawk 1623."		
	121.8 Clr Dell Ground	**Pilot reads clearance back correctly**	*If any pilot read backs are ever incorrect, fix as required*		*Citation XXXXX, read back correct*			
	121.8 Clr Dell Ground			Pilot finishes any remaining cockpit set- up and preflight duties				

Engine Start

Parked at transient parking - MTN	**121.8 Clr Dell Ground**			Pilot completes pertinent checklists and starts engines				

Experimental Flight Leg 2 Script
Taxi Out

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots · Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	121.8 Clr Dell Ground			Request ATC taxi clearance		(Pilot contacts Ground and requests taxi clearance)		
Parked at transient parking, MTN	**121.8 Clr Dell Ground**	**Pilot contacts ground for taxi clearance**			*Citation XXXXX taxi Alpha to Runway 15, Hold short of Runway 15*			
	121.8 Clr Dell Ground					Taxi Alpha to Runway 15, hold short of Runway 15		
	121.8 Clr Dell Ground	**Pilot reads clearance back correctly**			*XXXXX, read back is correct.*			
	121.8 Clr Dell Ground			Pilot completes any other cockpit tasks and taxi outs				
	121.8 Clr Dell Ground	**As aircraft turns on Taxiway Alpha**		Hear ATC request to contact tower				
	121.8 Clr Dell Ground				*Citation XXXXX Switch to Tower*			
	121.8 Clr Dell Ground					(pilot reports switching to Tower frequency)		
	121.3 MTN Tower			Select Tower frequency				Recorded Background Chatter for MTN clearance delivery/ground frequency 121.8 **TERMINATES**

Take Off

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots · Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	121.3 MTN Tower	**Pilot lets ATC know ready for Takeoff** OR **aircraft approaches Runway 15, hold short line**		Get takeoff clearance				
	121.3 MTN Tower				*Citation XXXXX line up and wait Runway 15*			
	121.3 MTN Tower					(pilot repeats clearance to line up and wait on Runway 15)		
	121.3 MTN Tower			Taxi into position and wait on runway				
Lined up and waiting to takeoff on Runway 15	**121.3 MTN Tower**	**Aircraft in position and holding on Runway 15, KMTN**		Receive takeoff clearance and take off				
	121.3 MTN Tower				*Citation XXXXX wind is 120 at 8, maintain runway heading climb and maintain 2000, Runway 15, cleared for takeoff "*			
	121.3 MTN Tower					(pilot repeats clearance to take off on Runway 15)		
	121.3 MTN Tower			Pilot takes off and begins climb				Recorded Background Chatter for MTN Tower Frequency 121.3 **BEGINS**

Climb

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots · Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
(Aircraft enters scattered clouds at 800 ft)	**121.3 MTN Tower**							
800 ft climbing to 2000 ft MSL	**121.3 MTN Tower**	**Aircraft is at 800 ft. MSL**		Change frequency and check in with Departure controller	*Citation XXXXX contact Potomac Departure on 119.0."*			
	121.3 MTN Tower					(pilot acknowledges handoff to Departure)		
	119.0 (Potomac Dep #1)			Pilot selects departure frequency				Recorded Background Chatter for first Potomac Departure frequency 119.0 **BEGINS**
	119.0 (Potomac Dep #1)					(pilot checks in with departure controller)		
	119.0 (Potomac Dep #1)	**Pilot checks in with departure controller**			*Citation XXXXX, Potomac Departure, radar contact XXXX (alt). Turn right heading 190, maintain 2000 ft."*			
	119.0 (Potomac Dep #1)					Heading 190, maintain 2000, XXXXX		
	119.0 (Potomac Dep #1)			Turns to 190 and levels off at 2000 ft				
2000 ft MSL	**119.0 (Potomac Dep #1)**	**Aircraft reaches 2,000 ft. MSL**		Respond to amendment to clearance	*Citation XXXXX, cleared direct PALEO then as filed. Maintain 2000.*			

Experimental Flight Leg 2 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots · Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
ISA Trigger upon aircraft passing 2,000 ft plus 60 sec. Place book mark in data capture program								
	119.0 (Potomac Dep #1)					(pilot acknowledges clearance)		
2 nm before PALEO, 2000 ft MSL	**119.0 (Potomac Dep #1)**	**2 nm before aircraft reaches PALEO**		Respond to amendment to clearance	*Citation XXXXX, cleared direct Nottingham (OTT), Maintain 2000."*			
	119.0 (Potomac Dep #1)					(pilot acknowledges clearance)		
21 DME before OTT, 2000 ft MSL	**119.0 (Poomac Dep #1)**	**21 nm before OTT**		Respond to ATC clearance	*Citation XXXXX, climb and maintain 12,000, contact Potomac Departure on 124.55."*			
	119.0 (Potomac Dep #1)					(pilot acknowledges clearance)		
	124.55 (Potomac Dep #2)			Start climb, dial in Potomac Dep #2 frequency and select				Recorded Background Chatter for second Potomac Departure Frequency 124.55 **BEGINS**
	124.55 (Potomac Dep #2)			Contact Potomac Departure #2		(pilot contacts new Departure Controller)		
	124.55 (Potomac Dep #2)	**Pilot checks in with new departure controller**			*Roger XXXXX, Good morning*			
7,000 ft climbing to 12,000 ft MSL, approx. 13 DME before OTT	**124.55 (Potomac Dep #2)**	**Aircraft is at 7,000 ft. MSL**		Respond immediately to ATC instruction to descend	*Citation XXXXX, descend immediately, maintain 6,000 for emergency traffic."*			

Experimental Flight Leg 2 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots · Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	124.55 (Potomac Dep #2)					(pilot acknowledges instruction to descend immediately)		
	124.55 (Potomac Dep #2)			Descends to 6,000 ft				
ISA Trigger upon aircraft reaching 6,000 ft after emergency descent. Place bookmark in data capture program								
Aircraft (USAirway A320) passes overhead	**124.55 (Potomac Dep #2)**							
5 DME before OTT, 6,000 ft MSL	**124.55 (Potomac Dep #2)**	**Aircraft is 5 DME before OTT**		Respond to ATC clearance	*Citation XXXXX, resume climb to 12,000. Contact Potomac Departure on 119.7."*			
	124.55 (Potomac Dep #2)					(pilot acknowledges instruction to resume climb and contact Departure Controller #3)		
	119.7 (Potomac Dep #3)			Start climb, dial in Potomac Dep #3 frequency and select				Recorded Background Chatter for third Potomac Departure frequency 119.7 **BEGINS**
	119.7 (Potomac Dep #3)			Check in with new Departure Controller		(pilot checks in with new Departure Controller)		
Climbing to 12000	**119.7 (Potomac Dep #3)**	**Pilot checks in with new Departure Controller**			*XXXXX, Roger*			

Experimental Flight Leg 2 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots · Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
At OTT VOR, climbing to 12,000 ft MSL	**119.7 (Potomac Dep #3)**	**Aircraft is at OTT VOR**		Respond to ATC clearance	*Citation XXXXX, Climb and maintain FL200 Leaving 17,000 contact Washington Center on 133.9."*			
	119.7 (Potomac Dep #3)					(pilot acknowledges instruction to climb to FL200 and to contact Washington Center #1 controller at 17,000)		
Climbing through 17,000 for FL200	**133.9 (Washington Center #1)**			Reaches 17,000 ft, switches to Washington Center #1 frequency				Recorded Background Chatter for first Washington Center Frequency 133.9 **BEGINS**
	133.9 (Washington Center #1)		*Hi altitude maps for controllers*	Contacts Washington Center #1		(pilot checks in with Center controller #1)		
	133.9 (Washington Center #1)	**Pilot checks in with Washington Center**			*Citation XXXXX, Roger. Please verify the rest of your routing and your squawk*			
	133.9 (Washington Center #1)					*Citation XXXXX, Casanova, J48, Montebello, direct Hot Springs, squawking 1623*		
	133.9 (Washington Center #1)				*XXXXX, Thank you.*			
FL200	**133.9 (Washington Center #1)**			Perform level off at cruise altitude				
ISA Trigger upon aircraft reaching FL200 plus 60 sec. Place bookmark in data capture program								

Experimental Flight Leg 2 Script

Cruise

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots · Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	133.9 (Washington Center #1)	**Pilot asks to go off frequency (pilot is 15 nm or greater from CSN)**	*If pilot chooses to contact Flight Watch for updated WX and is greater than 15 NM from CSN, use Flight Watch Comms at the end of this script after clearing them off frequency*		*XXXXX report back on no later than 10 nm before CSN, frequency change to Flight Watch approved*	(pilot requests temporary change of frequency to contact Flight Watch)		
	133.9 (Washington Center #1)	**Alternate clearance if pilot is within 15 nm of CSN when calls to ask for permission to go off frequency**	*Use alternate clearance above if pilot is before 15nm of CSN*		*Citation XXXXX, unable frequency change at this time. For traffic descend and maintain 16,000 Culpeper altimeter 29.86.*			
	133.9 (Washington Center #1)					(pilot acknowledges ATC instruction)		
FL200	**133.9 (Washington Center #1)**			Prepare for arrival and approach to Runway 25 at KHSP				

Experimental Flight Leg 2 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots· Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
Descent								
10 nm before CSN, FL200	**133.9 (Washington Center #1)**	**Aircraft is 10nm before CSN**	*Pilot is only given this clearance if he/she was not given this clearance earlier (requested Flight Watch within 15nm of CSN)*	Respond to ATC instruction	*Citation XXXXX, for traffic descend and maintain 16,000 Culpeper altimeter 29.86.*			
	133.9 (Washington Center #1)					(pilot acknowledges instruction to descend)		
Aircraft is at or past CSN VOR but not yet to TURGA (24 nm before MOL)	**133.9 (Washington Center #1)**	**Pilot is between 100 and 50 miles of HSP and dials in and selects AWOS frequency**	*AWOS is not available if aircraft has not yet reached CSN*	Pilot checks KHSP AWOS				Ingalls Field Airport Automated Weather Observation. XXXX Zulu Weather, wind 220 at 5, visibility 6 miles, 900 overcast, temperature 11 degrees Celsius, dew point 7, altimeter 29.84."
Descending to 16,000 ft. MSL	**133.9 (Washington Center #1)**		*Switch back to lo-Alt charts for controllers*	Complete Descent Checklist				
CSN VOR	**133.9 (Washington Center #1)**			Turn over CSN				
ISA Trigger upon aircraft turning over CSN VOR plus 60 sec. Place bookmark in data capture program								

Experimental Flight Leg 2 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots · Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
CSN VOR	**133.9 (Washington Center #1)**			Respond to cb pop sound and CAS amber message ANTISKID FAIL				
At WITTO, 16,000 ft. MSL	**133.9 (Washington Center #1)**	**Aircraft is at WITTO**		Respond to ATC instruction	*Citation XXXXX descend pilot's discretion, cross 15 northeast of Montebello at one-zero, 10,000.*			
	133.9 (Washington Center #1)					(pilot acknowledges pilot's discretion to descend and crossing restriction at Montebello)		
	133.9 (Washington Center #1)			Programs G1000 and/or starts descent to meet crossing restriction				
At MITER, 16,000 ft. MSL	**133.9 (Washington Center #1)**	**Aircraft is at MITER**	*Lost Pilot Scenario begins- Mustang pilot may choose not to assist in relaying comms*	Begin Lost Pilot Scenario- Respond to ATC request for help in communicating with a lost aircraft	*Archer 3576 Juliet, Radar contact lost, squawk VFR. Try Washington Center in 30 miles on 135.4*			Recorded Background Chatter for Washington Center #1 frequency 133.9 is **PAUSED**

Experimental Flight Leg 2 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots · Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	134.525 Flight Watch						*Umm. Washington Center if I tried to turn around, could I stay with you? 76 Juliet,*	
	133.9 (Washington Center #1)						[10 second pause]	
	133.9 (Washington Center #1)						*Washington Center, Archer 76 Juliet,*	
	133.9 (Washington Center #1)						[10 second pause]	
	133.9 (Washington Center #1)				*Archer 3576 Juliet, radar contact lost, squawk VFR. Try Washington Center in 30 miles on 135.4*			
	133.9 (Washington Center #1)						*Washington Center, this is Archer 3576 Juliet, I'm trapped in a valley and need to find an airport*	
	133.9 (Washington Center #1)				*Archer 3576 Juliet, Washington Center*			
	133.9 (Washington Center #1)						*Washington Center, Archer 3576 Juliet,, radio check*	
	133.9 (Washington Center #1)						[10 second pause]	

Experimental Flight Leg 2 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots · Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	133.9 (Washington Center #1)				*Archer 3576 Juliet, Washington Center*			
	133.9 (Washington Center #1)						*Washington Center, can you read me? I'm lost and under a cloud deck and need to find an airport.*	
	133.9 (Washington Center #1)						[10 second pause]	
	133.9 (Washington Center #1)				*Citation XXXXX, we're having trouble talking to an aircraft, I suspect he may be too low for us to hear him. Could you relay our communi-cations to Archer 3576 Juliet ?*			
	133.9 (Washington Center #1)		*If pilot declines to help, jump to alternate (purple) section below*			(pilot agrees to help or declines)		
Lost Pilot Scenario · Go to Line 141 if Participant Declines to Help								
	133.9 (Washington Center #1)				*XXXXX, ask Archer 3576 Juliet if he is receiving me*			
	133.9 (Washington Center #1)					(pilot transmits communication from Center to Archer 76 Juliet)		

Experimental Flight Leg 2 Scirpt

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots · Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	133.9 (Washington Center #1)						*Affirmative, I have been receiving him but he does not respond. I'm lost and under the cloud deck and need to find an airport.*	
	133.9 (Washington Center #1)					(pilot transmits communication from Archer 76 Juliet to Center)		
	133.9 (Washington Center #1)				*Ok XXXXX if you would just tell me what 76 Juliet says - Archer 76 Juliet can you receive Elkins VOR?*			
	133.9 (Washington Center #1)						*umm, standby*	
	133.9 (Washington Center #1)					(pilot transmits communication from Archer 76 Juliet to Center)		
	133.9 (Washington Center #1)						[5 second pause]	
	133.9 (Washington Center #1)		*If Mustang pilot does not transmit stand by then Center makes call to JetBlue*		*JetBlue 1486 contact New York Center 119.07*			
	133.9 (Washington Center #1)						*Center on 119.07, JetBlue 1486*	

Experimental Flight Leg 2 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots · Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	133.9 (Washington Center #1)						(10 second pause]	
	133.9 (Washington Center #1)						*Negative, I can't get Elkins, 76 Juliet*	
	133.9 (Washington Center #1)					(pilot transmits communication from Archer 76 Juliet to Center)		
	133.9 (Washington Center #1)				*76 Juliet can you get Gordonsville?*			
	133.9 (Washington Center #1)						(10 second pause]	
	133.9 (Washington Center #1)						*Negative*	
	133.9 (Washington Center #1)					(pilot transmits communication from Archer 76 Juliet to Center)		
	133.9 (Washington Center #1)				*76 Juliet, how about Linden*			
	133.9 (Washington Center #1)						*Hold on*	
	133.9 (Washington Center #1)						[15 second pause]	
	133.9 (Washington Center #1)						Affirmative, I've got Linden	
	133.9 (Washington Center #1)					(pilot transmits communication from Archer 76 Juliet to Center)		

Experimental Flight Leg 2 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots · Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	133.9 (Washington Center #1)				*76 Juliet Can you get the radial and DME?*			
	133.9 (Washington Center #1)						[10 second pause]	
	133.9 (Washington Center #1)						*Washington Center, Delta 1213, 11 thousand 3 hundred, climbing 240*	
	133.9 (Washington Center #1)				*Roger Delta 1213*			
	133.9 (Washington Center #1)						[5 second pause]	
	133.9 (Washington Center #1)						*260 degree radial, 25 DME, 76 Juliet*	
	133.9 (Washington Center #1)					(pilot transmits communication from Archer 76 Juliet to Center)		
	133.9 (Washington Center #1)				*76 Juliet, suggested heading 190, Shenandoah Valley airport is about 25 miles on that heading.*			
	133.9 (Washington Center #1)						*Ok, heading 190 to Shenandoah at 25 miles, Thanks.*	
	133.9 (Washington Center #1)					(pilot transmits communication from Archer 76 Juliet to Center)		

Experimental Flight Leg 2 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots · Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	133.9 (Washington Center #1)				76 Juliet contact Shenandoah Valley on 123.0.			
	133.9 (Washington Center #1)						*Shenandoah Valley on 123.0, 76 Juliet - Thanks again, both of you.*	
	133.9 (Washington Center #1)					(pilot transmits communication from Archer 76 Juliet to Center)		
	133.9 (Washington Center #1)	**Pilot reports to Center controller that lost aircraft confirms instruction to switch to radio frequency 123.0**		End lost pilot scenario - Respond to instruction to change frequency	*Citation XXXXX, thanks for your help. Contact Washington Center on 134.4."*			
Lost Pilot Scenario · if Participant Declines to Help								
	133.9 (Washington Center #1)		*Alternate Section if Mustang pilot declines to help lost pilot*	Mustang pilot continues to fly route during these comms among others	*King Air 1 Golf Golf, we're having trouble talking to an aircraft. Could you assist with relaying our communications to Archer 3576 Juliet?*			
	133.9 (Washington Center #1)						*Sure, 1 Golf Golf*	

Experimental Flight Leg 2 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots · Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	133.9 (Washington Center #1)				*Thanks, 1 Golf Golf ask Archer 76 Juliet if he is receiving me*			
	133.9 (Washington Center #1)						*Archer 76 Juliet, this is King Air 1 Golf Golf, Center has asked me to help relay comms to you - can you read me?*	
	133.9 (Washington Center #1)						*Affirmative, I read you and I have been receiving him but he does not respond. I'm lost and under a cloud deck and need to find an airport.*	
	133.9 (Washington Center #1)						*Center, Archer 76 Juliet says he reads you but guesses you can't read him - he is lost under the clouds and needs an airport*	
	133.9 (Washington Center #1)				*Ok Archer 76 Juliet can you receive Elkins VOR?*			
	133.9 (Washington Center #1)						*umm, standby*	
	133.9 (Washington Center #1)						[5 second pause]	
	133.9 (Washington Center #1)				*JetBlue 1486 contact New York Center 119.07*			

Experimental Flight Leg 2 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots · Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	133.9 (Washington Center #1)						*Center on 119.07, JetBlue 1486*	
	133.9 (Washington Center #1)						[10 second pause]	
	133.9 (Washington Center #1)						*Negative, I can't get Elkins, 76 Juliet*	
	133.9 (Washington Center #1)						*Negative Center, Archer 76 Juliet can't get Elkins, 1 Golf Golf*	
	133.9 (Washington Center #1)				*76 Juliet, how about Linden?*			
	133.9 (Washington Center #1)						*Hold on*	
	133.9 (Washington Center #1)						[15 second pause]	
	133.9 (Washington Center #1)						*Affirmative, I've got Linden*	
	133.9 (Washington Center #1)						*Affirmative Center, Archer 76 Juliet has Linden, 1 Golf Golf*	
	133.9 (Washington Center #1)				*76 Juliet can you get the radial and DME?*			
	133.9 (Washington Center #1)						[10 second pause]	
	133.9 (Washington Center #1)						*Washington Center, Delta 1213, 11 thousand 3 hundred, climbing 240*	

Experimental Flight Leg 2 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots · Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	133.9 (Washington Center #1)				*Roger Delta 1213*			
	133.9 (Washington Center #1)						[5 second pause]	
	133.9 (Washington Center #1)						*260 degree radial, 25 DME, 76 Juliet*	
	133.9 (Washington Center #1)						*Center, 76 Juliet says 260 degree radial and 25 DME for Linden VOR, 1 Golf Golf*	
	133.9 (Washington Center #1)				*76 Juliet, suggested heading 190, Shenandoah Valley airport is about 25 miles on that heading.*			
	133.9 (Washington Center #1)						*Ok, heading 190 to Shenandoah at 25 miles, Thanks.*	
	133.9 (Washington Center #1)						*Archer 76 Juliet confirms heading 190 and Shenandoah at 25 miles, 1 Golf Golf*	
	133.9 (Washington Center #1)				*76 Juliet contact Shenandoah Valley on 123.0.*			
	133.9 (Washington Center #1)						*Shenandoah Valley on 123.0, 76 Juliet - Thanks again, both of you.*	

Experimental Flight Leg 2 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots · Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	133.9 (Washington Center #1)						*76J confirms frequency change to 123.0 for Shenandoah Valley, 1GG*	
	133.9 (Washington Center #1)				*1 Golf Golf thanks very much for your help*			
	133.9 (Washington Center #1)						*Anytime, 1 Golf Golf*	
	133.9 (Washington Center #1)			Mustang pilot continues to fly route				Recorded Background Chatter for Washington Center #1 Frequency 133.9 is **RESUMED**
	133.9 (Washington Center #1)	**19 DME before MOL**		Mustang pilot told to switch to new Center Controller	*Citation XXXXX, Contact Washington Center on 134.4."*			
Descending from 16,000 ft.to 10,000 ft MSL	**133.9 (Washington Center #1)**	Aircraft has just begun descent from 16,000 ft.	*During the lost pilot scenario, the Mustang pilot should report leaving 16,000 ft, initiating descent*	Report leaving 16,000'		(pilot reports initiating descent, leaving 16,000 ft. for 10,000 ft.)		
	133.9 (Washington Center #1)	**Pilot reports initiating descent from 16,000 ft MSL**			*Citation XXXXX, Roger*			

Experimental Flight Leg 2 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots · Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	133.9 (Washington Center #1)			Respond to direction to change to new Center frequency		(pilot responds to direction to contact Washington Center #2 controller on 134.4)		
	134.4 (Washington Center #2)			Dials in and selects new frequency				Recorded Background Chatter for Washington Center #2 frequency 134.4 **BEGINS**
	134.4 (Washington Center #2)			Pilot checks in with new controller		*(pilot checks in with new controller)*		
	134.4 (Washington Center #2)	**Pilot checks in with Washington Center #2 controller**			*XXXXX, Roger*			
Aircraft is at or past TURGA (24 nm before MOL)	**118.8 (AWOS)**	**Pilot is within 50 miles of HSP and dials in and selects AWOS frequency**	*AWOS is not available if aircraft has not yet reached CSN*	Pilot checks KHSP AWOS				Ingalls Field Airport Automated Weather Observation. XXXX Zulu Weather, wind 230 at 6, visibility 5 miles, 1000 overcast, temperature 11 degrees Celsius, dew point 7, altimeter 29.84."
10 nm before MOL, 10,000 ft. MSL	**134.4 (Washington Center #2)**	**Aircraft is 10 nm before MOL**		Respond to controller's clearance	*Citation XXXXX, you can expect the ILS approach runway 25 at Ingalls Field, Advise when you have the weather*			

Experimental Flight Leg 2 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots · Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	134.4 (Washington Center #2)			Reports having gotten AWOS wx at HSP		(pilot gets AWOS wx from HSP, if necessary, and reports having it to ATC)		
	134.4 (Washington Center #2)	**Pilot reports that helshe has current AWOS information for Hot Springs**			*Citation XXXXX, Roger*			
ISA Trigger upon aircraft reacing MOL VOR. Place bookmark in data capture program								
Montebello VOR, 10,000 ft. MSL	**134.4 (Washington Center #2)**	**Aircraft is at Montebello VOR**		Turn at Montebello	*Citation XXXXX, 17 miles from IFAVU, proceed direct to IFAVU, maintain 8000 until IFAVU, cleared for the straight-in ILS Runway 25 approach at Hot Springs*			
	134.4 (Washington Center #2)			Read back approach clearance		17 miles from IFAVU, proceed direct to IFAVU, maintain 8000 until IFAVU, cleared for the straight-in ILS Runway 25 approach at Hot Springs, xxxxx		
	134.4 (Washington Center #2)	**Pilot reads back approach clearance correctly**			*Citation XXXXX, read back correct*			

Experimental Flight Leg 2 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots · Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	134.4 (Washington Center #2)			Complete checklists, final preparations for flying the approach				

Approach

IFAVU (IAF), 8,000 ft. MSL	**134.4 (Washington Center #2)**			Start to configure aircraft per Cessna SOP for approach				
AHLER, 8,000 ft. MSL	**134.4 (Washington Center #2)**	**Aircraft is at AHLER intermediate fix**		Monitor turn at AHLER & Respond to ATC instruction to change to CTAF frequency	*Citation XXXXX, radar service is terminated, frequency change to advisory approved, report canceling IFR on this frequency in the air or on the ground with Leesburg flight service on 122.0*			
ISA Trigger upon aircraft turning inbound over AHLER plus 15 sec. Place bookmark in data capture program								
At DURAN (OM) descending on the glideslope	**134.4 (Washington Center #2)**			Monitor intercept and beginning of decent		(pilot acknowledges frequency change to CTAF and instructions about cancelling IFR)		
	123.0 (Hot Springs CTAF)			Pilot changes to CTAF Frequency				Recorded Background Chatter for Washington Center #2 Frequency 134.4 is **TERMINATED**. There is no recorded background chatter for HSP CTAF

Experimental Flight Leg 2 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots · Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
(Break out of clouds at 4788 MSL/ 996AGL}	**123.0 (Hot Springs CTAF)**							
	123.0 (Hot Springs CTAF)	*In the following, the Mustang participant with choose to go around or fly the missed approach. If pilot chooses to fly the missed approach, ATC should assist with that as you normally would. If the Mustang*						
4600 MSL, descending on the glideslope	**123.0 (Hot Springs CTAF)**	**Aircraft is at 4600 ft. MSL**	*Malibu 49 Lima may need to respond to questions from Mustang engine looks like it will start OK*	Monitor aircraft on the field			Ingalls traffic, Malibu 6349 Lima on the active. My engine just quit. I will restart and exit the active as quickly as possible. Ingalls	
4300 MSL, descending on glideslope	**123.0 (Hot Springs CTAF)**	**Aircraft is at 4280 (500 ft. AGL)**		Make decision about how to proceed for landing			Ingalls traffic, Malibu 6349 Lima engine restarted. Exiting runway at next taxiway, Ingalls	
	123.0 (Hot Springs CTAF)	**90 seconds after disabled aircraft called and reported that its engine had started**	*If the Mustang pilot has already re-contacted Center to execute the missed approach, this comm is not made*				Malibu 49 Lima, clear of Runway 25, Ingalls	

Experimental Flight Leg 2 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots · Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	134.4 (Washington Center #2)		*This is for cancelling IFR clearance while airborne, see comms below if cancelled on the ground*	(If they choose to cancel IFR clearance while airborne)				
	134.4 (Washington Center #2)	**Pilot cancels IFR with ATC while still airborne**			*Roger XXXXX, Your IFR is canceled. Squawk 1200, Have a good day*			

Landing

	123.0 (Hot Springs CTAF)			Pilot lands the aircraft				
	123.0 (Hot Springs CTAF)			Pilot taxis off the runway				

Taxi In

Taxiway Foxtrot	**123.0 (Hot Springs CTAF)**			Taxi on taxiways to ramp		(pilot makes radio call clear of the active and taxi intentions)		
	122.0 (Leesburg Flight Service)		*This is for cancelling IFR clearance after landing - see comms above if cancelled while still airborne - if pilot forgets to cancel IFR clearance, say nothing to them about it*	Cancel IFR Clearance with Leesburg Flight Service Station		(pilot switches to Leesburg FSS frequency and cancels IFR clearance		
	122.0 (Leesburg Flight Service)	**Pilot cancels IFR with FSS after landing**			*Roger XXXXX, on the ground at Hot Springs, Your IFR is canceled. Have a good day.*			

Experimental Flight Leg 2 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots · Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
Engine Shutdown and Securing								
Transient Parking, KMTN	123.0 (Hot Springs CTAF)			Execute engine shutdown and secure aircraft as per Cessna SOP				
CALL TO FLIGHT WATCH AT ANY POINT DURING THE FLIGHT								
	134.525 Flight Watch			Pilot switches to Flight Watch frequency				Recorded Background Chatter for Washington Center #1 frequency 133.9 is **PAUSED**
	134.525 Flight Watch		*Adjust comms as required*			(pilot contacts Flight Watch and asks for updated weather at HSP)		
	134.525 Flight Watch	**After pilot asks for Wx update from Flight Watch**			*XXXXX, Flight Watch, say time of arrival at Hot Springs*			
	134.525 Flight Watch					(pilot gives estimated time of arrive at MTN)		
	134.525 Flight Watch	**Pilot states time of arrival at Hot Springs**			*XXXXX, standby…*			
	134.525 Flight Watch		*Wait, 20 seconds*					

Experimental Flight Leg 2 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	134.525 Flight Watch	**20 seconds after Flight Watch briefer tells pilot to standby**			*Citation XXXXX, current weather at HSP is wind 220 at 7, visibility 6, 1000 overcast, temperature 12, dew point 7, altimeter 29.84. Ummm, I don't have any PIREPS that are pertinent, and no forecast for Hot Springs but have a forecast for Lewisburg which is pretty nearby - that is Greenbrier Valley. Would you like to hear it?*			
	134.525 Flight Watch					(pilot says yes or no)		
	134.525 Flight Watch	**Pilot asks to hear forecast weather for Lewisburg**	*If pilot requests to hear Lewisburg Airport forecast*		*XXXXX, forecast for Lewisburg from 1200 Zulu until 1600 Zulu is wind 210 at 10, visibility greater than 6, ceiling at 6100 ft, no significant weather forecast for this period. Is there anything else I can help you with?*			
	134.525 Flight Watch		*Flight Watch responds to questions, etc. as necessary*			*(pilot asks any other questions or for clarification)*		
	134.525 Flight Watch	**Pilot says he/she has all info needed**			*XXXXX, do you have time to give me a PIREP*			

Experimental Flight Leg 2 Script

Aircraft Location	Active Radio Freq.	Trigger	Alternatel Notes	Pilot Task	ATCI Flight Watch Comms	Mustang Pilot (Study Participant) Comms	Other Pilots · Live Comms	Recorded Comms (ATIS, AWOS, Background Chatter)
	134.525 Flight Watch					(pilot either says yes, and gives PIREP or says no and declines)		
	134.525 Flight Watch	**Pilot finishes giving PIREP**	*If Pilot Gives a PIREP*		*XXXXX, thank you vefy much*			
	133.9 (Washington Center #1)			Pilot switches back to Washington Center #1 frequency				Recorded Background Chatter for Washington Center #1 frequency 133.9 is **RESUMED**
	133.9 (Washington Center #1)					(pilot reports back on frequency)		
	133.9 (Washington Center #1)	**Pilot reports back on frequency**			*XXXXX Roger*			
Return to cruise portion of flight or where ever you left the script								

Appendix B.1 Background Chatter Dialogue for Experimental Flight Leg 1

Leg 1 Event Description	ATC	Pilot

TEB Clearance Delivery · 128.05 (10 minutes)

Chatter begins as soon as Mustang switches to Clearance Delivery Frequency		
Pilatus 547AF Clearance to Chicago Midway in process when subject begins listening	… Goshen, direct. Maintain two thousand, expect flight level 280 ten minutes after departure, departure frequency 126.7, squawk 1076	
	5 seconds	
		OK, Pilatus 547AF is cleared to Midway via the Teterboro 6, vectors Milton, Victor 232 Chardon, direct Waterville, Victor 92 Goshen, direct. Maintain two thousand, expect 280 in ten, departure frequency 126.7, squawk 1076
	Pilatus 7AF readback correct	
	15 seconds	
Lear 435MS clearance to Nashville		Teterboro Clearance, Lear 435MS, Atlantic with Alpha, IFR Nashville.
	5 seconds	
	Lear 435MS, cleared to Nashville, via the Teterboro Six, radar vectors PARKE J6 YOCKY as filed. Climb and maintain 2000, expect flight level 380 ten minutes after departure, squawk 2637	
	8 seconds	

Leg 1 Event Description	ATC	Pilot
		Uh, Lear 435MS is cleared to Nashville, Teterboro Six, vectors PARKE J6 YOCKY as filed, 2000, 380 ten minutes after, squawk 2637
	Lear 5MS readback correct	
	12 seconds	
Challenger 725DD clearance to Birmingham		Challenger 725DD at Jet Aviation, information Alpha, prefiled to Birmingham
	Challenger 725DD stand by…	
	10 seconds	
	Challenger 725DD is cleared to Birmingham, via the Teterboro Six departure, radar vectors LANNA J48 Montebello J22 VULCAN, direct. Climb and maintain 2000, expect flight level 400 ten minutes after departure, squawk 4430	
	5 seconds	
		Ok, cleared Birmingham, Teterboro Six, vectors to LANNA J48 Montebello J22 VULCAN, direct. 2000, expect 400 in ten, 4430, Challenger 725DD
	Challenger 725DD readback correct	
	40 seconds	
Netjets 307 Clearance to Denver Centennial		Clearance, Netjets 307 at Atlantic, with Alpha
	5 seconds	
	Netjets 307 is cleared to Alpha Papa Alpha via the Teterboro Six departure, radar vectors to ELIOT J60 Iowa City J10 North Platte, direct, maintain 2000, expect flight level 420 ten minutes after departure, squawk 1077	
	5 seconds	

Leg 1 Event Description	ATC	Pilot
		307 is cleared to Centenial, Teterboro Six, vectors to ELIOT J60 Iowa City J10 North Platte, direct, 2000, expect 420 in ten, 1077
	Netjets 307 readback correct	
	10 seconds	
Mooney AA59R seeks clearance to Ohio State University in Columbus, OH		Clearance Delivery, Mooney AA59R is at transient parking, I'm an IFR flight going to OSU in Columbus.
	5 seconds	
	Mooney AA59R Stand by…	
	10 seconds	
	Mooney AA59R, I do not have you in the system	
	5 seconds	
		Um, what?
	Mooney 59R, I do not have you in the system - I don't have a clearance for you	
		Are you sure? That's for Mooney AA59R going to Ohio State University Airport, that's OSU..not CMH in Columbus, Ohio
	Affirmative, 59R, I do not have you in the system	
	5 seconds	
		Oh…OK…um...59R
	50 seconds	
Citation 650JL clearance to Toledo		Teterboro Clearance, Citation 650JL, Meridian with Alpha, going to Toledo,
	3 seconds	

Leg 1 Event Description	ATC	Pilot
	Citation 650JL is cleared to Toledo via the Teterboro Six departure, radar vectors ELIOT J60 Dryer direct Waterville direct Climb and maintain 2000, expect flight level 320 ten minutes after departure, squawk 6704	
	5 seconds	
		ZeroJL is cleared to Toledo, Teterboro Six, vectors ELIOT J60 Dryer Waterville direct. Maintain 2000, expect 320 in ten, 6704. Thanks, Terry.
	Good flight, Chris.	
	40 seconds	
Netjets 445 Clearance to San Diego		Netjets 445, Atlantic, IFR San Diego.
	3 seconds	
	Netjets 445 cleared to San Diego via the Teterboro Six departure, ELIOT Ja0 Kansas City J24 Salina J96 Parker as filed, maintain 2000, expect 400 ten minutes after departure, squawk 3726	
	5 seconds	
		uh...Netjets 445 is cleared to San Diego, Teterboro Six, ELIOT jet a0 Kansas City jet 24 Salina Parker as filed, 2000 400 ten minutes after takeoff, 3726
	That's Salina, J96 Parker	
	2 seconds	

Leg 1 Event Description	ATC	Pilot
		OK, Salina J96 Parker
	Read back correct	
	30 seconds	
Moony AA59R asking again about clearance to Ohio State University in Columbus, OH		Teterboro Clearance Delivery, this is Mooney AA59R again, do you have a clearance for me yet?
	Mooney 59R, standby	
	5 seconds	
	Negative 59R, I do not have a clearance fo you in the system	
		shh....OK, thanks. 59R

Leg 1 Event Description	ATC	Pilot

TEB Ground - 121.9 (15 minutes)

Chatter begins as soon as Mustang changes to the Ground Frequency		
Malibu PS1KD taxi to FBO		Teterboro Ground, Malibu PS1KD, taxi to First Aviation
	Malibu PS1KD, taxi Gulf, Quebec	
		Gulf, Quebec Malibu 1KD
	15 seconds	
Gulfstream 450GA taxi FBO 2		Gulfstream 450GA taxiway Golf, Taxi Signature
	3 seconds	
	Gulfstream 450GA right turn on Papa, taxi Signature	
		Papa to Signature, GA
	60 seconds	
Helicopter 9888S taxi Air Charter		Teterboro Ground, Helicopter 9888S Jet Aviation, hover taxi Air Charter
	3 seconds	
	Helicopter 9888S, hover taxi Air Charter via Kilo, Lima, and Quebec, cross runway 19	
		Kilo, Lima, and Quebec, 88S
	3 seconds	
	88S you are cleared to cross runway 19	
		Roger, cross runway 19, 88S
	20 seconds	

Leg 1 Event Description	ATC	Pilot
Citation 650JL taxi RW 24		Teterboro Ground, Citation 650JL Meridian with Alpha, taxi
	5 seconds	
	Give way to the Gulfstream, taxi runway 24 via Papa, Lima and Alpha, cross runway 19	
	5 seconds	
		Give way, then taxi 24 Papa, Lima, Alpha, cross 19, Citation 650JL
	70 seconds	
Challenger C-GXPZ taxi FBO 2		Teterboro Ground, Challenger Canadian GXPZ, off 24 taxi Jet Aviation
	XPZ taxi Jet Aviation	
	8 seconds	
		uh, XPZ unfamiliar
	3 seconds	
	Quebec, Right on Golf, right on Lima, right on Juliet	
	5 seconds	
		uh, Quebec, Golf, Lima, and Juliet, XPZ
	40 seconds	
Baron 1164W Taxi FBO 1		Ground, Baron 1164W, on Charlie, Taxi First Aviation

Leg 1 Event Description	ATC	Pilot
	4 seconds	
	November 1164W, right on Quebec, taxi straight ahead	
		Right on Quebec
	50 seconds	
Pilatus 547AF taxi RW 24		Ground, Pilatus 547AF at Meridian, taxi with Alpha
	5 seconds	
	Pilatus 547AF taxi runway 24 via Golf and Quebec, cross runway 19	
		24 via Golf and Quebec, cross 19
	60 seconds	
Falcon 840DP taxi FBO 1		Teterboro Ground, Falcon 840DP taxi Jet Aviation
	840DP taxi Jet Aviation via Golf and Juliet	
		Golf and Juliet, Zero DP
	10 seconds	
Hawker 123P taxi RW 24		Teterboro Ground, Hawker 123P Signature, Alpha, taxi 24
	3 seconds	
	Hawker 123P, taxi runway 24 via Papa, Lima and Alpha, cross runway 19	
		Runway 24 via Papa, Lima, and Alpha, cross 19
	15 seconds	

Leg 1 Event Description	ATC	Pilot
Lear 435MS taxi RW 24		Teterboro Ground, Learjet 435MS Atlantic with Alpha, taxi
	5 seconds	
	Aircraft calling Teterboro Ground say again	
		Yes, Ground, Lear 435MS Atlantic with Alpha, taxi
	Lear 435MS, taxi runway 24 via Papa, Lima and Alpha, cross runway 19	
		5MS, Papa, Lima and Alpha, taxi 24, cross 19
	50 seconds	
Netjets 307 taxi RW 24		Ground, Netjets 307 , at Atlantic, Taxi with Alpha
	Netjets 307 taxi Runway 24 via Papa, Lima, and Alpha, follow the Lear Jet departing Atlantic, cross runway 19	
	5 seconds	
		24 via Papa, Lima and Alpha, cross 19, got the Lear, 307
	40 seconds	
Challenger 752DD taxi RW 24		
		Teterboro Ground, this is Challenger 752DD at Jet Aviation, taxi with Alpha
	10 seconds	
		Teterboro Ground, Challenger 752DD at Jet Aviation, taxi with Alpha
	Challenger 2DD, taxi runway 24 via Lima and Quebec, cross runway 19	
		Taxi 24, cross 19, via Lima and Quebec, 2DD
	70 seconds	
NetJets 445 taxi RW 24		Ground, NetJets 445, Atlantic with Alpha, taxi
	5 seconds	

Leg 1 Event Description	ATC	Pilot
	NetJets 445, taxi runway 24, via Papa, Lima, and Alpha, cross runway 19	
	5 seconds	
		24, Papa, Lima, Alpha, cross 19, NetJets 445
	40 seconds	
Cirrus 580CD taxi FBO 1		Cirrus 580CD off 24, for Meridian North
	3 seconds	
	580CD right on Papa, taxi Meridian North	
		Right on Papa, Zero CD
	60 seconds	
Cessna GT58 taxi to FBO		Teterboro Ground, Cessna GT58, just off the active at C, taxi to Signature
	Cessna T58, taxi to the ramp	
		Taxi to the ramp, T58, thanks.

Leg 1 Event Description	ATC	Pilot

TEB Tower - 119.5 (5 minutes)

Chatter begins right after Mustang has been given clearance to take off		
Cessna 2086G Cleared to Land	Cessna 2086G, wind 220 at 12, runway 24, cleared to land	
		86G
	10 seconds	
Premier Jet 2HZ checks in		Teterboro tower, Premier November 2HZ 3400 on the ILS with Alpha
	3 seconds	
	Premier 2HZ, number two behind a Skylane on a two mile final, continue	
		2HZ
Lear 435MS Cleared for Takeoff	Lear 5MS, wind 220 at 12, cleared for takeoff, runway 24	
		Rolling, 5MS
Cessna lands	**30 seconds**	
Netjets 307 Cleared for Takeoff	Netjets 307 , line up and wait, runway 24	
		Line up and wait, runway 24, 307
	10 seconds	
Premier Jet 2HZ cleared to land	Premier 2HZ, wind 220 at 14, runway 24, cleared to land	
		cleared to land 2-4, 2HZ
Lear 435MS Contact Departure	Lear Jet 5MS, contact departure 126.7	
	3 seconds	

Leg 1 Event Description	ATC	Pilot
		126.7, 5MS, see ya
Cessna 2086G Contact Ground	86G where are you parking today?	
		First Aviation for 86G
	86G exit left on Lima, contact ground point niner	
		Lima and Ground on point 9, 86G
Premier Jet 2HZ lands	**30 seconds**	
Premier Jet 2HZ goes to Ground	Premier 2HZ, exit left on Gulf and contact Ground on 121.9	
		Left on Gulf, ground on 121.9, 2HZ
	10 seconds	
Netjets 307 Cleared for Takeoff	Netjets 307, wind 210 at 10, runway 24, cleared for takeoff	
		Cleared for takeoff, 307
	10 seconds	
Falcon 73MR Cleared to land	Falcon 73MR, wind 220 at 13, runway 24, cleared to land	
	5 seconds	
		Cleared to land, 3MR
	15 seconds	
Netjets 307 Contact Departure	Netjets 307 contact departure	
		Switching, 307
	20 seconds	
Falcon 73MR to Ground	Falcon 73MR exit left or right on Golf, contact ground point nine	
		Right on Golf, point nine, 3MR, thanks.
	10 seconds	
Citation 650JL Cleared for Takeoff	Citation 650JL, wind 210 at 11, runway 24, cleared for takeoff	
		Cleared for takeoff, runway 24, 0JL

Leg 1 Event Description	ATC	Pilot
	15 seconds	
Citation 650JL Contact Departure	Citation 650JL contact departure	
		Departure, 0JL
	2 seconds	
Citation 104HW cleared to land		Citation 104HW 3500 on the ILS with Alpha
	5 seconds	
	Citation 104HW, Runway 24 cleared to land, wind 220 at 10	
		24 cleared to land, HW
	10 seconds	
Challenger 752DD Cleared For takeoff	Challenger 752DD cleared for takeoff runway 24, Citation on a 3 mile final	
		Cleared for takeoff, 2DD
	25 seconds	
Citation 104HW cleared off the active and transferred to Ground	Citation 4HW, turn right at the next taxiway and contact Ground on point 9	
		Ok, right and ground on point 9, 4HW
Challenger 752DD Contact Departure	Challenger 752DD contact departure	
		Departure, 2DD
	5 seconds	
NetJets 445 Cleared for takeoff	NetJets 445, wind 220 at 13, runway 24, cleared for takeoff	
		Takeoff, NetJets 445

Leg 1 Event Description	ATC	Pilot

NY Depature #1 - 126.7 (5 minutes) - phase includes interruption for crossing traffic

Chatter begins as soon as Mustang switches to this frequency		
Pilatus 547AF Cleared direct Broadway (Interrupted conversation)		…ousand, direct Broadway, 7AF
	5 seconds	
Hawker 123P Climb and maintain six thousand	Hawker 123P climb and maintain 6 thousand	
		Six thousand, 23P
	5 seconds	
Delta 162 maintain 3 thousand; contact Approach, 119.2	Delta 162. ,maintain 3000, contact approach 119.2	
		maintain 3000, approach on 119.2, Delta 162
	5 seconds	
Delta 1984, contact Approach, 119.2	Delta 1984. ,maintain 3000, contact approach 119.2	
		approach 119.2, Delta 1984
	5 seconds	
United 74 reports on10 thousand descending 7 thousand, Kennedy Alpha		United 74, 10, ten thousand descending 7 thousand, Kennedy Alpha
	United 74 roger, maintain 7 thousand, expect vectors for the ILS	
		7 thousand, United 74
	10 seconds	

Leg 1 Event Description	ATC	Pilot
JetBlue 185 transerred to new approach frequency 119.2	JetBlue 185 contact approach 119.2	
		9 point 2, JetBlue 185
	5 seconds	
FedEx 1023 turn left 020, descend and maintain 7000	FedEx 1023, turn left 020, descend and maintain 7 thousand	
		020 and 7 thousand for FedEx ten 23
	5 seconds	
Lear 435MS turn right heading 330, climb and maintain 11, eleven thousand	LearJet 435MS turn right 330 climb and maintain 11, eleven thousand	
		330, eleven thousand, 5MS
	5 seconds	
Air Canada 1781 transerred to new approach frequency 119.2	Air Canada 1781 contact approach 119.2	
		119.2 Air Canada 1781
	10 seconds	
Challenger 541XJ Contact TEB tower	Challenger 1XJ, Radar services terminated, contact Teterboro tower 119.5	
		Nineteen five, 1XJ
	5 seconds	
Continental 127 transerred to new approach frequency 119.2	Continental 127, contact approach on 119.2	
		119.2 for Continental 127
	5 seconds	
Baron N1PZ turn right heading 220 maintain 2000 until established cleared for the approach	Baron 1PZ, turn right heading 220, maintain 2000 until established, cleared for the ILS runway 24 approach,	

Leg 1 Event Description	ATC	Pilot
	3 seconds	
		Right 220, 2000 till established, cleared for the approach
	5 seconds	
Hawker 123P Cleared Direct PARKE, climb and maintain 10, ten thousand	Hawker 23P turn left heading 260 direct PARKE when able, climb and maintain 10, ten thousand	
		Left 260, direct PARKE, 10, ten thousand, Hawker 23P
	10 seconds	
American 1195 transerred to new approach frequency 119.2	American 1195 contact approach on 119.2	
		119.2 American 1195, bye
	5 seconds	
Citation 650JL reports on 1000 climbing 2000 Cleared ELIOT		New York approach, Citation 650JL 1000 climbing 2000
	5 seconds	
	Citation 650JL cleared direct ELIOT, then as filed	
		Direct ELIOT, 0JL
	10 seconds	
Delta 1010 turn left 020, descend and maintain 7 thousand	Delta 1010, turn left 020, descend and maintain 7 thousand	
		020 and 7 thousand, Delta ten-ten
	5 seconds	
Continental 1354 contact approach on 119.2	Continental 1354 contact approach 119.2	
		119.2, Continental 1354
	5 seconds	
Hawker UF65D, Contact TEB tower	Hawker 65D turn right heading 220, maintain 2000 until established, cleared for the ILS runway 24 approach,	

Leg 1 Event Description	ATC	Pilot
	3 seconds	
		Right 220, 2000 till established, cleared for the approach. 65D
	10 seconds	
TBM 9420Y Reports on 10 thousand descending 6 thousand for TEB (enters airspace from Solberg VOR toward Broadway		New York approach, TBM 9420Y ten thousand, descending 6 thousand, Teterboro Alpha
	TBM 20Y, thanks for Alpha, Cleared direct Broadway	
		Direct Broadway, 20Y
	5 seconds	
Baron N1PZ contact tower	Baron 1PZ radar services terminated, contact Teterboro tower 119.5	
		Baron 1PZ, Tower 119.5, Good Day
	5 seconds	

Leg 1 Event Description	ATC	Pilot
Netjets 307 Reports on 1000 climbing 2000		New York approach, NetJets 307, 1000, climbing 2000
	NetJets 307, maintain 2000, higher when clear of traffic	
		2000, 307
	10 seconds	
Jetblue 1428 reports on 10 thousand 5 hundred for Laguardia (from Stillwater)		New York approach, Jetblue 1428, 10 thousand, descending 6 thousand, with Kilo
	Jetblue 1428 turn left 090 vectors for Laguardia	
		Left 090, 1428
	5 seconds	
United 74 contact Approach, 119.2	United 74 contact approach 119.2	
		119.2, United 74
	5 seconds	
American 1052 transerred to new approach frequency 119.2	American 1052 contact approach on 119.2	
		19 - 2 for American ten 52, see ya

Leg 1 Event Description	ATC	Pilot

NY Depature #2 • 132.80 (7 minutes)

Chatter begins as soon as Mustang switches to this frequency		
Challenger 752DD reports on 1000 climbing 2000		New York approach, Challenger 752DD 1000 climbing 2000
	Challenger 752DD, turn left 250, LANNA when able, climb and maintain 4000	
		250 direct LANNA, maintain 4000, 2DD
	10 seconds	
Pilatus 547AF Climb and maintain 11 thousand	Pilatus 547AF climb and maintain 1-1, eleven thousand	
		11 thousand. 7AF
	5 seconds	
Phenom 542JS Checks on 1000 climbing 2000		Approach Phenom 542JS 1000 climbing 2000
	Phenom 542JS, turn right heading 350, maintain 2000	
	5 seconds	
		Right 350, 2000, 542JS
	5 seconds	
Citation 881VP Reports on 11 thousand descending 6 thousand		Approach, Citation 881VP 11 thousand descending 6 thousand, heading 120 assigned, Newark Whiskey
	Citation 881VP. Stop your descent at 8 thousand	
		Descending 8 thousand, 1VP
	10 seconds	
Gulfstream XA-EYA Reports on 9 thousand 8 hundred descending 6 thousand From Colts Neck)		New York Approach, Gulfstream XA-EYA, 9800 descending 6000
	Gulfstream XA-EYA, maintain 6000, advise receiving Kennedy Sierra	
		Gulfstream XA-EYA: 6000, we'll call with Sierra:

Leg 1 Event Description	ATC	Pilot
	10 seconds	
Citation 650JL climb and maintain 12 thousand	Citation 650JL climb and maintain 12 thousand	
		12 thousand, 0JL
	5 seconds	
Hawker 123P climb and maintain flight level 230, contact New York Center on 119.07	Hawker 23P Climb and maintain flight level 230, contact New York Center on 119.07	
		230 and nineteen oh seven, 23P
	10 seconds	
TBM 9420Y turn left heading 020 maintain 3 thousand	TBM 20Y turn left heading 020 for traffic descend and maintain 3 thousand	
	5 seconds	
		Was that for 9420Y?
	Affirmative, TBM 9420Y turn left heading 020 for traffic descend and maintain 3 thousand	
		Left 020, 3 thousand, 20Y
	10 seconds	
Phenom 542JS descend immediately, maintain 2000	Phenom 2JS descend immediately, maintain 2000	
	5 seconds	
		back down to 2000, 2JS
	5 seconds	
United 1020 maintain 3 thousand; contact Approach, 126.7	United 1020, maintain 3000, contact approach 126.7	
		Three thousand, 119.2 United uh...1020
	5 seconds	

Leg 1 Event Description	ATC	Pilot
Phenom 542JS I have a phone number for you to call advise ready to copy	Phenom 542JS I have a phone number for you to call, advise ready to copy	
	5 seconds	
		Stand by, 542JS
	10 seconds	
Netjets 307 Contact New York Center on 119.07	NetJets 307 contact New York Center on 119. 07	
		Center on 119.07, good day, NetJets 307
	5 seconds	
TBM 9420Y turn right 120, descend and maintain 2000	TBM 9420Y turn right heading 120, descend and maintain 2000	
		120 and 2000, 20Y
	10 seconds	
Phenom 542JS ready to copy		Phenom 542JS Ready to copy
	Phenom 542JS, call 201 641-4010 as soon as you land.	
		201-641-4010, 2JS
	10 seconds	

Leg 1 Event Description	ATC	Pilot
Netjets 445 reports on 1000 climbing 2000		NetJets 445, 1000 climbing 2000
	Netjets 445 expect direct ELIOT, maintain 2000	
		2000, expect direct ELIOT, 445
	2 seconds	
Challenger 752DD climb and maintain 10 thousand	Challenger 752DD Climb and maintain 10, ten thousand	
		Maintain 10 thousand, 2DD
	8 seconds	
Approach is trying to contact Gulfstream XA-EYA who never reported they had information Sierra	Gulfstream XA-EYA, New York Departure, did you get information Sierra at Kennedy?	
	10 seconds	
	Gulfstream XA-EYA, New York Departure	
	5 seconds	
TBM 9420Y turn right 220 maintain 2000 until established, cleared for the approach	TBM 9420Y, turn right heading 220, maintain 2000 until established, cleared for the ILS runway 24 approach Teterboro	
		Right 22-, 2000 till established, cleared for the approach, 20Y
	5 seconds	
Citation 650JL Climb and maintain flight level 240, contact New York Center on 135.45	Citation 650JL climb and maintain flight level 240, contact New York Center 135.45	
		Maintain 240, 135.45. 0JL
	10 seconds	
Approach is still trying to contact Gulfstream XA-EYA who never reported they had information Sierra	Gulfstream XA-EYA, New York Departure	

Leg 1 Event Description	ATC	Pilot
	5 seconds	
Pilatus 547AF Climb and maintain flight level 240, contact New York Center, 135.45	Approach: Pilatus 547AF climb and maintain flight level 240, contact New York Center 135.45	
		Climb and maintain 240, 135.45, 7AF

Leg 1 Event Description	ATC	Pilot

New York Center - 135.45 (20 Minutes)

Chatter begins as soon as Mustang switches to this frequency		
	15 seconds	
Pilatus 922WV, contact approach 119.2 Calls in 20 SW of Colts Neck flying toward Deer Park	Pilatus 922WV, Contact New York approach 119.2	
		Approach on Nineteen two, 2WV
	30 seconds	
Citation 41VP turn 20 degrees right for traffic (is 40 SSE of WAVEY northbound before the vector	Citation 41VP turn 20 degrees right for traffic	
		20 right, 1VP
	15 seconds	
Falcon 72288 Contact Approach FL 190 Stillwater for Teterboro will start descending immediately after frequency change)	Falcon 2BB contact New York approach, 127.6	
		Approach 127.6, 2BB
	25 seconds	
Eclipse 187EA cleared direct DuPont (FL 230 45 west of DuPont, heading 120 before "direct"	Eclipse 187EA cleared direct DuPont	
		Direct DuPont, 7EA
	15 seconds	
United 1521 descend and maintain 7 thousand contact approach 126.7	United 1521 descend and maintain 7 thousand, contact approach 126.7	
		7 thousand, approach 126.7, United 15-21

Leg 1 Event Description	ATC	Pilot
	60 seconds	
American 1559 Descend and maintain 7 thousand, contact Approach 119.2 (Northeas bound 50 SW of LaGuardia	American 1559 descend and maintain 7 thousand, contact approach 119.2	
		7000, approach on 119.2, American 1559
	30 seconds	
Challenger 752DD checks on 12 thousand climbing 220		New York Center, Challenger 752DD, 12 thousand climbing 220
	Challenger 752DD. New York Center roger	
	15 seconds	
Malibu 737K Cross 10 miles west of Stillwater at and maintain 15 thousand (FL210 40 west of Stillwater)	Malibu 737K Cross 10 miles west of Stillwater at 15 thousand, Teterboro altimeter 29.85	
		10 west of Stillwater at 15 thousand, 37K
	35 seconds	
Citation 41VP cleared direct White Plains	Citation 41VP cleared direct White Plains	
		Direct White Plains, 1VP
	25 seconds	
Pilatus 547AF checks on 11 thousand 6 hundred climbing 240		New York Center, Pilatus 547AF 11,600 climb 240
	Pilatus 547AF cleared direct Goshen	
		Direct Goshen now, 7AF
	10 seconds	
American 1756 Descend and maintain 7 thousand, contact Approach 119.2 (Northeas bound 50 SW of LaGuardia	American 1756 descend and maintain 7 thousand, contact approach 119.2	
		7000, approach on 119.2, American 1756

Leg 1 Event Description	ATC	Pilot
	30 seconds	
Gulfstream 34M51 descend and maintain 7 thousand contact approach 126.7	Gulfstream M51 descend and maintain 7 thousand, contact approach 126.7	
		7 thousand, approach 126.7, Mike fifty-one
	60 seconds	
Cactus 2215 descent and maintain 7 thousand, contact approach 126.7 (FL 180 descending 25 west of BIGGY for Newark	Cactus 2215 descend and Maintain 7000, Teterboro altimeter 29.85, contact New York approach 126.7	
		7000, 29.85 and 126.7, Cactus 2215
	15 seconds	
American 1410 checks on 300 descending 220 heading 040 assigned (10 NE of Pottstown for Kennedy)		Center, American 1410 300, descending 220, heading 040 assigned
	American 1410, roger, turn left 020	
	50 seconds	
Flight Options 145 contact NY Center 135.97 (50 west of Sparta, 300 climbing 380)	Flight Options 145, contact New York Center 135.97	
	5 seconds	
		Center on thirty five ninety seven, Options 145
	25 seconds	
Frontier Flight 1364 Descend and maintain 7 thousand, contact Approach 119.2 (Northeas bound 50 SW of LaGuardia	Frontier Flight 1364 descend and maintain 7 thousand, contact approach 119.2	
		7000, approach on 119.2, Frontier 1364

Leg 1 Event Description	ATC	Pilot
	20 seconds	
KingAir 120MG Cleared direct Broadway, descend and maintain 15 thousand (30 south of Broadway northbound at 190)	KingAir 120MG cleared direct Broadway, descend and maintain 15 thousand Teterboro altimeter 2985	
		Broadway, 15 thousand, 0MG, uh, I don't have Broadway in my flight plan, what's next after Broadway?
	KingAir 0MG, it'll be Broadway, Sparta, direct.	
		OK, Broadway, Sparta, direct, 0MG
	15 seconds	
Caravan 95JD checks on 12 thousand 2 hundred climbing 240		New York Center, Caravan 95JD 12,200 climbing 240
	Caravan 5JD cleared direct Goshen	
		Direct Goshen, 5JD
	50 seconds	
Falcon 50MH Contact Approach FL 190 Stillwater for Teterboro will start descending immediately after frequency change)	Falcon 50MH contact New York approach, 127.6	
		Approach 127.6, 0MH
	40 seconds	
Conquest 425TK Checks on, 250 descending 15 thousand (20 west or LANNA for White Plains)		New York Center Conquest 425TK checking on 250 descending 15 thousand
	Conquest 5TK roger.	
	15 seconds	
Malibu 737K descend and maintain 7 thousand contact approach 126.7	Malibu 737K descend and maintain 7 thousand, contact approach 126.7	
		7 thousand, approach 126.7

Leg 1 Event Description	ATC	Pilot
	50 seconds	
Twin Commander 54GA Cleared direct HAYED (responds 'You got the spelling on that one?"	Twin Commander 54GA cleared direct HAYED	
		Direct Haid. Uh, Center, you got the spelling on that one?
	4GA that's Hotel Alpha Yankee Echo Delta	
		OK direct HAYED, got that now, 4GA
	20 seconds	
Eclipse 187EA Contact Washington Center 135.2	Eclipse 187EA contact Washington Center 135.2	
		Washington Center 135.2, G'day mate
	35 seconds	
Cactus 1229 Descend and maintain 7 thousand, contact Approach 119.2 (Northeas bound 50 SW of LaGuardia	Cactus 1229 descend and maintain 7 thousand, contact approach 119.2	
		7000, 119.2 for approach, Cactus 1229
	60 seconds	
Aztec 40212 Checks on 11 thousand, heading 170 assigned – cleared direct BIGGY		New York Center, Good morning, Aztec 40212 11 thousand, heading 170 assigned
	Aztec 40212 roger, cleared direct BIGGY	
		Direct BIGGY, 212
	45 seconds	
Citation 650JL Contact New York Center on 135.97	Citation 650JL Contact New York Center 135.97	

Leg 1 Event Description	ATC	Pilot
	20 seconds	
American 1223 checks on flight level 190, response descend and maintain 11 thousand 40 miles SW of Broadway for Kennedy		Center, American 1223 190
	American 1223 roger, descend and maintain 11, eleven thousand, Teterboro altimeter 29.85	
		Down to 11 thousand, 2985, American 1223
	40 seconds	
repeat: Citation 650JL Contact New York Center on 135.97	Citation 650JL Contact New York Center 135.97	
	15 seconds	
repeat: Citation 650JL Contact New York Center on 135.97	Citation 650JL, New York Center	
		New York Center, Citation 0JL
	Glad you could join us - 0JL, contact New York Center on 135.97	
		sorry, Center on 135.97, for 0JL,
	5 seconds	
Delta 157 Descend and maintain 7 thousand, contact Approach 119.2 (Northeas bound 50 SW of LaGuardia	Delta 157 descend and maintain 7 thousand, contact approach 119.2	
		down to 7000, 119.2, Delta 157

Leg 1 Event Description	ATC	Pilot
	15 seconds	
Dash 8 MMM85 Contact Approach FL 190 Stillwater for Teterboro will start descending immediately after frequency change)	Dash 8 M85 contact New York approach, 127.6	
		contact Approach on 127.6, M85
	30 seconds	
Lifeguard B148H	Lifeguard 48H contact New York Center on 135.97	
		New York Center on 135.97, Lifeguard 48H - thanks.

Leg 1 Event Description	ATC	Pilot

Washington Center - 134.5 (7 Minutes)

Chatter begins as soon as Mustang switches to this frequency		
Pilatus 398J contact New York Center 127.40		
	Pilatus 98J contact New York Center 127.40	
		New York on 27.40, 98J
	15 seconds	
Hawker 500FN Checks on 236 descending 15 thousand Heading140 assigned – continue descent 11 thousand		Washington Center Hawker 500FN 236 descending 15 thousand heading 140 assigned
	Hawker 500FN roger, continue descent maintain 11 thousand, Baltimore altimeter 29.90	
		11 thousand, 29.90
	10 seconds	
Citation 109WS Contact Potomac Approach 119.0 (at Smyrna for Baltimore)	Citation 109WS contact Potomac approach 119.0	
		Approach 119.0, 9WS
	10 seconds	
United flight 23, checks on 230 discretion 11 thousand (5 east of Kessel for Dulles		Washington Center United 23, 230 discretion 11 thousand
	United 23 roger	
	5 seconds	
Southwest 2631 contact Potomac Approach 119.0	Southwest 2631 contact Potomac Approach 119.0	
		Approach 119.0, Southwest 2631, see ya
	15 seconds	

Leg 1 Event Description	ATC	Pilot
United flight 23 leaving flight level 230		Center United 23 vacating 230
	Roger United 23	
	20 seconds	
Air Canada 1445 descend and maintain 8 thousand, contact Potomac Approach 119.0 (Over Westminster for Dulles)	Air Canada 1445 descend and maintain 8 thousand, contact Potomac Approach 119.0, Baltimore altimeter 29.90	
		8 thousand, Approach on 119.0, Air Canada 1445
	5 seconds	
Bonanza 2173L Checks on 5 thousand 3 hundred climbing10 thousand Off Baltimore northwest bound		Washington Center, this is Bonanza 2173L checking in 5 thousand 3 hundred climbing 10 thousand
	Bonanza 2173L roger	
	10 seconds	
Smokey One flight Descend and maintain 11 thousand, direct Andrews (no response – UHF)	Smokey One flight descend and maintain 1-1, eleven thousand, direct Andrews, Baltimore altimeter 29.90	
	15 seconds	
United 111, checks on 10 thousand four hundred, climbing 230, heading 050 assigned (Off Dulles, headed for Heathrow)		Washington Center, United 111, 15,400 climbing 230, heading 050 assigned
	United 111, roger	
	5 seconds	
Smokey One flight contact Potomac Approach, (no response, UHF)	Smokey One Flight, contact Potomac approach 289.275	
	10 seconds	

Leg 1 Event Description	ATC	Pilot
Aeroflot 432 checks on 4600 climbing 230 heading 020 (Off Dulles for Moscow)		Washington Center, Aeroflot 432, 4600 climbing 230 heading 020 assigned by ATC
	Aeroflot 432 roger, turn right 040 expect on course in ten miles	
		Turn Right 040, Aeroflot 432
	15 seconds	
Hawker 500FN contact Potomac Approach 120.45	Hawker 500FN contact Potomac approach 120.45	
		Potomac 120.45, 0FN
	10 seconds	
Aer Lingus 2233 checks on 240 descending 8 thousand – Turn left, heading 220		Center, Aer Lingus 22-33, 240 descending 8 thousand
	Roger Aer Lingus 22-33, turn left heading 220	
	10 seconds	
United 111 Contact New York Center on 125.35	United 111 contact New York Center on 125.35	
		New York on 125.35, United 111
	10 seconds	
KingAir 60KW checks on 6 thousand climbing 240 Off FDK for Indianapolis		Washington Center, KingAir 6KW checking in at 6 thousand climbing up to 240
	KingAir 60KW roger, turn left 290, expect on course in 3 minutes	
		Left turn 290, 0KW
	5 seconds	
Expert 11 cleared direct Pax River (no response – UHF)	Expert 11 cleared direct Pax River	
	10 seconds	

Leg 1 Event Description	ATC	Pilot
Eclipse 187EA descend and Maintain 11 thousand, Maintain at least 250 knots	Eclipse 187EA descend and Maintain 11 thousand, maintain at least 250 knots in transition, Baltimore altimeter 29.90	
		11 thousand, 250 knots or better, 7EA
	5 seconds	
Expert 11 Contact Potomac Approach (no response, UHF)	Expert 11, Contact contact Potomac approach 289.275	
	15 seconds	
Aeroflot 432 Contact New York Center 135.37	Aeroflot 432 contact New York Center	
		New York, 135.37, da svidanya, Aeroflot 432
	5 seconds	
Eclipse 187EA continue descent, maintain 8 thousand, contact Potomac Approach 119.0	Eclipse 187EA continue descent maintain 8 thousand, contact Potomac approach 119.0	
		8 thousand now for 7EA
	7EA, contact Potomac approach on 119.0	
		7EA Potomac on 119.0

Leg 1 Event Description	ATC	Pilot

Potomac Approach - 119.0 (15 minutes)

Chatter begins as soon as Mustang switches to this frequency		
	25 seconds	
Citation 109WS Contact Baltimore tower 119.4	Citation 109WS contact Baltimore tower 119.4	
		119.4, 9WS
	10 seconds	
Conquest 441WJ Climb and maintain 220, contact Washington Center 135.2 (climbing from Baltimore for Des Moines	Conquest 441WJ Climb and Maintain flight level 220, contact Washington Center 135.2	
		Flight level 220, Center on 135.2, 1WJ
	15 seconds	
American 5467 Contact Washington Center 135.2	American 5467, contact Washington Center 135.2	
		Center on 135.2, Good morning American 5467
	20 seconds	
Learjet QWE29 Checks on 230 descending 7 thousand		Potomac approach, Lear QWE29, 250 descending 7 thousand and we have Papa at Gaithersburg
	Roger Lear E29, Good Morning	
	30 seconds	
Cherokee 4319Y checks on 2500 climbing 4 thousand Cleared direct Lancaster		Potomac approach, Cherokee 4319Y 2500 climbing 4000
	Cherokee 4319Y cleared direct Lancaster	
		Direct Lancaster, 19Y
	30 seconds	

Leg 1 Event Description	ATC	Pilot
Meridian 5347V traffic 1 o'clock 3 miles northwest bound, 6 thousand, contact Baltimore Tower 119.4	Meridian 5347V traffic 1 o'clock 3 miles northwest bound a Skyhawk at 6 thousand, contact Baltimore tower 119.4	
		No joy on the traffic, I'm IMC, tower on 119.4
	5 seconds	
Jetstream 21A Checks on, 8 thousand, Martin State Hotel Checks in inside Smyrna		Approach, Jetstream 21A, 8 thousand, with Hotel at Martin State
	Jetstream 21A, descend and maintain 4 thousand	
		4 thousand, 21A
	30 seconds	
Skyhawk 610SP, traffic 2 o'clock 3 miles south bound 5 thousand (/MC)	Skyhawk 610Sp traffic 2 o'clock 3 miles southbound 5 thousand	
		0Sp is in IMC
	45 seconds	
American 5861 Contact Washington Center 135.2	American 5861, contact Washington Center 135.2	
		Center on 135.2, Thanks, American 5861
	25 seconds	
Cherokee 4319Y Climb and maintain 6 thousand	Cherokee 4319Y climb and maintain 6 thousand	
		Climbing 6 thousand, 19Y
	15 seconds	
CitationJet 525XD, checks on 2 thousand, climbing 11 thousand (Off Martinsberg, for Bedford)		Approach, CitationJet 525XD checking on 2000 climbing 11 thousand.
	CitationJet 525XD roger	
	40 seconds	

Leg 1 Event Description	ATC	Pilot
Saratoga 25CA Checks on 11 thousand, Baltimore Bravo – descend and maintain 7 thousand Reset transponder, squawk 4323 (Reports near Linden)		Potomac approach, Saratoga November 25CA 11 thousand, Baltimore Bravo
	25CA descend and maintain 7 thousand, reset transponder, squawk 4323 advise when you have Bravo	
		Squawk 4323, 7 thousand, 5CA has Bravo,
	15 seconds	
CapeAir 21 Contact Washington Center 135.2	CapeAir 21, contact Washington Center 135.2	
		contact Center on 135.2, CapeAir 21
	60 seconds	
Sabreliner NY15 Checks on 210 descending 7 thousand		Potomac approach, Sabreliner NY15, 210 descending 7 thousand, have Bravo at Baltimore
	Sabreliner Y15 roger	
	50 seconds	
Hawker VH-NKD climb and maintain flight level 230, contact Washington Center 135.2 (Off Dulles for Munich)	Hawker VH-NKD Climb and maintain flight level 230, contact Washington Center 135.2	
		Hawker VH-NKD climb and maintain 230, Washington on 135.2
	15 seconds	
Citation 787T Contact Washington Center 135.2	Citation 87T, contact Washington Center 135.2	
		Center on 135.2, Good morning 87T
	10 seconds	
Cessna 101LL Checks on, 8 thousand, Martin State XXX Checks in inside Smyrna		Approach, Stationair 101LL8 thousand, Martin State information Hotel
	Cessna 101LL, descend and maintain 4 thousand	

Leg 1 Event Description	ATC	Pilot
		4 thousand, 1LL
	50 seconds	
BeechJet 515RY Checks on 2100 climbing 14 thousand – Turn left 340 when able proceed direct Harrisburg (Off Baltimore for Fargo)		Washington Approach it's BeechJet 515RY checking on 2100 climbing 14 thousand
	515RY Potomac approach, turn left heading 340, when able proceed direct Harrisburg	
		Heading 340, direct Harrisburg now, 5RY
	25 seconds	
Citation 9578J Checks on, 2000 climbing 6 thousand Off Baltimore heading 030 to be looped to the west before heading to Miami		Approach Citation 9578J 2000 climbing 6 thousand heading 030 assigned
	Citation 9578J left turn 290, expect en route clearance in five minutes	
		Left 290 78J
	10 seconds	
Pilatus 452GH Checks on 230 descending 7 thousand		Potomac approach, Pilatus 452GH, 230 descending 7 thousand Gaithersburg Papa
	Pilatus 452GH roger	
	35 seconds	
AstraJet 702BC Checks on 214 descending 7 thousand Baltimore Bravo – turn right 250 descend 5 thousand (10 miles outside Smyrna		AstraJet 702BC, 214 descending 7 thousand, have Baltimore Bravo
	AstraJet 702BC descend and maintain 5 thousand, turn right heading 250	
		Right 250, 5 thousand. 2BC
	40 seconds	

Leg 1 Event Description	ATC	Pilot
CitationJet 525XD Contact Washington Center 135.2	Citation 5XD, contact Washington Center 135.2	
		Center on 135.2, Good morning 5XD
	45 seconds	
KingAir 536RB Checks on 2000 climbing 6 thousand Off Martin State for White Plains		Potomac approach, KingAir 536RB with you at two thousand climbing 6 thousand
	KingAir 536RB roger	

Leg 1 Event Description	ATC	Pilot

Martin State Tower - 121.3 (10 minutes)

Chatter begins after the Mustang has checked in with MTN Tower after passing CINDI		
	10 seconds	
Conquest C-FKTN Line up and wait and then cleared to takeoff		Martin State Tower, Conquest C-FKTN ready runway 15
	Conquest C-FKTN Runway 15 line up and wait	
		Line up and Wait, KTN
	15 seconds	
	Conquest C-FKTN, wind 130 at 13, Runway 15 cleared to takeoff	
		Runway 15, rolling, Conquest KTN
	15 seconds	
	Conquest C-FKTN, turn right heading 190	
		190 Conquest KTN
	50 seconds	
Maintenance truck seeks permission to cross runway 15 at Taxiway Bravo		Tower, truck 3 at Bravo, permission to cross runway 15 to taxiway Charlie
	Truck 3, cross runway 15 to Taxiway C, then contact Ground on point 8	
		Cross 15 to Charlie, then contact Ground
	20 seconds	
Conquest C-FKTN contact Depature	Conquest C-FKTN contact Depature	
		Switching - thanks. Conquest KTN
	180 seconds (3 minutes)	
Citation D-/POD Checks on 2000 on the approach (Number 2 behind our pilot who is number 1)		Martin state tower Citation D-IPOD 2000 on the approach at CINDI

Leg 1 Event Description	ATC	Pilot
	POD number 2 behind a Citation. Expect landing clearance short final, report beginning circle northeast	
		report circling, POD
	120 seconds	
Citation 770JM checks on 2000 /nformation Hotel		Martin State, Citation 770JM 2000 at CINDI
	Citation 770JM continue, report beginning circling northeast, confirm you have information Hotel	
		Report circling and we have Hotel, 0JM
	15 seconds	
Citation D-/POD initiates Circling maneuver		POD starting the circle
	POD wind 130 at 11, runway 15, cleared to land	
		POD cleared to land runway 15
	120 seconds	
Citation 770JM initiates Circling maneuver		7JM is starting to circle
	7JM continue	
		7JM
	50 seconds	
Citation D-/POD initiates Circling maneuver	Citation POD, contact Ground on 121.8	
		121.8, POD
	15 seconds	
Citation 770JM cleared to land	Citation 0JM wind 130 at 10, runway 15 cleared to land	Cleared to land, 0JM
	60 seconds	
Citation 770JM goes to Ground	Citation 0JM, exit taxiway Sierra, contact Ground on 121.8	
		Ground on 121.8, off at Sierra, 0JM

Martin State Ground - 121.8 No Extra Background Chatter

Apendix B.2 Background Chatter Dialogue for Experimental Flight Leg 2

Leg 1 Event Description	ATC	Pilot

MTN Clearance Delivery and Ground · 121.8 (20 minutes)

Chatter begins as soon as Mustang switches to Clearance Delivery/Ground Frequency		
Skyhawk 37BMA taxi to transient		...Alpha off the active to transient
	Cessna 378MA taxi straight ahead	
		straight ahead 8MA
	5 seconds	
	8MA bear right, transient parking is in front of the terminal building	
		Ok, thanks, MA
	5 seconds	
Hawker B07M taxi RW 15		Martin State Ground, Hawker 807M, India, taxilane Bravo to runway 15
	Hawker 807M, give way to the Skyhawk entering transient, taxi runway 15 via Foxtrot to taxiway Alpha, Hold short runway 15	
		Got the Skyhawk, taxi Foxtrot to Alpha, hold short of runway 15, 07M
	15 seconds	
Baron 952WB Taxi FBO 1		Martin State ground, it's Baron 952WB clear of 15 at Juliet, taxi T-hangers
	Baron 952WB, taxi Juliet, Foxtrot, Taxilane Gulf	
		Juliet, Foxtrot, Gulf, 2WB
	20 seconds	
KingAir 443CL NBMC Clearance to Akron		Clearance, KingAir 443CL, transient with India, Instruments to Akron

Leg 2 Event Description	ATC	Pilot
	5 seconds	
	KingAir 443CL, cleared to Akron via runway heading, vectors Martinsburg. Hagerstown, 8t Thomas Johnstown VOLAN Akron direct, climb and maintain 2000, expect flight level 260 five minutes after departure, Potomac Approach 119.0, squawk 7431	
	5 seconds	
		KingAir 443CL, Runway heading vectors Martinsburg, Hagerstown, 8t Thomas, Johnstown, VOLAN, Akron direct, 2000, 260 in five, 19.0, 7431
	3CL, readback correct	
	30 seconds	
Netjets 420 taxi RW 15		Ground, Netjets 420, 8trawberry Point, taxi with India
	Netjets 420, taxi runway 15 via Foxtrot, to Alpha, hold short of runway 15	
		Foxtrot, Alpha to 15, hold short of 15, Netjets 420
	30 seconds	
KingAir 443C taxi RW 15		Ground, KingAir 443C, Hanger 2, taxi with India
	KingAir 443C taxi runway 15 via Alpha, hold short of runway 15	
		Alpha hold short of runway 15, 43C
	40 seconds	
Cirrus 580CD taxi FBO 1		Ground, Cirrus 580CD off 15 at Juliet, taxi transient
	0CD. right on Foxtrot, taxi to the ramp	
		Foxtrot to the ramp. Cirrus 0CD
	10 seconds	

Leg 2 Event Description	ATC	Pilot
Lear 6856W taxi RW 15		Ground, Learjet 6856W Martin State with India, taxi IFR
	Lear 6856W taxi runway 15 via Foxtrot to Alpha, hold short of runway 15	
		15 via Foxtrot, Alpha, hold short of 15, 56W
	20 seconds	
Archer 4142F Taxi transient		Ground, Archer 4142F clear of 15, at Juliet
	Archer 42F, where do you park?	
		T-hangers please
	Archer 42F, Taxi right on Foxtrot, Taxilane Gulf	
		Foxtrot to Gulf, 42F
	60 seconds	
Gulfstream N8Me taxi RW 15		Ground, Gulfstream N8MC, Strawbery Point, taxi 15 with India
	Gulfstream 8MC, taxi Echo, cross runway 15 no delay, taxi Echo, Tango, left on Alpha, Hold short of runway 15	
		Echo, cross runway 15 no delay, Echo, Tango Alpha, hold short 15, 8MC
	10 seconds	
Jetprop 887JD elearance to White Plains		Martin State Ground, Jetprop 887JD Martin State with India, clearance to White Plains
	5 seconds	
	Jetprop 887JD cleared to White Plains via runway heading vectors PALEO V44 Sea Isle V139 RICED direct climb and maintain 2000, expect 15 thousand in 5 minutes, Potomac Approach on 119.0, squawk 6744	
		White Plains runway heading vectors to PALEO, V44 to Sea Isle, V149 RICED direct, nineteen zero and 6744, Jetprop 887JD
	That's V139 RICED direct	
		Oh, 139, then RICED direct
	7JD, readback correct	

Leg 2 Event Description	ATC	Pilot
	45 seconds	
Citation 460CP clearance to Nashville		Clearance, Citation 460CP, instrument to Nashville, we have India
	Citation 460CP is cleared to Nashville, via fly runway heading vectors Linden J134 COLNS J6 Charleston as filed, climb and maintain 2000, expect flight level 380 ten minutes after takeoff, Potomac departure 119.0, squawk 2537	
		Nashville, runway heading for vectors Linden,Jet 134 Collins, Jet 6 Charleston as filed, 119.0, 2537
	0CP, readback is correct	
	60 seconds	
Caravan 901JA clearance to Montreal		Martin State, this is Caravan 901JA with India, IFR to Montreal, clearance please
	5 seconds	
	Caravan 901JA is cleared to Montreal, via fly runway heading, radar vectors BELAY V499 Lancaster J6 Albany J570 BUGSY J524 Montreal direct, climb and maintain 2000, expect flight level 190 ten minutes after departure, Potomac departure 119.0, squawk 4362	
		1JA is cleared to Montreal, runway heading, vectors BELAY, V499 Lancaster J6 Albany J570 BUGSY J524 Montreal direct, 2000, 190 in ten, 119.0, 4362
	1JA, readback correct	
	30 seconds	
Falcon 843DP taxi FBO 1		Martin State ground, Falcon 843DP, clear of 15 at…[pause]..um Sierra, taxi to transient
	Falcon 843DP taxi right on Foxtrot to transient parking	
		Foxtrot to Transient, 3DP
	60 seconds	

Leg 2 Event Description	ATC	Pilot
Gulfstream 455GA taxi FBO 2		Martin State Ground, Gulfstream 455GA at Juliet, taxi to Stawberry Point
	Gulfstream 455GA give way to the Falcon on Foxtrot crossing left to right, then turn left on Foxtrot, taxi to Strawberry Point Ramp	
		Wait for the Falcon then left on Foxtrot to the Point, 5GA
	20 seconds	
Mooney 381L Clearance to Bedford		Martin State Ground, Clearance for Mooney 381L, IFR Bedford
	5 seconds	
	Mooney 381L is cleared to Hanscomb Field, via fly runway heading vectors PALEO V44 Sea Isle, as filed, climb and maintain 2000, expect 7000 ten minutes after departure, Potomac Departure 119.0, squawk 2337	
		Runway heading, vectors PALEO V44 Sea Isle, as filed, departure 119.0. squawk 2337, 81L
	30 seconds	
Viper 2 taxi Guard ramp		
		Martin State ground, Viper 2, taxi Guard Ramp
	Welcome back, Viper 2, taxi via Tango	
		Tango to the ramp, Viper 2
	60 seconds	
Citation R515U at Lockheed Martin, taxi to the compass rose		Ground, Citation R515U at Lockheed Martin, taxi to the compass rose
	Citation R515U, Turn right on Foxtrot, left on Echo, hold short of runway 15, contact the Tower on 121.8	
		Right on Foxtrot, left on Echo, contact the Tower, 15U
	15U, hold short of runway 15	
		sorry, hold short of 15, 15U

Leg 2 Event Description	ATC	Pilot
	10 seconds	
Netjets 186 Clearance to Orlando Sanford		Ground, Netjets 186 clearance to Orlando Sanford with India
	Netjets 186 is cleared to Sierra Foxtrot Bravo airport via fly runway heading vectors DAILY J61 HUBBS J193 WEAVR J121 Charleston J79 Ormond Beach direct, climb and maintain 2000, expect flight level 400 5 minutes after departure, Potomac departure 119.0, squawk 3742	
		Netjets 186 cleared to Sanford, runway heading, vectors DAILY, J61 HUBBS J193 WEAVR J121 Charleston J79 Ormond Beach direct, 2000, 400 in 5, 3742
	Netjets 186, readback correct	
	50 seconds	
Cessna Skylane 145AT clearance to Nashville		Clearance, this is Skylane 145AT, IFR to Nashville
	5 seconds	
	Sklylane 145AT is cleared to Nashville via runway heading, vectors Linden J134 COLNS J6 Charleston YOCKY direct, climb and maintain 2000, expect flight level 400 5 minutes after takeoff, Potomac departure 119.0 squawk 3375	
		Skylane 145AT is cleared to Nashville, runway heading, vectors Linden, J134 Collins J6 Charleston YOCKY direct, 119.0, 3375
	Skylane 5AT, readback correct	

Leg 1 Event Description	ATC	Pilot

MTN Tower - 121.3 (4 minutes)

Chatter begins as soon as Mustang takesoff		
	30 seconds	
Hawker B07M Cleared for takeoff		Tower, Hawker 807M, ready, IFR
	Hawker 807M, wind 120 at 10, runway 15, cleared for takeoff	
		Hawker 807M is rolling
	10 seconds	
Cherokee KL1E4 ready to take off - line up and wait		Tower, Cherokee KL1E4 is ready to go on 15
	Cherokee 1E4 runway 15 line up and wait	
	15 seconds	
Cherokee KL1E4 cleared to take off	Cherokee 1E4, winds 120 at 8, runway 15 cleared to takeoff	
		Cleared for takeoff, 1EA
	20 seconds	
Cherokee KL1E4 switched to departure	Cherokee 1E4, turn left heading 110, contact depature	
		Left 110, contact departure, bye, 1EA
	40 seconds	
Netjets 420 cleared for takeoff		Tower, Netjets 420 ready, 15
	Netjets 420 wind 120 at 9, cleared for takeoff	
		Cleared for takeoff, 420
	30 seconds	
Netjets 420 switched to depature	Netjets 420, turn right heading 190, contact depature	
		right 190 and switching to Departure, Netjets 420
	5 seconds	

Leg 2 Event Description	ATC	Pilot
Citation 734D8 On the Approach		Tower, Citation 734D8 2000 at CINDI on the approach with India
	Citation 734D8, report starting the circle, Caution Citation 10 turning right.	
		Roger, we'll report the turn, looking for the Citation, 4D8
	120 seconds	
Citation 734D8 starting to circle, cleared to land		Tower, Citation 734D8 beginning the circle
	Roger 4D8, wind 120 at 8, runway 15, cleared to land	
		cleared to land, 4D8

Leg 1 Event Description	ATC	Pilot

Potomac Depature #1 • 119.0 (5 minutes)

Chatter begins as soon as Mustang switches to this frequency		
TBM 700VB Cleared direct Yardley Climb and maintain 17 thousand contact Washington Center, 135.2 (off Gaithersburg for Plattsburg)	….direct Yardley, climb and maintain 17 thousand, contact Washington Center 135.2	
		Yardley, 17 thousand, Washington 135.2 700VB
	10 seconds	
United 4123 reports on12 thousand descending 8 thousand, Baltimore Mike (from O'Hare for Baltimore)		Potomac Approach, United ah 4123, 12 thousand, descending 8 thousand, Baltimore Mike
	United 4123 decend and maintain 5 thousand.	
		5 thousand, United 4123
	5 seconds	
Saratoga 91287 Cleared for the Martin State approach	Saratoga 91287, you are four miles from MEHAN, turn right heading 110, maintain 2600 until established, cleared for the RNAV 15 Approach into Martin State	
		Right 110, 2600 until established, cleared for the approach Saratoga 287
	10 seconds	
Lear 6806W reports on 1000 climbing 2000 Cleared heading 200 Vectors Victor 157		Potomac Departure, LearJet 6806W, 1000 climbing 2000
	Lear 6806W turn right heading 200, Vectors, Victor 157	
		Right turn heading 200, Lear 806W
	5 seconds	
FedEx 1023 (15 north of Dulles at 13 thousand, heading 060 setting up for the ILS to BWI	FedEx 1023, turn right heading 090, descend and maintain 7 thousand	
		Right 090, 7 thousand, FedEx 1023

Leg 2 Event Description	ATC	Pilot
	5 seconds	
American 1521 maintain 13 thousand (From Boston for Dulles)	American 1521. Maintain 13 thousand, contact Potomac Approach on 120.45	
		13 thousand, 120.45, American 1521
	10 seconds	
Saratoga 91287 Contact Martin State tower	Saratoga 91287 Contact Martin State Tower, 121.3	
		121.3, 287 going to tower
	5 seconds	
Jetprop 887JD Cleared Direct Sea Isle, climb and maintain 10, ten thousand – Was that for 887JD – Affirmative 887JD cleared Direct Altoona, climb and maintain 10, ten thousand	Jetprop 887JD, cleared direct to Sea Isle, climb and maintain 10, ten thousand	
		Uh, was that for 887JD?
	Affirmative, 887JD, cleared Sea Isle, climb and maintain one zero, ten thousand.	
		Sea Isle and 10 thousand, 7JD
	10 seconds	
Netjets 420 Reports on level 2000		Potomac Approach, Netjets 420 level 2000
	Netjets 420 cleared direct DAILY when able, climb and maintain 9 thousand	
		Direct DAILY 9 thousand, Netjets 420
	5 seconds	
Jetblue 1428 reports on (at PALEO) 10 thousand 5 hundred descending 6 thousand, for Dulles		Potomac Approach Jetblue 1428 10 thousand 5 hundred descending 6 thousand, Dulles with Delta
	Jetblue 1428 roger, Echo is current, advise when you have it	
		Ok, we will call back with Echo

Leg 2 Event Description	ATC	Pilot
	10 seconds	
Gulfstream 8MC reports on 1000 climbing 2000 (off Martin State, for Boeing Field)		Approach Gulfstream 8MC level 2000
	Gulfstream 8MC climb and maintain 8 thousand, cleared direct Westminster when able	
		8 thousand and direct Westminster now, 8MC
	10 seconds	
Jetblue 1428 Reports Mike		Approach, Jetblue 1428 has Echo
	Roger, thanks for Echo JetBlue	
	15 seconds	
Citation 460CP reports on 2000 out of Martin State		Potomac, Citation 460CP off Martin State, 2000
	Citation 460CP, heading 180, climb and maintain 8000, expect direct Linden	
		Heading 180, 8 thousand, CP
	5 seconds	
Lear 6806W Climb and maintain 11 thousand	Lear 806W climb and maintain 11 thousand	
		11 thousand, Lear 806W
	5 seconds	
United 4123 approach clerance to aWI runway 28	United 4123, turn right heading 250, descend and maintain 2000 until established, cleared ILS 28 Baltimore	
		Ok, United 4123, right 250, down to 2000 until established, cleared ILS runway 28, United 4123
	10 seconds	
Netjets 420 climb and maintain 12 thousand heading 200, contact Departure on 124.55	Netjets 420 , fly heading 200, climb and maintain 12 thousand, contact departure 124.55	
		heading 200, 12 thousand, departure on 124.55, Netjets 420, good day

Leg 2 Event Description	ATC	Pilot
	10 seconds	
Cactus 2315 checks on 12 thousand descending 6 thousand aaltimore		Potomac Approach, Cactus 2315 12 thousand descending 6 thousand
	Cactus 2315 roger, advise Baltimore information Mike	
		Cactus 2315 has Mike
	10 seconds	
KingAir 443C Checks on 1000 climbing off Martin State		Departure, KingAir 443C is assigned heading 090 and we are climbing 1000 on our way to 3000
	KingAir 443C roger	
	5 seconds	
Jetblue 1428 Set up for the ILS at Dulles	Jetblue 1428 turn right heading 340, contact approach on 120.45, good day	
		JetBlue 1428, 120.45, see ya

Leg 1 Event Description	ATC	Pilot

Potomac Departure #2 - 124.55 (5 minutes) - emergency decent occurs approx 2 min 15 seconds into phase

Chatter begins as soon as Mustang switches to this frequency		
	5 seconds	
Comair 5294 (5 S of DCA going to JAX at 3000 climbing to 6000)		Potomac Departure, Comair 5294, out of 3 climbing for 6
	Comair 5294, radar contact, direct to SABBI	
		Direct to SABBI, for Comair 5294
	15 seconds	
Centurion 169WW approaching Annapolis	Centurion 169WW contact approach on 119.7, good day	
		119.7 now for Centurian 169ww
	10 seconds	
Cheyenne 4116Q Checks on 1000 climbing 2000 (off Easton, MD for Daytona Beach)		Potomac departure Cheyenne 4116Q 1000 climbing 2000
	Cheyenne 4116Q, radar contact out of 1100, turn left heading 120, climb and maintain 5 thousand, Easton altimeter is 29.90	
		left heading 120, climb to 5000, 29.90 for Cheyenne 4116Q
	20 seconds	
Netjets 420 handoff to another Washington Center sector	Netjets 420, contact Washington Center on 130.52	
		Over to center on 130.52, Netjets 420. Good day.
	10 seconds	

Leg 2 Event Description	ATC	Pilot
CitationJet G-SFCJ Reports on 11 thousand descending 6 thousand (from Gander)		Potomac Approach CitationJet G-SFCJ 11 thousand descending 6 thousand with Mike
	CitationJet G-SFCJ, descend and maintain 5 thousand	
		Descend and maintain 5000, CitationJet G-SFCJ
	20 seconds	
Handoff for Comair 5294	Comair 5294, contact Washington Center on 134.25	
		34.25, Comair 294, good bye
	15 seconds	
Piaggio 180AV 10 Northeast of OTT checking in		Potomac approach, Piaggio 180AV, out of 11000 for 6000 with the weather at Leonardtown
	Piaggio 180AV turn right 220 descend and maintain 4000, expect the RNAV for runway 11, Andrew's altimeter is 29.90	
		Ok, right heading 220 and down to 4000, Piaggio 180AV
	10 seconds	
CitationJet G-SFCJ Cleared direct Martinsburg	CitationJet G-SFCJ cleared direct to HURTZ, descend and maintain 3000, contact Potomac approach on 119.7	
		Direct to HURTZ, down to 3 and approach on 119.7. Citation Jet CJ
	10 seconds	
Chautauqua 3742 Reports on 10 thousand descending 6 thousand for National		Potomac Approach, Chautauqua 3742 checking on at 10 thousand, descending 6, with India
	Chautauqua 3742, descend to 3000 - be advised they are switching the airport around, you will be the last arrival from the north	
		Chautauqua 3742 now down to 3, thanks for the heads up
	5 seconds	

Leg 2 Event Description	ATC	Pilot
Airforce One checks in enroute to Germany		Potomac departure, Air Force One is out of 2000 for 4000, request priority handling
	Air Force One, radar contact 5 miles south of Andrews, turn left heading 060, climb and maintain FL200, squawk 5522	
		Air Force One, left heading 060, climb to FL200 and we will squawk 5522, thanks for your help.
	You are welcome Sir	
	10 seconds	
Bluestreak 356 (Near Kessel for Baltimore) Reports on 9 thousand 8 hundred descending 6 thousand		Potomac Approach, Bluestreak 356 is checking on 9 thousand 8 hundred, descending 6 thousand, information Mike
	Bluestreak 356, thanks for Mike, Cleared direct Martinsburg	
		Direct Martinsburg, Bluestreak 356
	10 seconds	
Chautauqua 3742 Altitude change and handoff	Chautauqua 3742 go ahead and contact approach on 124.7, good day	
		Approach now on 124.7, Chautauqua 3742. Good day
	5 seconds	
Gulfstream 219AX direct to HURTZ, Maintain 3 thousand, contact potomac approach 119.0	Gulfstream 219AX cleared direct to HURTZ, descend and maintain 3000, contact Potomac approach on 119.0	
		direct to HURTZ, descend to 3000, over to approach on 119.0, 9AX
	10 seconds	

Leg 2 Event Description	ATC	Pilot
Skylane 21143 (ten south of OTT going to Gaithersburg) turn left heading 300 maintain 3 thousand	Skylane 21143 turn left heading 300 decend and maintain 3 thousand	
		Heading 300 and 3 thousand, 143
	10 seconds	
Air Force One handoff	Air Force One, contact Washington center on 135.42	
		Center now on 135.42, Air Force One

Leg 1 Event Description	ATC	Pilot

Potomac Departure #3 • 119.7 (3 minutes)

Chatter begins as soon as Mustang switches to this frequency		
	10 seconds	
Gulfstream A6-DWD (Off aWl for Calgary) reports on 2000 climbing 6000 heading 350		Potomac Departure Gulfstream A6-DWD 2000 climbing 6000, heading 350 assigned
	Gulfstream A6-DWD radar contact, turn left 320, climb and maintain 8000, expect on course in 10 miles	
		Left to 320, maintain 8 thousand, DWD
	20 seconds	
Flight following request from Cessna 116VH		Potomac approach, Cessna 116VH, 10 miles Northeast of Brooke VFR to Charlottesville at 1500 request flight following
	Cessna 116VH, squawk 7236 and indent	
		Cessna 116VH squawking 7236 and we will ident
	15 seconds	
alue streak 321, freq change	Bluestreak 321, contact Washington Center on 134.25	
		34.25 for Bluestreak 321, good day
	Good day	
	10 seconds	
radar contact with Cessna 116VH	Cessna 116VH, radar contact 8 miles north of Brooke at 1500, maintain VFR contact potomac approach on 124.65, he has better coverage over there then I do	
		Cessna 116VH, ok we will call him on 124.55, thanks
	No sir, it is 124.65 for approach 6VH	
		Oh OK 124.65, sorry, thanks
	15 seconds	
Delta 2010, freq change	Delta 2010, contact Washington Center on 134.25	
		Center on 134.25, Delta 2010
	15 seconds	

Leg 2 Event Description	ATC	Pilot
Saratoga 719OP climb and maintain 8000	Saratoga gOp climb and maintain 8000	
		8000, Saratoga gOp
	10 seconds	
Falcon OS33U climb to 16,000 and contact Center	Falcon 33U, climb and maintan 16,000, contact Washington Center on 134.25	
		Climb 16 thousand, Center on 134.25, Thanks

Leg 1 Event Description	ATC	Pilot

Washington Center 133.9 (25 minutes)

Chatter begins as soon as Mustang switches to this frequency - Chatter ends when lost pilot scenario begins or when pilot is tranferred to next Washington Center Frequency (134.4) participant choses not to assist lost pilot		
unnamed aircraft leaving frequency		…Air 5716, Good Day
	15 seconds	
Global 13JS Cleared direct Brickyard, climb and maintain flight level 360, Washington Center on 127.07	Global 13JS cleared Brickyard, climb and maintain flight level 360, contact Washington Center 127.07	
		Direct Brickyard, 360, twenty seven Oh seven, 3JS
	10 seconds	
Delta 2514, contact approach 120.45	Delta 2514 contact Potomac Approach 120.45	
		Approach on 120.45, Delta 2514
	40 seconds	
Premier 529HC cleared direct Snowhill – what's the spelling?	Premier 529HC cleared direct Snowhill	
		Direct Snowhill, [pause] do you have the spelling on that?
	9HC, Snowhill is Sierra Whiskey Lima	
		Direct Sierra Whiskey Lima, 9HC
	20 seconds	
American 3229 Descend and maintain 7 thousand, contact Approach 120.45	American 3229 Descend and maintain 7 thousand, contact Approach 120.45	
		Descend 7000, approach 120.45, American 3229
	10 seconds	

Leg 2 Event Description	ATC	Pilot
Comair 1589 checks on 12 thousand climbing 220		Potomac Departure, Comair 1589 12 thousand climbing flight level 220
	Comair 1589, this is Washington Center, you are cleared direct Greensboro	
		Sorry Center, Direct Greensboro Comair 1589
	40 seconds	
Ammendment to Meridian 457C routing	Meridian 457C, I have an amendment to your routing, advise ready to copy	
	5 seconds	
		57C's ready
	Meridian 457C, cleared direct Franklin, J207 Raleigh-Durham direct	
		Franklin J207 Raleigh-Durham direct, 57C - thanks
	25 seconds	
Comair 2365, turn right 030	Comair 2365, turn right 030	
		right 030, Comair 2365
	10 seconds	
American 1124 checks on 11 thousand 6 hundred climbing 240		Washington Center, American 1124 11 thousand 6 hundred, climbing flight level 240
	1124 roger	
	15 seconds	
Speedbird 1502 descent and maintain 7 thousand, contact approach 120.45	Speedbird 1502 descend and maintain 7 thousand, contact Potomac Approach on 120.45	
		7 thousand, 120.45 for Approach, Speedbird 1502
	45 seconds	

Leg 2 Event Description	ATC	Pilot
Piaggio 8870B checks on 300 descending 210 heading 140 assigned		Washington Center, Piaggio 8870B flight level 300 descending 210, heading 140 assigned
	Piaggio 8870B continue descent, maintain flight level 190	
		Flight level 190, 70B
	15 seconds	
Delta 1333 contact Washington Center 129.05	Delta 1333 contact Cleveland Center 129.05	
		Cleveland 129.05, Delta 1333, Good day
	20 seconds	
AirTran 2158 Cleared direct Richmond descend and maintain 15 thousand	AirTran 2158 cleared direct Richmond, descend and maintain 15 thousand, Richmond altimeter, 29.83	
		Direct Richmond, 15 thousand, AirTran 2158
	20 seconds	
KingAir 801GG Checks on 16 thousand 7 hundred climbing FL 250		Washington Center, good morning, KingAir 801GG's at 16 thousand 7 hundred climbing 250
	KingAir 801GG, turn 20 degrees right for traffic	
		20 right, 1GG
	15 seconds	
Conquest 425AR Checks on, 250 descending 15 thousand		Morning Center, Conquest 425AR 250 descending 15 thousand
	Conquest 425AR roger, Cleared direct Casanova	
		Direct Casanova, 5AR
	45 seconds	
United 1457 contact New York Center 119.07	United 1457contact New York Center 119.07	
		New York on 119.07, United 1457
	30 seconds	
Twin Commander 125MM Turn left 250, vectors for military airspace	Twin Commander 125MM turn left 250 for military airspace	

Leg 2 Event Description	ATC	Pilot
		Left 250, 5MM
	20 seconds	
Cactus 2114 Contact Potomac Approach 124.7	Cactus 2114 Descend and maintain 9 thousand, Reagan National altimeter 29.88, contact Potomac Approach 124.7	
		9 thousand, 124.7, Cactus 2114
	40 seconds	
Citation 7725D Checks on 11 thousand climbing 230, heading 150 assigned – cleared direct Casanova		Washington Center, Citation 7725D 11 thousand, climbing 230 heading 150 assigned
	Citation 7725D cleared direct Casanova.	
		Direct Casanova, 25D
	15 seconds	
American 1971 Contact Washington Center on 132.92	American 1971, contact Washington Center on 132.92	
		Center on 132.92, American 19-71
	20 seconds	
American 3218 checks on flight level 190, response descend and maintain 11 thousand		Washington Center, American 3218 flight level 190
	American 3218 descend and maintain 11 thousand	
		Maintain 11 thousand, American 3218
	25 seconds	
Challenger 408TB Continuous light to moderate turbulence from FL 320 to 180 on the descent		Washington Center, Challenger 408T8 checking in, flight level 180, continuous light to moderate chop between 320 and 180 on the descent
	Challenger 408T8, roger,	
	10 seconds	
Hawker 947CE Where's that turbulence?		Center, Hawker 7CE, where's that turbulence
	Hawker 7CE, standby	

Leg 2 Event Description	ATC	Pilot
	5 seconds	
Center calls Challenger 408TB for turbulence location - from 50 west of Casanova to 30 east of Casanova	Challenger 408TB where was that turbulence	
		We picked up most of it between 20 west and 20 east of Brooke VOR, 8TB
	Hawker 947CE, that turbulence is from 20 west to 20 east of Brooke VOR	
	5 seconds	
Hawker 947CE will vectoring south keep us out of the turbulence		Will vectoring south keep us clear of that turbulence?
	10 seconds	
Center calls United flight 1863, say ride conditions	United 1863, Washington Center, say ride conditions	
		Occasional light chop at 320
	5 seconds	
AirTran 2782 Checks on 10 thousand 3 hundred climbing240		Washington Center, good morning AirTran 2782, 10 thousand 3 hundred, climbing 240
approx. 14:02	AirTran 2782, roger	
	5 seconds	
	Hawker 947CE, a Boeing 767 reports occasional light chop over at 320 over Richmond	
		Can we get a southern route for 7CE
	Standby	
(lost pilot scenario may begin somewhere around here)	**10 seconds**	
American 3218 contact Potomac Approach 120.45	American 3218 contact Potomac Approach 120.45	
		120.45. American 3218, good morning
	45 seconds	

Leg 2 Event Description	ATC	Pilot
United Flight 32 leaving flight level 230		Washington Center, United 32 leaving 230
	United Flight 32, roger, BREAK	
Air Canada 1212 descend and maintain 8 thousand, contact Potomac Approach 120.45	Air Canada 1212 descend and maintain 8 thousand Dulles altimeter 29.87, Contact Potomac Approach 120.45	
		8 thousand, approach 120.45, Air Canada 1212
	40 seconds	
Centurion 48VA, checks on 10 thousand four hundred, climbing 210, heading 150 assigned		Center, this is Cessna 8VA at 10 thousand 4 hundred, climbing 210.
	Centurion 48VA, roger	
		Uh, center, we're assigned heading 150
	8VA turn left heading 100	
		100 on the heading, 8VA
	50 seconds	
Striker 6 contact Potomac Approach, (no response - UHF Freq)	Striker 9 contact Potomac Approach 250.3	
	60 seconds	
Lufhansa 1442 checks on 235 descending 16 thousand, 260 knots or greater – turn right 250 expect direct Dulles in five minutes		Washington Center, Lufthansa 1442 235 descending 16 thousand, 260 knots or greater in transition.
	Lufthansa 1442 turn right heading 250, expect direct Dulles in five minutes	
		Right turn 250, expect Dulles in five, 1442
	45 seconds	
Citation 82KW contact Potomac Approach 120.45	Citation 82KW contact Potomac approach 119.7	
		Nineteen seven 2KW
	40 seconds	

Leg 2 Event Description	ATC	Pilot
Alitalia 3305 checks on 8 climbing 230– Turn left, heading 020		Washington, Alitalia 3305 12 thousand climbing 230
	Alitalia 3305 roger, turn left heading 020	
		020, Alitalia 3305
	60 seconds	
King 12, maintain 220 knots, expect delay vectors for Andrews	King 12, maintain 220 knots, expect delay vectors for Andrews	
		220 knots, King 12
	90 seconds	
American 5834 checks on 6 thousand climbing 240		Center, American 5834 14 thousand, climbing 240
	American 5834 cleared direct Kessel	
		Direct Kessel, American 5834
	60 seconds	
King 12 cleared turn right heading 150 Contact Potomac Approach on 119.3	King 12 turn right heading 150, contact Potomac Approach 119.3	
		Heading 150, Approach 119.3

Leg 1 Event Description	ATC	Pilot

Washington Center 134.4 (15 minutes)

Chatter begins as soon as Mustang switches to this frequency		
	20 seconds	
Midwest 597 Contact Washington Center 128.75	Midwest 597, contact Washington Center 128.75	
		Center on 128.75, Midwest 597
	40 seconds	
Delta 5369 checks on 8000 climbing 11 thousand, Cleared direct Lynchburg, as Filed		Washington Center, Delta 5369 8 thousand climbing 11 thousand
	Delta 5369, cleared direct Lynchburg, as filed	
		Direct Lynchburg, Delta 5369
	30 seconds	
Continental 2548 Checks on flight level 230 cleared direct Charleston		Center, Continental 2548, flight level 230
	Continental 2548, cleared direct Charleston	
		Direct Charleston, Continental 2548
	30 seconds	
Delta 1375, Turn left heading 330	Delta 1375 turn left 330	
		330, Delta 1375
	90 seconds	
Saratoga 8396J Climb and maintain 8 thousand	Saratoga 8396J climb and maintain 8 thousand	
		8 thousand, 96J
	20 seconds	
Soutwest 2518, checks on 230, descending 11 thousand		Center, Southwest 2518, flight level 230 descending 11 thousand

Leg 2 Event Description	ATC	Pilot
	Soutwest 2518, roger	
	15 seconds	
Apache 3304P Checks on 11 thousand, Baltimore Bravo – descend and maintain 7 thousand Reset transponder, squawk 4323		Washington Center, this is Apache 3304P, checking on at 11 thousand, Baltimore Bravo
	Descend and maintain 7 thousand, reset transponder, squawk 4323	
		7 thousand, 4323, 04P
	10 seconds	
Malibu 6349L 3 miles from AHLER, maintain 6 thousand until established, cleared ILS approach runway 25 Hot Springs	Malibu 6349L, 3 miles from AHLER, maintain 6 thousand until established, cleared the ILS runway 25 approach, Hot Springs	
		6 thousand until established, cleared the Hot Springs approach, 49L
	90 seconds	
Falcon C-GGFP checks on at 12 thousand, descend and maintain 7 thousand, contact Potomac Approach 120.45		Washington center, Falcon C-GGFP 12 thousand
	Falcon C-GGFP, descend and maintain 7 thousand, contact Potomac Approach, 120.45	
		GFP, down to 7 thousand, Approach on 120.45
	60 seconds	
Delta 1479 Checks on Flight level 200 – Climb and maintain 330, direct Atlanta		Washington Center, Delta 1479, 220
	Delta 1479 climb and maintain flight level 330, cleared direct Atlanta	

Leg 2 Event Description	ATC	Pilot
		330 and direct Atlanta, Delta 1479
	25 seconds	
United 4871 Checks on, 240 Descending 16 thousand, 260 knots maximum assigned		Hello Washington Center, United 4871, 240 Descending 16 thousand, 260 knots maximum assigned
	Roger, United 4871	
	60 seconds	
Legacy 676TC Checks on 233 descending 7 thousand has Lynchburg Whiskey		Legacy 676TC Checks on 233 descending 7 thousand have Whiskey at Lynchburg
	Roger, Legacy 676TC	
	60 seconds	
AirTran 1619 Checks on 10 thousand climbing 16 Heading 150		Center, AirTran 1619, 10 thousand climbing 16 Heading 150
	AirTran 1619 turn right heading 170, airspeed 250 kts or greater	
		right 170, 250 kts. or better for AirTran 1619
	20 seconds	
Fairchild RE11D Contact Washington Center 128.75	Fairchild 11D, contact Washington Center 128.75	
		Center on 128.75, Fairchild 11D
	40 seconds	
Cherokee JJ347 Climb and maintain 8 thousand	Cherokee 347 climb and maintain 8 thousand	
		8 thousand, 347
	30 seconds	
Alaska 1219 Checks on Flight level 200 – Climb and maintain 330, direct Atlanta		Washington Center, Alaska 1219, flight level 220
	Alaska 1219 climb and maintain flight level 330, cleared direct Atlanta	

Leg 2 Event Description	ATC	Pilot
		Flight level 330, direct Atlanta, Alaska 1219
	25 seconds	
Mooney 231EE climb and maintain 15 thousand	Mooney 231EE climb and maintain 15 thousand	
		Mooney 231EE 11 thousand climbing 15
	30 seconds	
Continental 2422 Checks on flight level 230 cleared direct Charleston		Center, Continental 2422, flight level 230
	Continental 2422, cleared direct Savannah	
		Direct Savannah, Continental 2422
	90 seconds	
Delta 1118, Turn left heading 330	Delta 1118 turn left 330	
		330, Delta 1118

Hotsprings CTAF (123.0) · no extra background chatter