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16. ABSTRACT

The Next Generation Air Transportation System (NextGen) consists of a series of transformations designed to increase the capacity, safety, and security of air traffic operations. A key element of NextGen is trajectory operations. This research addresses minimum human factors requirements for flight deck interface design and operating procedures to be used for trajectory operation, in particular the procedures for disseminating trajectory clearances using voice, data comm, or a combination of both, and for entering those clearances into aircraft navigation systems. Cognitive task analyses were conducted using several techniques to better understand the human factors issues associated with disseminating and entering trajectory clearances. These task analysis methods were used to examine five tasks on each of three flight management systems (FMS). The tasks included clearances which ranged from simple to the more complex Required Time of Arrival (RTA) clearances, delivered by either voice or data comm. The models indicate that receipt of a voice clearance takes less time than receipt of a data comm clearance, unless the crew decides to write down the voice clearance. A voice clearance that is written down requires considerably more time than a data comm clearance that is printed. This supports the idea that data comm is better suited for more complex clearances since such clearances would be more likely to be written down by the crew when received via voice, and therefore less efficient by voice. In addition to the response time results, the cognitive task analyses resulted in the identification of several human factors issues and a few recommendations for NextGen data comm operations.

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Trajectory Operations Human Factors Study

Disseminating and Entering Trajectory Clearances

Final Report

GMU-TR-2012-04, Revision 2

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Executive Summary

The Next Generation Air Transportation System (NextGen) consists of a series of transformations designed to increase the capacity, safety, and security of air traffic operations. A key element of NextGen is trajectory operations, where aircraft operate on negotiated paths represented by a four dimensional trajectory (4DT). Research is necessary to support the development of minimum human factors requirements for flight deck interface design and operating procedures to be used for trajectory operations. Specifically, procedures will be needed for disseminating 2½- to 4-DT clearances using voice, data comm, or a combination of both, and for entering those clearances into aircraft navigation systems.

Cognitive task analyses were conducted using several techniques to better understand the human factors issues associated with disseminating and entering 2½- to 4-DT clearances. The techniques employed were Natural GOMS (Goals, Operators, Methods, and Selection Rules) Language (NGOMSL), CogTool, and SANLab-CM. These task analysis methods were used to examine five tasks on each of three flight management systems (FMS). The tasks included clearances which ranged from simple to the more complex Required Time of Arrival (RTA) clearances, and they were delivered by either voice or data comm.

For the five tasks, across the three FMSs, all three modeling techniques resulted in very similar estimates. NGOMSL and CogTool provide single point estimates of the time it will take an expert user to complete a given task. The minimum values produced by the SANLab-CM model represent the prediction for an expert user who makes no mistakes and has no hesitations or distractions, which generally places the estimate below the NGOMSL and CogTool estimates. The SANLab-CM mean values represent more realistic human performance, and are closer to the NGOMSL and CogTool estimates, since users likely will exhibit variability in their response times.

The models indicate that receipt of a voice clearance takes less time than receipt of a data comm clearance, unless the crew decides to write down the voice clearance. A voice clearance that is written down requires considerably more time than a data comm clearance that is printed. This supports the idea that data comm is better suited for more complex clearances since such clearances would be more likely to be written down by the crew when received via voice, and therefore less efficient by voice.

In addition to the response time results, the cognitive task analyses resulted in the identification of several human factors issues, and the following recommendations.

- When the crew must wait for feedback from the system, the system should provide both positive and negative feedback. The system should not use a lack of negative feedback to indicate positive feedback.

- Given current avionics, RTA clearances should be disseminated separately from other clearance parameters. This will allow the crew to accept and execute the other parameters before having to determine whether they can accept the RTA. When technology advances to the point where the avionics are capable of calculating whether an RTA is achievable given additional proposed parameters, such complex clearances should be disseminated as a single clearance. Then, entering an RTA and additional crossing restrictions (altitude and/or speed) together, rather than separately, would increase efficiency.

- As avionics are developed to handle TBO-type clearances, developers should be encouraged to consider industry-wide standardization. Industry-wide standardization reduces the need for training and reduces the risk of error.

- More research should be done to identify additional human factors issues and recommendations for the dissemination and entry of TBO-type clearances. SANLab-CM is a useful tool for such research since it provides for user variability and results in more realistic time predictions likely to be observed either within users over time or across different users.

Introduction

The Next Generation Air Transportation System (NextGen) consists of a series of transformations designed to increase the capacity, safety, and security of air traffic operations. A key element of NextGen is trajectory operations. Trajectory operations are defined as an air traffic management system where each aircraft in the system operates on a negotiated path represented by a four dimensional trajectory (4DT). Trajectory operations will require pilot negotiation, selection, implementation, and monitoring of aircraft status relative to position, altitude, and time.

It is envisioned that ATC clearances that modify trajectories may be delivered via voice or data communications (data comm), depending on the aircraft equipage and the complexity of the communication. Data comm would be used to deliver more complex clearances to equipped aircraft, while voice would be the secondary delivery mode, used to provide all clearances to unequipped aircraft and simpler clearances to equipped aircraft. On the flight deck, data comm clearances will likely be displayed on the multi-function control display unit (MCDU). The clearances will then be manually entered into the aircraft navigation system or, if the navigation system is integrated, the clearances can be autoloaded into the system. If clearances are autoloaded, pilots will be procedurally required to review and accept all clearances prior to execution.

Research is necessary to support the development of minimum human factors requirements for flight deck interface design and operating procedures to be used for trajectory operations. Specifically, procedures will be needed for disseminating 2½- to 4-DT clearances using voice, data comm, or a combination of both, and for entering those clearances into aircraft navigation systems.

This report describes cognitive task analyses conducted using several techniques to better understand the human factors issues associated with disseminating and entering 2½- to 4-DT clearances. These techniques include Natural GOMS (Goals, Operators, Methods, and Selection Rules) Language (NGOMSL), CogTool, and SANLab-CM. The NGOMSL technique was used to create a baseline model for the receipt and entry of clearance information. The cognitive modeling software CogTool was used to provide independent estimates of the time required to perform these activities. The cognitive modeling software, SANLab-CM, which uses the output of the CogTool model as input, provides additional quantitative predictions of user behavior. The information derived from these models provides insight into the dissemination and clearance entry processes, which can be used to identify human factors issues and ultimately to provide recommendations for the development of procedures that might reduce errors or improve efficiency.

Cognitive Task Analyses

A cognitive task analysis is the systematic analysis of the cognitive and physical activities required to complete a task. There are numerous task analysis techniques, and numerous uses of a task analysis, including equipment design, procedure development, training design, and the development of decision support systems. In this project, several task analysis methods were used to examine each of several tasks on each of several flight management systems. The tasks and equipment used in the task analyses are described briefly below and discussed in more detail in a previous report from Baker, Gee, Nelson, Chang, and Boehm-Davis (2012).

Tasks and Equipment

The tasks used in the cognitive task analysis ranged from simple to more complex. They were delivered by both voice (radio clearance) and data comm (FMS clearance), and they included Required Time of Arrival (RTA) clearances. These tasks were:

Task 1
Voice: "Proceed direct to HELPR."
Data Comm: PROCEED DIRECT TO HELPR

Task 2
Voice: "Cross HELPR at flight level one niner zero."
Data Comm: CROSS HELPR AT FL190

Task 3
Voice: "Cross HELPR at one eight zero zero Zulu."
Data Comm: CROSS HELPR AT TIME 1800Z

Task 4
Voice: "Cross HELPR at one eight zero zero Zulu at flight level one niner zero."
Data Comm: CROSS HELPR AT TIME 1800Z AT FL190

Task 5
Voice: "Cross HELPR at one eight zero zero Zulu at or above flight level one niner zero."
Data Comm: CROSS HELPR AT TIME 1800Z AT OR ABOVE FL190

Three flight management systems (FMS) were used in the cognitive task analysis.

NGOMSL

GOMS (Goals, Operators, Methods, and Selection Rules) is a method of modeling user behavior in order to evaluate interface design (Card, Moran, & Newell, 1983). A GOMS model describes how a user would accomplish a task by listing the goals required to complete the task, the steps (methods) to accomplish the goals, the actions (operators) to complete the methods, and the selection rules in the event that there is more than one method to accomplish a goal.

Natural GOMS Language, or NGOMSL, is a variant of the GOMS technique (Kieras, 1996). Like GOMS, the NGOMSL technique describes the steps required to accomplish a task using goals, methods, operators, and selection rules. The steps are structured sequentially and hierarchically, and execution times are assigned for each operator, method, and selection. Once a model is complete, specific task scenarios are traced through the model (a "trace") to determine an execution time for that task scenario on a given system. Multiple traces are run to allow identification of usability issues and to compare the usability of alternate designs.

In this analysis, an NGOMSL model was developed for the receipt of a clearance by the flight deck from air traffic control via either voice or data communications, the acceptance or rejection of the clearance, and the entry of the clearance information into the FMS. Due to differences between the three FMSs, a separate model was developed for each FMS. The three base NGOMSL models are provided in Appendix A.

Traces were then run based on scenarios generated from the tasks described above. For each FMS, two traces were run for each of the five tasks and for both voice and data comm conditions, resulting in 20 traces per FMS and 60 total traces. The traces are provided in Appendix B.

CogTool

CogTool (John, 2011) is prototyping software for developing and evaluating user interfaces. The tool allows the developer to create a representation, or prototype, of a display. The developer then uses this representation to simulate how the user would interact with the display to complete a specific task. The tool uses a predictive human performance model (which takes into account cognitive, perceptual, and physical task components) to evaluate how long it will take a skilled user to complete the task using the display. It creates the task analysis using the keystroke level model (KLM) combined with estimates based on the Adaptive Control of Thought – Rational (ACT-R) cognitive architecture (Anderson & Lebiere, 1998), and provides a trace of the task analysis, along with the time estimates arising from the ACT-R model.

In this analysis, CogTool models were developed based on the NGOMSL models. Example figures depicting a CogTool task representation and a portion of a trace are provided in Appendix C.

SANLab-CM

SANLab-CM (Stochastic Activity Network Laboratory for Cognitive Modeling; Patton & Gray, 2010) is software that was developed to model a task while accounting for individual variation in response time. The other cognitive models in this analysis (NGOMSL and CogTool) assume expert performance with no errors and a single value for estimating individual parameters (e.g., the use of 0.4 seconds to move the hand to the keyboard). Although pilots are highly trained

experts, it is unrealistic to assume that every pilot, or even a single pilot, will react with exactly the same response time on every occasion. Inserting variability into the model acknowledges that different pilots, or the same pilot over time, will sometimes take more time to complete an operation than at other times.

SANLab-CM provides for variability by assigning a distribution of response times for each individual parameter in the model. On any given trace of the model, a value for each parameter is pulled from its distribution, and the critical path is computed using those values. The model is then run hundreds or even thousands of times, producing many unique critical paths, as well as the time required for each unique critical path. This then creates a distribution of critical path times. This can provide the developer with a range of times likely to be observed either within users over time or across different users.

In this analysis, SANLab-CM models were developed based on the output from the CogTool models; a segment of a SANLab-CM trace is included in Appendix D.

Results

NGOMSL Models
Using the three NGOMSL models, representing the three flight management systems, twenty traces were run with each model, four for each of the five tasks, two with a voice clearance and two with a data comm clearance. The assumptions for each of the twenty traces were varied across the traces to obtain time estimates based on a larger range of conditions. These assumptions included, for example, how the clearance information was retained (remembered, written down, printed), whether the clearance was accepted or rejected, and whether the pilot's hand was already positioned on the FMS when the clearance was received. A summary of the basic assumptions is provided in Table 1, while the detailed assumptions for each trace are included with the traces in Appendix B. The results from the traces are summarized in Table 2.

Table 1. Assumptions for NGOMSL Traces

Trace	Task	Modality	Remembered, Written, or Printed?	Remembered when Entering?	Hands Start on FMS?	Clearance Acceptable
1	1	Voice	Remembered	Yes	No	Yes
2	1	Voice	Remembered	Yes	No	No
3	1	Data Comm	Printed	Yes	Yes	No
4	1	Data Comm	Remembered	Yes	Yes	No
5	2	Voice	Written	No	No	Yes
6	2	Voice	Remembered	Yes	No	Yes
7	2	Data Comm	Printed	No	Yes	Yes
8	2	Data Comm	Remembered	Yes	Yes	Yes
9	3	Voice	Remembered	Yes	No	Yes
10	3	Voice	Written	Yes	No	No
11	3	Data Comm	Remembered	Yes	Yes	Yes
12	3	Data Comm	Printed	Yes	Yes	No
13	4	Voice	Written	No	No	Yes
14	4	Voice	Remembered	Yes	No	Yes
15	4	Data Comm	Printed	No	No	Yes (non-RTA) No (RTA)
16	4	Data Comm	Remembered	Yes	Yes	Yes (non-RTA) No (RTA)
17	5	Voice	Written	No	No	Yes
18	5	Voice	Remembered	Yes	No	Yes
19	5	Data Comm	Printed	No	No	Yes
20	5	Data Comm	Remembered	Yes	Yes	Yes

Table 2. Execution time resulting from NGOMSL traces

Trace	Task	Modality	FMS 1 (time in seconds)	FMS 2 (time in seconds)	FMS 3 (time in seconds)
1	1	Voice	18.68	18.68	18.68
2	1	Voice	15.79	15.79	15.79
3	1	Data Comm	25.62	23.24	23.24
4	1	Data Comm	21.71	19.33	19.33
5	2	Voice	48.51	48.51	48.51
6	2	Voice	26.35	26.35	26.35
7	2	Data Comm	36.78	34.40	34.40
8	2	Data Comm	28.87	26.49	26.49
9	3	Voice	23.11	35.60	37.96
10	3	Voice	34.37	45.77	48.13
11	3	Data Comm	25.81	36.02	38.28
12	3	Data Comm	29.72	38.84	41.10
13	4	Voice	68.62	80.52	84.99
14	4	Voice	37.85	49.75	54.22
15	4	Data Comm	50.57	60.09	64.56
16	4	Data Comm	38.65	48.17	52.54
17	5	Voice	74.31	86.21	90.68
18	5	Voice	40.84	52.74	57.21
19	5	Data Comm	54.65	64.17	68.64
20	5	Data Comm	41.93	51.45	55.92

Note. Different traces of the same task made different assumptions, as shown in Table 1. These different assumptions led to different execution times.

An examination of these results is informative.

- There is a considerable difference between receipt of a voice clearance and receipt of a data comm clearance when the crew decides to write down the voice clearance. The trace results indicate that a voice clearance that is simply remembered requires less time (M = 31.76 seconds, *SD* = 16.11) than a data comm clearance that is remembered (M = 35.40, *SD* = 12.57), but that a voice clearance that is written down requires more time (M = 63.26, *SD* = 20.62) than a data comm clearance that is printed (M = 43.33, *SD* = 16.42). This supports the idea that data comm is better suited for more complex clearances since such clearances would be much more likely to be written down by the crew when received via voice, and therefore less efficient by voice.

- For non-RTA clearances (Tasks 1 and 2), the results for FMSs 2 and 3 are identical. This suggests that there has been some standardization in avionics for entering current clearances. In comparison, for RTA clearances (Tasks 3, 4, and 5), the results for the

same two FMSs are different. This suggests that RTA implementation has not been standardized in avionics development.

- For non-RTA clearances, FMS 1 results in the same or slightly longer times, while for RTA clearances, it appears to result in the shortest times. However, FMS 1 does not have automatic RTA capability. The time appears shortest because there is no clearance entry for an RTA clearance. With FMS 1, the crew can attempt to manually manage the RTA. However, using flight control to manage RTA was beyond the scope of the NGOMSL; thus, it is not modeled.

- In comparing times for RTA clearances between FMS 2 and FMS 3, FMS 2 appears to result in shorter times. However, the times were also affected by the modeling assumptions. With FMS 2, the FMS performs an internal RTA calculation that can take approximately 10 to 15 seconds. However, system performance and system delays were not included in the model. An additional 10 to 15 seconds would make the times for FMS 2 longer than those for FMS 3.

CogTool

CogTool was used to generate models of four of the NGOMSL traces. Like NGOMSL, CogTool yields mean times for task completion; however, it also produces output in a format that can be imported into other programs for more complex analyses. Tasks 1 through 4 were modeled using each of the three FMSs. Specifically, Traces 4, 8, 11, and 16 were modeled. The CogTool results are provided in Table 3.

Table 3. Execution time resulting from CogTool traces

Trace	Task	Modality	FMS 1 (time in seconds)	FMS 2 (time in seconds)	FMS 3 (time in seconds)
4	1	Data Comm	20.8	17.6	17.6
8	2	Data Comm	25.1	22.3	22.3
11	3	Data Comm	22.9	32.2	30.3
16	4	Data Comm	33.4	41.2	42.5

SANLab-CM

SANLab-CM models were then developed from the CogTool analyses. As described above, SANLab-CM allows a distribution to be applied to each component of the model. These distributions provide a better understanding of the ranges of performance that can be expected on the flight deck. As recommended by the creators of SANLab-CM, Gaussian (normal) distributions were used, and their variance was randomly set to a value between 0.1 and 1.0 times the mean, which were imported from CogTool. Using these settings, SANLab-CM

randomly selected a value from each of the distributions for every iteration. All SANLab-CM analysis consisted of 1,000 iterations.

Comparison of Results

Four traces (Traces 4, 8, 11, and 16) were analyzed using the three task analysis techniques. The results are summarized in Table 4, and displayed in Figure 1.

Table 4. Execution time resulting from NGOMSL, CogTool, and SANLab-CM

			FMS 1 (time in seconds)	FMS 2 (time in seconds)	FMS 3 (time in seconds)
Trace 4: Task 1, PROCEED DIRECT TO HELPR	**NGOMSL**		21.7	19.3	19.3
	CogTool		20.8	17.6	17.6
	SANLab	Mean	23.09	19.3	19.3
		SD	2.8	2.7	2.7
		Min	13.9	11.6	11.6
		Max	34.2	33.1	33.1
Trace 8: Task 2, CROSS HELPR AT FL190	**NGOMSL**		28.9	26.5	26.5
	CogTool		25.1	22.3	22.3
	SANLab	Mean	27.7	24.6	24.3
		SD	3.5	3.4	3.2
		Min	18.6	14.7	16.8
		Max	44.1	37.0	38.7
Trace 11: Task 3, CROSS HELPR AT TIME 1800Z	**NGOMSL**		25.8	36.0	38.3
	CogTool		22.9	32.2	30.3
	SANLab	Mean	24.6	36.2	33.7
		SD	3.3	3.8	3.5
		Min	15.1	25.8	21.6
		Max	36.8	57.2	47.7
Trace 16: Task 4, CROSS HELPR AT TIME 1800Z AT FL190	**NGOMSL**		38.7	48.2	52.5
	CogTool		33.4	41.2	42.5
	SANLab	Mean	37.6	47.0	47.8
		SD	4.2	4.4	4.5
		Min	27.4	33.9	34.9
		Max	57.2	65.3	64.5

Figure 1. Comparison of NGOMSL, CogTool, and SANLab-CM Results
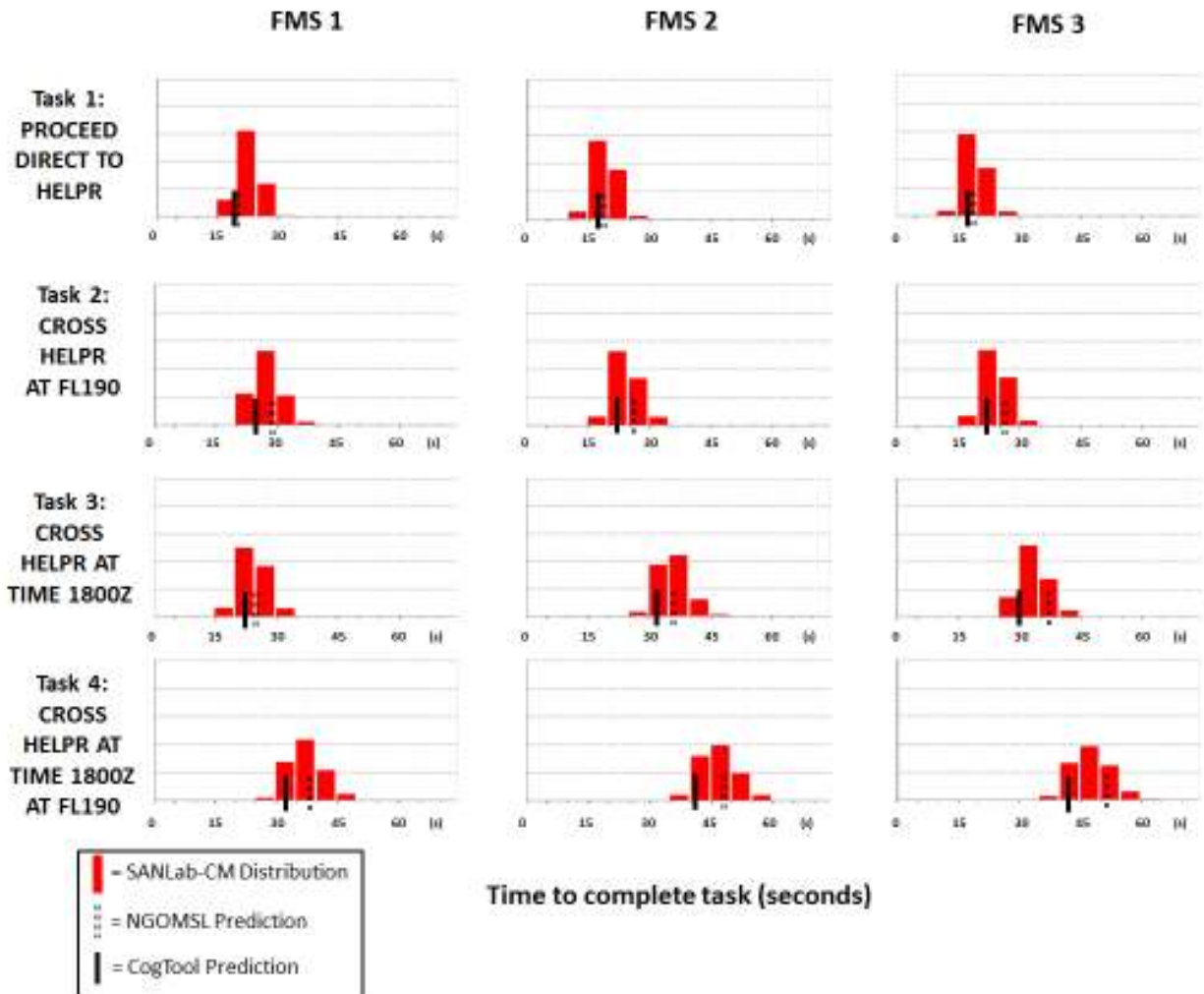
Note. SANLab-CM distribution shows the frequency with which each time point was estimated by a run of the model. The lines for NGOMSL and CogTool show the point estimates for each of those models.

As shown in both Table 4 and Figure 1, all three modeling techniques provide very similar estimates using a given FMS to complete a given task. NGOMSL and CogTool provide single point estimates of the time it will take an expert user to complete a given task. The minimum value produced by the SANLab-CM model represents the approximation for an expert who makes no mistakes and has no pauses or interruptions. The mean value produced by the SANLab-CM model is closer to the NGOMSL and CogTool predictions. The somewhat faster time predictions from the CogTool model are likely due to CogTool's use of Fitt's Law to calculate unique operator times for individual hand movements, while NGOMSL uses an average time for all hand movements. It may also be due to CogTool's use of ACT-R estimates for some parameters in lieu of NGOMSL estimates.

In all cases, the SANLab-CM average time is higher than the CogTool result but equal to or less than the NGOMSL result. The SANLab-CM estimates may be more reflective of observed times in the real world as people do vary in their responses from time to time and the individual component distributions may be more realistic than the CogTool or NGOMSL results. Performance at the lower end of the distribution is limited by the time it takes to complete physical movements and minimum cognitive processing times. The upper end of the distribution may be reflective of a pilot being distracted by something, or being somewhat unfamiliar with new or seldom-used FMS functionality. Thus, the SANLab-CM predictions may be the most reasonable to use when making decisions about how long it might take for a pilot to complete a particular task.

Human Factors Issues

During development of the cognitive task analyses, several human factors issues were identified.

- In one of the flight management systems, after the crew enters the RTA, they must wait for the system to calculate whether the RTA is achievable. If the RTA is not achievable, the message "Unable RTA" is displayed. However, if the RTA is achievable, no positive message is displayed. This means that after the crew enters the RTA, they must wait for an unspecified time, during which they are not sure whether the RTA is achievable or whether the system has not finished calculating whether the RTA is achievable.

- None of the FMSs investigated appears to have the capability to handle a complex clearance that includes both RTA and additional information. For a clearance that includes both an RTA and an altitude and/or speed restriction, the crew would first enter the altitude and/or speed restriction since the change in altitude or speed would affect the RTA calculation. The crew would have to execute the altitude and/or speed change in order for the system to be able to accurately calculate whether the RTA is achievable. This presents the crew with a dilemma. They cannot execute the altitude and/or speed change without accepting the clearance, but they do not yet know if they can accept the RTA portion of the clearance. If a clearance is disseminated as a single message via data comm, there is currently no provision for partial acceptance.

- Currently, speed and altitude crossing restrictions are entered at the same place on the FMS. However, time restrictions are entered on a separate page. For a clearance that includes both an RTA and an altitude and/or speed restriction (e.g., cross position at time at level), the altitude and speed restrictions are entered on one FMS page, while the time restriction is entered on a different FMS page.

Recommendations

Based on the development of the cognitive models and the results of the traces, the following recommendations are provided.

- When the crew must wait for feedback from the system, the system should provide both positive and negative feedback. The system should not use a lack of negative feedback to indicate positive feedback.

- Given current avionics, RTA clearances should be disseminated separately from other clearance parameters. This will allow the crew to accept and execute the other parameters before having to determine whether they can accept the RTA. When technology advances to the point where the avionics are capable of calculating whether an RTA is achievable given additional proposed parameters, such complex clearances should be disseminated as a single clearance. Then, entering an RTA and additional crossing restrictions (altitude and/or speed) together, rather than separately, would increase efficiency.

- As avionics are developed to handle TBO-type clearances, developers should be encouraged to consider industry-wide standardization. Industry-wide standardization reduces the need for training and reduces the risk of error.

- More research should be done to identify additional human factors issues and recommendations for the dissemination and entry of TBO-type clearances. SANLab-CM is a useful tool for such research since it provides for user variability and results in more realistic time predictions likely to be observed either within users over time or across different users.

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Appendix A: NGOMSL Models for Receiving and Entering Clearances

FMS 1

Assumptions:

ATC has sent one or more clearances

Only one crew member reads each written clearance

For initial reading of clearance and for readback, clearances must be read aloud. Other readings may be aloud or silent

Crew will initially reply "Standby" to ATC before deciding whether to accept an RTA clearance

Waypoint in clearance is in flight plan

Must enter non-RTA portion of mixed clearance into FMS before deciding on RTA portion

Clearances changing current flight parameters (altitude, speed, heading) are not entered into the FMS

Crew can choose to accept a clearance or report unable

"Unable" = "Reject"

To get back to an open clearance still need to press "DLK" then "NEW MSGS"

System response time is negligible

Model only includes receiving, responding to, and entering clearances. It does not include any other aircraft manipulation

Model included RTA clearances, proceed direct to clearance, and crossing restrictions; Other clearances can be added to the model

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Handle a clearance		0.1			0.1	
Step 1	Selection Rule: Receive a clearance	0.1			0.1	
Step 2	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance	0.1			0.1	
Step 3	Accomplish Goal: Enter a clearance	0.1			0.1	
Step 4	Selection Rule: Decide on a clearance	0.1			0.1	
Step 5	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <keyword> = "Activate" and Accomplish Goal: Line select key	0.1			0.1	
Step 6	Selection Rule: Respond to a clearance	0.1			0.1	
Step 7	Decide: IF there are more clearances, THEN GOTO Step 1	0.1			0.1	
Step 8	Return with goal accomplished	0.1			0.1	

				Total time	0.9	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Selection Rule for Goal: Receive a clearance		0.1			0.1	
Step 1	IF clearance is text, THEN Accomplish Goal: Receive an FMS clearance	0.1			0.1	
Step 2	IF clearance is audio, THEN Accomplish Goal: Receive a radio clearance	0.1			0.1	
Step 3	Return with goal accomplished	0.1			0.1	
				Total time	0.3	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Receive a radio clearance		0.1			0.1	
Step 1	Listen to clearance and retain <clearance information>	0.1	Listen(n)	0.4	variable	Estimated using time to speak, 150 wpm (0.4 sec/word)
Step 2	Decide: IF printed clearance is desired, THEN Accomplish Goal: Write down clearance	0.1			0.1	
Step 3	Return with goal accomplished	0.1			0.1	
				Total time		

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Receive an FMS clearance		0.1			0.1	
Step 1	Decide: IF hand not on FMS, THEN move hand to FMS	0.1	H	0.4	0.5	
Step 2	Accomplish Goal: Open clearance	0.1			0.1	
Step 3	Accomplish Goal: Read the clearance	0.1			0.1	
Step 4	Decide: IF printed clearance is desired, THEN Selection Rule: Get printed copy	0.1			0.1	
Step 5	Return with goal accomplished	0.1			0.1	
				Total time	1	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Open clearance		0.1			0.1	
Step 1	Remember <menu key> = "DLK" and Accomplish Goal: Menu key	0.1			0.1	
Step 2	Remember <keyword> = "NEW MSGS" and Accomplish Goal: Line select key	0.1			0.1	
Step 3	Remember <keyword> = clearance to open and Accomplish Goal: Line select key	0.1			0.1	
Step 4	Return with goal accomplished	0.1			0.1	
				Total time	0.5	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Selection Rule for Goal: Get printed copy		0.1			0.1	
Step 1	IF printer is available, THEN Accomplish Goal: Print the clearance	0.1			0.1	
Step 2	IF pen and paper are available, THEN Accomplish Goal: Write down clearance	0.1			0.1	
Step 3	Return with goal accomplished	0.1			0.1	
				Total time	**0.3**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Print the clearance		0.1			0.1	
Step 1	Remember <keyword> = "Print" and Accomplish Goal: Line select key	0.1			0.1	
Step 2	Reach for print out	0.1	R	0.41	0.51	
Step 3	Grasp print out	0.1	G	0.7	0.8	
Step 4	Transport paper to reading position	0.1	R	0.41	0.51	
Step 5	Return with goal accomplished	0.1			0.1	
				Total time	**2.12**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Write down clearance		0.1			0.1	
Step 1	Decide: IF paper is not readily available, THEN Accomplish Goal: Obtain paper	0.1			0.1	
Step 2	Decide: IF pen is not in hand, THEN Accomplish Goal: Obtain pen	0.1			0.1	
Step 3	Recall <clearance information> and write <clearance information>	0.1	W(n)	2.7	variable	Writing, 22 wpm (2.7 sec/word)
Step 4	Return pen to original location	0.1	R	0.41	0.51	
Step 5	Release pen	0.1	RL	0.07	0.17	
Step 6	Move hand back to starting location	0.1	H	0.4	0.5	
Step 7	Return with goal accomplished	0.1			0.1	
				Total time		

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Obtain paper		0.1			0.1	
Step 1	Reach for paper	0.1	R	0.41	0.51	
Step 2	Grasp paper	0.1	G	0.7	0.8	
Step 3	Transport paper to writing space	0.1	R	0.41	0.51	
Step 4	Release paper	0.1	RL	0.07	0.17	
Step 5	Return with goal accomplished	0.1			0.1	
				Total time	**2.19**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Obtain pen		0.1			0.1	
Step 1	Reach for pen	0.1	R	0.41	0.51	
Step 2	Grasp pen	0.1	G	0.7	0.8	
Step 3	Transport pen to paper	0.1	R	0.41	0.51	
Step 4	Position the pen over paper	0.1	PN	0.06	0.16	
Step 5	Return with goal accomplished	0.1			0.1	
				Total time	**2.18**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Read the clearance		0.1			0.1	
Step 1	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and retain <clearance information>	0.2	Sp(n) or Read(n)	0.4 or 0.24	variable	Reading aloud, use time to speak, 150 wpm (0.4 sec/word) Reading silently, use time to read, 250 wpm (0.24 sec/word)
Step 2	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished	0.1			0.1	
Step 3	Remember <menu key> = "Next" and Accomplish Goal: Menu key	0.1			0.1	
Step 4	GOTO Step 1	0.1			0.1	
				Total time		

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Selection Rule for Goal: Method of reading		0.1			0.1	
Step 1	IF clearance is in writing, THEN Accomplish Goal: Read clearance from paper	0.1			0.1	
Step 2	IF clearance is not in writing and is on screen, THEN Accomplish Goal: Read the clearance	0.1			0.1	
Step 3	Return with goal accomplished	0.1			0.1	
				Total time	**0.3**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Selection Rule for Goal: Decide on a clearance		0.1			0.1	
Step 1	IF clearance includes only RTA, THEN Accomplish Goal: Compare ETA to RTA	0.1			0.1	
Step 2	IF clearance includes only non-RTA, THEN Accomplish Goal: Determine whether non-RTA clearance is acceptable	0.1			0.1	
Step 3	IF clearance includes both RTA and other information, THEN Accomplish Goal: Determine whether mixed clearance is acceptable	0.1			0.1	
Step 4	Return with goal accomplished	0.1			0.1	
				Total time	**0.3**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Compare ETA to RTA		0.1			0.1	
Step 1	Compare clearance RTA to displayed ETA	0.1	M	1.2	1.3	
Step 2	Decide: IF speed can be managed to maintain a predicted ETA that conforms with the assigned RTA, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"	0.2	M(n)	1.2	variable	A standard time is not available for this parameter, so a mental (1.2 sec) has been assigned. For more complex decisions, additional mentals can be added.
Step 3	Return with goal accomplished	0.1			0.1	
				Total time		

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Determine whether non-RTA clearance is acceptable		0.1			0.1	
Step 1	Determine whether non-RTA clearance is acceptable	0.1	M(n)	1.2	variable	A standard time is not available for this parameter, so a mental (1.2 sec) has been assigned. For more complex decisions, additional mentals can be added.
Step 2	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"	0.2			0.2	
Step 3	Return with goal accomplished	0.1			0.1	
				Total time		

Method for Goal: Determine whether mixed clearance is acceptable		0.1			0.1	
Step 1	Accomplish Goal: Determine whether non-RTA clearance is acceptable	0.1			0.1	
Step 2	Decide: IF <response> = "Unable," THEN Return with goal accomplished	0.1			0.1	
Step 3	Accomplish Goal: Compare ETA to RTA	0.1			0.1	
Step 4	Return with goal accomplished	0.1			0.1	
				Total time	**0.5**	

Method for Goal: Read clearance from paper		0.1			0.1	
Step 1	Decide: IF paper not visible, THEN move paper	0.1	R	0.41	0.51	
Step 2	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on paper aloud and retain <clearance information>, ELSE Read information on paper and retain <clearance information>	0.2	Sp(n) or Read(n)	0.4 or 0.24	variable	Reading aloud, use time to speak, 150 wpm (0.4 sec/word) Reading silently, use time to read, 250 wpm (0.24 sec/word)
Step 3	Return with goal accomplished	0.1			0.1	
				Total time		

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Selection Rule for Goal: Respond to a clearance		0.1			0.1	
Step 1	IF responding by voice, THEN Accomplish Goal: Respond by voice	0.1			0.1	
Step 2	IF responding by FMS, THEN Accomplish Goal: Respond by FMS	0.1			0.1	
Step 3	Return with goal accomplished	0.1			0.1	
				Total time	**0.3**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Respond by voice		0.1			0.1	
Step 1	Move hand to yoke and "Push to talk" button	0.1	H	0.4	0.5	
Step 2	Press "Push to talk" button	0.1	B	0.1	0.2	
Step 3	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by <response>	0.2	Sp(n)	0.4	variable	Speaking, 150 wpm (0.4 sec/word)
Step 4	Release "Push to talk" button	0.1	B	0.1	0.2	
Step 5	Return hand to FMS	0.1	H	0.4	0.5	
Step 6	Return with goal accomplished	0.1			0.1	
				Total time		

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Selection Rule for Goal: Method of clearance readback		0.1			0.1	
Step 1	IF <clearance information> is remembered, THEN Accomplish Goal: Readback clearance from memory	0.1			0.1	
Step 2	IF <clearance information> is not remembered, THEN Accomplish Goal: Readback clearance by reading	0.1			0.1	
Step 3	Return with goal accomplished	0.1			0.1	
				Total time	**0.3**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Readback clearance from memory		0.1			0.1	
Step 1	Recall <clearance information> and state <clearance information> followed by call sign	0.1	Sp(n)	0.4	variable	Speaking, 150 wpm (0.4 sec/word)
Step 2	Return with goal accomplished	0.1			0.1	
				Total time		

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Readback clearance by reading		0.1			0.1	
Step 1	Selection Rule: Method of reading	0.1			0.1	
Step 2	State call sign	0.1	Sp(n)	0.4	variable	Speaking, 150 wpm (0.4 sec/word)
Step 3	Return with goal accomplished	0.1			0.1	
				Total time		

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Respond by FMS		0.1			0.1	
Step 1	Decide: IF hand not on FMS, THEN move hand to FMS	0.1	H	0.4	0.5	
Step 2	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance	0.1			0.1	
Step 3	Remember <keyword> = <response> and Accomplish Goal: Line select key	0.1			0.1	
Step 4	Remember <keyword> = "Send" and Accomplish Goal: Line select key	0.1			0.1	
Step 5	Return with goal accomplished	0.1			0.1	
				Total time	1	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Enter a clearance		0.1			0.1	
Step 1	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading	0.2			0.2	
Step 2	Decide: IF hand not on FMS, THEN move hand to FMS	0.1	H	0.4	0.5	
Step 3	Selection Rule: Specific clearance type	0.1			0.1	
Step 4	Return with goal accomplished	0.1			0.1	
				Total time	1	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Selection Rule for Goal: Specific clearance type		0.1			0.1	
Step 1	IF clearance is proceed direct to, THEN Accomplish Goal: Enter proceed direct to	0.1			0.1	
Step 2	IF clearance is crossing restriction, THEN Accomplish Goal: Enter crossing restriction	0.1			0.1	
Step 3	IF clearance is crossing restriction with RTA, THEN Accomplish Goal: Enter crossing restriction	0.1			0.1	
Step 4	IF clearance is only RTA, THEN Accomplish Goal: Locate waypoint	0.1			0.1	
Step 5	Return with goal accomplished	0.1			0.1	
				Total time	**0.3**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Enter proceed direct to		0.1			0.1	
Step 1	Accomplish Goal: Locate waypoint	0.1			0.1	
Step 2	Point finger to left line select key next to waypoint	0.1	R	0.41	0.51	
Step 3	Press and release left line select key next to waypoint	0.1	K	0.28	0.38	
Step 4	Decide: IF not on first page of flight plan, THEN Remember <menu key> = "FPL" and Accomplish Goal: Menu key	0.1			0.1	
Step 5	Point finger to second left line select key	0.1	R	0.41	0.51	
Step 6	Press and release second left line select key	0.1	K	0.28	0.38	
Step 7	Return with goal accomplished	0.1			0.1	
				Total time	**2.18**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Enter crossing restriction		0.1			0.1	
Step 1	Accomplish Goal: Locate waypoint	0.1			0.1	
Step 2	Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad	0.1			0.1	
Step 3	Remember <menu key> = "/" and Accomplish Goal: Menu key	0.1			0.1	
Step 4	Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad	0.1			0.1	
Step 5	Point finger to right line select key next to waypoint	0.1	R	0.41	0.51	
Step 6	Press and release right line select key next to waypoint	0.1	K	0.28	0.38	
Step 7	Return with goal accomplished	0.1			0.1	
				Total time	**1.49**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Enter into scratchpad		0.1			0.1	
Step 1	Remember <menu key> = first digit/character in restrictions and Accomplish Goal: Menu key	0.1			0.1	
Step 2	Remember <menu key> = next digit/character in restriction and Accomplish Goal: Menu key	0.1			0.1	
Step 3	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2	0.1			0.1	
Step 4	If <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below	0.1			0.1	
Step 5	Return with goal accomplished	0.1			0.1	
				Total time	**0.6**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Selection Rule for Goal: At and above or below		0.1			0.1	
Step 1	IF restriction is at or above, THEN Remember <menu key> = "A" and Accomplish Goal: Menu key	0.1			0.1	
Step 2	IF restriction is below, THEN Remember <menu key> = "B" and Accomplish Goal: Menu key	0.1			0.1	
Step 3	Return with goal accomplished	0.1			0.1	
				Total time	**0.3**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Menu key		0.1			0.1	
Step 1	Recall <menu key> and point finger to appropriate menu key	0.1	R	0.41	0.51	
Step 2	Press and release appropriate menu key	0.1	K	0.28	0.38	
Step 3	Return with goal accomplished	0.1			0.1	
				Total time	**1.09**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Line select key		0.1			0.1	
Step 1	Recall <keyword> and point finger to line select key next to keyword	0.1	R	0.41	0.51	
Step 2	Press and release appropriate line select key	0.1	K	0.28	0.38	
Step 3	Return with goal accomplished	0.1			0.1	
				Total time	**1.09**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Locate waypoint		0.1			0.1	
Step 1	Remember <menu key> = "FPL" and Accomplish Goal: Menu key	0.1			0.1	
Step 2	Search for waypoint	0.1	Read(n)	0.24	variable	Reading, 250 wpm (0.24 sec/word)
Step 3	Decide: IF waypoint is found, THEN Return with goal accomplished	0.1			0.1	
Step 4	Remember <menu key> = "Next" and Accomplish Goal: Menu key	0.1			0.1	
Step 5	GOTO Step 2	0.1			0.1	
				Total time		

FMS 2

Assumptions:

ATC has sent one or more clearances

Only one crew member reads each written clearance

For initial reading of clearance and for readback, clearances must be read aloud. Other readings may be aloud or silent

Crew will initially reply "Standby" to ATC before deciding whether to accept an RTA clearance

Waypoint in clearance is in flight plan

Avionics are capable of handling complex RTA clearances (RTA plus altitude and/or speed restrictions)

Must enter non-RTA portion of mixed clearance into FMS before deciding on RTA portion

Do not need to be on a specific page to determine whether a non-RTA clearance is acceptable

Clearances changing current flight parameters (altitude, speed, heading) are not entered into the FMS

Crew can choose to accept a clearance or report unable

"Unable" = "Reject"

System response time is negligible

Model only includes receiving, responding to, and entering clearances. It does not include any other aircraft manipulation

Model included RTA clearances, proceed direct to clearance, and crossing restrictions; Other clearances can be added to the model

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Handle a clearance		0.1			0.1	
Step 1	Selection Rule: Receive a clearance	0.1			0.1	
Step 2	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance	0.1			0.1	
Step 3	Accomplish Goal: Enter a clearance	0.1			0.1	
Step 4	Selection Rule: Decide on a clearance	0.1			0.1	
Step 5	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key	0.1			0.1	
Step 6	Selection Rule: Respond to a clearance	0.1			0.1	
Step 7	Decide: IF there are more clearances, THEN GOTO Step 1	0.1			0.1	
Step 8	Return with goal accomplished	0.1			0.1	
				Total time	**0.9**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Selection Rule for Goal: Receive a clearance		0.1			0.1	
Step 1	IF clearance is text, THEN Accomplish Goal: Receive an FMS clearance	0.1			0.1	
Step 2	IF clearance is audio, THEN Accomplish Goal: Receive a radio clearance	0.1			0.1	
Step 3	Return with goal accomplished	0.1			0.1	
				Total time	**0.3**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Receive a radio clearance		0.1			0.1	
Step 1	Listen to clearance and retain <clearance information>	0.1	Listen(n)	0.4	variable	Estimated using time to speak, 150 wpm (0.4 sec/word)
Step 2	Decide: IF printed clearance is desired, THEN Accomplish Goal: Write down clearance	0.1			0.1	
Step 3	Return with goal accomplished	0.1			0.1	
				Total time		

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Receive an FMS clearance		0.1			0.1	
Step 1	Decide: IF hand not on FMS, THEN move hand to FMS	0.1	H	0.4	0.5	
Step 2	Accomplish Goal: Open clearance	0.1			0.1	
Step 3	Accomplish Goal: Read the clearance	0.1			0.1	
Step 4	Decide: IF printed clearance is desired, THEN Selection Rule: Get printed copy	0.1			0.1	
Step 5	Return with goal accomplished	0.1			0.1	
				Total time	**1**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Open clearance		0.1			0.1	
Step 1	Remember <menu key> = "ATC" and Accomplish Goal: Menu key	0.1			0.1	
Step 2	Remember <keyword> = clearance to open and Accomplish Goal: Line select key	0.1			0.1	
Step 3	Return with goal accomplished	0.1			0.1	
				Total time	**0.4**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Selection Rule for Goal: Get printed copy		0.1			0.1	
Step 1	IF printer is available, THEN Accomplish Goal: Print the clearance	0.1			0.1	
Step 2	IF pen and paper are available, THEN Accomplish Goal: Write down clearance	0.1			0.1	
Step 3	Return with goal accomplished	0.1			0.1	
				Total time	**0.3**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Print the clearance		0.1			0.1	
Step 1	Remember <keyword> = "Print" and Accomplish Goal: Line select key	0.1			0.1	
Step 2	Reach for print out	0.1	R	0.41	0.51	
Step 3	Grasp print out	0.1	G	0.7	0.8	
Step 4	Transport paper to reading position	0.1	R	0.41	0.51	
Step 5	Return with goal accomplished	0.1			0.1	
				Total time	**2.12**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Write down clearance		0.1			0.1	
Step 1	Decide: IF paper is not readily available, THEN Accomplish Goal: Obtain paper	0.1			0.1	
Step 2	Decide: IF pen is not in hand, THEN Accomplish Goal: Obtain pen	0.1			0.1	
Step 3	Recall <clearance information> and write <clearance information>	0.1	W(n)	2.7	variable	Writing, 22 wpm (2.7 sec/word)
Step 4	Return pen to original location	0.1	R	0.41	0.51	
Step 5	Release pen	0.1	RL	0.07	0.17	
Step 6	Move hand back to starting location	0.1	H	0.4	0.5	
Step 7	Return with goal accomplished	0.1			0.1	
				Total time		

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Obtain paper		0.1			0.1	
Step 1	Reach for paper	0.1	R	0.41	0.51	
Step 2	Grasp paper	0.1	G	0.7	0.8	
Step 3	Transport paper to writing space	0.1	R	0.41	0.51	
Step 4	Release paper	0.1	RL	0.07	0.17	
Step 5	Return with goal accomplished	0.1			0.1	
				Total time	**2.19**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Obtain pen		0.1			0.1	
Step 1	Reach for pen	0.1	R	0.41	0.51	
Step 2	Grasp pen	0.1	G	0.7	0.8	
Step 3	Transport pen to paper	0.1	R	0.41	0.51	
Step 4	Position the pen over paper	0.1	PN	0.06	0.16	
Step 5	Return with goal accomplished	0.1			0.1	
				Total time	**2.18**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Read the clearance		0.1			0.1	
Step 1	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and retain <clearance information>	0.2	Sp(n) or Read(n)	0.4 or 0.24	variable	Reading aloud, use time to speak, 150 wpm (0.4 sec/word) Reading silently, use time to read, 250 wpm (0.24 sec/word)
Step 2	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished	0.1			0.1	
Step 3	Remember <menu key> = "Next Page" and Accomplish Goal: Menu key	0.1			0.1	
Step 4	GOTO Step 1	0.1			0.1	
				Total time		

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Selection Rule for Goal: Method of reading		0.1			0.1	
Step 1	IF clearance is in writing, THEN Accomplish Goal: Read clearance from paper	0.1			0.1	
Step 2	IF clearance is not in writing and is on screen, THEN Accomplish Goal: Read the clearance	0.1			0.1	
Step 3	Return with goal accomplished	0.1			0.1	
				Total time	**0.3**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Selection Rule for Goal: Decide on a clearance		0.1			0.1	
Step 1	IF clearance includes only RTA, THEN Accomplish Goal: Determine whether RTA clearance is acceptable	0.1			0.1	
Step 2	IF clearance includes only non-RTA, THEN Accomplish Goal: Determine whether non-RTA clearance is acceptable	0.1			0.1	
Step 3	IF clearance includes both RTA and other information, THEN Accomplish Goal: Determine whether mixed clearance is acceptable	0.1			0.1	
Step 4	Return with goal accomplished	0.1			0.1	
				Total time	**0.3**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Determine whether RTA clearance is acceptable		0.1			0.1	
Step 1	Decide: IF not on RTA page, THEN Accomplish Goal: Go to RTA page	0.1			0.1	
Step 2	Wait for system response	0.1			0.1	System response time is not included in the model.
Step 3	Decide: IF system returns "Unable RTA", THEN Retain <response> = "Unable," ELSE Retain <response> = "Wilco"	0.2	M	1.2	1.4	
Step 4	Return with goal accomplished	0.1			0.1	
				Total time	**1.8**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Determine whether non-RTA clearance is acceptable		0.1			0.1	
Step 1	Determine whether non-RTA clearance is acceptable	0.1	M(n)	1.2	variable	A standard time is not available for this parameter, so a mental (1.2 sec) has been assigned. For more complex decisions, additional mentals can be added.
Step 2	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"	0.2			0.2	
Step 3	Return with goal accomplished	0.1			0.1	
				Total time		

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Determine whether mixed clearance is acceptable		0.1			0.1	
Step 1	Accomplish Goal: Determine whether non-RTA clearance is acceptable	0.1			0.1	
Step 2	Decide: IF <response> = "Unable," THEN Return with goal accomplished	0.1			0.1	
Step 3	Accomplish Goal: Determine whether RTA clearance is acceptable	0.1			0.1	
Step 4	Return with goal accomplished	0.1			0.1	
				Total time	**0.5**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Read clearance from paper		0.1			0.1	
Step 1	Decide: IF paper not visible, THEN move paper	0.1	R	0.41	0.51	
Step 2	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on paper aloud and retain <clearance information>, ELSE Read information on paper and retain <clearance information>	0.2	Sp(n) or Read(n)	0.4 or 0.24	variable	Reading aloud, use time to speak, 150 wpm (0.4 sec/word) Reading silently, use time to read, 250 wpm (0.24 sec/word)
Step 3	Return with goal accomplished	0.1			0.1	
				Total time		

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Selection Rule for Goal: Respond to a clearance		0.1			0.1	
Step 1	IF responding by voice, THEN Accomplish Goal: Respond by voice	0.1			0.1	
Step 2	IF responding by FMS, THEN Accomplish Goal: Respond by FMS	0.1			0.1	
Step 3	Return with goal accomplished	0.1			0.1	
				Total time	**0.3**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Respond by voice		0.1			0.1	
Step 1	Move hand to yoke and "Push to talk" button	0.1	H	0.4	0.5	
Step 2	Press "Push to talk" button	0.1	B	0.1	0.2	
Step 3	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by <response>	0.2	Sp(n)	0.4	variable	Speaking, 150 wpm (0.4 sec/word)
Step 4	Release "Push to talk" button	0.1	B	0.1	0.2	
Step 5	Return hand to FMS	0.1	H	0.4	0.5	
Step 6	Return with goal accomplished	0.1			0.1	
				Total time		

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Selection Rule for Goal: Method of clearance readback		0.1			0.1	
Step 1	IF <clearance information> is remembered, THEN Accomplish Goal: Readback clearance from memory	0.1			0.1	
Step 2	IF <clearance information> is not remembered, THEN Accomplish Goal: Readback clearance by reading	0.1			0.1	
Step 3	Return with goal accomplished	0.1			0.1	
				Total time	**0.3**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Readback clearance from memory		0.1			0.1	
Step 1	Recall <clearance information> and state <clearance information> followed by call sign	0.1	Sp(n)	0.4	variable	Speaking, 150 wpm (0.4 sec/word)
Step 2	Return with goal accomplished	0.1			0.1	

		Total time				

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Readback clearance by reading		0.1			0.1	
Step 1	Selection Rule: Method of reading	0.1			0.1	
Step 2	State call sign	0.1	Sp(n)	0.4	variable	Speaking, 150 wpm (0.4 sec/word)
Step 3	Return with goal accomplished	0.1			0.1	
				Total time		

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Respond by FMS		0.1			0.1	
Step 1	Decide: IF hand not on FMS, THEN move hand to FMS	0.1	H	0.4	0.5	
Step 2	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance	0.1			0.1	
Step 3	Remember <keyword> = <response> and Accomplish Goal: Line select key	0.1			0.1	
Step 4	Remember <keyword> = "Send" and Accomplish Goal: Line select key	0.1			0.1	
Step 5	Return with goal accomplished	0.1			0.1	
				Total time	1	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Enter a clearance		0.1			0.1	
Step 1	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading	0.2			0.2	
Step 2	Decide: IF hand not on FMS, THEN move hand to FMS	0.1	H	0.4	0.5	
Step 3	Selection Rule: Specific clearance type	0.1			0.1	
Step 4	Return with goal accomplished	0.1			0.1	
				Total time	1	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Selection Rule for Goal: Specific clearance type		0.1			0.1	
Step 1	IF clearance is proceed direct to, THEN Accomplish Goal: Enter proceed direct to	0.1			0.1	
Step 2	IF clearance is only crossing restriction, THEN Accomplish Goal: Enter crossing restriction	0.1			0.1	
Step 3	IF clearance is only RTA, THEN Accomplish Goal: Enter RTA	0.1			0.1	
Step 4	IF clearance is crossing restriction with RTA, THEN Accomplish Goal: Enter mixed clearance	0.1			0.1	
Step 5	Return with goal accomplished	0.1			0.1	
				Total time	**0.3**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Enter proceed direct to		0.1			0.1	
Step 1	Accomplish Goal: Locate waypoint	0.1			0.1	
Step 2	Point finger to left line select key next to waypoint	0.1	R	0.41	0.51	
Step 3	Press and release left line select key next to waypoint	0.1	K	0.28	0.38	
Step 4	Decide: IF not on first page of flight plan, THEN Remember <menu key> = "Legs" and Accomplish Goal: Menu key	0.1			0.1	
Step 5	Point finger to first left line select key	0.1	R	0.41	0.51	
Step 6	Press and release first left line select key	0.1	K	0.28	0.38	
Step 7	Return with goal accomplished	0.1			0.1	
				Total time	**2.18**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Enter crossing restriction		0.1			0.1	
Step 1	Accomplish Goal: Locate waypoint	0.1			0.1	
Step 2	Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad	0.1			0.1	
Step 3	Remember <menu key> = "/" and Accomplish Goal: Menu key	0.1			0.1	
Step 4	Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad	0.1			0.1	
Step 5	Point finger to right line select key next to waypoint	0.1	R	0.41	0.51	
Step 6	Press and release right line select key next to waypoint	0.1	K	0.28	0.38	
Step 7	Return with goal accomplished	0.1			0.1	
				Total time	**1.49**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Enter into scratchpad		0.1			0.1	
Step 1	Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key	0.1			0.1	
Step 2	Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key	0.1			0.1	
Step 3	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2	0.1			0.1	
Step 4	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below	0.1			0.1	
Step 5	Return with goal accomplished	0.1			0.1	
				Total time	**0.6**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Selection Rule for Goal: At and above or below		0.1			0.1	
Step 1	IF restriction is at or above, THEN Remember <menu key> = "A" and Accomplish Goal: Menu key	0.1			0.1	
Step 2	IF restriction is below, THEN Remember <menu key> = "B" and Accomplish Goal: Menu key	0.1			0.1	
Step 3	Return with goal accomplished	0.1			0.1	
				Total time	**0.3**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Enter RTA		0.1			0.1	
Step 1	Decide: IF waypoint not located, THEN Accomplish Goal: Locate waypoint	0.1			0.1	
Step 2	Point finger to left line select key next to waypoint	0.1	R	0.41	0.51	
Step 3	Press and release left line select key next to waypoint	0.1	K	0.28	0.38	
Step 4	Accomplish Goal: Go to RTA page	0.1			0.1	
Step 5	Remember <keyword> = "RTA Waypoint" and Accomplish Goal: Line select key	0.1			0.1	
Step 6	Retain <clearance value> = digits/characters in clearance and Accomplish Goal: Enter into scratchpad	0.1			0.1	
Step 7	Point finger to right line select key next to waypoint	0.1	R	0.41	0.51	
Step 8	Press and release right line select key next to waypoint	0.1	K	0.28	0.38	
Step 9	Return with goal accomplished	0.1			0.1	
				Total time	**2.38**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Enter mixed clearance		0.1			0.1	
Step 1	Accomplish Goal: Enter crossing restriction	0.1			0.1	
Step 2	Accomplish Goal: Enter RTA	0.1			0.1	
Step 3	Return with goal accomplished	0.1			0.1	
				Total time		

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Menu key		0.1			0.1	
Step 1	Recall <menu key> and point finger to appropriate menu key	0.1	R	0.41	0.51	
Step 2	Press and release appropriate menu key	0.1	K	0.28	0.38	
Step 3	Return with goal accomplished	0.1			0.1	
				Total time	**1.09**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Line select key		0.1			0.1	
Step 1	Recall <keyword> and point finger to line select key next to keyword	0.1	R	0.41	0.51	
Step 2	Press and release appropriate line select key	0.1	K	0.28	0.38	
Step 3	Return with goal accomplished	0.1			0.1	
				Total time	**1.09**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Locate waypoint		0.1			0.1	
Step 1	Remember <menu key> = "Legs" and Accomplish Goal: Menu key	0.1			0.1	
Step 2	Search for waypoint	0.1	Read(n)	0.24	variable	Reading, 250 wpm (0.24 sec/word)
Step 3	Decide: IF waypoint is found, THEN Return with goal accomplished	0.1			0.1	
Step 4	Remember <menu key> = "Next Page" and Accomplish Goal: Menu key	0.1			0.1	
Step 5	GOTO Step 2	0.1			0.1	
				Total time		

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Go to RTA page		0.1			0.1	
Step 1	Remember <menu key> = "Prog" and Accomplish Goal: Menu key	0.1			0.1	
Step 2	Remember <menu key> = "Next Page" and Accomplish Goal: Menu key	0.1			0.1	
Step 3	Remember <menu key> = "Next Page" and Accomplish Goal: Menu key	0.1			0.1	
Step 4	Return with goal accomplished	0.1			0.1	
				Total time	**0.5**	

FMS 3

Assumptions:

ATC has sent one or more clearances

Only one crew member reads each written clearance

For initial reading of clearance and for readback, clearances must be read aloud. Other readings may be aloud or silent

Crew will initially reply "Standby" to ATC before deciding whether to accept an RTA clearance

Waypoint in clearance is in flight plan

Avionics are capable of handling complex RTA clearances (RTA plus altitude and/or speed restrictions)

Must enter non-RTA portion of mixed clearance into FMS before deciding on RTA portion

Do not need to be on a specific page to determine whether a non-RTA clearance is acceptable

Clearances changing current flight parameters (altitude, speed, heading) are not entered into the FMS

Crew can choose to accept a clearance or report unable

"Unable" = "Reject"

System response time is negligible

Model only includes receiving, responding to, and entering clearances. It does not include any other aircraft manipulation

Model included RTA clearances, proceed direct to clearance, and crossing restrictions; Other clearances can be added to the model

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Handle a clearance		0.1			0.1	
Step 1	Selection Rule: Receive a clearance	0.1			0.1	
Step 2	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance	0.1			0.1	
Step 3	Accomplish Goal: Enter a clearance	0.1			0.1	
Step 4	Selection Rule: Decide on a clearance	0.1			0.1	
Step 5	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key	0.1			0.1	
Step 6	Selection Rule: Respond to a clearance	0.1			0.1	
Step 7	Decide: IF there are more clearances, THEN GOTO Step 1	0.1			0.1	
Step 8	Return with goal accomplished	0.1			0.1	
				Total time	**0.9**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Selection Rule for Goal: Receive a clearance		0.1			0.1	
Step 1	IF clearance is text, THEN Accomplish Goal: Receive an FMS clearance	0.1			0.1	
Step 2	IF clearance is audio, THEN Accomplish Goal: Receive a radio clearance	0.1			0.1	
Step 3	Return with goal accomplished	0.1			0.1	
				Total time	**0.3**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Receive a radio clearance		0.1			0.1	
Step 1	Listen to clearance and retain <clearance information>	0.1	Listen (n)	0.4	variable	Estimated using time to speak, 150 wpm (0.4 sec/word)
Step 2	Decide: IF printed clearance is desired, THEN Accomplish Goal: Write down clearance	0.1			0.1	
Step 3	Return with goal accomplished	0.1			0.1	
				Total time		

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Receive an FMS clearance		0.1			0.1	
Step 1	Decide: IF hand not on FMS, THEN move hand to FMS	0.1	H	0.4	0.5	
Step 2	Accomplish Goal: Open clearance	0.1			0.1	
Step 3	Accomplish Goal: Read the clearance	0.1			0.1	
Step 4	Decide: IF printed clearance is desired, THEN Selection Rule: Get printed copy	0.1			0.1	
Step 5	Return with goal accomplished	0.1			0.1	
				Total time	**1**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Open clearance		0.1			0.1	
Step 1	Remember <menu key> = "ATC" and Accomplish Goal: Menu key	0.1			0.1	
Step 2	Remember <keyword> = clearance to open and Accomplish Goal: Line select key	0.1			0.1	
Step 3	Return with goal accomplished	0.1			0.1	
				Total time	**0.4**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Selection Rule for Goal: Get printed copy		0.1			0.1	
Step 1	IF printer is available, THEN Accomplish Goal: Print the clearance	0.1			0.1	
Step 2	IF pen and paper are available, THEN Accomplish Goal: Write down clearance	0.1			0.1	
Step 3	Return with goal accomplished	0.1			0.1	
				Total time	**0.3**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Print the clearance		0.1			0.1	
Step 1	Remember <keyword> = "Print" and Accomplish Goal: Line select key	0.1			0.1	
Step 2	Reach for print out	0.1	R	0.41	0.51	
Step 3	Grasp print out	0.1	G	0.7	0.8	
Step 4	Transport paper to reading position	0.1	R	0.41	0.51	
Step 5	Return with goal accomplished	0.1			0.1	
				Total time	**2.12**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Write down clearance		0.1			0.1	
Step 1	Decide: IF paper is not readily available, THEN Accomplish Goal: Obtain paper	0.1			0.1	
Step 2	Decide: IF pen is not in hand, THEN Accomplish Goal: Obtain pen	0.1			0.1	
Step 3	Recall <clearance information> and write <clearance information>	0.1	W(n)	2.7	variable	Writing, 22 wpm (2.7 sec/word)
Step 4	Return pen to original location	0.1	R	0.41	0.51	
Step 5	Release pen	0.1	RL	0.07	0.17	
Step 6	Move hand back to starting location	0.1	H	0.4	0.5	
Step 7	Return with goal accomplished	0.1			0.1	
				Total time		

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Obtain paper		0.1			0.1	
Step 1	Reach for paper	0.1	R	0.41	0.51	
Step 2	Grasp paper	0.1	G	0.7	0.8	
Step 3	Transport paper to writing space	0.1	R	0.41	0.51	
Step 4	Release paper	0.1	RL	0.07	0.17	
Step 5	Return with goal accomplished	0.1			0.1	
				Total time	**2.19**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Obtain pen		0.1			0.1	
Step 1	Reach for pen	0.1	R	0.41	0.51	
Step 2	Grasp pen	0.1	G	0.7	0.8	
Step 3	Transport pen to paper	0.1	R	0.41	0.51	
Step 4	Position the pen over paper	0.1	PN	0.06	0.16	
Step 5	Return with goal accomplished	0.1			0.1	
				Total time	**2.18**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Read the clearance		0.1			0.1	
Step 1	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and retain <clearance information>	0.2	Sp(n) or Read(n)	0.4 or 0.24	variable	Reading aloud, use time to speak, 150 wpm (0.4 sec/word) Reading silently, use time to read, 250 wpm (0.24 sec/word)
Step 2	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished	0.1			0.1	
Step 3	Remember <menu key> = "Next Page" and Accomplish Goal: Menu key	0.1			0.1	
Step 4	GOTO Step 1	0.1			0.1	
				Total time		

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Selection Rule for Goal: Method of reading		0.1			0.1	
Step 1	IF clearance is in writing, THEN Accomplish Goal: Read clearance from paper	0.1			0.1	
Step 2	IF clearance is not in writing and is on screen, THEN Accomplish Goal: Read the clearance	0.1			0.1	
Step 3	Return with goal accomplished	0.1			0.1	
				Total time	**0.3**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Selection Rule for Goal: Decide on a clearance		0.1			0.1	
Step 1	IF clearance includes only RTA, THEN Accomplish Goal: Determine whether RTA clearance is acceptable	0.1			0.1	
Step 2	IF clearance includes only non-RTA, THEN Accomplish Goal: Determine whether non-RTA clearance is acceptable	0.1			0.1	
Step 3	IF clearance includes both RTA and other information, THEN Accomplish Goal: Determine whether mixed clearance is acceptable	0.1			0.1	
Step 4	Return with goal accomplished	0.1			0.1	
				Total time	**0.3**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Determine whether RTA clearance is acceptable		0.1			0.1	
Step 1	Decide: IF not on RTA page, THEN Accomplish Goal: Go to RTA page	0.1			0.1	
Step 2	Decide: IF RTA is between minimum and maximum RTAs, THEN Retain <response> = "Wilco" ELSE Retain <response> = "Unable"	0.2	M	1.2	1.4	
Step 3	Return with goal accomplished	0.1			0.1	
				Total time	**1.7**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Determine whether non-RTA clearance is acceptable		0.1			0.1	
Step 1	Determine whether non-RTA clearance is acceptable	0.1	M(n)	1.2	variable	A standard time is not available for this parameter, so a mental (1.2 sec) has been assigned. For more complex decisions, additional mentals can be added.
Step 2	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"	0.2			0.2	
Step 3	Return with goal accomplished	0.1			0.1	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
				Total time		

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Determine whether mixed clearance is acceptable		0.1			0.1	
Step 1	Accomplish Goal: Determine whether non-RTA clearance is acceptable	0.1			0.1	
Step 2	Decide: IF <response> = "Unable," THEN Return with goal accomplished	0.1			0.1	
Step 3	Accomplish Goal: Determine whether RTA clearance is acceptable	0.1			0.1	
Step 4	Return with goal accomplished	0.1			0.1	
				Total time	**0.5**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Read clearance from paper		0.1			0.1	
Step 1	Decide: IF paper not visible, THEN move paper	0.1	R	0.41	0.51	
Step 2	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on paper aloud and retain <clearance information>, ELSE Read information on paper and retain <clearance information>	0.2	Sp(n) or Read(n)	0.4 or 0.24	variable	Reading aloud, use time to speak, 150 wpm (0.4 sec/word) Reading silently, use time to read, 250 wpm (0.24 sec/word)
Step 3	Return with goal accomplished	0.1			0.1	
				Total time		

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Selection Rule for Goal: Respond to a clearance		0.1			0.1	
Step 1	IF responding by voice, THEN Accomplish Goal: Respond by voice	0.1			0.1	
Step 2	IF responding by FMS, THEN Accomplish Goal: Respond by FMS	0.1			0.1	
Step 3	Return with goal accomplished	0.1			0.1	
				Total time	**0.3**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Respond by voice		0.1			0.1	
Step 1	Move hand to yoke and "Push to talk" button	0.1	H	0.4	0.5	
Step 2	Press "Push to talk" button	0.1	B	0.1	0.2	
Step 3	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by <response>	0.2	Sp(n)	0.4	variable	Speaking, 150 wpm (0.4 sec/word)
Step 4	Release "Push to talk" button	0.1	B	0.1	0.2	
Step 5	Return hand to FMS	0.1	H	0.4	0.5	
Step 6	Return with goal accomplished	0.1			0.1	
				Total time		

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Selection Rule for Goal: Method of clearance readback		0.1			0.1	
Step 1	IF <clearance information> is remembered, THEN Accomplish Goal: Readback clearance from memory	0.1			0.1	
Step 2	IF <clearance information> is not remembered, THEN Accomplish Goal: Readback clearance by reading	0.1			0.1	
Step 3	Return with goal accomplished	0.1			0.1	
				Total time	**0.3**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Readback clearance from memory		0.1			0.1	
Step 1	Recall <clearance information> and state <clearance information> followed by call sign	0.1	Sp(n)	0.4	variable	Speaking, 150 wpm (0.4 sec/word)
Step 2	Return with goal accomplished	0.1			0.1	
				Total time		

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Readback clearance by reading		0.1			0.1	
Step 1	Selection Rule: Method of reading	0.1			0.1	
Step 2	State call sign	0.1	Sp(n)	0.4	variable	Speaking, 150 wpm (0.4 sec/word)
Step 3	Return with goal accomplished	0.1			0.1	
				Total time		

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Respond by FMS		0.1			0.1	
Step 1	Decide: IF hand not on FMS, THEN move hand to FMS	0.1	H	0.4	0.5	
Step 2	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance	0.1			0.1	
Step 3	Remember <keyword> = <response> and Accomplish Goal: Line select key	0.1			0.1	
Step 4	Remember <keyword> = "Send" and Accomplish Goal: Line select key	0.1			0.1	
Step 5	Return with goal accomplished	0.1			0.1	
				Total time	**1**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Enter a clearance		0.1			0.1	
Step 1	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading	0.2			0.2	
Step 2	Decide: IF hand not on FMS, THEN move hand to FMS	0.1	H	0.4	0.5	
Step 3	Selection Rule: Specific clearance type	0.1			0.1	
Step 4	Return with goal accomplished	0.1			0.1	
				Total time	**1**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Selection Rule for Goal: Specific clearance type		0.1			0.1	
Step 1	IF clearance is proceed direct to, THEN Accomplish Goal: Enter proceed direct to	0.1			0.1	
Step 2	IF clearance is only crossing restriction, THEN Accomplish Goal: Enter crossing restriction	0.1			0.1	
Step 3	IF clearance is only RTA, THEN Accomplish Goal: Enter RTA	0.1			0.1	
Step 4	IF clearance is crossing restriction with RTA, THEN Accomplish Goal: Enter mixed clearance	0.1			0.1	
Step 5	Return with goal accomplished	0.1			0.1	
				Total time	**0.3**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Enter proceed direct to		0.1			0.1	
Step 1	Accomplish Goal: Locate waypoint	0.1			0.1	
Step 2	Point finger to left line select key next to waypoint	0.1	R	0.41	0.51	
Step 3	Press and release left line select key next to waypoint	0.1	K	0.28	0.38	
Step 4	Decide: IF not on first page of flight plan, THEN Remember <menu key> = "Legs" and Accomplish Goal: Menu key	0.1			0.1	
Step 5	Point finger to first left line select key	0.1	R	0.41	0.51	
Step 6	Press and release first left line select key	0.1	K	0.28	0.38	
Step 7	Return with goal accomplished	0.1			0.1	
				Total time	**2.18**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Enter crossing restriction		0.1			0.1	
Step 1	Accomplish Goal: Locate waypoint	0.1			0.1	
Step 2	Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad	0.1			0.1	
Step 3	Remember <menu key> = "/" and Accomplish Goal: Menu key	0.1			0.1	
Step 4	Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad	0.1			0.1	
Step 5	Point finger to right line select key next to waypoint	0.1	R	0.41	0.51	
Step 6	Press and release right line select key next to waypoint	0.1	K	0.28	0.38	
Step 7	Return with goal accomplished	0.1			0.1	
				Total time	**1.49**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Enter into scratchpad		0.1			0.1	
Step 1	Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key	0.1			0.1	
Step 2	Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key	0.1			0.1	
Step 3	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2	0.1			0.1	
Step 4	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below	0.1			0.1	
Step 5	Return with goal accomplished	0.1			0.1	
				Total time	**0.6**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Selection Rule for Goal: At and above or below		0.1			0.1	
Step 1	IF restriction is at or above, THEN Remember <menu key> = "A" and Accomplish Goal: Menu key	0.1			0.1	
Step 2	IF restriction is below, THEN Remember <menu key> = "B" and Accomplish Goal: Menu key	0.1			0.1	
Step 3	Return with goal accomplished	0.1			0.1	
				Total time	**0.3**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Enter RTA		0.1			0.1	
Step 1	Accomplish Goal: Go to RTA page	0.1			0.1	
Step 2	Retain <clearance value> = characters in waypoint and Accomplish Goal: Enter into scratchpad	0.1			0.1	
Step 3	Remember <keyword> = "RTA Waypoint" and Accomplish Goal: Line select key	0.1			0.1	
Step 4	Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad	0.1			0.1	
Step 5	Point finger to right line select key next to waypoint	0.1	R	0.41	0.51	
Step 6	Press and release right line select key next to waypoint	0.1	K	0.28	0.38	
Step 7	Return with goal accomplished	0.1			0.1	
				Total time	**1.49**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Enter mixed clearance		0.1			0.1	
Step 1	Accomplish Goal: Enter crossing restriction	0.1			0.1	
Step 2	Accomplish Goal: Enter RTA	0.1			0.1	
Step 3	Return with goal accomplished	0.1			0.1	
				Total time	**0.4**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Menu key		0.1			0.1	
Step 1	Recall <menu key> and point finger to appropriate menu key	0.1	R	0.41	0.51	
Step 2	Press and release appropriate menu key	0.1	K	0.28	0.38	
Step 3	Return with goal accomplished	0.1			0.1	
				Total time	**1.09**	

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Line select key		0.1			0.1	
Step 1	Recall <keyword> and point finger to line select key next to keyword	0.1	R	0.41	0.51	
Step 2	Press and release appropriate line select key	0.1	K	0.28	0.38	
Step 3	Return with goal accomplished	0.1			0.1	

| | | | | Total time | **1.09** | |

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Locate waypoint		0.1			0.1	
Step 1	Remember <menu key> = "Legs" and Accomplish Goal: Menu key	0.1			0.1	
Step 2	Search for waypoint	0.1	Read(n)	0.24	variable	Reading, 250 wpm (0.24 sec/word)
Step 3	Decide: IF waypoint is found, THEN Return with goal accomplished	0.1			0.1	
Step 4	Remember <menu key> = "Next Page" and Accomplish Goal: Menu key	0.1			0.1	
Step 5	GOTO Step 2	0.1			0.1	
				Total time		

	Action	Statement time	Operator	Operator time	Total time	Assumptions/ Comments
Method for Goal: Go to RTA page		0.1			0.1	
Step 1	Remember <menu key> = "VNAV" and Accomplish Goal: Menu key	0.1			0.1	
Step 2	Remember <keyword> = "RTA" and Accomplish Goal: Line select key	0.1			0.1	
Step 3	Return with goal accomplished	0.1			0.1	
				Total time	**0.4**	

Appendix B: Traces for NGOMSL Models for Receiving and Entering Clearances

FMS 1

Trace 1 – Task 1, Voice

Equipment: FMS 1
NGOMSL Trace: Proceed direct to HELPR

Assumptions:
Clearance received by voice
When clearance is stated aloud or heard over the radio it is 4 words ("Proceed direct to HELPR")
Call sign is stated before audio clearance
Airline call sign is 3 words
Clearance is not written down
Clearance information is remembered when entering the clearance
Hands do not start on FMS
Desired waypoint is the third waypoint listed on the first page of the flight plan
It takes one mental to determine if clearance is acceptable or not
Clearance is acceptable and pilot will comply
Response is sent by voice
Clearance information is remembered during readback
There is clearance information to enter into the FMS
Only one clearance was sent

Time	Action
0.1	Method for Goal: Handle a clearance
0.1	1 Selection Rule: Receive a clearance
0.1	Selection Rule for Goal: Receive a clearance
0.1	2 T IF clearance is audio, THEN Accomplish Goal: Receive a radio clearance
0.1	Method for Goal: Receive a radio clearance
2.9	1 Listen to clearance and retain <clearance information>
0.1	2 F Decide: IF printed clearance is desired, THEN Accomplish Goal: Write down clearance
0.1	3 Return with goal accomplished
0.1	3 Return with goal accomplished

Value	Step	T/F	Description
0.1	2	F	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1	3		Accomplish Goal: Enter a clearance
0.1			Method for Goal: Enter a clearance
0.2	1	T	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.5	2	T	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3		Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1	1	T	IF clearance is proceed direct to, THEN Accomplish Goal: Enter proceed direct to
0.1			Method for Goal: Enter proceed direct to
0.1	1		Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1	1		Remember <menu key> = "FPL" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.82	2		Search for waypoint
0.1	3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.51	2		Point finger to left line select key next to waypoint
0.38	3		Press and release left line select key next to waypoint
0.1	4	F	Decide: IF not on first page of flight plan, THEN Remember <menu key> = "FPL" and Accomplish Goal: Menu key
0.51	5		Point finger to second left line select key
0.38	6		Press and release second left line select key
0.1	7		Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	4		Return with goal accomplished

0.1	4		Selection Rule: Decide on a clearance
0.1			Selection Rule for Goal: Decide on a clearance
0.1		2 T	IF clearance includes only non-RTA, THEN Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1			Method for Goal: Determine whether non-RTA clearance is acceptable
1.3		1	Determine whether non-RTA clearance is acceptable
0.2		2 T	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1		3	Return with goal accomplished
0.1		4	Return with goal accomplished
0.1	5 T		Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <keyword> = "Activate" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1	6		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1		1 T	IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1			Method for Goal: Respond by voice
0.5		1	Move hand to yoke and "Push to talk" button
0.2		2	Press "Push to talk" button
0.2		3 T	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by <response>
0.1			Selection Rule for Goal: Method of clearance readback
0.1		1 T	IF <clearance information> is remembered, THEN Accomplish Goal: Readback clearance from memory
0.1			Method for Goal: Readback clearance from memory
2.9		1	Recall <clearance information> and state <clearance information> followed by call sign
0.1		2	Return with goal accomplished
0.1		3	Return with goal accomplished
0.2		4	Release "Push to talk" button
0.5		5	Return hand to FMS
0.1		6	Return with goal accomplished
0.1		3	Return with goal accomplished
0.1	7 F		Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
18.68			Total time

Trace 2 – Task 1, Voice

Equipment: FMS 1
NGOMSL Trace: Proceed direct to HELPR

Assumptions:
Clearance received by voice
When clearance is stated aloud or heard over the radio it is 4 words ("Proceed direct to HELPR")
Call sign is stated before audio clearance
Airline call sign is 3 words
Clearance is not written down
Clearance information is remembered when entering the clearance
Hands do not start on FMS
Desired waypoint is the third waypoint listed on the first page of the flight plan
It takes one mental to determine if clearance is acceptable or not
Clearance is not acceptable
Response is sent by voice
There is no clearance information to enter into the FMS
Only one clearance was sent

Time	Action
0.1	Method for Goal: Handle a clearance
0.1	1 Selection Rule: Receive a clearance
0.1	Selection Rule for Goal: Receive a clearance
0.1	2 T IF clearance is audio, THEN Accomplish Goal: Receive a radio clearance
0.1	Method for Goal: Receive a radio clearance
2.9	1 Listen to clearance and retain <clearance information>
0.1	2 F Decide: IF printed clearance is desired, THEN Accomplish Goal: Write down clearance
0.1	3 Return with goal accomplished
0.1	3 Return with goal accomplished

0.1	2	F	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1	3		Accomplish Goal: Enter a clearance
0.1			Method for Goal: Enter a clearance
0.2		1 T	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.5		2 T	Decide: IF hand not on FMS, THEN move hand to FMS
0.1		3	Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1		1 T	IF clearance is proceed direct to, THEN Accomplish Goal: Enter proceed direct to
0.1			Method for Goal: Enter proceed direct to
0.1		1	Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1		1	Remember <menu key> = "FPL" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.82		2	Search for waypoint
0.1		3 T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.51		2	Point finger to left line select key next to waypoint
0.38		3	Press and release left line select key next to waypoint
0.1		4 F	Decide: IF not on first page of flight plan, THEN Remember <menu key> = "FPL" and Accomplish Goal: Menu key
0.51		5	Point finger to second left line select key
0.38		6	Press and release second left line select key
0.1		7	Return with goal accomplished
0.1		5	Return with goal accomplished
0.1		4	Return with goal accomplished

Time	Step		Description
0.1	4		Selection Rule: Decide on a clearance
0.1			Selection Rule for Goal: Decide on a clearance
0.1		2 T	IF clearance includes only non-RTA, THEN Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1			Method for Goal: Determine whether non-RTA clearance is acceptable
1.3		1	Determine whether non-RTA clearance is acceptable
0.2		2 F	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1		3	Return with goal accomplished
0.1		4	Return with goal accomplished
0.1	5 F		Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <keyword> = "Activate" and Accomplish Goal: Line select key
0.1	6		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1		1 T	IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1			Method for Goal: Respond by voice
0.5		1	Move hand to yoke and "Push to talk" button
0.2		2	Press "Push to talk" button
1.8		3 F	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by <response>
0.2		4	Release "Push to talk" button
0.5		5	Return hand to FMS
0.1		6	Return with goal accomplished
0.1		3	Return with goal accomplished
0.1	7 F		Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
15.79			Total time

Trace 3 – Task 1, Data Comm

Equipment: FMS 1
NGOMSL Trace: Proceed Direct to HELPR

Assumptions:
Clearance received by data communications (Data Comm)
Hands start on FMS
Entire clearance is read aloud upon receipt
When clearance is read from screen or paper it is 4 words ("Proceed direct to HELPR")
Clearance is one page
Clearance is printed upon receipt
Printer is available
Clearance information is remembered when entering clearance
Hand is not on FMS after grasping print out
Desired waypoint is the third waypoint listed on the first page of the flight plan
It takes one mental to determine if clearance is acceptable or not
Clearance is not acceptable
Response is sent by FMS
Once opened, clearance remains open until clearance information is entered
There is no clearance information to enter into the FMS
Only one clearance was sent

Time	Action				
0.1	Method for Goal: Handle a clearance				
0.1	1	Selection Rule: Receive a clearance			
0.1		Selection Rule for Goal: Receive a clearance			
0.1		1	T	IF clearance is text, THEN Accomplish Goal: Receive an FMS clearance	
0.1			Method for Goal: Receive an FMS clearance		
0.1			1	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1			2	Accomplish Goal: Open clearance	
0.1				Method for Goal: Open clearance	
0.1				1	Remember <menu key> = "DLK" and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51					1 Recall <menu key> and point finger to appropriate menu key
0.38					2 Press and release appropriate menu key
0.1					3 Return with goal accomplished

Time	Step	T	Description
0.1	2		Remember <keyword> = "NEW MSGS" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	3		Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	3		Accomplish Goal: Read the clearance
0.1			Method for Goal: Read the clearance
1.8	1	T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and retain <clearance information>
0.1	2	T	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1	4	T	Decide: IF printed clearance is desired, THEN Selection Rule: Get printed copy
0.1			Selection Rule for Goal: Get printed copy
0.1	1	T	IF printer is available, THEN Accomplish Goal: Print the clearance
0.1			Method for Goal: Print the clearance
0.1	1		Remember <keyword> = "Print" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.51	2		Reach for print out
0.8	3		Grasp print out
0.51	4		Transport paper to reading position
0.1	5		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	3		Return with goal accomplished

Time	Step	Flag	Description
0.1	2	F	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1	3		Accomplish Goal: Enter a clearance
0.1			Method for Goal: Enter a clearance
0.2	1	T	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.5	2	T	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3		Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1	1	T	IF clearance is proceed direct to, THEN Accomplish Goal: Enter proceed direct to
0.1			Method for Goal: Enter proceed direct to
0.1	1		Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1	1		Remember <menu key> = "FPL" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.82	2		Search for waypoint
0.1	3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.51	2		Point finger to left line select key next to waypoint
0.38	3		Press and release left line select key next to waypoint
0.1	4	F	Decide: IF not on first page of flight plan, THEN Remember <menu key> = "FPL" and Accomplish Goal: Menu key
0.51	5		Point finger to second left line select key
0.38	6		Press and release second left line select key
0.1	7		Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	4		Selection Rule: Decide on a clearance
0.1			Selection Rule for Goal: Decide on a clearance
0.1	2	T	IF clearance includes only non-RTA, THEN Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1			Method for Goal: Determine whether non-RTA clearance is acceptable
1.3	1		Determine whether non-RTA clearance is acceptable
0.2	2	F	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1	3		Return with goal accomplished
0.1	4		Return with goal accomplished

0.1	5	F	Decide: IF \<response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember \<keyword> = "Activate" and Accomplish Goal: Line select key
0.1	6		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1		2 T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1			Method for Goal: Respond by FMS
0.1		1 F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1		2 T	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1			Method for Goal: Open clearance
0.1		1	Remember \<menu key> = "DLK" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall \<menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.1		2	Remember \<keyword> = "NEW MSGS" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall \<keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		3	Remember \<keyword> = clearance to open and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall \<keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		4	Return with goal accomplished

0.1		3	Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		4	Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		5	Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	7	F	Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
25.62			Total time

Trace 4 – Task 1, Data Comm

Equipment: FMS 1
NGOMSL Trace: Proceed Direct to HELPR

Assumptions:
Clearance received by data communications (Data Comm)
Hands start on FMS
Entire clearance is read aloud upon receipt
When clearance is read from screen it is 4 words ("Proceed direct to HELPR")
Clearance is one page
Clearance is not printed upon receipt
Clearance information is remembered when entering clearance
Desired waypoint is the third waypoint listed on the first page of the flight plan
It takes one mental to determine if clearance is acceptable or not
Clearance is not acceptable
Response is sent by FMS
Once opened, clearance remains open until clearance information is entered
There is no clearance information to enter into the FMS
Only one clearance was sent

Time	Action				
0.1	Method for Goal: Handle a clearance				
0.1	1	Selection Rule: Receive a clearance			
0.1		Selection Rule for Goal: Receive a clearance			
0.1		1	T	IF clearance is text, THEN Accomplish Goal: Receive an FMS clearance	
0.1			Method for Goal: Receive an FMS clearance		
0.1			1	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1			2	Accomplish Goal: Open clearance	
0.1				Method for Goal: Open clearance	
0.1				1	Remember <menu key> = "DLK" and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51					1 Recall <menu key> and point finger to appropriate menu key
0.38					2 Press and release appropriate menu key
0.1					3 Return with goal accomplished
0.1				2	Remember <keyword> = "NEW MSGS" and Accomplish Goal: Line select key
0.1					Method for Goal: Line select key
0.51					1 Recall <keyword> and point finger to line select key next to keyword
0.38					2 Press and release appropriate line select key
0.1					3 Return with goal accomplished

Value		Step	T/F	Description
0.1		3		Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51		1		Recall <keyword> and point finger to line select key next to keyword
0.38		2		Press and release appropriate line select key
0.1		3		Return with goal accomplished
0.1		4		Return with goal accomplished
0.1		3		Accomplish Goal: Read the clearance
0.1				Method for Goal: Read the clearance
1.8		1	T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and retain <clearance information>
0.1		2	T	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1		4	F	Decide: IF printed clearance is desired, THEN Selection Rule: Get printed copy
0.1		5		Return with goal accomplished
0.1		3		Return with goal accomplished
0.1	2		F	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1	3			Accomplish Goal: Enter a clearance
0.1				Method for Goal: Enter a clearance
0.2		1	T	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1		2	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1		3		Selection Rule: Specific clearance type
0.1				Selection Rule for Goal: Specific clearance type
0.1		1	T	IF clearance is proceed direct to, THEN Accomplish Goal: Enter proceed direct to
0.1				Method for Goal: Enter proceed direct to
0.1		1		Accomplish Goal: Locate waypoint
0.1				Method for Goal: Locate waypoint
0.1		1		Remember <menu key> = "FPL" and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51		1		Recall <menu key> and point finger to appropriate menu key
0.38		2		Press and release appropriate menu key
0.1		3		Return with goal accomplished

Value	Step	Flag	Description
0.82	2		Search for waypoint
0.1	3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.51	2		Point finger to left line select key next to waypoint
0.38	3		Press and release left line select key next to waypoint
0.1	4	F	Decide: IF not on first page of flight plan, THEN Remember <menu key> = "FPL" and Accomplish Goal: Menu key
0.51	5		Point finger to second left line select key
0.38	6		Press and release second left line select key
0.1	7		Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	4		Selection Rule: Decide on a clearance
0.1			Selection Rule for Goal: Decide on a clearance
0.1	2	T	IF clearance includes only non-RTA, THEN Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1			Method for Goal: Determine whether non-RTA clearance is acceptable
1.3	1		Determine whether non-RTA clearance is acceptable
0.2	2	F	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1	3		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	5		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1	2	T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1			Method for Goal: Respond by FMS
0.1	1	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	2	T	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1			Method for Goal: Open clearance
0.1	1		Remember <menu key> = "DLK" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	2		Remember <keyword> = "NEW MSGS" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished

Time	Step	F	Description
0.1	3		Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	3		Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	4		Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	6	F	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <keyword> = "Activate" and Accomplish Goal: Line select key
0.1	7	F	Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
21.71			Total time

Trace 5 – Task 2, Voice

Equipment: FMS 1
NGOMSL Trace: Cross HELPR at FL190

Assumptions:
Clearance received by voice
When clearance is read from paper or heard over the radio it is 8 words ("Cross HELPR at flight level one niner zero")
Call sign is stated before audio clearance
Airline call sign is 3 words
Clearance is written down
Need to obtain pen and paper
Clearance is written as 4 words ("Cross HELPR at FL190")
Clearance information is not initially remembered, and must be read aloud, when entering the clearance
Once visible, paper will remain visible until hand moved to FMS
Hand returns to paper after replacing pen
Desired waypoint is the third waypoint listed on the first page of the flight plan
It takes one mental to determine if clearance is acceptable or not
Clearance is acceptable and pilot will comply
Response is sent by voice
Clearance information is not remembered during readback
There is clearance information to enter into the FMS
Only one clearance was sent

Time	Action
0.1	Method for Goal: Handle a clearance
0.1	1 Selection Rule: Receive a clearance
0.1	Selection Rule for Goal: Receive a clearance
0.1	2 T IF clearance is audio, THEN Accomplish Goal: Receive a radio clearance
0.1	Method for Goal: Receive a radio clearance
4.5	1 Listen to clearance and retain <clearance information>
0.1	2 T Decide: IF printed clearance is desired, THEN Accomplish Goal: Write down clearance
0.1	Method for Goal: Write down clearance
0.1	1 T Decide: IF paper is not readily available, THEN Accomplish Goal: Obtain paper
0.1	Method for Goal: Obtain paper
0.51	1 Reach for paper
0.8	2 Grasp paper
0.51	3 Transport paper to writing space
0.17	4 Release paper
0.1	5 Return with goal accomplished

Value						Description
0.1				2	T	Decide: IF pen is not in hand, THEN Accomplish Goal: Obtain pen
0.1						Method for Goal: Obtain pen
0.51				1		Reach for pen
0.8				2		Grasp pen
0.51				3		Transport pen to paper
0.16				4		Position the pen over paper
0.1				5		Return with goal accomplished
10.9			3			Recall <clearance information> and write <clearance information>
0.51			4			Return pen to original location
0.17			5			Release pen
0.5			6			Move hand back to starting location
0.1			7			Return with goal accomplished
0.1		3				Return with goal accomplished
0.1	3					Return with goal accomplished
0.1	2				F	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1	3					Accomplish Goal: Enter a clearance
0.1						Method for Goal: Enter a clearance
0.2		1			F	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1						Selection Rule for Goal: Method of reading
0.1			1		T	IF clearance is in writing, THEN Accomplish Goal: Read clearance from paper
0.1						Method for Goal: Read clearance from paper
0.1				1	F	Decide: IF paper not visible, THEN move paper
3.4				2	T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on paper aloud and retain <clearance information>, ELSE Read information on paper and retain <clearance information>
0.1				3		Return with goal accomplished
0.1			3			Return with goal accomplished

Value	Step	Flag	Description
0.5	2	T	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3		Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1	2	T	IF clearance is crossing restriction, THEN Accomplish Goal: Enter crossing restriction
0.1			Method for Goal: Enter crossing restriction
0.1	1		Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1	1		Remember <menu key> = "FPL" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.82	2		Search for waypoint
0.1	3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1	2	F	Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1	3		Remember <menu key> = "/" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	4	T	Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1			Method for Goal: Enter into scratchpad
0.1	1		Remember <menu key> = first digit/character in restrictions and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	2		Remember <menu key> = next digit/character in restriction and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished

Value	Step	T/F	Description
0.1	3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	2		Remember <menu key> = next digit/character in restriction and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	4	F	If <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1	5		Return with goal accomplished
0.51	5		Point finger to right line select key next to waypoint
0.38	6		Press and release right line select key next to waypoint
0.1	7		Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	4		Selection Rule: Decide on a clearance
0.1			Selection Rule for Goal: Decide on a clearance
0.1	2	T	IF clearance includes only non-RTA, THEN Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1			Method for Goal: Determine whether non-RTA clearance is acceptable
1.3	1		Determine whether non-RTA clearance is acceptable
0.2	2	T	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1	3		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	5	T	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <keyword> = "Activate" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished

Time							Description
0.1	6						Selection Rule: Respond to a clearance
0.1							Selection Rule for Goal: Respond to a clearance
0.1		1	T				IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1							Method for Goal: Respond by voice
0.5				1			Move hand to yoke and "Push to talk" button
0.2				2			Press "Push to talk" button
0.2				3	T		Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by <response>
0.1							Selection Rule for Goal: Method of clearance readback
0.1					2	T	IF <clearance information> is not remembered, THEN Accomplish Goal: Readback clearance by reading
0.1							Method for Goal: Readback clearance by reading
0.1						1	Selection Rule: Method of reading
0.1							Selection Rule for Goal: Method of reading
0.1						1 T	IF clearance is in writing, THEN Accomplish Goal: Read clearance from paper
0.1							Method for Goal: Read clearance from paper
0.51						1 T	Decide: IF paper not visible, THEN move paper
3.4						2 T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on paper aloud and retain <clearance information>, ELSE Read information on paper and retain <clearance information>
0.1						3	Return with goal accomplished
0.1					3		Return with goal accomplished
1.3				2			State call sign
0.1					3		Return with goal accomplished
0.1				3			Return with goal accomplished
0.2				4			Release "Push to talk" button
0.5				5			Return hand to FMS
0.1				6			Return with goal accomplished
0.1			3				Return with goal accomplished
0.1	7	F					Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8						Return with goal accomplished
48.51							Total time

Trace 6 – Task 2, Voice

Equipment: FMS 1	
NGOMSL Trace: Cross HELPR at FL190	
Assumptions:	
Clearance received by voice	
When clearance is stated aloud or heard over the radio it is 8 words ("Cross HELPR at flight level one niner zero")	
Call sign is stated before audio clearance	
Airline call sign is 3 words	
Clearance is not written down	
Clearance information is remembered when entering the clearance	
Hands do not start on FMS	
Desired waypoint is the third waypoint listed on the first page of the flight plan	
It takes one mental to determine if clearance is acceptable or not	
Clearance is acceptable and pilot will comply	
Response is sent by voice	
Clearance information is remembered during readback	
There is clearance information to enter into the FMS	
Only one clearance was sent	

Time	Action
0.1	Method for Goal: Handle a clearance
0.1	1 Selection Rule: Receive a clearance
0.1	Selection Rule for Goal: Receive a clearance
0.1	2 T IF clearance is audio, THEN Accomplish Goal: Receive a radio clearance
0.1	Method for Goal: Receive a radio clearance
4.5	1 Listen to clearance and retain <clearance information>
0.1	2 F Decide: IF printed clearance is desired, THEN Accomplish Goal: Write down clearance
0.1	3 Return with goal accomplished
0.1	3 Return with goal accomplished

Value	Step	T/F	Description
0.1	2	F	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1	3		Accomplish Goal: Enter a clearance
0.1			Method for Goal: Enter a clearance
0.2	1	T	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.5	2	T	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3		Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1	2	T	IF clearance is crossing restriction, THEN Accomplish Goal: Enter crossing restriction
0.1			Method for Goal: Enter crossing restriction
0.1	1		Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1	1		Remember <menu key> = "FPL" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.82	2		Search for waypoint
0.1	3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1	2	F	Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1	3		Remember <menu key> = "/" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	4	T	Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1			Method for Goal: Enter into scratchpad
0.1	1		Remember <menu key> = first digit/character in restrictions and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished

Value	Step	Flag	Description
0.1	2		Remember <menu key> = next digit/character in restriction and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	2		Remember <menu key> = next digit/character in restriction and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	4	F	If <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1	5		Return with goal accomplished
0.51	5		Point finger to right line select key next to waypoint
0.38	6		Press and release right line select key next to waypoint
0.1	7		Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	4		Selection Rule: Decide on a clearance
0.1			Selection Rule for Goal: Decide on a clearance
0.1	2	T	IF clearance includes only non-RTA, THEN Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1			Method for Goal: Determine whether non-RTA clearance is acceptable
1.3	1		Determine whether non-RTA clearance is acceptable
0.2	2	T	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1	3		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	5	T	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <keyword> = "Activate" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished

0.1	6			Selection Rule: Respond to a clearance	
0.1				Selection Rule for Goal: Respond to a clearance	
0.1		1	T	IF responding by voice, THEN Accomplish Goal: Respond by voice	
0.1				Method for Goal: Respond by voice	
0.5			1	Move hand to yoke and "Push to talk" button	
0.2			2	Press "Push to talk" button	
0.2		3	T	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by <response>	
0.1				Selection Rule for Goal: Method of clearance readback	
0.1			1	T	IF <clearance information> is remembered, THEN Accomplish Goal: Readback clearance from memory
0.1				Method for Goal: Readback clearance from memory	
4.5				1	Recall <clearance information> and state <clearance information> followed by call sign
0.1				2	Return with goal accomplished
0.1			3	Return with goal accomplished	
0.2			4	Release "Push to talk" button	
0.5			5	Return hand to FMS	
0.1			6	Return with goal accomplished	
0.1		3		Return with goal accomplished	
0.1	7	F		Decide: IF there are more clearances, THEN GOTO Step 1	
0.1	8			Return with goal accomplished	
26.35				Total time	

Trace 7 – Task 2, Data Comm

Equipment: FMS 1
NGOMSL Trace: Cross HELPR at FL190

Assumptions:
Clearance received by data communications (Data Comm)
Hands start on FMS
Entire clearance is read aloud upon receipt
When clearance is read from screen or paper it is 8 words ("Cross HELPR at flight level one niner zero")
Clearance is one page
Clearance is printed upon receipt
Printer is available
Clearance information is not initially remembered, and must be read aloud, when entering the clearance
Once visible, paper will remain visible until hand moved to FMS
Hand is not on FMS after reading clearance from paper
Desired waypoint is the third waypoint listed on the first page of the flight plan
It takes one mental to determine if clearance is acceptable or not
Clearance is acceptable and pilot will comply
Response is sent by FMS
Once opened, clearance remains open until clearance information is entered
There is clearance information to enter into the FMS
Only one clearance was sent

Time	Action
0.1	Method for Goal: Handle a clearance
0.1	1　　　Selection Rule: Receive a clearance
0.1	Selection Rule for Goal: Receive a clearance
0.1	1　T　IF clearance is text, THEN Accomplish Goal: Receive an FMS clearance
0.1	Method for Goal: Receive an FMS clearance
0.1	1　F　Decide: IF hand not on FMS, THEN move hand to FMS
0.1	2　Accomplish Goal: Open clearance
0.1	Method for Goal: Open clearance
0.1	1　Remember <menu key> = "DLK" and Accomplish Goal: Menu key
0.1	Method for Goal: Menu key
0.51	1　Recall <menu key> and point finger to appropriate menu key
0.38	2　Press and release appropriate menu key
0.1	3　Return with goal accomplished
0.1	2　Remember <keyword> = "NEW MSGS" and Accomplish Goal: Line select key
0.1	Method for Goal: Line select key
0.51	1　Recall <keyword> and point finger to line select key next to keyword
0.38	2　Press and release appropriate line select key
0.1	3　Return with goal accomplished

Value				Description
0.1			3	Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51			1	Recall <keyword> and point finger to line select key next to keyword
0.38			2	Press and release appropriate line select key
0.1			3	Return with goal accomplished
0.1		4		Return with goal accomplished
0.1	3			Accomplish Goal: Read the clearance
0.1				Method for Goal: Read the clearance
3.4			1 T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and retain <clearance information>
0.1			2 T	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1		4 T		Decide: IF printed clearance is desired, THEN Selection Rule: Get printed copy
0.1				Selection Rule for Goal: Get printed copy
0.1		1 T		IF printer is available, THEN Accomplish Goal: Print the clearance
0.1				Method for Goal: Print the clearance
0.1			1	Remember <keyword> = "Print" and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51			1	Recall <keyword> and point finger to line select key next to keyword
0.38			2	Press and release appropriate line select key
0.1			3	Return with goal accomplished
0.51			2	Reach for print out
0.8			3	Grasp print out
0.51			4	Transport paper to reading position
0.1			5	Return with goal accomplished
0.1		3		Return with goal accomplished
0.1	5			Return with goal accomplished
0.1	3			Return with goal accomplished

Value	Step	T/F	Description
0.1	2	F	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1	3		Accomplish Goal: Enter a clearance
0.1			Method for Goal: Enter a clearance
0.2	1	F	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1			Selection Rule for Goal: Method of reading
0.1	1	T	IF clearance is in writing, THEN Accomplish Goal: Read clearance from paper
0.1			Method for Goal: Read clearance from paper
0.1	1	F	Decide: IF paper not visible, THEN move paper
3.4	2	T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on paper aloud and retain <clearance information>, ELSE Read information on paper and retain <clearance information>
0.1	3		Return with goal accomplished
0.1	3		Return with goal accomplished
0.5	2	T	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3		Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1	2	T	IF clearance is crossing restriction, THEN Accomplish Goal: Enter crossing restriction
0.1			Method for Goal: Enter crossing restriction
0.1	1		Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1	1		Remember <menu key> = "FPL" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.82	2		Search for waypoint
0.1	3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1	2	F	Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1	3		Remember <menu key> = "/" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished

Time							Description
0.1			4			T	Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1							Method for Goal: Enter into scratchpad
0.1				1			Remember <menu key> = first digit/character in restrictions and Accomplish Goal: Menu key
0.1							Method for Goal: Menu key
0.51					1		Recall <menu key> and point finger to appropriate menu key
0.38					2		Press and release appropriate menu key
0.1					3		Return with goal accomplished
0.1				2			Remember <menu key> = next digit/character in restriction and Accomplish Goal: Menu key
0.1							Method for Goal: Menu key
0.51					1		Recall <menu key> and point finger to appropriate menu key
0.38					2		Press and release appropriate menu key
0.1					3		Return with goal accomplished
0.1				3		T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1				2			Remember <menu key> = next digit/character in restriction and Accomplish Goal: Menu key
0.1							Method for Goal: Menu key
0.51					1		Recall <menu key> and point finger to appropriate menu key
0.38					2		Press and release appropriate menu key
0.1					3		Return with goal accomplished
0.1				3		F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1				4		F	If <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1				5			Return with goal accomplished
0.51			5				Point finger to right line select key next to waypoint
0.38			6				Press and release right line select key next to waypoint
0.1			7				Return with goal accomplished
0.1		5					Return with goal accomplished
0.1	4						Return with goal accomplished
0.1	4						Selection Rule: Decide on a clearance
0.1							Selection Rule for Goal: Decide on a clearance
0.1		2				T	IF clearance includes only non-RTA, THEN Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1							Method for Goal: Determine whether non-RTA clearance is acceptable
1.3		1					Determine whether non-RTA clearance is acceptable
0.2		2				T	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1		3					Return with goal accomplished
0.1	4						Return with goal accomplished

Prob	L1	L2	L3	L4	L5	Flag	Description
0.1	5					T	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <keyword> = "Activate" and Accomplish Goal: Line select key
0.1							Method for Goal: Line select key
0.51		1					Recall <keyword> and point finger to line select key next to keyword
0.38		2					Press and release appropriate line select key
0.1		3					Return with goal accomplished
0.1	6						Selection Rule: Respond to a clearance
0.1							Selection Rule for Goal: Respond to a clearance
0.1		2				T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1							Method for Goal: Respond by FMS
0.1			1			F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1			2			T	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1							Method for Goal: Open clearance
0.1				1			Remember <menu key> = "DLK" and Accomplish Goal: Menu key
0.1							Method for Goal: Menu key
0.51					1		Recall <menu key> and point finger to appropriate menu key
0.38					2		Press and release appropriate menu key
0.1					3		Return with goal accomplished
0.1				2			Remember <keyword> = "NEW MSGS" and Accomplish Goal: Line select key
0.1							Method for Goal: Line select key
0.51					1		Recall <keyword> and point finger to line select key next to keyword
0.38					2		Press and release appropriate line select key
0.1					3		Return with goal accomplished
0.1				3			Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1							Method for Goal: Line select key
0.51					1		Recall <keyword> and point finger to line select key next to keyword
0.38					2		Press and release appropriate line select key
0.1					3		Return with goal accomplished
0.1				4			Return with goal accomplished
0.1			3				Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1							Method for Goal: Line select key
0.51				1			Recall <keyword> and point finger to line select key next to keyword
0.38				2			Press and release appropriate line select key
0.1				3			Return with goal accomplished

0.1		4	Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		5	Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	7 F		Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
36.78	Total time		

Trace 8 – Task 2, Data Comm

Equipment: FMS 1
NGOMSL Trace: Cross HELPR at FL190

Assumptions:
Clearance received by data communications (Data Comm)
Hands start on FMS
Entire clearance is read aloud upon receipt
When clearance is read from screen it is 8 words ("Cross HELPR at flight level one niner zero")
Clearance is one page
Clearance is not printed upon receipt
Clearance information is remembered when entering the clearance
Desired waypoint is the third waypoint listed on the first page of the flight plan
It takes one mental to determine if clearance is acceptable or not
Clearance is acceptable and pilot will comply
Response is sent by FMS
Once opened, clearance remains open until clearance information is entered
There is clearance information to enter into the FMS
Only one clearance was sent

Time	Action
0.1	Method for Goal: Handle a clearance
0.1	1 Selection Rule: Receive a clearance
0.1	Selection Rule for Goal: Receive a clearance
0.1	1 T IF clearance is text, THEN Accomplish Goal: Receive an FMS clearance
0.1	Method for Goal: Receive an FMS clearance
0.1	1 F Decide: IF hand not on FMS, THEN move hand to FMS
0.1	2 Accomplish Goal: Open clearance
0.1	Method for Goal: Open clearance
0.1	1 Remember <menu key> = "DLK" and Accomplish Goal: Menu key
0.1	Method for Goal: Menu key
0.51	1 Recall <menu key> and point finger to appropriate menu key
0.38	2 Press and release appropriate menu key
0.1	3 Return with goal accomplished
0.1	2 Remember <keyword> = "NEW MSGS" and Accomplish Goal: Line select key
0.1	Method for Goal: Line select key
0.51	1 Recall <keyword> and point finger to line select key next to keyword
0.38	2 Press and release appropriate line select key
0.1	3 Return with goal accomplished

Time	Step	T/F	Description
0.1	3		Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	3		Accomplish Goal: Read the clearance
0.1			Method for Goal: Read the clearance
3.4	1	T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and retain <clearance information>
0.1	2	T	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1	4	F	Decide: IF printed clearance is desired, THEN Selection Rule: Get printed copy
0.1	5		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	2	F	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1	3		Accomplish Goal: Enter a clearance
0.1			Method for Goal: Enter a clearance
0.2	1	T	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1	2	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3		Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1	2	T	IF clearance is crossing restriction, THEN Accomplish Goal: Enter crossing restriction
0.1			Method for Goal: Enter crossing restriction
0.1	1		Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1	1		Remember <menu key> = "FPL" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished

Value				T/F	Description
0.82		2			Search for waypoint
0.1		3		T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1	2			F	Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1	3				Remember <menu key> = "/" and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51		1			Recall <menu key> and point finger to appropriate menu key
0.38		2			Press and release appropriate menu key
0.1		3			Return with goal accomplished
0.1	4			T	Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1					Method for Goal: Enter into scratchpad
0.1		1			Remember <menu key> = first digit/character in restrictions and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51			1		Recall <menu key> and point finger to appropriate menu key
0.38			2		Press and release appropriate menu key
0.1			3		Return with goal accomplished
0.1		2			Remember <menu key> = next digit/character in restriction and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51			1		Recall <menu key> and point finger to appropriate menu key
0.38			2		Press and release appropriate menu key
0.1			3		Return with goal accomplished
0.1		3		T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2			Remember <menu key> = next digit/character in restriction and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51			1		Recall <menu key> and point finger to appropriate menu key
0.38			2		Press and release appropriate menu key
0.1			3		Return with goal accomplished
0.1		3		F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		4		F	If <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1		5			Return with goal accomplished

0.51	5		Point finger to right line select key next to waypoint
0.38	6		Press and release right line select key next to waypoint
0.1	7		Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	4		Selection Rule: Decide on a clearance
0.1			Selection Rule for Goal: Decide on a clearance
0.1	2	T	IF clearance includes only non-RTA, THEN Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1			Method for Goal: Determine whether non-RTA clearance is acceptable
1.3	1		Determine whether non-RTA clearance is acceptable
0.2	2	T	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1	3		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	5		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1	2	T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1			Method for Goal: Respond by FMS
0.1	1	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	2	T	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1			Method for Goal: Open clearance
0.1	1		Remember <menu key> = "DLK" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	2		Remember <keyword> = "NEW MSGS" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	3		Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	4		Return with goal accomplished

0.1		3	Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		4	Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		5	Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	6 T		Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <keyword> = "Activate" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	7 F		Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
28.87			Total time

Trace 9 – Task 3, Voice

Equipment: FMS 1
NGOMSL Trace: Cross HELPR at 1800Z

Assumptions:
Clearance received by voice
When clearance is stated aloud or heard over the radio it is 8 words ("Cross HELPR at one eight zero zero Zulu")
Call sign is stated before audio clearance
Airline call sign is 3 words
Clearance is not written down
Response is sent by voice
Clearance information is remembered when entering the clearance
Desired waypoint is the third waypoint listed on the first page of the flight plan
It takes one mental to determine if clearance is acceptable or not
Clearance is acceptable and pilot will comply
Clearance information is remembered during readback
There is no clearance information to enter into the FMS
Only one clearance was sent

Time	Action				
0.1	Method for Goal: Handle a clearance				
0.1	1	Selection Rule: Receive a clearance			
0.1		Selection Rule for Goal: Receive a clearance			
0.1		2	T	IF clearance is audio, THEN Accomplish Goal: Receive a radio clearance	
0.1			Method for Goal: Receive a radio clearance		
4.5			1	Listen to clearance and retain <clearance information>	
0.1			2	F	Decide: IF printed clearance is desired, THEN Accomplish Goal: Write down clearance
0.1			3	Return with goal accomplished	
0.1		3	Return with goal accomplished		

Time	Step	T/F	Description
0.1	2	T	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1	1	T	IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1			Method for Goal: Respond by voice
0.5	1		Move hand to yoke and "Push to talk" button
0.2	2		Press "Push to talk" button
1.8	3	F	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by <response>
0.2	4		Release "Push to talk" button
0.5	5		Return hand to FMS
0.1	6		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	3		Accomplish Goal: Enter a clearance
0.1			Method for Goal: Enter a clearance
0.2	1	T	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1	2	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3		Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1	4	T	IF clearance is only RTA, THEN Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1	1		Remember <menu key> = "FPL" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.82	2		Search for waypoint
0.1	3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	4		Selection Rule: Decide on a clearance
0.1			Selection Rule for Goal: Decide on a clearance
0.1	1	T	IF clearance includes only RTA, THEN Accomplish Goal: Compare ETA to RTA
0.1			Method for Goal: Compare ETA to RTA
1.3	1		Compare clearance RTA to displayed ETA
1.4	2	T	Decide: IF speed can be managed to maintain a predicted ETA that conforms with the assigned RTA, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1	3		Return with goal accomplished
0.1	4		Return with goal accomplished

0.1	5	F	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <keyword> = "Activate" and Accomplish Goal: Line select key
0.1	6		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1		1 T	IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1			Method for Goal: Respond by voice
0.5		1	Move hand to yoke and "Push to talk" button
0.2		2	Press "Push to talk" button
0.2		3 T	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by <response>
0.1			Selection Rule for Goal: Method of clearance readback
0.1		1 T	IF <clearance information> is remembered, THEN Accomplish Goal: Readback clearance from memory
0.1			Method for Goal: Readback clearance from memory
4.5		1	Recall <clearance information> and state <clearance information> followed by call sign
0.1		2	Return with goal accomplished
0.1		3	Return with goal accomplished
0.2		4	Release "Push to talk" button
0.5		5	Return hand to FMS
0.1		6	Return with goal accomplished
0.1		3	Return with goal accomplished
0.1	7	F	Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
23.11			Total time

Trace 10 – Task 3, Voice

Equipment: FMS 1
NGOMSL Trace: Cross HELPR at 1800Z

Assumptions:
Clearance received by voice
When clearance is stated aloud or heard over the radio it is 8 words ("Cross HELPR at one eight zero zero Zulu")
Call sign is stated before audio clearance
Airline call sign is 3 words
Clearance is written down
Paper is available
Pen is not in hand
Clearance is written as 4 words ("Cross HELPR at 1800Z")
Response is sent by voice
Clearance information is remembered when entering the clearance
Desired waypoint is the third waypoint listed on the first page of the flight plan
It takes one mental to determine if clearance is acceptable or not
Clearance is not acceptable
There is no clearance information to enter into the FMS
Only one clearance was sent

Time	Action
0.1	Method for Goal: Handle a clearance
0.1	1 Selection Rule: Receive a clearance
0.1	Selection Rule for Goal: Receive a clearance
0.1	2 T IF clearance is audio, THEN Accomplish Goal: Receive a radio clearance
0.1	Method for Goal: Receive a radio clearance
4.5	1 Listen to clearance and retain <clearance information>
0.1	2 T Decide: IF printed clearance is desired, THEN Accomplish Goal: Write down clearance
0.1	Method for Goal: Write down clearance
0.1	1 F IF paper is not readily available, THEN Accomplish Goal: Obtain paper
0.1	2 T IF pen is not in hand, THEN Accomplish Goal: Obtain pen
0.1	Method for Goal: Obtain pen
0.51	1 Reach for pen
0.8	2 Grasp pen
0.51	3 Transport pen to paper
0.16	4 Position the pen over paper
0.1	5 Return with goal accomplished

10.9		3	Recall <clearance information> and write <clearance information>
0.51		4	Return pen to original location
0.17		5	Release pen
0.5		6	Move hand back to starting location
0.1		7	Return with goal accomplished
0.1		3	Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	2 T		Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1	1 T		IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1			Method for Goal: Respond by voice
0.5		1	Move hand to yoke and "Push to talk" button
0.2		2	Press "Push to talk" button
1.8		3 F	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by <response>
0.2		4	Release "Push to talk" button
0.5		5	Return hand to FMS
0.1		6	Return with goal accomplished
0.1		3	Return with goal accomplished
0.1	3		Accomplish Goal: Enter a clearance
0.1			Method for Goal: Enter a clearance
0.2	1 T		Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1	2 F		Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3		Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1	4 T		IF clearance is only RTA, THEN Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1		1	Remember <menu key> = "FPL" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.82		2	Search for waypoint
0.1		3 T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1		5	Return with goal accomplished
0.1	4		Return with goal accomplished

0.1	4		Selection Rule: Decide on a clearance
0.1			Selection Rule for Goal: Decide on a clearance
0.1	1	T	IF clearance includes only RTA, THEN Accomplish Goal: Compare ETA to RTA
0.1			Method for Goal: Compare ETA to RTA
1.3	1		Compare clearance RTA to displayed ETA
1.4	2	F	Decide: IF speed can be managed to maintain a predicted ETA that conforms with the assigned RTA, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1	3		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	5	F	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <keyword> = "Activate" and Accomplish Goal: Line select key
0.1	6		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1	1	T	IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1			Method for Goal: Respond by voice
0.5	1		Move hand to yoke and "Push to talk" button
0.2	2		Press "Push to talk" button
1.8	3	F	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by <response>
0.2	4		Release "Push to talk" button
0.5	5		Return hand to FMS
0.1	6		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	7	F	Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
34.37			Total time

Trace 11 – Task 3, Data Comm

<table>
<tr><td colspan="2">Equipment: FMS 1</td></tr>
<tr><td colspan="2">NGOMSL Trace: Cross HELPR at time 1800Z</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td colspan="2">Assumptions:</td></tr>
<tr><td colspan="2">Clearance received by data communications (Data Comm)</td></tr>
<tr><td colspan="2">Hands start on FMS</td></tr>
<tr><td colspan="2">Entire clearance is read aloud upon receipt</td></tr>
<tr><td colspan="2">When clearance is read from screen it is 9 words ("Cross HELPR at time one eight zero zero Zulu")</td></tr>
<tr><td colspan="2">Clearance is one page</td></tr>
<tr><td colspan="2">Clearance is not printed upon receipt</td></tr>
<tr><td colspan="2">Response is sent by FMS</td></tr>
<tr><td colspan="2">Once opened, clearance remains open until clearance information is entered</td></tr>
<tr><td colspan="2">Clearance information is remembered when entering the clearance</td></tr>
<tr><td colspan="2">Desired waypoint is the third waypoint listed on the first page of the flight plan</td></tr>
<tr><td colspan="2">It takes one mental to determine if clearance is acceptable or not</td></tr>
<tr><td colspan="2">Clearance is acceptable and pilot will comply</td></tr>
<tr><td colspan="2">There is no clearance information to enter into the FMS</td></tr>
<tr><td colspan="2">Only one clearance was sent</td></tr>
</table>

Time	Action
0.1	Method for Goal: Handle a clearance
0.1	1　　　Selection Rule: Receive a clearance
0.1	Selection Rule for Goal: Receive a clearance
0.1	1　T　IF clearance is text, THEN Accomplish Goal: Receive an FMS clearance
0.1	Method for Goal: Receive an FMS clearance
0.1	1　F　Decide: IF hand not on FMS, THEN move hand to FMS
0.1	2　　Accomplish Goal: Open clearance
0.1	Method for Goal: Open clearance
0.1	1　　Remember <menu key> = "DLK" and Accomplish Goal: Menu key
0.1	Method for Goal: Menu key
0.51	1　Recall <menu key> and point finger to appropriate menu key
0.38	2　Press and release appropriate menu key
0.1	3　Return with goal accomplished
0.1	2　Remember <keyword> = "NEW MSGS" and Accomplish Goal: Line select key
0.1	Method for Goal: Line select key
0.51	1　Recall <keyword> and point finger to line select key next to keyword
0.38	2　Press and release appropriate line select key
0.1	3　Return with goal accomplished

Value	Step	T/F	Description
0.1	3		Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	3		Accomplish Goal: Read the clearance
0.1			Method for Goal: Read the clearance
3.8	1	T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and retain <clearance information>
0.1	2	T	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1	4	F	Decide: IF printed clearance is desired, THEN Selection Rule: Get printed copy
0.1	5		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	2	T	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1	2	T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1			Method for Goal: Respond by FMS
0.1	1	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	2	F	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1	3		Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	4		Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	3		Return with goal accomplished

0.1	3		Accomplish Goal: Enter a clearance
0.1			Method for Goal: Enter a clearance
0.2	1	T	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1	2	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3		Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1	4	T	IF clearance is only RTA, THEN Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1	1		Remember <menu key> = "FPL" and Accomplish Goal: Menu key
0.1			Method For Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.82	2		Search for waypoint
0.1	3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	4		Selection Rule: Decide on a clearance
0.1			Selection Rule for Goal: Decide on a clearance
0.1	1	T	IF clearance includes only RTA, THEN Accomplish Goal: Compare ETA to RTA
0.1			Method for Goal: Compare ETA to RTA
1.3	1		Compare clearance RTA to displayed ETA
1.4	2	T	Decide: IF speed can be managed to maintain a predicted ETA that conforms with the assigned RTA, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1	3		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	5	F	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <keyword> = "Activate" and Accomplish Goal: Line select key
0.1	6		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1	2	T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1			Method for Goal: Respond by FMS
0.1	1	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	2	T	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1			Method for Goal: Open clearance
0.1	1		Remember <menu key> = "DLK" and Accomplish Goal: Menu key
0.1			Method For Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished

0.1		2	Remember <keyword> = "NEW MSGS" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		3	Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		4	Return with goal accomplished
0.1	3		Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1	4		Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	7 F		Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
25.81			Total time

Trace 12 – Task 3, Data Comm

<div style="background-color:#b5c98e">

Equipment: FMS 1

NGOMSL Trace: Cross HELPR at time 1800Z

Assumptions:

Clearance received by data communications (Data Comm)

Hands start on FMS

Entire clearance is read aloud upon receipt

When clearance is read from screen it is 9 words ("Cross HELPR at time one eight zero zero Zulu")

Clearance is one page

Clearance is printed upon receipt

Printer is available

Response is sent by FMS

Hand is not on FMS after grasping print out

Once opened, clearance remains open until clearance information is entered

Clearance information is remembered when entering the clearance

Desired waypoint is the third waypoint listed on the first page of the flight plan

It takes one mental to determine if clearance is acceptable or not

Clearance is not acceptable

There is no clearance information to enter into the FMS

Only one clearance was sent

</div>

Time	Action
0.1	Method for Goal: Handle a clearance
0.1	1 Selection Rule: Receive a clearance
0.1	Selection Rule for Goal: Receive a clearance
0.1	1 T IF clearance is text, THEN Accomplish Goal: Receive an FMS clearance
0.1	Method for Goal: Receive an FMS clearance
0.1	1 F Decide: IF hand not on FMS, THEN move hand to FMS
0.1	2 Accomplish Goal: Open clearance
0.1	Method for Goal: Open clearance
0.1	1 Remember <menu key> = "DLK" and Accomplish Goal: Menu key
0.1	Method for Goal: Menu key
0.51	1 Recall <menu key> and point finger to appropriate menu key
0.38	2 Press and release appropriate menu key
0.1	3 Return with goal accomplished

Value						T	Step
0.1			2				Remember <keyword> = "NEW MSGS" and Accomplish Goal: Line select key
0.1							Method for Goal: Line select key
0.51				1			Recall <keyword> and point finger to line select key next to keyword
0.38				2			Press and release appropriate line select key
0.1				3			Return with goal accomplished
0.1			3				Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1							Method for Goal: Line select key
0.51				1			Recall <keyword> and point finger to line select key next to keyword
0.38				2			Press and release appropriate line select key
0.1				3			Return with goal accomplished
0.1			4				Return with goal accomplished
0.1		3					Accomplish Goal: Read the clearance
0.1							Method for Goal: Read the clearance
3.8			1			T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain
0.1			2			T	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1		4				T	Decide: IF printed clearance is desired, THEN Selection Rule: Get printed copy
0.1							Selection Rule for Goal: Get printed copy
0.1			1			T	IF printer is available, THEN Accomplish Goal: Print the clearance
0.1							Method for Goal: Print the clearance
0.1				1			Remember <keyword> = "Print" and Accomplish Goal: Line select key
0.1							Method for Goal: Line select key
0.51					1		Recall <keyword> and point finger to line select key next to keyword
0.38					2		Press and release appropriate line select key
0.1					3		Return with goal accomplished
0.51				2			Reach for print out
0.8				3			Grasp print out
0.51				4			Transport paper to reading position
0.1				5			Return with goal accomplished
0.1			3				Return with goal accomplished
0.1		5					Return with goal accomplished
0.1	3						Return with goal accomplished

Value	L1	L2	L3	L4	L5	Flag	Description
0.1	2					T	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1							Selection Rule for Goal: Respond to a clearance
0.1		2				T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1							Method for Goal: Respond by FMS
0.5			1			T	Decide: IF hand not on FMS, THEN move hand to FMS
0.1			2			F	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1			3				Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1							Method for Goal: Line select key
0.51				1			Recall <keyword> and point finger to line select key next to keyword
0.38				2			Press and release appropriate line select key
0.1				3			Return with goal accomplished
0.1			4				Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1							Method for Goal: Line select key
0.51				1			Recall <keyword> and point finger to line select key next to keyword
0.38				2			Press and release appropriate line select key
0.1				3			Return with goal accomplished
0.1			5				Return with goal accomplished
0.1		3					Return with goal accomplished
0.1	3						Accomplish Goal: Enter a clearance
0.1							Method for Goal: Enter a clearance
0.2		1				T	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1		2				F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1		3					Selection Rule: Specific clearance type
0.1							Selection Rule for Goal: Specific clearance type
0.1			4			T	IF clearance is only RTA, THEN Accomplish Goal: Locate waypoint
0.1							Method for Goal: Locate waypoint
0.1				1			Remember <menu key> = "FPL" and Accomplish Goal: Menu key
0.1							Method For Goal: Menu key
0.51					1		Recall <menu key> and point finger to appropriate menu key
0.38					2		Press and release appropriate menu key
0.1					3		Return with goal accomplished
0.82				2			Search for waypoint
0.1				3		T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1			5				Return with goal accomplished
0.1		4					Return with goal accomplished

Value	Level	Flag	Description
0.1	4		Selection Rule: Decide on a clearance
0.1			Selection Rule for Goal: Decide on a clearance
0.1	1	T	IF clearance includes only RTA, THEN Accomplish Goal: Compare ETA to RTA
0.1			Method for Goal: Compare ETA to RTA
1.3	1		Compare clearance RTA to displayed ETA
1.4	2	F	Decide: IF speed can be managed to maintain a predicted ETA that conforms with the assigned RTA, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1	3		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	5	F	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <keyword> = "Activate" and Accomplish Goal: Line select key
0.1	6		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1	2	T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1			Method for Goal: Respond by FMS
0.1	1	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	2	T	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1			Method for Goal: Open clearance
0.1	1		Remember <menu key> = "DLK" and Accomplish Goal: Menu key
0.1			Method For Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	2		Remember <keyword> = "NEW MSGS" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	3		Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	4		Return with goal accomplished

0.1		3	Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		4	Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		5	Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	7 F		Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
29.72			Total time

Trace 13 – Task 4, Voice

Equipment: FMS 1
NGOMSL Trace: Cross HELPR at 1800Z at FL190

Assumptions:
Clearance received by voice
When clearance is read from paper or heard over the radio it is 14 words ("Cross HELPR at one eight zero zero Zulu at flight level one niner zero")
Call sign is stated before audio clearance
Airline call sign is 3 words
Clearance is written down
Need to obtain pen and paper
Clearance is written as 6 words ("Cross HELPR at 1800Z at FL190")
Response is sent by voice
Clearance information is not initially remembered, and must be read aloud, when entering the clearance
Paper is not visible after hand moved to FMS
Hand is not on FMS after reading clearance from paper
Desired waypoint is the third waypoint listed on the first page of the flight plan
It takes one mental to determine if non-RTA portion of clearance is acceptable or not
Non-RTA portion of clearance is acceptable and pilot will comply
It takes one mental to determine if RTA portion of clearance is acceptable or not
RTA portion of clearance is acceptable and pilot will comply
Clearance information is not remembered during readback
There is clearance information to enter into the FMS
Only one clearance was sent

Time	Action
0.1	Method for Goal: Handle a clearance
0.1	1 Selection Rule: Receive a clearance
0.1	Selection Rule for Goal: Receive a clearance
0.1	2 T IF clearance is audio, THEN Accomplish Goal: Receive a radio clearance
0.1	Method for Goal: Receive a radio clearance
6.9	1 Listen to clearance and retain <clearance information>
0.1	2 T Decide: IF printed clearance is desired, THEN Accomplish Goal: Write down clearance
0.1	Method for Goal: Write down clearance
0.1	1 T Decide: IF paper is not readily available, THEN Accomplish Goal: Obtain paper
0.1	Method for Goal: Obtain paper
0.51	1 Reach for paper
0.8	2 Grasp paper
0.51	3 Transport paper to writing space
0.17	4 Release paper
0.1	5 Return with goal accomplished

Time	Step	Flag	Description
0.1	2	T	Decide: IF pen is not in hand, THEN Accomplish Goal: Obtain pen
0.1			Method for Goal: Obtain pen
0.51	1		Reach for pen
0.8	2		Grasp pen
0.51	3		Transport pen to paper
0.16	4		Position the pen over paper
0.1	5		Return with goal accomplished
16.3	3		Recall <clearance information> and write <clearance information>
0.51	4		Return pen to original location
0.17	5		Release pen
0.5	6		Move hand back to starting location
0.1	7		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	2	T	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1	1	T	IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1			Method for Goal: Respond by voice
0.5	1		Move hand to yoke and "Push to talk" button
0.2	2		Press "Push to talk" button
1.8	3	F	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by <response>
0.2	4		Release "Push to talk" button
0.5	5		Return hand to FMS
0.1	6		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	3		Accomplish Goal: Enter a clearance
0.1			Method for Goal: Enter a clearance
0.2	1	F	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1			Selection Rule for Goal: Method of reading
0.1	1	T	IF clearance is in writing, THEN Accomplish Goal: Read clearance from paper
0.1			Method for Goal: Read clearance from paper
0.51	1	T	Decide: IF paper not visible, THEN move paper
5.8	2	T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on paper aloud and retain <clearance information>, ELSE Read information on paper and retain <clearance information>
0.1	3		Return with goal accomplished
0.1	3		Return with goal accomplished

Value	Level	Flag	Description
0.5	2	T	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3		Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1	3	T	IF clearance is crossing restriction with RTA, THEN Accomplish Goal: Enter crossing restriction
0.1			Method for Goal: Enter crossing restriction
0.1	1		Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1	1		Remember <menu key> = "FPL" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.82	2		Search for waypoint
0.1	3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1	2	F	Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1	3		Remember <menu key> = "/" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	4	T	Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1			Method for Goal: Enter into scratchpad
0.1	1		Remember <menu key> = first digit/character in restrictions and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	2		Remember <menu key> = next digit/character in restriction and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished

Value	Step	T/F	Description
0.1	3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	2		Remember <menu key> = next digit/character in restriction and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	4	F	If <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1	5		Return with goal accomplished
0.51	5		Point finger to right line select key next to waypoint
0.38	6		Press and release right line select key next to waypoint
0.1	7		Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	4		Selection Rule: Decide on a clearance
0.1			Selection Rule for Goal: Decide on a clearance
0.1	3	T	IF clearance includes both RTA and other information, THEN Accomplish Goal: Determine whether mixed clearance is acceptable
0.1			Method for Goal: Determine whether mixed clearance is acceptable
0.1	1		Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1			Method for Goal: Determine whether non-RTA clearance is acceptable
1.3	1		Determine whether non-RTA clearance is acceptable
0.2	2	T	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1	3		Return with goal accomplished
0.1	2	F	Decide: IF <response> = "Unable," THEN Return with goal accomplished
0.1	3		Accomplish Goal: Compare ETA to RTA
0.1			Method for Goal: Compare ETA to RTA
1.3	1		Compare clearance RTA to displayed ETA
1.4	2	T	Decide: IF speed can be managed to maintain a predicted ETA that conforms with the assigned RTA, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1	3		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	4		Return with goal accomplished

Time	Step	T/F	Description
0.1	5	T	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <keyword> = "Activate" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	6		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1	1	T	IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1			Method for Goal: Respond by voice
0.5	1		Move hand to yoke and "Push to talk" button
0.2	2		Press "Push to talk" button
0.2	3	T	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by <response>
0.1			Selection Rule for Goal: Method of clearance readback
0.1	2	T	IF <clearance information> is not remembered, THEN Accomplish Goal: Readback clearance by reading
0.1			Method for Goal: Readback clearance by reading
0.1	1		Selection Rule: Method of reading
0.1			Selection Rule for Goal: Method of reading
0.1	1	T	IF clearance is in writing, THEN Accomplish Goal: Read clearance from paper
0.1			Method for Goal: Read clearance from paper
0.51	1	T	Decide: IF paper not visible, THEN move paper
5.8	2	T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on paper aloud and retain <clearance information>, ELSE Read information on paper and retain <clearance information>
0.1	3		Return with goal accomplished
0.1	3		Return with goal accomplished
1.3	2		State call sign
0.1	3		Return with goal accomplished
0.1	3		Return with goal accomplished
0.2	4		Release "Push to talk" button
0.5	5		Return hand to FMS
0.1	6		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	7	F	Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
68.62			Total time

Trace 14 – Task 4, Voice

Equipment: FMS 1
NGOMSL Trace: Cross HELPR at 1800Z at FL190

Assumptions:
Clearance received by voice
When clearance is stated aloud or heard over the radio it is 14 words ("Cross HELPR at one eight zero zero Zulu at flight level one niner zero")
Call sign is stated before audio clearance
Airline call sign is 3 words
Clearance is not written down
Response is sent by voice
Clearance information is remembered when entering the clearance
Desired waypoint is the third waypoint listed on the first page of the flight plan
It takes one mental to determine if non-RTA portion of clearance is acceptable or not
Non-RTA portion of clearance is acceptable and pilot will comply
It takes one mental to determine if RTA portion of clearance is acceptable or not
RTA portion of clearance is acceptable and pilot will comply
Clearance information is remembered during readback
There is clearance information to enter into the FMS
Only one clearance was sent

Time	Action			
0.1	Method for Goal: Handle a clearance			
0.1	1	Selection Rule: Receive a clearance		
0.1		Selection Rule for Goal: Receive a clearance		
0.1		2	T	IF clearance is audio, THEN Accomplish Goal: Receive a radio clearance
0.1				Method for Goal: Receive a radio clearance
6.9			1	Listen to clearance and retain <clearance information>
0.1			2 F	Decide: IF printed clearance is desired, THEN Accomplish Goal: Write down clearance
0.1			3	Return with goal accomplished
0.1		3	Return with goal accomplished	

Time	Step	T/F	Description
0.1	2	T	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1	1	T	IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1			Method for Goal: Respond by voice
0.5	1		Move hand to yoke and "Push to talk" button
0.2	2		Press "Push to talk" button
1.8	3	F	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by <response>
0.2	4		Release "Push to talk" button
0.5	5		Return hand to FMS
0.1	6		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	3		Accomplish Goal: Enter a clearance
0.1			Method for Goal: Enter a clearance
0.2	1	T	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1	2	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3		Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1	3	T	IF clearance is crossing restriction with RTA, THEN Accomplish Goal: Enter crossing restriction
0.1			Method for Goal: Enter crossing restriction
0.1	1		Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1	1		Remember <menu key> = "FPL" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.82	2		Search for waypoint
0.1	3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1	2	F	Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1	3		Remember <menu key> = "/" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished

0.1		4 T		Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1				Method for Goal: Enter into scratchpad
0.1			1	Remember <menu key> = first digit/character in restrictions and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51				1 Recall <menu key> and point finger to appropriate menu key
0.38				2 Press and release appropriate menu key
0.1				3 Return with goal accomplished
0.1			2	Remember <menu key> = next digit/character in restriction and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51				1 Recall <menu key> and point finger to appropriate menu key
0.38				2 Press and release appropriate menu key
0.1				3 Return with goal accomplished
0.1			3 T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			2	Remember <menu key> = next digit/character in restriction and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51				1 Recall <menu key> and point finger to appropriate menu key
0.38				2 Press and release appropriate menu key
0.1				3 Return with goal accomplished
0.1			3 F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			4 F	If <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1			5	Return with goal accomplished
0.51		5		Point finger to right line select key next to waypoint
0.38		6		Press and release right line select key next to waypoint
0.1		7		Return with goal accomplished
0.1	5			Return with goal accomplished
0.1	4			Return with goal accomplished

Time	Step	Flag	Description
0.1	4		Selection Rule: Decide on a clearance
0.1			Selection Rule for Goal: Decide on a clearance
0.1	3	T	IF clearance includes both RTA and other information, THEN Accomplish Goal: Determine whether mixed clearance is acceptable
0.1			Method for Goal: Determine whether mixed clearance is acceptable
0.1	1		Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1			Method for Goal: Determine whether non-RTA clearance is acceptable
1.3	1		Determine whether non-RTA clearance is acceptable
0.2	2	T	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1	3		Return with goal accomplished
0.1	2	F	Decide: IF <response> = "Unable," THEN Return with goal accomplished
0.1	3		Accomplish Goal: Compare ETA to RTA
0.1			Method for Goal: Compare ETA to RTA
1.3	1		Compare clearance RTA to displayed ETA
1.4	2	T	Decide: IF speed can be managed to maintain a predicted ETA that conforms with the assigned RTA, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1	3		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	5	T	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <keyword> = "Activate" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	6		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1	1	T	IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1			Method for Goal: Respond by voice
0.5	1		Move hand to yoke and "Push to talk" button
0.2	2		Press "Push to talk" button
0.2	3	T	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by <response>
0.1			Selection Rule for Goal: Method of clearance readback
0.1	1	T	IF <clearance information> is remembered, THEN Accomplish Goal: Readback clearance from memory
0.1			Method for Goal: Readback clearance from memory
6.9	1		Recall <clearance information> and state <clearance information> followed by call sign
0.1	2		Return with goal accomplished
0.1	3		Return with goal accomplished

0.2		4	Release "Push to talk" button
0.5		5	Return hand to FMS
0.1		6	Return with goal accomplished
0.1		3	Return with goal accomplished
0.1	7	F	Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
37.85			Total time

Trace 15 – Task 4, Data Comm

Equipment: FMS 1

NGOMSL Trace: Cross HELPR at time 1800Z at FL190

Assumptions:

Clearance received by data communications (Data Comm)

Hands do not start on FMS

Entire clearance is read aloud upon receipt

When clearance is read from screen page one is 9 words ("Cross HELPR at time one eight zero zero Zulu") and page two is 6 words ("At flight level one niner zero")

Clearance is two pages

Clearance is printed upon receipt

Printer is available

Response is sent by FMS

Hand is not on FMS after grasping print out

Once opened, clearance remains open until clearance information is entered

Clearance information is not initially remembered, and must be read aloud, when entering the clearance

Paper is not visible after hand moved to FMS

When clearance is read from paper it is 15 words ("Cross HELPR at time one eight zero zero Zulu at flight level one niner zero")

Hand is not on FMS after reading clearance from paper

Desired waypoint is the third waypoint listed on the first page of the flight plan

It takes one mental to determine if non-RTA portion of clearance is acceptable or not

Non-RTA portion of clearance is acceptable

It takes one mental to determine if RTA portion of clearance is acceptable or not

RTA portion of clearance is not acceptable

There is no clearance information to enter into the FMS

Only one clearance was sent

Time	Action
0.1	Method for Goal: Handle a clearance
0.1	1 Selection Rule: Receive a clearance
0.1	Selection Rule for Goal: Receive a clearance
0.1	1 T IF clearance is text, THEN Accomplish Goal: Receive an FMS clearance
0.1	Method for Goal: Receive an FMS clearance
0.5	1 T Decide: IF hand not on FMS, THEN move hand to FMS
0.1	2 Accomplish Goal: Open clearance
0.1	Method for Goal: Open clearance
0.1	1 Remember <menu key> = "DLK" and Accomplish Goal: Menu key
0.1	Method for Goal: Menu key
0.51	1 Recall <menu key> and point finger to appropriate menu key
0.38	2 Press and release appropriate menu key
0.1	3 Return with goal accomplished

0.1		2	Remember <keyword> = "NEW MSGS" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51			1 Recall <keyword> and point finger to line select key next to keyword
0.38			2 Press and release appropriate line select key
0.1			3 Return with goal accomplished
0.1		3	Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51			1 Recall <keyword> and point finger to line select key next to keyword
0.38			2 Press and release appropriate line select key
0.1			3 Return with goal accomplished
0.1		4	Return with goal accomplished
0.1	3		Accomplish Goal: Read the clearance
0.1			Method for Goal: Read the clearance
3.8		1 T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and retain <clearance information>
0.1		2 F	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1		3	Remember <menu key> = "Next" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51			1 Recall <menu key> and point finger to appropriate menu key
0.38			2 Press and release appropriate menu key
0.1			3 Return with goal accomplished

Time	Step	Flag	Description
0.1	4		GOTO Step 1
2.6	1	T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and retain <clearance information>
0.1	2	T	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1	4	T	Decide: IF printed clearance is desired, THEN Selection Rule: Get printed copy
0.1			Selection Rule for Goal: Get printed copy
0.1	1	T	IF printer is available, THEN Accomplish Goal: Print the clearance
0.1			Method for Goal: Print the clearance
0.1	1		Remember <keyword> = "Print" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.51	2		Reach for print out
0.8	3		Grasp print out
0.51	4		Transport paper to reading position
0.1	5		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	2	T	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1	2	T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1			Method for Goal: Respond by FMS
0.5	1	T	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	2	F	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1	3		Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished

Value	Step	Description
0.1	4	Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1		Method for Goal: Line select key
0.51	1	Recall <keyword> and point finger to line select key next to keyword
0.38	2	Press and release appropriate line select key
0.1	3	Return with goal accomplished
0.1	5	Return with goal accomplished
0.1	3	Return with goal accomplished
0.1	3	Accomplish Goal: Enter a clearance
0.1		Method for Goal: Enter a clearance
0.2	1 F	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1		Selection Rule for Goal: Method of reading
0.1	1 T	IF clearance is in writing, THEN Accomplish Goal: Read clearance from paper
0.1		Method for Goal: Read clearance from paper
0.51	1 T	Decide: IF paper not visible, THEN move paper
6.2	2 T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on paper aloud and retain <clearance information>, ELSE Read information on paper and retain <clearance information>
0.1	3	Return with goal accomplished
0.1	3	Return with goal accomplished
0.5	2 T	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3	Selection Rule: Specific clearance type
0.1		Selection Rule for Goal: Specific clearance type
0.1	3 T	IF clearance is crossing restriction with RTA, THEN Accomplish Goal: Enter crossing restriction
0.1		Method for Goal: Enter crossing restriction
0.1	1	Accomplish Goal: Locate waypoint
0.1		Method for Goal: Locate waypoint
0.1	1	Remember <menu key> = "FPL" and Accomplish Goal: Menu key
0.1		Method for Goal: Menu key
0.51	1	Recall <menu key> and point finger to appropriate menu key
0.38	2	Press and release appropriate menu key
0.1	3	Return with goal accomplished

0.82		2		Search for waypoint
0.1		3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1	2	F		Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1	3			Remember <menu key> = "/" and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51		1		Recall <menu key> and point finger to appropriate menu key
0.38		2		Press and release appropriate menu key
0.1		3		Return with goal accomplished
0.1	4	T		Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1				Method for Goal: Enter into scratchpad
0.1	1			Remember <menu key> = first digit/character in restrictions and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51		1		Recall <menu key> and point finger to appropriate menu key
0.38		2		Press and release appropriate menu key
0.1		3		Return with goal accomplished
0.1	2			Remember <menu key> = next digit/character in restriction and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51		1		Recall <menu key> and point finger to appropriate menu key
0.38		2		Press and release appropriate menu key
0.1		3		Return with goal accomplished
0.1	3	T		Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	2			Remember <menu key> = next digit/character in restrictions and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51		1		Recall <menu key> and point finger to appropriate menu key
0.38		2		Press and release appropriate menu key
0.1		3		Return with goal accomplished
0.1	3	F		Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	4	F		If <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1	5			Return with goal accomplished

0.51				5	Point finger to right line select key next to waypoint
0.38				6	Press and release right line select key next to waypoint
0.1				7	Return with goal accomplished
0.1			5		Return with goal accomplished
0.1		4			Return with goal accomplished
0.1	4				Selection Rule: Decide on a clearance
0.1		Selection Rule for Goal: Decide on a clearance			
0.1			3 T		IF clearance includes both RTA and other information, THEN Accomplish Goal: Determine whether mixed clearance is acceptable
0.1			Method for Goal: Determine whether mixed clearance is acceptable		
0.1				1	Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1				Method for Goal: Determine whether non-RTA clearance is acceptable	
1.3					1 Determine whether non-RTA clearance is acceptable
0.2					2 T Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1					3 Return with goal accomplished
0.1				2 F	Decide: IF <response> = "Unable," THEN Return with goal accomplished
0.1				3	Accomplish Goal: Compare ETA to RTA
0.1				Method for Goal: Compare ETA to RTA	
1.3					1 Compare clearance RTA to displayed ETA
1.4					2 F Decide: IF speed can be managed to maintain a predicted ETA that conforms with the assigned RTA, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1					3 Return with goal accomplished
0.1				4	Return with goal accomplished
0.1			4		Return with goal accomplished
0.1	5 F	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <keyword> = "Activate" and Accomplish Goal: Line select key			
0.1	6	Selection Rule: Respond to a clearance			
0.1		Selection Rule for Goal: Respond to a clearance			
0.1		2 T IF responding by FMS, THEN Accomplish Goal: Respond by FMS			
0.1		Method for Goal: Respond by FMS			
0.1			1 F Decide: IF hand not on FMS, THEN move hand to FMS		
0.1			2 T Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance		
0.1			Method for Goal: Open clearance		
0.1				1 Remember <menu key> = "DLK" and Accomplish Goal: Menu key	
0.1				Method for Goal: Menu key	
0.51					1 Recall <menu key> and point finger to appropriate menu key
0.38					2 Press and release appropriate menu key
0.1					3 Return with goal accomplished

0.1		2	Remember <keyword> = "NEW MSGS" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51			1 Recall <keyword> and point finger to line select key next to keyword
0.38			2 Press and release appropriate line select key
0.1			3 Return with goal accomplished
0.1		3	Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51			1 Recall <keyword> and point finger to line select key next to keyword
0.38			2 Press and release appropriate line select key
0.1			3 Return with goal accomplished
0.1		4	Return with goal accomplished
0.1	3		Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1	4		Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	7 F		Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
50.57			Total time

Trace 16 – Task 4, Data Comm

Equipment: FMS 1
NGOMSL Trace: Cross HELPR at time 1800Z at FL190

Assumptions:
Clearance received by data communications (Data Comm)
Hands start on FMS
Entire clearance is read aloud upon receipt
When clearance is read from screen page one is 9 words ("Cross HELPR at time one eight zero zero Zulu") and page two is 6 words ("At flight level one niner zero")
Clearance is two pages
Clearance is not printed upon receipt
Response is sent by FMS
Once opened, clearance remains open until clearance information is entered
Clearance information is remembered when entering the clearance
Desired waypoint is the third waypoint listed on the first page of the flight plan
It takes one mental to determine if non-RTA portion of clearance is acceptable or not
Non-RTA portion of clearance is acceptable
It takes one mental to determine if RTA portion of clearance is acceptable or not
RTA portion of clearance is not acceptable
There is no clearance information to enter into the FMS
Only one clearance was sent

Time	Action
0.1	Method for Goal: Handle a clearance
0.1	1 Selection Rule: Receive a clearance
0.1	Selection Rule for Goal: Receive a clearance
0.1	1 T IF clearance is text, THEN Accomplish Goal: Receive an FMS clearance
0.1	Method for Goal: Receive an FMS clearance
0.1	1 F Decide: IF hand not on FMS, THEN move hand to FMS
0.1	2 Accomplish Goal: Open clearance
0.1	Method for Goal: Open clearance
0.1	1 Remember <menu key> = "DLK" and Accomplish Goal: Menu key
0.1	Method for Goal: Menu key
0.51	1 Recall <menu key> and point finger to appropriate menu key
0.38	2 Press and release appropriate menu key
0.1	3 Return with goal accomplished

Value						Description
0.1			2			Remember <keyword> = "NEW MSGS" and Accomplish Goal: Line select key
0.1						Method for Goal: Line select key
0.51				1		Recall <keyword> and point finger to line select key next to keyword
0.38				2		Press and release appropriate line select key
0.1				3		Return with goal accomplished
0.1			3			Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1						Method for Goal: Line select key
0.51				1		Recall <keyword> and point finger to line select key next to keyword
0.38				2		Press and release appropriate line select key
0.1				3		Return with goal accomplished
0.1			4			Return with goal accomplished
0.1		3				Accomplish Goal: Read the clearance
0.1						Method for Goal: Read the clearance
3.8			1		T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and retain <clearance information>
0.1			2		F	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1			3			Remember <menu key> = "Next" and Accomplish Goal: Menu key
0.1						Method for Goal: Menu key
0.51				1		Recall <menu key> and point finger to appropriate menu key
0.38				2		Press and release appropriate menu key
0.1				3		Return with goal accomplished
0.1			4			GOTO Step 1
2.6			1		T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and retain <clearance information>
0.1			2		T	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1		4			F	Decide: IF printed clearance is desired, THEN Selection Rule: Get printed copy
0.1			5			Return with goal accomplished
0.1	3					Return with goal accomplished

0.1	2	T	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1	2	T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1			Method for Goal: Respond by FMS
0.1	1	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	2	F	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1	3		Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keywor
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	4		Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keywor
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	3		Accomplish Goal: Enter a clearance
0.1			Method for Goal: Enter a clearance
0.2	1	T	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1	2	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3		Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1	3	T	IF clearance is crossing restriction with RTA, THEN Accomplish Goal: Enter crossing restriction
0.1			Method for Goal: Enter crossing restriction
0.1	1		Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1	1		Remember <menu key> = "FPL" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished

0.82			2	Search for waypoint
0.1			3 T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1		2 F		Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1		3		Remember <menu key> = "/" and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu ke
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		4 T		Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1				Method for Goal: Enter into scratchpad
0.1			1	Remember <menu key> = first digit/character in restrictions and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1			2	Remember <menu key> = next digit/character in restriction and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1			3 T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			2	Remember <menu key> = next digit/character in restrictions and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished

Value						T/F	Description
0.1					3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1					4	F	If <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1					5		Return with goal accomplished
0.51				5			Point finger to right line select key next to waypoint
0.38				6			Press and release right line select key next to waypoint
0.1				7			Return with goal accomplished
0.1			5				Return with goal accomplished
0.1		4					Return with goal accomplished
0.1	4						Selection Rule: Decide on a clearance
0.1							Selection Rule for Goal: Decide on a clearance
0.1				3		T	IF clearance includes both RTA and other information, THEN Accomplish Goal: Determine whether mixed clearance is acceptable
0.1							Method for Goal: Determine whether mixed clearance is acceptable
0.1			1				Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1							Method for Goal: Determine whether non-RTA clearance is acceptable
1.3				1			Determine whether non-RTA clearance is acceptable
0.2				2		T	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1				3			Return with goal accomplished
0.1			2			F	Decide: IF <response> = "Unable," THEN Return with goal accomplished
0.1			3				Accomplish Goal: Compare ETA to RTA
0.1							Method for Goal: Compare ETA to RTA
1.3				1			Compare clearance RTA to displayed ETA
1.4				2		F	Decide: IF speed can be managed to maintain a predicted ETA that conforms with the assigned RTA, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1				3			Return with goal accomplished
0.1			4				Return with goal accomplished
0.1		4					Return with goal accomplished
0.1	5						Selection Rule: Respond to a clearance
0.1							Selection Rule for Goal: Respond to a clearance
0.1			2			T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1							Method for Goal: Respond by FMS
0.1			1			F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1			2			T	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1							Method for Goal: Open clearance
0.1				1			Remember <menu key> = "DLK" and Accomplish Goal: Menu key
0.1							Method for Goal: Menu key
0.51					1		Recall <menu key> and point finger to appropriate menu key
0.38					2		Press and release appropriate menu key
0.1					3		Return with goal accomplished

0.1		2		Remember <keyword> = "NEW MSGS" and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51			1	Recall <keyword> and point finger to line select key next to keyword
0.38			2	Press and release appropriate line select key
0.1			3	Return with goal accomplished
0.1		3		Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51			1	Recall <keyword> and point finger to line select key next to keyword
0.38			2	Press and release appropriate line select key
0.1			3	Return with goal accomplished
0.1		4		Return with goal accomplished
0.1		3		Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51			1	Recall <keyword> and point finger to line select key next to keyword
0.38			2	Press and release appropriate line select key
0.1			3	Return with goal accomplished
0.1		4		Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51			1	Recall <keyword> and point finger to line select key next to keyword
0.38			2	Press and release appropriate line select key
0.1			3	Return with goal accomplished
0.1		5		Return with goal accomplished
0.1		3		Return with goal accomplished
0.1	6	F		Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <keyword> = "Activate" and Accomplish Goal: Line select key
0.1	7	F		Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8			Return with goal accomplished
38.65				Total time

Trace 17 – Task 5, Voice

Equipment: FMS 1
NGOMSL Trace: Cross HELPR at 1800Z at or above FL190

Assumptions:
Clearance received by voice
When clearance is read from paper or heard over the radio it is 16 words ("Cross HELPR at one eight zero zero Zulu at or above flight level one niner zero")
Call sign is stated before audio clearance
Airline call sign is 3 words
Clearance is written down
Paper is available
Pen is not in hand
Clearance is written as 8 words ("Cross HELPR at 1800Z at or above FL190")
Response is sent by voice
Clearance information is not initially remembered, and must be read aloud, when entering the clearance
Paper is not visible after hand moved to FMS
Hand is not on FMS after reading clearance from paper
Desired waypoint is the third waypoint listed on the first page of the flight plan
It takes one mental to determine if non-RTA portion of clearance is acceptable or not
Non-RTA portion of clearance is acceptable and pilot will comply
It takes one mental to determine if RTA portion of clearance is acceptable or not
RTA portion of clearance is acceptable and pilot will comply
Clearance information is remembered during readback
There is clearance information to enter into the FMS
Only one clearance was sent

Time	Action				
0.1	Method for Goal: Handle a clearance				
0.1	1	Selection Rule: Receive a clearance			
0.1		Selection Rule for Goal: Receive a clearance			
0.1		2	T	IF clearance is audio, THEN Accomplish Goal: Receive a radio clearance	
0.1			Method for Goal: Receive a radio clearance		
7.7			1	Listen to clearance and retain <clearance information>	
0.1			2	T	Decide: IF printed clearance is desired, THEN Accomplish Goal: Write down clearance
0.1				Method for Goal: Write down clearance	
0.1				1	F	Decide: IF paper is not readily available, THEN Accomplish Goal: Obtain paper
0.1				2	T	Decide: IF pen is not in hand, THEN Accomplish Goal: Obtain pen

0.1			Method for Goal: Obtain pen
0.51		1	Reach for pen
0.8		2	Grasp pen
0.51		3	Transport pen to paper
0.16		4	Position the pen over paper
0.1		5	Return with goal accomplished
21.7		3	Recall <clearance information> and write <clearance information>
0.51		4	Return pen to original location
0.17		5	Release pen
0.5		6	Move hand back to starting location
0.1		7	Return with goal accomplished
0.1		3	Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	2 T		Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1	1 T		IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1			Method for Goal: Respond by voice
0.5		1	Move hand to yoke and "Push to talk" button
0.2		2	Press "Push to talk" button
1.8		3 F	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by <response>
0.2		4	Release "Push to talk" button
0.5		5	Return hand to FMS
0.1		6	Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	3		Accomplish Goal: Enter a clearance
0.1			Method for Goal: Enter a clearance
0.2	1 F		Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1			Selection Rule for Goal: Method of reading
0.1	1 T		IF clearance is in writing, THEN Accomplish Goal: Read clearance from paper
0.1			Method for Goal: Read clearance from paper
0.51		1 T	Decide: IF paper not visible, THEN move paper
6.6		2 T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on paper aloud and retain <clearance information>, ELSE Read information on paper and retain <clearance information>
0.1		3	Return with goal accomplished
0.1	3		Return with goal accomplished

Value	Step	T/F	Description
0.5	2	T	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3		Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1	3	T	IF clearance is crossing restriction with RTA, THEN Accomplish Goal: Enter crossing restriction
0.1			Method for Goal: Enter crossing restriction
0.1	1		Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1	1		Remember <menu key> = "FPL" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.82	2		Search for waypoint
0.1	3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1	2	F	Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1	3		Remember <menu key> = "/" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	4	T	Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1			Method for Goal: Enter into scratchpad
0.1	1		Remember <menu key> = first digit/character in restrictions and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	2		Remember <menu key> = next digit/character in restriction and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished

Time	1	2	3	4	5	6	7	T/F	Description
0.1					3			T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1					2				Remember <menu key> = next digit/character in restriction and Accomplish Goal: Menu key
0.1									Method for Goal: Menu key
0.51						1			Recall <menu key> and point finger to appropriate menu key
0.38						2			Press and release appropriate menu key
0.1						3			Return with goal accomplished
0.1					3			F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1					4			T	IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1									Selection Rule for Goal: At and above or below
0.1						1		T	IF restriction is at or above, THEN Remember <menu key> = "A" and Accomplish Goal: Menu key
0.1									Method for Goal: Menu key
0.51							1		Recall <menu key> and point finger to appropriate menu key
0.38							2		Press and release appropriate menu key
0.1							3		Return with goal accomplished
0.1						3			Return with goal accomplished
0.1					5				Return with goal accomplished
0.51				5					Point finger to right line select key next to waypoint
0.38				6					Press and release right line select key next to waypoint
0.1				7					Return with goal accomplished
0.1			5						Return with goal accomplished
0.1		4							Return with goal accomplished
0.1	4								Selection Rule: Decide on a clearance
0.1									Selection Rule for Goal: Decide on a clearance
0.1		3						T	IF clearance includes both RTA and other information, THEN Accomplish Goal: Determine whether mixed clearance is acceptable
0.1									Method for Goal: Determine whether mixed clearance is acceptable
0.1			1						Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1									Method for Goal: Determine whether non-RTA clearance is acceptable
1.3				1					Determine whether non-RTA clearance is acceptable
0.2				2				T	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1				3					Return with goal accomplished

Time	Content
0.1	2 F Decide: IF <response> = "Unable," THEN Return with goal accomplished
0.1	3 Accomplish Goal: Compare ETA to RTA
0.1	Method for Goal: Compare ETA to RTA
1.3	1 Compare clearance RTA to displayed ETA
1.4	2 T Decide: IF speed can be managed to maintain a predicted ETA that conforms with the assigned RTA, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1	3 Return with goal accomplished
0.1	4 Return with goal accomplished
0.1	4 Return with goal accomplished
0.1	5 T Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <keyword> = "Activate" and Accomplish Goal: Line select key
0.1	Method for Goal: Line select key
0.51	1 Recall <keyword> and point finger to line select key next to keyword
0.38	2 Press and release appropriate line select key
0.1	3 Return with goal accomplished
0.1	6 Selection Rule: Respond to a clearance
0.1	Selection Rule for Goal: Respond to a clearance
0.1	1 T IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1	Method for Goal: Respond by voice
0.5	1 Move hand to yoke and "Push to talk" button
0.2	2 Press "Push to talk" button
0.2	3 T Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by <response>
0.1	Selection Rule for Goal: Method of clearance readback
0.1	1 T IF <clearance information> is remembered, THEN Accomplish Goal: Readback clearance from memory
0.1	Method for Goal: Readback clearance from memory
7.7	1 Recall <clearance information> and state <clearance information> followed by call sign
0.1	2 Return with goal accomplished
0.1	3 Return with goal accomplished
0.2	4 Release "Push to talk" button
0.5	5 Return hand to FMS
0.1	6 Return with goal accomplished
0.1	3 Return with goal accomplished
0.1	7 F Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8 Return with goal accomplished
74.31	Total time

Trace 18 – Task 5, Voice

Equipment: FMS 1

NGOMSL Trace: Cross HELPR at 1800Z at or above FL190

Assumptions:

Clearance received by voice

When clearance is stated aloud or heard over the radio it is 16 words ("Cross HELPR at one eight zero zero Zulu at or above flight level one niner zero")

Call sign is stated before audio clearance

Airline call sign is 3 words

Clearance is not written down

Response is sent by voice

Clearance information is remembered when entering the clearance

Desired waypoint is the third waypoint listed on the first page of the flight plan

It takes one mental to determine if non-RTA portion of clearance is acceptable or not

Non-RTA portion of clearance is acceptable and pilot will comply

It takes one mental to determine if RTA portion of clearance is acceptable or not

RTA portion of clearance is acceptable and pilot will comply

Clearance information is remembered during readback

There is clearance information to enter into the FMS

Only one clearance was sent

Time	Action			
0.1	Method for Goal: Handle a clearance			
0.1	1	Selection Rule: Receive a clearance		
0.1		Selection Rule for Goal: Receive a clearance		
0.1		2	T	IF clearance is audio, THEN Accomplish Goal: Receive a radio clearance
0.1			Method for Goal: Receive a radio clearance	
7.7			1	Listen to clearance and retain <clearance information>
0.1			2	F	Decide: IF printed clearance is desired, THEN Accomplish Goal: Write down clearance
0.1			3	Return with goal accomplished
0.1		3	Return with goal accomplished	

0.1	2	T	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1	1	T	IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1			Method for Goal: Respond by voice
0.5	1		Move hand to yoke and "Push to talk" button
0.2	2		Press "Push to talk" button
1.8	3	F	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by <response>
0.2	4		Release "Push to talk" button
0.5	5		Return hand to FMS
0.1	6		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	3		Accomplish Goal: Enter a clearance
0.1			Method for Goal: Enter a clearance
0.2	1	T	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1	2	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3		Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1	3	T	IF clearance is crossing restriction with RTA, THEN Accomplish Goal: Enter crossing restriction
0.1			Method for Goal: Enter crossing restriction
0.1	1		Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1	1		Remember <menu key> = "FPL" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.82	2		Search for waypoint
0.1	3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1	2	F	Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1	3		Remember <menu key> = "/" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished

0.1		4	T		Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1					Method for Goal: Enter into scratchpad
0.1		1			Remember <menu key> = first digit/character in restrictions and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51			1		Recall <menu key> and point finger to appropriate menu key
0.38			2		Press and release appropriate menu key
0.1			3		Return with goal accomplished
0.1		2			Remember <menu key> = next digit/character in restriction and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51			1		Recall <menu key> and point finger to appropriate menu key
0.38			2		Press and release appropriate menu key
0.1			3		Return with goal accomplished
0.1		3	T		Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2			Remember <menu key> = next digit/character in restriction and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51			1		Recall <menu key> and point finger to appropriate menu key
0.38			2		Press and release appropriate menu key
0.1			3		Return with goal accomplished
0.1		3	F		Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		4	T		If <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1					Selection Rule for Goal: At and above or below
0.1			1	T	IF restriction is at or above, THEN Remember <menu key> = "A" and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1			3		Return with goal accomplished
0.1		5			Return with goal accomplished

0.51		5	Point finger to right line select key next to waypoint
0.38		6	Press and release right line select key next to waypoint
0.1		7	Return with goal accomplished
0.1		5	Return with goal accomplished
0.1		4	Return with goal accomplished
0.1	4		Selection Rule: Decide on a clearance
0.1			Selection Rule for Goal: Decide on a clearance
0.1		3 T	IF clearance includes both RTA and other information, THEN Accomplish Goal: Determine whether mixed clearance is acceptable
0.1			Method for Goal: Determine whether mixed clearance is acceptable
0.1		1	Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1			Method for Goal: Determine whether non-RTA clearance is acceptable
1.3		1	Determine whether non-RTA clearance is acceptable
0.2		2 T	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1		3	Return with goal accomplished
0.1		2 F	Decide: IF <response> = "Unable," THEN Return with goal accomplished
0.1		3	Accomplish Goal: Compare ETA to RTA
0.1			Method for Goal: Compare ETA to RTA
1.3		1	Compare clearance RTA to displayed ETA
1.4		2 T	Decide: IF speed can be managed to maintain a predicted ETA that conforms with the assigned RTA, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1		3	Return with goal accomplished
0.1		4	Return with goal accomplished
0.1		4	Return with goal accomplished
0.1	5 T		Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <keyword> = "Activate" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished

Time	Step	Description
0.1	6	Selection Rule: Respond to a clearance
0.1		Selection Rule for Goal: Respond to a clearance
0.1	1 T	IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1		Method for Goal: Respond by voice
0.5	1	Move hand to yoke and "Push to talk" button
0.2	2	Press "Push to talk" button
0.2	3 T	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by <response>
0.1		Selection Rule for Goal: Method of clearance readback
0.1	1 T	IF <clearance information> is remembered, THEN Accomplish Goal: Readback clearance from memory
0.1		Method for Goal: Readback clearance from memory
7.7	1	Recall <clearance information> and state <clearance information> followed by call sign
0.1	2	Return with goal accomplished
0.1	3	Return with goal accomplished
0.2	4	Release "Push to talk" button
0.5	5	Return hand to FMS
0.1	6	Return with goal accomplished
0.1	3	Return with goal accomplished
0.1	7 F	Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8	Return with goal accomplished
40.84		Total time

Trace 19 – Task 5, Data Comm

Equipment: FMS 1
NGOMSL Trace: Cross HELPR at time 1800Z at or above FL190

Assumptions:
Clearance received by data communications (Data Comm)
Hands do not start on FMS
Entire clearance is read aloud upon receipt
When clearance is read from screen page one is 9 words ("Cross HELPR at time one eight zero zero Zulu")
and page two is 8 words ("At or above flight level one niner zero")
Clearance is two pages
Clearance is printed upon receipt
Printer is available
Response is sent by FMS
Hand is not on FMS after grasping print out
Once opened, clearance remains open until clearance information is entered
Clearance information is not initially remembered, and must be read aloud, when entering the clearance
Paper is not visible after hand moved to FMS
When clearance is read from paper it is 17 words ("Cross HELPR at time one eight zero zero Zulu at or above
flight level one niner zero")
Hand is not on FMS after reading clearance from paper
Desired waypoint is the third waypoint listed on the first page of the flight plan
It takes one mental to determine if non-RTA portion of clearance is acceptable or not
Non-RTA portion of clearance is acceptable and pilot will comply
It takes one mental to determine if RTA portion of clearance is acceptable or not
RTA portion of clearance is acceptable and pilot will comply
There is clearance information to enter into the FMS
Only one clearance was sent

Time	Action				
0.1	Method for Goal: Handle a clearance				
0.1	1	Selection Rule: Receive a clearance			
0.1		Selection Rule for Goal: Receive a clearance			
0.1		1	T	IF clearance is text, THEN Accomplish Goal: Receive an FMS clearance	
0.1			Method for Goal: Receive an FMS clearance		
0.5			1	T	Decide: IF hand not on FMS, THEN move hand to FMS
0.1			2	Accomplish Goal: Open clearance	
0.1				Method for Goal: Open clearance	
0.1				1	Remember <menu key> = "DLK" and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51					1	Recall <menu key> and point finger to appropriate menu key
0.38					2	Press and release appropriate menu key
0.1					3	Return with goal accomplished

0.1			2		Remember <keyword> = "NEW MSGS" and Accomplish Goal: Line select key
0.1					Method for Goal: Line select key
0.51				1	Recall <keyword> and point finger to line select key next to keyword
0.38				2	Press and release appropriate line select key
0.1				3	Return with goal accomplished
0.1			3		Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1					Method for Goal: Line select key
0.51				1	Recall <keyword> and point finger to line select key next to keyword
0.38				2	Press and release appropriate line select key
0.1				3	Return with goal accomplished
0.1			4		Return with goal accomplished
0.1		3			Accomplish Goal: Read the clearance
0.1					Method for Goal: Read the clearance
3.8			1	T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and retain <clearance information>
0.1			2	F	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1			3		Remember <menu key> = "Next" and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished

Value	Step		Description
0.1		4	GOTO Step 1
3.4		1 T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and retain <clearance information>
0.1		2 T	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1	4 T		Decide: IF printed clearance is desired, THEN Selection Rule: Get printed copy
0.1			Selection Rule for Goal: Get printed copy
0.1		1 T	IF printer is available, THEN Accomplish Goal: Print the clearance
0.1			Method for Goal: Print the clearance
0.1		1	Remember <keyword> = "Print" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.51		2	Reach for print out
0.8		3	Grasp print out
0.51		4	Transport paper to reading position
0.1		5	Return with goal accomplished
0.1		3	Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	2 T		Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1		2 T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1			Method for Goal: Respond by FMS
0.5		1 T	Decide: IF hand not on FMS, THEN move hand to FMS
0.1		2 F	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1		3	Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		4	Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		5	Return with goal accomplished

0.1	3		Return with goal accomplished
0.1	3		Accomplish Goal: Enter a clearance
0.1			Method for Goal: Enter a clearance
0.2	1	F	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1			Selection Rule for Goal: Method of reading
0.1	1	T	IF clearance is in writing, THEN Accomplish Goal: Read clearance from paper
0.1			Method for Goal: Read clearance from paper
0.51	1	T	Decide: IF paper not visible, THEN move paper
7	2	T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on paper aloud and retain <clearance information>, ELSE Read information on paper and retain <clearance information>
0.1	3		Return with goal accomplished
0.1	3		Return with goal accomplished
0.5	2	T	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3		Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1	3	T	IF clearance is crossing restriction with RTA, THEN Accomplish Goal: Enter crossing restriction
0.1			Method for Goal: Enter crossing restriction
0.1	1		Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1	1		Remember <menu key> = "FPL" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.82	2		Search for waypoint
0.1	3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1	2	F	Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1	3		Remember <menu key> = "/" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished

Value				T/F	Description
0.1	4			T	Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1					Method for Goal: Enter into scratchpad
0.1	1				Remember <menu key> = first digit/character in restrictions and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51		1			Recall <menu key> and point finger to appropriate menu key
0.38		2			Press and release appropriate menu key
0.1		3			Return with goal accomplished
0.1	2				Remember <menu key> = next digit/character in restriction and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51		1			Recall <menu key> and point finger to appropriate menu key
0.38		2			Press and release appropriate menu key
0.1		3			Return with goal accomplished
0.1	3			T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	2				Remember <menu key> = next digit/character in restrictions and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51		1			Recall <menu key> and point finger to appropriate menu key
0.38		2			Press and release appropriate menu key
0.1		3			Return with goal accomplished
0.1	3			F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	4			T	If <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1					Selection Rule for Goal: At and above or below
0.1		1		T	IF restriction is at or above, THEN Remember <menu key> = "A" and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51			1		Recall <menu key> and point finger to appropriate menu key
0.38			2		Press and release appropriate menu key
0.1			3		Return with goal accomplished
0.1		3			Return with goal accomplished
0.1	5				Return with goal accomplished

0.51			5	Point finger to right line select key next to waypoint
0.38			6	Press and release right line select key next to waypoint
0.1			7	Return with goal accomplished
0.1			5	Return with goal accomplished
0.1		4		Return with goal accomplished
0.1	4			Selection Rule: Decide on a clearance
0.1				Selection Rule for Goal: Decide on a clearance
0.1		3 T		IF clearance includes both RTA and other information, THEN Accomplish Goal: Determine whether mixed clearance is acceptable
0.1				Method for Goal: Determine whether mixed clearance is acceptable
0.1			1	Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1				Method for Goal: Determine whether non-RTA clearance is acceptable
1.3			1	Determine whether non-RTA clearance is acceptable
0.2			2 T	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1			3	Return with goal accomplished
0.1			2 F	Decide: IF <response> = "Unable," THEN Return with goal accomplished
0.1			3	Accomplish Goal: Compare ETA to RTA
0.1				Method for Goal: Compare ETA to RTA
1.3			1	Compare clearance RTA to displayed ETA
1.4			2 T	Decide: IF speed can be managed to maintain a predicted ETA that conforms with the assigned RTA, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1			3	Return with goal accomplished
0.1			4	Return with goal accomplished
0.1		4		Return with goal accomplished
0.1	5 T			Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <keyword> = "Activate" and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51		1		Recall <keyword> and point finger to line select key next to keyword
0.38		2		Press and release appropriate line select key
0.1		3		Return with goal accomplished
0.1	6			Selection Rule: Respond to a clearance
0.1				Selection Rule for Goal: Respond to a clearance
0.1		2 T		IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1				Method for Goal: Respond by FMS
0.1			1 F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1			2 T	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1				Method for Goal: Open clearance
0.1				1 Remember <menu key> = "DLK" and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51				1 Recall <menu key> and point finger to appropriate menu key
0.38				2 Press and release appropriate menu key
0.1				3 Return with goal accomplished

Time				Description
0.1		2		Remember <keyword> = "NEW MSGS" and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51			1	Recall <keyword> and point finger to line select key next to keyword
0.38			2	Press and release appropriate line select key
0.1			3	Return with goal accomplished
0.1		3		Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51			1	Recall <keyword> and point finger to line select key next to keyword
0.38			2	Press and release appropriate line select key
0.1			3	Return with goal accomplished
0.1		4		Return with goal accomplished
0.1	3			Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51		1		Recall <keyword> and point finger to line select key next to keyword
0.38		2		Press and release appropriate line select key
0.1		3		Return with goal accomplished
0.1	4			Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51		1		Recall <keyword> and point finger to line select key next to keyword
0.38		2		Press and release appropriate line select key
0.1		3		Return with goal accomplished
0.1	5			Return with goal accomplished
0.1	3			Return with goal accomplished
0.1	7 F			Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8			Return with goal accomplished
54.65				Total time

Trace 20 – Task 5, Data Comm

Equipment: FMS 1

NGOMSL Trace: Cross HELPR at time 1800Z at or above FL190

Assumptions:

Clearance received by data communications (Data Comm)

Hands start on FMS

Entire clearance is read aloud upon receipt

When clearance is read from screen page one is 9 words ("Cross HELPR at time one eight zero zero Zulu") and page two is 8 words ("At or above flight level one niner zero")

Clearance is two pages

Clearance is not printed upon receipt

Response is sent by FMS

Once opened, clearance remains open until clearance information is entered

Clearance information is remembered when entering the clearance

Desired waypoint is the third waypoint listed on the first page of the flight plan

It takes one mental to determine if non-RTA portion of clearance is acceptable or not

Non-RTA portion of clearance is acceptable and pilot will comply

It takes one mental to determine if RTA portion of clearance is acceptable or not

RTA portion of clearance is acceptable and pilot will comply

There is clearance information to enter into the FMS

Only one clearance was sent

Time	Action				
0.1	Method for Goal: Handle a clearance				
0.1	1	Selection Rule: Receive a clearance			
0.1		Selection Rule for Goal: Receive a clearance			
0.1		1	T	IF clearance is text, THEN Accomplish Goal: Receive an FMS clearance	
0.1		Method for Goal: Receive an FMS clearance			
0.1			1	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1			2	Accomplish Goal: Open clearance	
0.1			Method for Goal: Open clearance		
0.1				1	Remember <menu key> = "DLK" and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key	
0.51					1 Recall <menu key> and point finger to appropriate menu key
0.38					2 Press and release appropriate menu key
0.1					3 Return with goal accomplished

0.1			2			Remember <keyword> = "NEW MSGS" and Accomplish Goal: Line select key
0.1						Method for Goal: Line select key
0.51				1		Recall <keyword> and point finger to line select key next to keyword
0.38				2		Press and release appropriate line select key
0.1				3		Return with goal accomplished
0.1			3			Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1						Method for Goal: Line select key
0.51				1		Recall <keyword> and point finger to line select key next to keyword
0.38				2		Press and release appropriate line select key
0.1				3		Return with goal accomplished
0.1			4			Return with goal accomplished
0.1		3				Accomplish Goal: Read the clearance
0.1						Method for Goal: Read the clearance
3.8			1		T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and retain <clearance information>
0.1			2		F	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1			3			Remember <menu key> = "Next" and Accomplish Goal: Menu key
0.1						Method for Goal: Menu key
0.51				1		Recall <menu key> and point finger to appropriate menu key
0.38				2		Press and release appropriate menu key
0.1				3		Return with goal accomplished
0.1			4			GOTO Step 1
3.4			1		T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and retain <clearance information>
0.1			2		T	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1		4			F	Decide: IF printed clearance is desired, THEN Selection Rule: Get printed copy
0.1			5			Return with goal accomplished
0.1	3					Return with goal accomplished

Value	Step	Flag	Description
0.1	2	T	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1	2	T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1			Method for Goal: Respond by FMS
0.1	1	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	2	F	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1	3		Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	4		Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	3		Accomplish Goal: Enter a clearance
0.1			Method for Goal: Enter a clearance
0.2	1	T	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1	2	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3		Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1	3	T	IF clearance is crossing restriction with RTA, THEN Accomplish Goal: Enter crossing restriction
0.1			Method for Goal: Enter crossing restriction
0.1	1		Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1	1		Remember <menu key> = "FPL" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished

Value	Step	T/F	Description
0.82	2		Search for waypoint
0.1	3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1	2	F	Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1	3		Remember <menu key> = "/" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu ke
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	4	T	Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1			Method for Goal: Enter into scratchpad
0.1	1		Remember <menu key> = first digit/character in restrictions and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	2		Remember <menu key> = next digit/character in restriction and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	2		Remember <menu key> = next digit/character in restrictions and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished

Time									Description
0.1					3			F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1					4			T	If <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1									Selection Rule for Goal: At and above or below
0.1						1		T	IF restriction is at or above, THEN Remember <menu key> = "A" and Accomplish Goal: Menu key
0.1									Method for Goal: Menu key
0.51							1		Recall <menu key> and point finger to appropriate menu key
0.38							2		Press and release appropriate menu key
0.1							3		Return with goal accomplished
0.1						3			Return with goal accomplished
0.1					5				Return with goal accomplished
0.51				5					Point finger to right line select key next to waypoint
0.38				6					Press and release right line select key next to waypoint
0.1				7					Return with goal accomplished
0.1			5						Return with goal accomplished
0.1		4							Return with goal accomplished
0.1	4								Selection Rule: Decide on a clearance
0.1									Selection Rule for Goal: Decide on a clearance
0.1		3						T	IF clearance includes both RTA and other information, THEN Accomplish Goal: Determine whether mixed clearance is acceptable
0.1									Method for Goal: Determine whether mixed clearance is acceptable
0.1			1						Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1									Method for Goal: Determine whether non-RTA clearance is acceptable
1.3				1					Determine whether non-RTA clearance is acceptable
0.2				2				T	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1				3					Return with goal accomplished
0.1			2					F	Decide: IF <response> = "Unable," THEN Return with goal accomplished
0.1			3						Accomplish Goal: Compare ETA to RTA
0.1									Method for Goal: Compare ETA to RTA
1.3				1					Compare clearance RTA to displayed ETA
1.4				2				T	Decide: IF speed can be managed to maintain a predicted ETA that conforms with the assigned RTA, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1				3					Return with goal accomplished
0.1			4						Return with goal accomplished
0.1		4							Return with goal accomplished

0.1	5	T		Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <keyword> = "Activate" and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51			1	Recall <keyword> and point finger to line select key next to keyword
0.38			2	Press and release appropriate line select key
0.1			3	Return with goal accomplished
0.1	6			Selection Rule: Respond to a clearance
0.1				Selection Rule for Goal: Respond to a clearance
0.1		2	T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1				Method for Goal: Respond by FMS
0.1			1 F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1			2 T	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1				Method for Goal: Open clearance
0.1				1 Remember <menu key> = "DLK" and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51				1 Recall <menu key> and point finger to appropriate menu key
0.38				2 Press and release appropriate menu key
0.1				3 Return with goal accomplished
0.1				2 Remember <keyword> = "NEW MSGS" and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51				1 Recall <keyword> and point finger to line select key next to keyword
0.38				2 Press and release appropriate line select key
0.1				3 Return with goal accomplished
0.1				3 Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51				1 Recall <keyword> and point finger to line select key next to keyword
0.38				2 Press and release appropriate line select key
0.1				3 Return with goal accomplished
0.1				4 Return with goal accomplished
0.1			3	Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51				1 Recall <keyword> and point finger to line select key next to keyword
0.38				2 Press and release appropriate line select key
0.1				3 Return with goal accomplished

0.1		4	Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		5	Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	7 F		Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
41.93			Total time

FMS 2

Trace 1 – Task 1, Voice

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Equipment: FMS 2
NGOMSL Trace: Proceed direct to HELPR

Assumptions:
Clearance received by voice
When clearance is stated aloud or heard over the radio it is 4 words ("Proceed direct to HELPR")
Call sign is stated before audio clearance
Airline call sign is 3 words
Clearance is not written down
Clearance information is remembered when entering the clearance
Hands do not start on FMS
Desired waypoint is the third waypoint listed on the first page of the flight plan
It takes one mental to determine if clearance is acceptable or not
Clearance is acceptable and pilot will comply
Response is sent by voice
Clearance information is remembered during readback
There is clearance information to enter into the FMS
Only one clearance was sent

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Time	Action
0.1	Method for Goal: Handle a clearance
0.1	1 Selection Rule: Receive a clearance
0.1	Selection Rule for Goal: Receive a clearance
0.1	2 T IF clearance is audio, THEN Accomplish Goal: Receive a radio clearance
0.1	Method for Goal: Receive a radio clearance
2.9	1 Listen to clearance and retain <clearance information>
0.1	2 F Decide: IF printed clearance is desired, THEN Accomplish Goal: Write down clearance
0.1	3 Return with goal accomplished
0.1	3 Return with goal accomplished

Value	Step	T/F	Description
0.1	2	F	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1	3		Accomplish Goal: Enter a clearance
0.1			Method for Goal: Enter a clearance
0.2	1	T	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.5	2	T	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3		Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1	1	T	IF clearance is proceed direct to, THEN Accomplish Goal: Enter proceed direct to
0.1			Method for Goal: Enter proceed direct to
0.1	1		Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1	1		Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.82	2		Search for waypoint
0.1	3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.51	2		Point finger to left line select key next to waypoint
0.38	3		Press and release left line select key next to waypoint
0.1	4	F	Decide: IF not on first page of flight plan, THEN Remember <menu key> = "FPL" and Accomplish Goal: Menu key
0.51	5		Point finger to second left line select key
0.38	6		Press and release second left line select key
0.1	7		Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	4		Return with goal accomplished

Time	Step		Description
0.1	4		Selection Rule: Decide on a clearance
0.1			Selection Rule for Goal: Decide on a clearance
0.1	2	T	IF clearance includes only non-RTA, THEN Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1			Method for Goal: Determine whether non-RTA clearance is acceptable
1.3	1		Determine whether non-RTA clearance is acceptable
0.2	2	T	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1	3		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	5	T	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	6		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1	1	T	IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1			Method for Goal: Respond by voice
0.5	1		Move hand to yoke and "Push to talk" button
0.2	2		Press "Push to talk" button
0.2	3	T	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by
0.1			Selection Rule for Goal: Method of clearance readback
0.1	1	T	IF <clearance information> is remembered, THEN Accomplish Goal: Readback clearance from memory
0.1			Method for Goal: Read back clearance from memory
2.9	1		Recall <clearance information> and state <clearance information> followed by call sign
0.1	2		Return with goal accomplished
0.1	3		Return with goal accomplished
0.2	4		Release "Push to talk" button
0.5	5		Return hand to FMS
0.1	6		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	7	F	Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
18.68			Total time

Trace 2 – Task 1, Voice

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Equipment: FMS 2

NGOMSL Trace: Proceed direct to HELPR

Assumptions:

Clearance received by voice

When clearance is stated aloud or heard over the radio it is 4 words ("Proceed direct to HELPR")

Call sign is stated before audio clearance

Airline call sign is 3 words

Clearance is not written down

Clearance information is remembered when entering the clearance

Hands do not start on FMS

Desired waypoint is the third waypoint listed on the first page of the flight plan

It takes one mental to determine if clearance is acceptable or not

Clearance is not acceptable

Response is sent by voice

There is no clearance information to enter into the FMS

Only one clearance was sent

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Time	Action
0.1	Method for Goal: Handle a clearance
0.1	1 Selection Rule: Receive a clearance
0.1	Selection Rule for Goal: Receive a clearance
0.1	2 T IF clearance is audio, THEN Accomplish Goal: Receive a radio clearance
0.1	Method for Goal: Receive a radio clearance
2.9	1 Listen to clearance and retain <clearance information>
0.1	2 F Decide: IF printed clearance is desired, THEN Accomplish Goal: Write down clearance
0.1	3 Return with goal accomplished
0.1	3 Return with goal accomplished

Weight	Seq	Flag	Description
0.1	2	F	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1	3		Accomplish Goal: Enter a clearance
0.1			Method for Goal: Enter a clearance
0.2	1	T	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.5	2	T	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3		Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1	1	T	IF clearance is proceed direct to, THEN Accomplish Goal: Enter proceed direct to
0.1			Method for Goal: Enter proceed direct to
0.1	1		Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1	1		Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.82	2		Search for waypoint
0.1	3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.51	2		Point finger to left line select key next to waypoint
0.38	3		Press and release left line select key next to waypoint
0.1	4	F	Decide: IF not on first page of flight plan, THEN Remember <menu key> = "FPL" and Accomplish Goal: Menu key
0.51	5		Point finger to second left line select key
0.38	6		Press and release second left line select key
0.1	7		Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	4		Return with goal accomplished

0.1	4		Selection Rule: Decide on a clearance
0.1			Selection Rule for Goal: Decide on a clearance
0.1		2 T	IF clearance includes only non-RTA, THEN Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1			Method for Goal: Determine whether non-RTA clearance is acceptable
1.3		1	Determine whether non-RTA clearance is acceptable
0.2		2 F	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1		3	Return with goal accomplished
0.1		4	Return with goal accomplished
0.1	5 F		Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key
0.1	6		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1		1 T	IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1			Method for Goal: Respond by voice
0.5		1	Move hand to yoke and "Push to talk" button
0.2		2	Press "Push to talk" button
1.8		3 F	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by <response>
0.2		4	Release "Push to talk" button
0.5		5	Return hand to FMS
0.1		6	Return with goal accomplished
0.1		3	Return with goal accomplished
0.1	7 F		Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
15.79			Total time

Trace 3 – Task 1, Data Comm

Equipment: FMS 2

NGOMSL Trace: Proceed direct to HELPR

Assumptions:

Clearance received by data communications (Data Comm)

Hands start on FMS

Entire clearance is read aloud upon receipt

When clearance is read from screen or paper it is 4 words ("Proceed direct to HELPR")

Clearance is one page

Clearance is printed upon receipt

Printer is available

Clearance information is remembered when entering clearance

Hand is not on FMS after grasping print out

Desired waypoint is the third waypoint listed on the first page of the flight plan

It takes one mental to determine if clearance is acceptable or not

Clearance is not acceptable

Response is sent by FMS

Once opened, clearance remains open until clearance information is entered

There is no clearance information to enter into the FMS

Only one clearance was sent

Time	Action				
0.1	Method for Goal: Handle a clearance				
0.1	1	Selection Rule: Receive a clearance			
0.1		Selection Rule for Goal: Receive a clearance			
0.1		1	T	IF clearance is text, THEN Accomplish Goal: Receive an FMS clearance	
0.1				Method for Goal: Receive an FMS clearance	
0.1			1	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1			2	Accomplish Goal: Open clearance	
0.1				Method for Goal: Open clearance	
0.1				1	Remember <menu key> = "ATC" and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51					1 Recall <menu key> and point finger to appropriate menu key
0.38					2 Press and release appropriate menu key
0.1					3 Return with goal accomplished
0.1				2	Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1					Method for Goal: Line select key
0.51					1 Recall <keyword> and point finger to line select key next to keyword
0.38					2 Press and release appropriate line select key
0.1					3 Return with goal accomplished
0.1				3	Return with goal accomplished

0.1			3		Accomplish Goal: Read the clearance
0.1					Method for Goal: Read the clearance
1.8			1	T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and
0.1			2	T	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1		4	T		Decide: IF printed clearance is desired, THEN Selection Rule: Get printed copy
0.1					Selection Rule for Goal: Get printed copy
0.1			1	T	IF printer is available, THEN Accomplish Goal: Print the clearance
0.1					Method for Goal: Print the clearance
0.1				1	Remember <keyword> = "Print" and Accomplish Goal: Line select key
0.1					Method for Goal: Line select key
0.51				1	Recall <keyword> and point finger to line select key next to keyword
0.38				2	Press and release appropriate line select key
0.1				3	Return with goal accomplished
0.51				2	Reach for print out
0.8				3	Grasp print out
0.51				4	Transport paper to reading position
0.1				5	Return with goal accomplished
0.1				3	Return with goal accomplished
0.1			5		Return with goal accomplished
0.1		3			Return with goal accomplished

Value	Step	T/F	Description
0.1	2	F	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1	3		Accomplish Goal: Enter a clearance
0.1			Method for Goal: Enter a clearance
0.2	1	T	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.5	2	T	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3		Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1	1	T	IF clearance is proceed direct to, THEN Accomplish Goal: Enter proceed direct to
0.1			Method for Goal: Enter proceed direct to
0.1	1		Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1	1		Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.82	2		Search for waypoint
0.1	3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.51	2		Point finger to left line select key next to waypoint
0.38	3		Press and release left line select key next to waypoint
0.1	4	F	Decide: IF not on first page of flight plan, THEN Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.51	5		Point finger to second left line select key
0.38	6		Press and release second left line select key
0.1	7		Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	4		Selection Rule: Decide on a clearance
0.1			Selection Rule for Goal: Decide on a clearance
0.1	2	T	IF clearance includes only non-RTA, THEN Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1			Method for Goal: Determine whether non-RTA clearance is acceptable
1.3	1		Determine whether non-RTA clearance is acceptable
0.2	2	F	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1	3		Return with goal accomplished
0.1	4		Return with goal accomplished

Time	Step	T/F	Description
0.1	5	F	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key
0.1	6		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1	2	T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1			Method for Goal: Respond by FMS
0.1	1	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	2	T	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1			Method for Goal: Open clearance
0.1	1		Remember <menu key> = "ATC" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	2		Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	3		Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	4		Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	7	F	Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
23.24			Total time

Trace 4 – Task 1, Data Comm

Equipment: FMS 2

NGOMSL Trace: Proceed direct to HELPR

Assumptions:

Clearance received by data communications (Data Comm)

Hands start on FMS

Entire clearance is read aloud upon receipt

When clearance is read from screen it is 4 words ("Proceed direct to HELPR")

Clearance is one page

Clearance is not printed upon receipt

Clearance information is remembered when entering clearance

Desired waypoint is the third waypoint listed on the first page of the flight plan

It takes one mental to determine if clearance is acceptable or not

Clearance is not acceptable

Response is sent by FMS

Once opened, clearance remains open until clearance information is entered

There is no clearance information to enter into the FMS

Only one clearance was sent

Time	Action				
0.1	Method for Goal: Handle a clearance				
0.1	1	Selection Rule: Receive a clearance			
0.1		Selection Rule for Goal: Receive a clearance			
0.1		1	T	IF clearance is text, THEN Accomplish Goal: Receive an FMS clearance	
0.1			Method for Goal: Receive an FMS clearance		
0.1			1	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1			2	Accomplish Goal: Open clearance	
0.1				Method for Goal: Open clearance	
0.1				1	Remember <menu key> = "ATC" and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51					1	Recall <menu key> and point finger to appropriate menu key
0.38					2	Press and release appropriate menu key
0.1					3	Return with goal accomplished
0.1				2	Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1					Method for Goal: Line select key
0.51					1	Recall <keyword> and point finger to line select key next to keyword
0.38					2	Press and release appropriate line select key
0.1					3	Return with goal accomplished
0.1				3	Return with goal accomplished

Value	L1	L2	L3	L4	L5	L6	T/F	Description
0.1		3						Accomplish Goal: Read the clearance
0.1								Method for Goal: Read the clearance
1.8			1				T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and
0.1			2				T	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1			4				F	Decide: IF printed clearance is desired, THEN Selection Rule: Get printed copy
0.1			5					Return with goal accomplished
0.1		3						Return with goal accomplished
0.1	2						F	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1	3							Accomplish Goal: Enter a clearance
0.1								Method for Goal: Enter a clearance
0.2		1					T	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1		2					F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1		3						Selection Rule: Specific clearance type
0.1								Selection Rule for Goal: Specific clearance type
0.1			1				T	IF clearance is proceed direct to, THEN Accomplish Goal: Enter proceed direct to
0.1								Method for Goal: Enter proceed direct to
0.1				1				Accomplish Goal: Locate waypoint
0.1								Method for Goal: Locate waypoint
0.1					1			Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.1								Method for Goal: Menu key
0.51						1		Recall <menu key> and point finger to appropriate menu key
0.38						2		Press and release appropriate menu key
0.1						3		Return with goal accomplished
0.82					2			Search for waypoint
0.1					3		T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.51				2				Point finger to left line select key next to waypoint
0.38				3				Press and release left line select key next to waypoint
0.1				4			F	Decide: IF not on first page of flight plan, THEN Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.51				5				Point finger to second left line select key
0.38				6				Press and release second left line select key
0.1				7				Return with goal accomplished
0.1			5					Return with goal accomplished
0.1		4						Return with goal accomplished

0.1	4			Selection Rule: Decide on a clearance
0.1				Selection Rule for Goal: Decide on a clearance
0.1		2	T	IF clearance includes only non-RTA, THEN Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1				Method for Goal: Determine whether non-RTA clearance is acceptable
1.3			1	Determine whether non-RTA clearance is acceptable
0.2			2 F	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1			3	Return with goal accomplished
0.1		4		Return with goal accomplished
0.1	5	F		Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key
0.1	6			Selection Rule: Respond to a clearance
0.1				Selection Rule for Goal: Respond to a clearance
0.1		2 T		IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1				Method for Goal: Respond by FMS
0.1		1 F		Decide: IF hand not on FMS, THEN move hand to FMS
0.1		2 T		Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1				Method for Goal: Open clearance
0.1			1	Remember <menu key> = "ATC" and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1			2	Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51			1	Recall <keyword> and point finger to line select key next to keyword
0.38			2	Press and release appropriate line select key
0.1			3	Return with goal accomplished
0.1			3	Return with goal accomplished
0.1			3	Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51			1	Recall <keyword> and point finger to line select key next to keyword
0.38			2	Press and release appropriate line select key
0.1			3	Return with goal accomplished

0.1		4	Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		5	Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	7 F		Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
19.33			Total time

Trace 5 – Task 2, Voice

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Equipment: FMS 2

NGOMSL Trace: Cross HELPR at FL190

Assumptions:

Clearance received by voice

When clearance is read from paper or heard over the radio it is 8 words ("Cross HELPR at flight level one niner zero")

Call sign is stated before audio clearance

Airline call sign is 3 words

Clearance is written down

Need to obtain pen and paper

Clearance is written as 4 words ("Cross HELPR at FL190")

Clearance information is not initially remembered, and must be read aloud, when entering the clearance

Once visible, paper will remain visible until hand moved to FMS

Hand returns to paper after replacing pen

Desired waypoint is the third waypoint listed on the first page of the flight plan

It takes one mental to determine if clearance is acceptable or not

Clearance is acceptable and pilot will comply

Response is sent by voice

Clearance information is not remembered during readback

There is clearance information to enter into the FMS

Only one clearance was sent

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Time	Action
0.1	Method for Goal: Handle a clearance
0.1	1 Selection Rule: Receive a clearance
0.1	Selection Rule for Goal: Receive a clearance
0.1	2 T IF clearance is audio, THEN Accomplish Goal: Receive a radio clearance
0.1	Method for Goal: Receive a radio clearance
4.5	1 Listen to clearance and retain <clearance information>
0.1	2 T Decide: IF printed clearance is desired, THEN Accomplish Goal: Write down clearance
0.1	Method for Goal: Write down clearance
0.1	1 T Decide: IF paper is not readily available, THEN Accomplish Goal: Obtain paper
0.1	Method for Goal: Obtain paper
0.51	1 Reach for paper
0.8	2 Grasp paper
0.51	3 Transport paper to writing space
0.17	4 Release paper
0.1	5 Return with goal accomplished

Time	Description
0.1	2 T Decide: IF pen is not in hand, THEN Accomplish Goal: Obtain pen
0.1	Method for Goal: Obtain pen
0.51	1 Reach for pen
0.8	2 Grasp pen
0.51	3 Transport pen to paper
0.16	4 Position the pen over paper
0.1	5 Return with goal accomplished
10.9	3 Recall <clearance information> and write <clearance information>
0.51	4 Return pen to original location
0.17	5 Release pen
0.5	6 Move hand back to starting location
0.1	7 Return with goal accomplished
0.1	3 Return with goal accomplished
0.1	3 Return with goal accomplished
0.1	2 F Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1	3 Accomplish Goal: Enter a clearance
0.1	Method for Goal: Enter a clearance
0.2	1 F Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1	Selection Rule for Goal: Method of reading
0.1	1 T IF clearance is in writing, THEN Accomplish Goal: Read clearance from paper
0.1	Method for Goal: Read clearance from paper
0.1	1 F Decide: IF paper not visible, THEN move paper
3.4	2 T Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on paper aloud and retain <clearance information>, ELSE Read information on paper and
0.1	3 Return with goal accomplished
0.1	3 Return with goal accomplished
0.5	2 T Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3 Selection Rule: Specific clearance type
0.1	Selection Rule for Goal: Specific clearance type
0.1	2 T IF clearance is only crossing restriction, THEN Accomplish Goal: Enter crossing restriction
0.1	Method for Goal: Enter crossing restriction
0.1	1 Accomplish Goal: Locate waypoint
0.1	Method for Goal: Locate waypoint
0.1	1 Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.1	Method for Goal: Menu key
0.51	1 Recall <menu key> and point finger to appropriate menu key
0.38	2 Press and release appropriate menu key
0.1	3 Return with goal accomplished

0.82		2			Search for waypoint
0.1		3		T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1	2			F	Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1	3				Remember <menu key> = "/" and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51		1			Recall <menu key> and point finger to appropriate menu key
0.38		2			Press and release appropriate menu key
0.1		3			Return with goal accomplished
0.1	4			T	Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1					Method for Goal: Enter into scratchpad
0.1		1			Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51			1		Recall <menu key> and point finger to appropriate menu key
0.38			2		Press and release appropriate menu key
0.1			3		Return with goal accomplished
0.1		2			Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51			1		Recall <menu key> and point finger to appropriate menu key
0.38			2		Press and release appropriate menu key
0.1			3		Return with goal accomplished
0.1		3		T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2			Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51			1		Recall <menu key> and point finger to appropriate menu key
0.38			2		Press and release appropriate menu key
0.1			3		Return with goal accomplished
0.1		3		F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		4		F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or
0.1		5			Return with goal accomplished
0.51	5				Point finger to right line select key next to waypoint
0.38	6				Press and release right line select key next to waypoint
0.1	7				Return with goal accomplished

0.1				5		Return with goal accomplished
0.1			4			Return with goal accomplished
0.1	4					Selection Rule: Decide on a clearance
0.1						Selection Rule for Goal: Decide on a clearance
0.1		2	T			IF clearance includes only non-RTA, THEN Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1						Method for Goal: Determine whether non-RTA clearance is acceptable
1.3			1			Determine whether non-RTA clearance is acceptable
0.2			2	T		Decide: IF clearance is acceptable, THEN Retain \<response\> = "Wilco," ELSE Retain \<response\> = "Unable"
0.1			3			Return with goal accomplished
0.1		4				Return with goal accomplished
0.1	5	T				Decide: IF \<response\> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember \<menu key\> = "Exec" and Accomplish Goal: Menu key
0.1						Method for Goal: Menu key
0.51			1			Recall \<menu key\> and point finger to appropriate menu key
0.38			2			Press and release appropriate menu key
0.1			3			Return with goal accomplished
0.1	6					Selection Rule: Respond to a clearance
0.1						Selection Rule for Goal: Respond to a clearance
0.1		1	T			IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1						Method for Goal: Respond by voice
0.5			1			Move hand to yoke and "Push to talk" button
0.2			2			Press "Push to talk" button
0.2			3	T		Recall \<response\> and Decide: IF \<response\> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by
0.1						Selection Rule for Goal: Method of clearance readback
0.1			2	T		IF \<clearance information\> is not remembered, THEN Accomplish Goal: Readback clearance by reading
0.1						Method for Goal: Readback clearance by reading
0.1				1		Selection Rule: Method of reading
0.1						Selection Rule for Goal: Method of reading
0.1				1	T	IF clearance is in writing, THEN Accomplish Goal: Read clearance from paper
0.1						Method for Goal: Read clearance from paper
0.51					1 T	Decide: IF paper not visible, THEN move paper
3.4					2 T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on paper aloud and retain \<clearance information\>, ELSE Read information on paper and retain
0.1					3	Return with goal accomplished
0.1				3		Return with goal accomplished

1.3		2	State call sign
0.1			3 Return with goal accomplished
0.1		3	Return with goal accomplished
0.2	4		Release "Push to talk" button
0.5	5		Return hand to FMS
0.1	6		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	7	F	Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
48.51			Total time

Trace 6 – Task 2, Voice

Equipment: FMS 2
NGOMSL Trace: Cross HELPR at FL190

Assumptions:
Clearance received by voice
When clearance is stated aloud or heard over the radio it is 8 words ("Cross HELPR at flight level one niner zero")
Call sign is stated before audio clearance
Airline call sign is 3 words
Clearance is not written down
Clearance information is remembered when entering the clearance
Hands do not start on FMS
Desired waypoint is the third waypoint listed on the first page of the flight plan
It takes one mental to determine if clearance is acceptable or not
Clearance is acceptable and pilot will comply
Response is sent by voice
Clearance information is remembered during readback
There is clearance information to enter into the FMS
Only one clearance was sent

Time	Action
0.1	Method for Goal: Handle a clearance
0.1	1 Selection Rule: Receive a clearance
0.1	Selection Rule for Goal: Receive a clearance
0.1	2 T IF clearance is audio, THEN Accomplish Goal: Receive a radio clearance
0.1	Method for Goal: Receive a radio clearance
4.5	1 Listen to clearance and retain <clearance information>
0.1	2 F Decide: IF printed clearance is desired, THEN Accomplish Goal: Write down clearance
0.1	3 Return with goal accomplished
0.1	3 Return with goal accomplished

0.1	2	F	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1	3		Accomplish Goal: Enter a clearance
0.1			Method for Goal: Enter a clearance
0.2	1	T	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.5	2	T	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3		Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1	2	T	IF clearance is only crossing restriction, THEN Accomplish Goal: Enter crossing restriction
0.1			Method for Goal: Enter crossing restriction
0.1	1		Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1	1		Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.82	2		Search for waypoint
0.1	3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1	2	F	Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1	3		Remember <menu key> = "/" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	4	T	Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1			Method for Goal: Enter into scratchpad
0.1	1		Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished

Value	Step	Flag	Description
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	4	F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or
0.1	5		Return with goal accomplished
0.51	5		Point finger to right line select key next to waypoint
0.38	6		Press and release right line select key next to waypoint
0.1	7		Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	4		Selection Rule: Decide on a clearance
0.1			Selection Rule for Goal: Decide on a clearance
0.1	2	T	IF clearance includes only non-RTA, THEN Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1			Method for Goal: Determine whether non-RTA clearance is acceptable
1.3	1		Determine whether non-RTA clearance is acceptable
0.2	2	T	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1	3		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	5	T	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished

Time	Step	T/F	Description
0.1	6		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1	1	T	IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1			Method for Goal: Respond by voice
0.5	1		Move hand to yoke and "Push to talk" button
0.2	2		Press "Push to talk" button
0.2	3	T	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by
0.1			Selection Rule for Goal: Method of clearance readback
0.1	1	T	IF <clearance information> is remembered, THEN Accomplish Goal: Readback clearance from memory
0.1			Method for Goal: Readback clearance from memory
4.5	1		Recall <clearance information> and state <clearance information> followed by call sign
0.1	2		Return with goal accomplished
0.1	3		Return with goal accomplished
0.2	4		Release "Push to talk" button
0.5	5		Return hand to FMS
0.1	6		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	7	F	Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
26.35			Total time

Trace 7 – Task 2, Data Comm

Equipment: FMS 2

NGOMSL Trace: Cross HELPR at FL190

Assumptions:

Clearance received by data communications (Data Comm)

Hands start on FMS

Entire clearance is read aloud upon receipt

When clearance is read from screen or paper it is 8 words ("Cross HELPR at flight level one niner zero")

Clearance is one page

Clearance is printed upon receipt

Printer is available

Clearance information is not initially remembered, and must be read aloud, when entering the clearance

Once visible, paper will remain visible until hand moved to FMS

Hand is not on FMS after reading clearance from paper

Desired waypoint is the third waypoint listed on the first page of the flight plan

It takes one mental to determine if clearance is acceptable or not

Clearance is acceptable and pilot will comply

Response is sent by FMS

Once opened, clearance remains open until clearance information is entered

There is clearance information to enter into the FMS

Only one clearance was sent

Time	Action				
0.1	Method for Goal: Handle a clearance				
0.1	1	Selection Rule: Receive a clearance			
0.1		Selection Rule for Goal: Receive a clearance			
0.1		1	T	IF clearance is text, THEN Accomplish Goal: Receive an FMS clearance	
0.1			Method for Goal: Receive an FMS clearance		
0.1			1	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1			2	Accomplish Goal: Open clearance	
0.1				Method for Goal: Open clearance	
0.1				1	Remember <menu key> = "ATC" and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key	
0.51					1 Recall <menu key> and point finger to appropriate menu key
0.38					2 Press and release appropriate menu key
0.1					3 Return with goal accomplished
0.1				2	Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key	
0.51					1 Recall <keyword> and point finger to line select key next to keyword
0.38					2 Press and release appropriate line select key
0.1					3 Return with goal accomplished

Value	Level	Flag	Operator / Goal
0.1	3		Return with goal accomplished
0.1	3		Accomplish Goal: Read the clearance
0.1			Method for Goal: Read the clearance
3.4	1	T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and
0.1	2	T	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1	4	T	Decide: IF printed clearance is desired, THEN Selection Rule: Get printed copy
0.1			Selection Rule for Goal: Get printed copy
0.1	1	T	IF printer is available, THEN Accomplish Goal: Print the clearance
0.1			Method for Goal: Print the clearance
0.1	1		Remember <keyword> = "Print" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.51	2		Reach for print out
0.8	3		Grasp print out
0.51	4		Transport paper to reading position
0.1	5		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	2	F	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1	3		Accomplish Goal: Enter a clearance
0.1			Method for Goal: Enter a clearance
0.2	1	F	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1			Selection Rule for Goal: Method of reading
0.1	1	T	IF clearance is in writing, THEN Accomplish Goal: Read clearance from paper
0.1			Method for Goal: Read clearance from paper
0.1	1	F	Decide: IF paper not visible, THEN move paper
3.4	2	T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on paper aloud and retain <clearance information>, ELSE Read information on paper and
0.1	3		Return with goal accomplished
0.1	3		Return with goal accomplished

Value	Step	Flag	Description
0.5	2	T	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3		Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1	2	T	IF clearance is only crossing restriction, THEN Accomplish Goal: Enter crossing restriction
0.1			Method for Goal: Enter crossing restriction
0.1	1		Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1	1		Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.82	2		Search for waypoint
0.1	3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1	2	F	Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1	3		Remember <menu key> = "/" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	4	T	Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1			Method for Goal: Enter into scratchpad
0.1	1		Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished

Cost	Content
0.1	3 T Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	2 Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1	Method for Goal: Menu key
0.51	1 Recall <menu key> and point finger to appropriate menu key
0.38	2 Press and release appropriate menu key
0.1	3 Return with goal accomplished
0.1	3 F Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	4 F Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or
0.1	5 Return with goal accomplished
0.51	5 Point finger to right line select key next to waypoint
0.38	6 Press and release right line select key next to waypoint
0.1	7 Return with goal accomplished
0.1	5 Return with goal accomplished
0.1	4 Return with goal accomplished
0.1	4 Selection Rule: Decide on a clearance
0.1	Selection Rule for Goal: Decide on a clearance
0.1	2 T IF clearance includes only non-RTA, THEN Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1	Method for Goal: Determine whether non-RTA clearance is acceptable
1.3	1 Determine whether non-RTA clearance is acceptable
0.2	2 T Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1	3 Return with goal accomplished
0.1	4 Return with goal accomplished
0.1	5 T Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key
0.1	Method for Goal: Menu key
0.51	1 Recall <menu key> and point finger to appropriate menu key
0.38	2 Press and release appropriate menu key
0.1	3 Return with goal accomplished

Time						Description
0.1	6					Selection Rule: Respond to a clearance
0.1						Selection Rule for Goal: Respond to a clearance
0.1		2	T			IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1						Method for Goal: Respond by FMS
0.1			1	F		Decide: IF hand not on FMS, THEN move hand to FMS
0.1			2	T		Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1						Method for Goal: Open clearance
0.1				1		Remember <menu key> = "ATC" and Accomplish Goal: Menu key
0.1						Method for Goal: Menu key
0.51					1	Recall <menu key> and point finger to appropriate menu key
0.38					2	Press and release appropriate menu key
0.1					3	Return with goal accomplished
0.1				2		Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1						Method for Goal: Line select key
0.51					1	Recall <keyword> and point finger to line select key next to keyword
0.38					2	Press and release appropriate line select key
0.1					3	Return with goal accomplished
0.1				3		Return with goal accomplished
0.1			3			Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1						Method for Goal: Line select key
0.51				1		Recall <keyword> and point finger to line select key next to keyword
0.38				2		Press and release appropriate line select key
0.1				3		Return with goal accomplished
0.1			4			Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1						Method for Goal: Line select key
0.51				1		Recall <keyword> and point finger to line select key next to keyword
0.38				2		Press and release appropriate line select key
0.1				3		Return with goal accomplished
0.1			5			Return with goal accomplished
0.1		3				Return with goal accomplished
0.1	7	F				Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8					Return with goal accomplished
34.4						Total time

Trace 8 – Task 2, Data Comm

Equipment: FMS 2
NGOMSL Trace: Cross HELPR at FL190

Assumptions:
Clearance received by data communications (Data Comm)
Hands start on FMS
Entire clearance is read aloud upon receipt
When clearance is read from screen it is 8 words ("Cross HELPR at flight level one niner zero")
Clearance is one page
Clearance is not printed upon receipt
Clearance information is remembered when entering the clearance
Desired waypoint is the third waypoint listed on the first page of the flight plan
It takes one mental to determine if clearance is acceptable or not
Clearance is acceptable and pilot will comply
Response is sent by FMS
Once opened, clearance remains open until clearance information is entered
There is clearance information to enter into the FMS
Only one clearance was sent

Time	Action
0.1	Method for Goal: Handle a clearance
0.1	1 Selection Rule: Receive a clearance
0.1	Selection Rule for Goal: Receive a clearance
0.1	1 T IF clearance is text, THEN Accomplish Goal: Receive an FMS clearance
0.1	Method for Goal: Receive an FMS clearance
0.1	1 F Decide: IF hand not on FMS, THEN move hand to FMS
0.1	2 Accomplish Goal: Open clearance
0.1	Method for Goal: Open clearance
0.1	1 Remember <menu key> = "ATC" and Accomplish Goal: Menu key
0.1	Method for Goal: Menu key
0.51	1 Recall <menu key> and point finger to appropriate menu key
0.38	2 Press and release appropriate menu key
0.1	3 Return with goal accomplished
0.1	2 Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1	Method for Goal: Line select key
0.51	1 Recall <keyword> and point finger to line select key next to keyword
0.38	2 Press and release appropriate line select key
0.1	3 Return with goal accomplished
0.1	3 Return with goal accomplished

0.1	3 Accomplish Goal: Read the clearance
0.1	Method for Goal: Read the clearance
3.4	1 T Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and
0.1	2 T Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1	4 F Decide: IF printed clearance is desired, THEN Selection Rule: Get printed copy
0.1	5 Return with goal accomplished
0.1	3 Return with goal accomplished
0.1	2 F Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1	3 Accomplish Goal: Enter a clearance
0.1	Method for Goal: Enter a clearance
0.2	1 T Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1	2 F Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3 Selection Rule: Specific clearance type
0.1	Selection Rule for Goal: Specific clearance type
0.1	2 T IF clearance is only crossing restriction, THEN Accomplish Goal: Enter crossing restriction
0.1	Method for Goal: Enter crossing restriction
0.1	1 Accomplish Goal: Locate waypoint
0.1	Method for Goal: Locate waypoint
0.1	1 Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.1	Method for Goal: Menu key
0.51	1 Recall <menu key> and point finger to appropriate menu key
0.38	2 Press and release appropriate menu key
0.1	3 Return with goal accomplished
0.82	2 Search for waypoint
0.1	3 T Decide: IF waypoint is found, THEN Return with goal accomplished
0.1	2 F Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1	3 Remember <menu key> = "/" and Accomplish Goal: Menu key
0.1	Method for Goal: Menu key
0.51	1 Recall <menu key> and point finger to appropriate menu key
0.38	2 Press and release appropriate menu key
0.1	3 Return with goal accomplished

0.1				4			T	Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1								Method for Goal: Enter into scratchpad
0.1					1			Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1								Method for Goal: Menu key
0.51						1		Recall <menu key> and point finger to appropriate menu key
0.38						2		Press and release appropriate menu key
0.1						3		Return with goal accomplished
0.1					2			Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1								Method for Goal: Menu key
0.51						1		Recall <menu key> and point finger to appropriate menu key
0.38						2		Press and release appropriate menu key
0.1						3		Return with goal accomplished
0.1					3		T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1					2			Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1								Method for Goal: Menu key
0.51						1		Recall <menu key> and point finger to appropriate menu key
0.38						2		Press and release appropriate menu key
0.1						3		Return with goal accomplished
0.1					3		F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1					4		F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or
0.1					5			Return with goal accomplished
0.51				5				Point finger to right line select key next to waypoint
0.38				6				Press and release right line select key next to waypoint
0.1				7				Return with goal accomplished
0.1			5					Return with goal accomplished
0.1		4						Return with goal accomplished
0.1	4							Selection Rule: Decide on a clearance
0.1								Selection Rule for Goal: Decide on a clearance
0.1		2					T	IF clearance includes only non-RTA, THEN Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1								Method for Goal: Determine whether non-RTA clearance is acceptable
1.3			1					Determine whether non-RTA clearance is acceptable
0.2			2				T	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1			3					Return with goal accomplished
0.1		4						Return with goal accomplished

0.1	5	T	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.1	6		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1		2 T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1			Method for Goal: Respond by FMS
0.1		1 F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1		2 T	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1			Method for Goal: Open clearance
0.1		1	Remember <menu key> = "ATC" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.1		2	Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		3	Return with goal accomplished

0.1			3	Remember \<keyword\> = \<response\> and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51			1	Recall \<keyword\> and point finger to line select key next to keyword
0.38			2	Press and release appropriate line select key
0.1			3	Return with goal accomplished
0.1		4		Remember \<keyword\> = "Send" and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51			1	Recall \<keyword\> and point finger to line select key next to keyword
0.38			2	Press and release appropriate line select key
0.1			3	Return with goal accomplished
0.1		5		Return with goal accomplished
0.1	3			Return with goal accomplished
0.1	7	F		Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8			Return with goal accomplished
26.49				Total time

Trace 9 – Task 3, Voice

Equipment: FMS 2
NGOMSL Trace: Cross HELPR at 1800Z

Assumptions:
Clearance received by voice
When clearance is stated aloud or heard over the radio it is 8 words ("Cross HELPR at one eight zero zero Zulu")
Call sign is stated before audio clearance
Airline call sign is 3 words
Clearance is not written down
Response is sent by voice
Clearance information is remembered when entering the clearance
Waypoint needs to be located
Desired waypoint is the third waypoint listed on the first page of the flight plan
Clearance is acceptable and pilot will comply
Clearance information is remembered during readback
There is clearance information to enter into the FMS
Only one clearance was sent

Time	Action				
0.1	Method for Goal: Handle a clearance				
0.1	1		Selection Rule: Receive a clearance		
0.1			Selection Rule for Goal: Receive a clearance		
0.1		2	T	IF clearance is audio, THEN Accomplish Goal: Receive a radio clearance	
0.1				Method for Goal: Receive a radio clearance	
4.5				1	Listen to clearance and retain <clearance information>
0.1				2	F	Decide: IF printed clearance is desired, THEN Accomplish Goal: Write down clearance
0.1				3	Return with goal accomplished
0.1			3	Return with goal accomplished	
0.1	2	T	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance		
0.1			Selection Rule for Goal: Respond to a clearance		
0.1		1	T	IF responding by voice, THEN Accomplish Goal: Respond by voice	
0.1				Method for Goal: Respond by voice	
0.5				1	Move hand to yoke and "Push to talk" button
0.2				2	Press "Push to talk" button
1.8				3	F	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by
0.2				4	Release "Push to talk" button
0.5				5	Return hand to FMS
0.1				6	Return with goal accomplished
0.1			3	Return with goal accomplished	

0.1	3		Accomplish Goal: Enter a clearance
0.1			Method for Goal: Enter a clearance
0.2	1	T	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1	2	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3		Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1	3	T	IF clearance is only RTA, THEN Accomplish Goal: Enter RTA
0.1			Method for Goal: Enter RTA
0.1	1	T	Decide: IF waypoint is not located, THEN Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1	1		Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.82	2		Search for waypoint
0.1	3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.51	2		Point finger to left line select key next to waypoint
0.38	3		Press and release left line select key next to waypoint
0.1	4		Accomplish Goal: Go to RTA page
0.1			Method for Goal: Go to RTA page
0.1	1		Remember <menu key> = "Prog" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	2		Remember <menu key> = "Next Page" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished

0.1		3		Remember <menu key> = "Next Page" and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		4		Return with goal accomplished
0.1	5			Remember <keyword> = "RTA Waypoint" and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51		1		Recall <keyword> and point finger to line select key next to keyword
0.38		2		Press and release appropriate line select key
0.1		3		Return with goal accomplished
0.1	6			Retain <clearance value> = digits/characters in clearance and Accomplish Goal: Enter into scratchpad
0.1				Method for Goal: Enter into scratchpad
0.1		1		Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3 T		Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished

Value	1	2	3	4	5	6	T/F	Description
0.1					3		T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1					2			Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1								Method for Goal: Menu key
0.51						1		Recall <menu key> and point finger to appropriate menu key
0.38						2		Press and release appropriate menu key
0.1						3		Return with goal accomplished
0.1					3		F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1					4		F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or
0.1					5			Return with goal accomplished
0.51				7				Point finger to right line select key next to waypoint
0.38				8				Press and release right line select key next to waypoint
0.1				9				Return with goal accomplished
0.1			5					Return with goal accomplished
0.1		4						Return with goal accomplished
0.1	4							Selection Rule: Decide on a clearance
0.1		1					T	IF clearance includes only RTA, THEN Accomplish Goal: Determine whether RTA clearance is acceptable
0.1								Method for Goal: Determine whether RTA clearance is acceptable
0.1			1				F	Decide: IF not on RTA page, THEN Accomplish Goal: Go to RTA page
0.1			2					Wait for system response
1.4			3				F	Decide: IF system returns "Unable RTA", THEN Retain <response> = "Unable," ELSE Retain <response> = "Wilco"
0.1			4					Return with goal accomplished
0.1		4						Return with goal accomplished
0.1	5						T	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key
0.1								Method for Goal: Menu key
0.51		1						Recall <menu key> and point finger to appropriate menu key
0.38		2						Press and release appropriate menu key
0.1		3						Return with goal accomplished

0.1	6		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1	1	T	IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1			Method for Goal: Respond by voice
0.5	1		Move hand to yoke and "Push to talk" button
0.2	2		Press "Push to talk" button
0.2	3	T	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by
0.1			Selection Rule for Goal: Method of clearance readback
0.1	1	T	IF <clearance information> is remembered, THEN Accomplish Goal: Readback clearance from memory
0.1			Method for Goal: Readback clearance from memory
4.5	1		Recall <clearance information> and state <clearance information> followed by call sign
0.1	2		Return with goal accomplished
0.1	3		Return with goal accomplished
0.2	4		Release "Push to talk" button
0.5	5		Return hand to FMS
0.1	6		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	7	F	Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
35.6			Total time

Trace 10 – Task 3, Voice

Equipment: FMS 2
NGOMSL Trace: Cross HELPR at 1800Z

Assumptions:
Clearance received by voice
When clearance is stated aloud or heard over the radio it is 8 words ("Cross HELPR at one eight zero zero Zulu")
Call sign is stated before audio clearance
Airline call sign is 3 words
Clearance is written down
Paper is available
Pen is not in hand
Clearance is written as 4 words ("Cross HELPR at 1800Z")
Response is sent by voice
Clearance information is remembered when entering the clearance
Waypoint needs to be located
Desired waypoint is the third waypoint listed on the first page of the flight plan
Clearance is not acceptable
There is no clearance information to enter into the FMS
Only one clearance was sent

Time	Action
0.1	Method for Goal: Handle a clearance
0.1	1 Selection Rule: Receive a clearance
0.1	Selection Rule for Goal: Receive a clearance
0.1	2 T IF clearance is audio, THEN Accomplish Goal: Receive a radio clearance
0.1	Method for Goal: Receive a radio clearance
4.5	1 Listen to clearance and retain <clearance information>
0.1	2 T Decide: IF printed clearance is desired, THEN Accomplish Goal: Write down clearance
0.1	Method for Goal: Write down clearance
0.1	1 F IF paper is not readily available, THEN Accomplish Goal: Obtain paper
0.1	2 T IF pen is not in hand, THEN Accomplish Goal: Obtain pen
0.1	Method for Goal: Obtain pen
0.51	1 Reach for pen
0.8	2 Grasp pen
0.51	3 Transport pen to paper
0.16	4 Position the pen over paper
0.1	5 Return with goal accomplished

Time	Statement
10.9	3 Recall <clearance information> and write <clearance information>
0.51	4 Return pen to original location
0.17	5 Release pen
0.5	6 Move hand back to starting location
0.1	7 Return with goal accomplished
0.1	3 Return with goal accomplished
0.1	3 Return with goal accomplished
0.1	2 T Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1	Selection Rule for Goal: Respond to a clearance
0.1	1 T IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1	Method for Goal: Respond by voice
0.5	1 Move hand to yoke and "Push to talk" button
0.2	2 Press "Push to talk" button
1.8	3 F Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by
0.2	4 Release "Push to talk" button
0.5	5 Return hand to FMS
0.1	6 Return with goal accomplished
0.1	3 Return with goal accomplished
0.1	3 Accomplish Goal: Enter a clearance
0.1	Method for Goal: Enter a clearance
0.2	1 T Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1	2 F Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3 Selection Rule: Specific clearance type
0.1	Selection Rule for Goal: Specific clearance type
0.1	3 T IF clearance is only RTA, THEN Accomplish Goal: Enter RTA
0.1	Method for Goal: Enter RTA
0.1	1 T Decide: IF waypoint is not located, THEN Accomplish Goal: Locate waypoint
0.1	Method for Goal: Locate waypoint
0.1	1 Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.1	Method for Goal: Menu key
0.51	1 Recall <menu key> and point finger to appropriate menu key
0.38	2 Press and release appropriate menu key
0.1	3 Return with goal accomplished

0.82		2			Search for waypoint
0.1		3	T		Decide: IF waypoint is found, THEN Return with goal accomplished
0.51	2				Point finger to left line select key next to waypoint
0.38	3				Press and release left line select key next to waypoint
0.1	4				Accomplish Goal: Go to RTA page
0.1					Method for Goal: Go to RTA page
0.1		1			Remember <menu key> = "Prog" and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1		2			Remember <menu key> = "Next Page" and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1		3			Remember <menu key> = "Next Page" and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1		4			Return with goal accomplished
0.1	5				Remember <keyword> = "RTA Waypoint" and Accomplish Goal: Line select key
0.1					Method for Goal: Line select key
0.51		1			Recall <keyword> and point finger to line select key next to keyword
0.38		2			Press and release appropriate line select key
0.1		3			Return with goal accomplished
0.1	6				Retain <clearance value> = digits/characters in clearance and Accomplish Goal: Enter into scratchpad
0.1					Method for Goal: Enter into scratchpad
0.1		1			Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished

Time								Description
0.1						2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1								Method for Goal: Menu key
0.51							1	Recall <menu key> and point finger to appropriate menu key
0.38							2	Press and release appropriate menu key
0.1							3	Return with goal accomplished
0.1						3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1						2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1								Method for Goal: Menu key
0.51							1	Recall <menu key> and point finger to appropriate menu key
0.38							2	Press and release appropriate menu key
0.1							3	Return with goal accomplished
0.1						3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1						2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1								Method for Goal: Menu key
0.51							1	Recall <menu key> and point finger to appropriate menu key
0.38							2	Press and release appropriate menu key
0.1							3	Return with goal accomplished
0.1						3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1						4	F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or
0.1						5		Return with goal accomplished
0.51					7			Point finger to right line select key next to waypoint
0.38					8			Press and release right line select key next to waypoint
0.1					9			Return with goal accomplished
0.1				5				Return with goal accomplished
0.1			4					Return with goal accomplished
0.1	4							Selection Rule: Decide on a clearance
0.1		1					T	IF clearance includes only RTA, THEN Accomplish Goal: Determine whether RTA clearance is acceptable
0.1								Method for Goal: Determine whether RTA clearance is acceptable
0.1			1				F	Decide: IF not on RTA page, THEN Accomplish Goal: Go to RTA page
0.1			2					Wait for system response
1.4			3				T	Decide: IF system returns "Unable RTA", THEN Retain <response> = "Unable," ELSE Retain <response> = "Wilco"
0.1			4					Return with goal accomplished
0.1		4						Return with goal accomplished

0.1	5	F	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key
0.1	6		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1		1 T	IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1			Method for Goal: Respond by voice
0.5		1	Move hand to yoke and "Push to talk" button
0.2		2	Press "Push to talk" button
1.8		3 F	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by
0.2		4	Release "Push to talk" button
0.5		5	Return hand to FMS
0.1		6	Return with goal accomplished
0.1		3	Return with goal accomplished
0.1	7 F		Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
45.77			Total time

Trace 11 – Task 3, Data Comm

Equipment: FMS 2

NGOMSL Trace: Cross HELPR at time 1800Z

Assumptions:

Clearance received by data communications (Data Comm)

Hands start on FMS

Entire clearance is read aloud upon receipt

When clearance is read from screen it is 9 words ("Cross HELPR at time one eight zero zero Zulu")

Clearance is one page

Clearance is not printed upon receipt

Response is sent by FMS

Once opened, clearance remains open until clearance information is entered

Clearance information is remembered when entering the clearance

Waypoint needs to be located

Desired waypoint is the third waypoint listed on the first page of the flight plan

Clearance is acceptable and pilot will comply

There is clearance information to enter into the FMS

Only one clearance was sent

Time	Action
0.1	Method for Goal: Handle a clearance
0.1	1 Selection Rule: Receive a clearance
0.1	Selection Rule for Goal: Receive a clearance
0.1	1 T IF clearance is text, THEN Accomplish Goal: Receive an FMS clearance
0.1	Method for Goal: Receive an FMS clearance
0.1	1 F Decide: IF hand not on FMS, THEN move hand to FMS
0.1	2 Accomplish Goal: Open clearance
0.1	Method for Goal: Open clearance
0.1	1 Remember <menu key> = "ATC" and Accomplish Goal: Menu key
0.1	Method for Goal: Menu key
0.51	1 Recall <menu key> and point finger to appropriate menu key
0.38	2 Press and release appropriate menu key
0.1	3 Return with goal accomplished
0.1	2 Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1	Method for Goal: Line select key
0.51	1 Recall <keyword> and point finger to line select key next to keyword
0.38	2 Press and release appropriate line select key
0.1	3 Return with goal accomplished
0.1	3 Return with goal accomplished

0.1		3	Accomplish Goal: Read the clearance
0.1			Method for Goal: Read the clearance
3.8		1 T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and
0.1		2 T	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1		4 F	Decide: IF printed clearance is desired, THEN Selection Rule: Get printed copy
0.1		5	Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	2 T		Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1	2 T		IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1			Method for Goal: Respond by FMS
0.1		1 F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1		2 F	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1		3	Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		4	Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		5	Return with goal accomplished
0.1	3		Return with goal accomplished

0.1	3		Accomplish Goal: Enter a clearance
0.1			Method for Goal: Enter a clearance
0.2	1	T	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1	2	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3		Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1	3	T	IF clearance is only RTA, THEN Accomplish Goal: Enter RTA
0.1			Method for Goal: Enter RTA
0.1	1	T	Decide: IF waypoint not located, THEN Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1	1		Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.1			Method For Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.82	2		Search for waypoint
0.1	3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.51	2		Point finger to left line select key next to waypoint
0.38	3		Press and release left line select key next to waypoint
0.1	4		Accomplish Goal: Go to RTA page
0.1			Method for Goal: Go to RTA page
0.1	1		Remember <menu key> = "Prog" and Accomplish Goal: Menu key
0.1			Method For Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	2		Remember <menu key> = "Next Page" and Accomplish Goal: Menu key
0.1			Method For Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished

0.1			3		Remember <menu key> = "Next Page" and Accomplish Goal: Menu key
0.1					Method For Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1			4		Return with goal accomplished
0.1		5			Remember <keyword> = "RTA Waypoint" and Accomplish Goal: Line select key
0.1					Method for Goal: Line select key
0.51			1		Recall <keyword> and point finger to line select key next to keyword
0.38			2		Press and release appropriate line select key
0.1			3		Return with goal accomplished
0.1		6			Retain <clearance value> = digits/characters in clearance and Accomplish Goal: Enter into scratchpad
0.1					Method for Goal: Enter into scratchpad
0.1			1		Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1			2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1			3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished

0.1	3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	4	F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or
0.1	5		Return with goal accomplished
0.51	7		Point finger to right line select key next to waypoint
0.38	8		Press and release right line select key next to waypoint
0.1	9		Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	4		Selection Rule: Decide on a clearance
0.1			Selection Rule for Goal: Decide on a clearance
0.1	1	T	IF clearance includes only RTA, THEN Accomplish Goal: Determine whether RTA clearance is acceptable
0.1			Method for Goal: Determine whether RTA clearance is acceptable
0.1	1	F	Decide: IF not on RTA page, THEN Accomplish Goal: Go to RTA page
0.1	2		Wait for system response
1.4	3	F	Decide: IF system returns "Unable RTA," THEN Retain <response> = "Unable," ELSE Retain <response> = "Wilco"
0.1	4		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	5	T	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished

Time	Step	T/F	Description
0.1	6		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1	2	T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1			Method for Goal: Respond by FMS
0.1	1	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	2	T	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1			Method for Goal: Open clearance
0.1	1		Remember <menu key> = "ATC" and Accomplish Goal: Menu key
0.1			Method For Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	2		Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	3		Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	4		Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	7	F	Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
36.02			Total time

Trace 12 – Task 3, Data Comm

Equipment: FMS 2

NGOMSL Trace: Cross HELPR at time 1800Z

Assumptions:

Clearance received by data communications (Data Comm)

Hands start on FMS

Entire clearance is read aloud upon receipt

When clearance is read from screen it is 9 words ("Cross HELPR at time one eight zero zero Zulu")

Clearance is one page

Clearance is printed upon receipt

Printer is available

Response is sent by FMS

Hand is not on FMS after grasping print out

Once opened, clearance remains open until clearance information is entered

Clearance information is remembered when entering the clearance

Waypoint needs to be located

Desired waypoint is the third waypoint listed on the first page of the flight plan

Clearance is not acceptable

There is no clearance information to enter into the FMS

Only one clearance was sent

Time	Action				
0.1	Method for Goal: Handle a clearance				
0.1	1	Selection Rule: Receive a clearance			
0.1		Selection Rule for Goal: Receive a clearance			
0.1		1	T	IF clearance is text, THEN Accomplish Goal: Receive an FMS clearance	
0.1			Method for Goal: Receive an FMS clearance		
0.1			1	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1			2	Accomplish Goal: Open clearance	
0.1				Method for Goal: Open clearance	
0.1				1	Remember <menu key> = "ATC" and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51					1 Recall <menu key> and point finger to appropriate menu key
0.38					2 Press and release appropriate menu key
0.1					3 Return with goal accomplished
0.1				2	Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1					Method for Goal: Line select key
0.51					1 Recall <keyword> and point finger to line select key next to keyword
0.38					2 Press and release appropriate line select key
0.1					3 Return with goal accomplished
0.1				3	Return with goal accomplished

0.1		3		Accomplish Goal: Read the clearance
0.1				Method for Goal: Read the clearance
3.8		1	T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and
0.1		2	T	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1		4	T	Decide: IF printed clearance is desired, THEN Selection Rule: Get printed copy
0.1				Selection Rule for Goal: Get printed copy
0.1		1	T	IF printer is available, THEN Accomplish Goal: Print the clearance
0.1				Method for Goal: Print the clearance
0.1		1		Remember <keyword> = "Print" and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51		1		Recall <keyword> and point finger to line select key next to keyword
0.38		2		Press and release appropriate line select key
0.1		3		Return with goal accomplished
0.51		2		Reach for print out
0.8		3		Grasp print out
0.51		4		Transport paper to reading position
0.1		5		Return with goal accomplished
0.1		3		Return with goal accomplished
0.1		5		Return with goal accomplished
0.1		3		Return with goal accomplished
0.1	2	T		Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1				Selection Rule for Goal: Respond to a clearance
0.1		2	T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1				Method for Goal: Respond by FMS
0.5		1	T	Decide: IF hand not on FMS, THEN move hand to FMS
0.1		2	F	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1		3		Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51		1		Recall <keyword> and point finger to line select key next to keyword
0.38		2		Press and release appropriate line select key
0.1		3		Return with goal accomplished

Value	Step	Description
0.1	4	Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1		Method for Goal: Line select key
0.51	1	Recall <keyword> and point finger to line select key next to keyword
0.38	2	Press and release appropriate line select key
0.1	3	Return with goal accomplished
0.1	5	Return with goal accomplished
0.1	3	Return with goal accomplished
0.1	3	Accomplish Goal: Enter a clearance
0.1		Method for Goal: Enter a clearance
0.2	1 T	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1	2 F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3	Selection Rule: Specific clearance type
0.1		Selection Rule for Goal: Specific clearance type
0.1	3 T	IF clearance is only RTA, THEN Accomplish Goal: Enter RTA
0.1		Method for Goal: Enter RTA
0.1	1 T	Decide: IF waypoint not located, THEN Accomplish Goal: Locate waypoint
0.1		Method for Goal: Locate waypoint
0.1	1	Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.1		Method For Goal: Menu key
0.51	1	Recall <menu key> and point finger to appropriate menu key
0.38	2	Press and release appropriate menu key
0.1	3	Return with goal accomplished
0.82	2	Search for waypoint
0.1	3 T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.51	2	Point finger to left line select key next to waypoint
0.38	3	Press and release left line select key next to waypoint
0.1	4	Accomplish Goal: Go to RTA page
0.1		Method for Goal: Go to RTA page
0.1	1	Remember <menu key> = "Prog" and Accomplish Goal: Menu key
0.1		Method For Goal: Menu key
0.51	1	Recall <menu key> and point finger to appropriate menu key
0.38	2	Press and release appropriate menu key
0.1	3	Return with goal accomplished

0.1		2	Remember <menu key> = "Next Page" and Accomplish Goal: Menu key
0.1			Method For Goal: Menu key
0.51			1 Recall <menu key> and point finger to appropriate menu key
0.38			2 Press and release appropriate menu key
0.1			3 Return with goal accomplished
0.1		3	Remember <menu key> = "Next Page" and Accomplish Goal: Menu key
0.1			Method For Goal: Menu key
0.51			1 Recall <menu key> and point finger to appropriate menu key
0.38			2 Press and release appropriate menu key
0.1			3 Return with goal accomplished
0.1		4	Return with goal accomplished
0.1	5		Remember <keyword> = "RTA Waypoint" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1	6		Retain <clearance value> = digits/characters in clearance and Accomplish Goal: Enter into scratchpad
0.1			Method for Goal: Enter into scratchpad
0.1		1	Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51			1 Recall <menu key> and point finger to appropriate menu key
0.38			2 Press and release appropriate menu key
0.1			3 Return with goal accomplished
0.1		2	Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51			1 Recall <menu key> and point finger to appropriate menu key
0.38			2 Press and release appropriate menu key
0.1			3 Return with goal accomplished

Value	Step	Flag	Description
0.1	3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	4	F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or
0.1	5		Return with goal accomplished
0.51	7		Point finger to right line select key next to waypoint
0.38	8		Press and release right line select key next to waypoint
0.1	9		Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	4		Selection Rule: Decide on a clearance
0.1			Selection Rule for Goal: Decide on a clearance
0.1	1	T	IF clearance includes only RTA, THEN Accomplish Goal: Determine whether RTA
0.1			Method for Goal: Determine whether RTA clearance is acceptable
0.1	1	F	Decide: IF not on RTA page, THEN Accomplish Goal: Go to RTA page
0.1	2		Wait for system response
1.4	3	T	Decide: IF system returns "Unable RTA," THEN Retain <response> = "Unable," ELSE Retain <response> = "Wilco"
0.1	4		Return with goal accomplished
0.1	4		Return with goal accomplished

0.1	5	F	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key
0.1	6		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1		2 T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1			Method for Goal: Respond by FMS
0.1		1 F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1		2 T	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1			Method for Goal: Open clearance
0.1		1	Remember <menu key> = "ATC" and Accomplish Goal: Menu key
0.1			Method For Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.1		2	Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		3	Return with goal accomplished
0.1		3	Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		4	Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		5	Return with goal accomplished
0.1		3	Return with goal accomplished
0.1	7 F		Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
38.84			Total time

Trace 13 – Task 4, Voice

Equipment: FMS 2
NGOMSL Trace: Cross HELPR at 1800Z at FL190

Assumptions:
Clearance received by voice
When clearance is read from paper or heard over the radio it is 14 words ("Cross HELPR at one eight zero zero Zulu at flight level one niner zero")
Call sign is stated before audio clearance
Airline call sign is 3 words
Clearance is written down
Need to obtain pen and paper
Clearance is written as 6 words ("Cross HELPR at 1800Z at FL190")
Response is sent by voice
Clearance information is not initially remembered, and must be read aloud, when entering the clearance
Paper is not visible after hand moved to FMS
Hand is not on FMS after reading clearance from paper
Desired waypoint is the third waypoint listed on the first page of the flight plan
After initially locating waypoint, it remains located until FMS is navigated to a different page
It takes one mental to determine if non-RTA portion of clearance is acceptable or not
Non-RTA portion of clearance is acceptable and pilot will comply
RTA portion of clearance is acceptable and pilot will comply
Clearance information is not remembered during readback
There is clearance information to enter into the FMS
Only one clearance was sent

Time	Action					
0.1	Method for Goal: Handle a clearance					
0.1	1		Selection Rule: Receive a clearance			
0.1			Selection Rule for Goal: Receive a clearance			
0.1		2	T	IF clearance is audio, THEN Accomplish Goal: Receive a radio clearance		
0.1				Method for Goal: Receive a radio clearance		
6.9				1		Listen to clearance and retain <clearance information>
0.1			2	T	Decide: IF printed clearance is desired, THEN Accomplish Goal: Write down clearance	
0.1					Method for Goal: Write down clearance	
0.1				1	T	Decide: IF paper is not readily available, THEN Accomplish Goal: Obtain paper
0.1						Method for Goal: Obtain paper
0.51					1	Reach for paper
0.8					2	Grasp paper
0.51					3	Transport paper to writing space
0.17					4	Release paper
0.1					5	Return with goal accomplished

Time						T/F	Operator
0.1				2		T	Decide: IF pen is not in hand, THEN Accomplish Goal: Obtain pen
0.1							Method for Goal: Obtain pen
0.51					1		Reach for pen
0.8					2		Grasp pen
0.51					3		Transport pen to paper
0.16					4		Position the pen over paper
0.1					5		Return with goal accomplished
16.3				3			Recall <clearance information> and write <clearance information>
0.51				4			Return pen to original location
0.17				5			Release pen
0.5				6			Move hand back to starting location
0.1				7			Return with goal accomplished
0.1			3				Return with goal accomplished
0.1		3					Return with goal accomplished
0.1	2					T	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1							Selection Rule for Goal: Respond to a clearance
0.1		1				T	IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1							Method for Goal: Respond by voice
0.5			1				Move hand to yoke and "Push to talk" button
0.2			2				Press "Push to talk" button
1.8			3			F	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by
0.2			4				Release "Push to talk" button
0.5			5				Return hand to FMS
0.1			6				Return with goal accomplished
0.1		3					Return with goal accomplished
0.1	3						Accomplish Goal: Enter a clearance
0.1							Method for Goal: Enter a clearance
0.2		1				F	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1							Selection Rule for Goal: Method of reading
0.1		1				T	IF clearance is in writing, THEN Accomplish Goal: Read clearance from paper
0.1							Method for Goal: Read clearance from paper
0.51			1			T	Decide: IF paper not visible, THEN move paper
5.8			2			T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on paper aloud and retain <clearance information>, ELSE Read information on paper and
0.1			3				Return with goal accomplished
0.1		3					Return with goal accomplished

0.5	2	T	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3		Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1	4	T	IF clearance is crossing restriction with RTA, THEN Accomplish Goal: Enter mixed clearance
0.1			Method for Goal: Enter mixed clearance
0.1	1		Accomplish Goal: Enter crossing restriction
0.1			Method for Goal: Enter crossing restriction
0.1	1		Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1	1		Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.82	2		Search for waypoint
0.1	3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1	2	F	Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter
0.1	3		Remember <menu key> = "/" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	4	T	Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter
0.1			Method for Goal: Enter into scratchpad
0.1	1		Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished

0.1			2			Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu
0.1						Method for Goal: Menu key
0.51					1	Recall <menu key> and point finger to appropriate menu key
0.38					2	Press and release appropriate menu key
0.1					3	Return with goal accomplished
0.1			3	T		Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			2			Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu
0.1						Method for Goal: Menu key
0.51					1	Recall <menu key> and point finger to appropriate menu key
0.38					2	Press and release appropriate menu key
0.1					3	Return with goal accomplished
0.1			3	F		Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			4	F		Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1			5			Return with goal accomplished
0.51		5				Point finger to right line select key next to waypoint
0.38		6				Press and release right line select key next to waypoint
0.1		7				Return with goal accomplished
0.1	2					Accomplish Goal: Enter RTA
0.1						Method for Goal: Enter RTA
0.1		1		F		Decide: IF waypoint not located, THEN Accomplish Goal: Locate waypoint
0.51		2				Point finger to left line select key next to waypoint
0.38		3				Press and release left line select key next to waypoint
0.1		4				Accomplish Goal: Go to RTA page
0.1						Method for Goal: Go to RTA page
0.1			1			Remember <menu key> = "Prog" and Accomplish Goal: Menu key
0.1						Method for Goal: Menu key
0.51					1	Recall <menu key> and point finger to appropriate menu key
0.38					2	Press and release appropriate menu key
0.1					3	Return with goal accomplished
0.1			2			Remember <menu key> = "Next Page" and Accomplish Goal: Menu key
0.1						Method for Goal: Menu key
0.51					1	Recall <menu key> and point finger to appropriate menu key
0.38					2	Press and release appropriate menu key
0.1					3	Return with goal accomplished

0.1	3		Remember <menu key> = "Next Page" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	5		Remember <keyword> = "RTA Waypoint" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1	6		Retain <clearance value> = digits/characters in clearance and Accomplish Goal: Enter into scratchpad
0.1			Method for Goal: Enter into scratchpad
0.1		1	Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.1		2	Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.1		3 T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2	Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished

0.1	3 T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	2	Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu
0.1		Method for Goal: Menu key
0.51	1	Recall <menu key> and point finger to appropriate menu key
0.38	2	Press and release appropriate menu key
0.1	3	Return with goal accomplished
0.1	3 F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	4 F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1	5	Return with goal accomplished
0.51	7	Point finger to right line select key next to waypoint
0.38	8	Press and release right line select key next to waypoint
0.1	9	Return with goal accomplished
0.1	3	Return with goal accomplished
0.1	5	Return with goal accomplished
0.1	4	Return with goal accomplished
0.1	4	Selection Rule: Decide on a clearance
0.1		Selection Rule for Goal: Decide on a clearance
0.1	3 T	IF clearance includes both RTA and other information, THEN Accomplish Goal: Determine whether mixed clearance is acceptable
0.1		Method for Goal: Determine whether mixed clearance is acceptable
0.1	1	Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1		Method for Goal: Determine whether non-RTA clearance is acceptable
1.3	1	Determine whether non-RTA clearance is acceptable
0.2	2 T	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1	3	Return with goal accomplished
0.1	2 F	Decide: IF <response> = "Unable," THEN Return with goal accomplished
0.1	3	Accomplish Goal: Determine whether RTA clearance is acceptable
0.1		Method for Goal: Determine whether RTA clearance is acceptable
0.1	1 F	Decide: IF not on RTA page, THEN Accomplish Goal: Go to RTA page
0.1	2	Wait for system response
1.4	3 F	Decide: IF system returns "Unable RTA", THEN Retain <response> = "Unable," ELSE Retain <response> = "Wilco"
0.1	4	Return with goal accomplished
0.1	4	Return with goal accomplished
0.1	4	Return with goal accomplished

Time	Step		Description
0.1	5	T	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	6		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1	1	T	IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1			Method for Goal: Respond by voice
0.5	1		Move hand to yoke and "Push to talk" button
0.2	2		Press "Push to talk" button
0.2	3	T	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by
0.1			Selection Rule for Goal: Method of clearance readback
0.1	2	T	IF <clearance information> is not remembered, THEN Accomplish Goal: Readback clearance by reading
0.1			Method for Goal: Readback clearance by reading
0.1	1		Selection Rule: Method of reading
0.1			Selection Rule for Goal: Method of reading
0.1	1	T	IF clearance is in writing, THEN Accomplish Goal: Read clearance from paper
0.1			Method for Goal: Read clearance from paper
0.51	1	T	Decide: IF paper not visible, THEN move paper
5.8	2	T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on paper aloud and retain <clearance information>, ELSE Read information on paper and retain
0.1	3		Return with goal accomplished
0.1	3		Return with goal accomplished
1.3	2		State call sign
0.1	3		Return with goal accomplished
0.1	3		Return with goal accomplished
0.2	4		Release "Push to talk" button
0.5	5		Return hand to FMS
0.1	6		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	7	F	Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
80.52			Total time

Trace 14 – Task 4, Voice

<table>
<tr><td colspan="5" style="background-color:#b5cc8c">Equipment: FMS 2
NGOMSL Trace: Cross HELPR at 1800Z at FL190

Assumptions:
Clearance received by voice
When clearance is stated aloud or heard over the radio it is 14 words ("Cross HELPR at one eight zero zero Zulu at flight level one niner zero")
Call sign is stated before audio clearance
Airline call sign is 3 words
Clearance is not written down
Response is sent by voice
Clearance information is remembered when entering the clearance
Desired waypoint is the third waypoint listed on the first page of the flight plan
After initially locating waypoint, it remains located until FMS is navigated to a different page
It takes one mental to determine if non-RTA portion of clearance is acceptable or not
Non-RTA portion of clearance is acceptable and pilot will comply
RTA portion of clearance is acceptable and pilot will comply
Clearance information is remembered during readback
There is clearance information to enter into the FMS
Only one clearance was sent</td></tr>
</table>

Time	Action			
0.1	Method for Goal: Handle a clearance			
0.1	1	Selection Rule: Receive a clearance		
0.1		Selection Rule for Goal: Receive a clearance		
0.1		2	T	IF clearance is audio, THEN Accomplish Goal: Receive a radio clearance
0.1			Method for Goal: Receive a radio clearance	
6.9			1	Listen to clearance and retain <clearance information>
0.1			2 F	Decide: IF printed clearance is desired, THEN Accomplish Goal: Write down clearance
0.1			3	Return with goal accomplished
0.1		3	Return with goal accomplished	
0.1	2 T	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance		
0.1		Selection Rule for Goal: Respond to a clearance		
0.1		1 T	IF responding by voice, THEN Accomplish Goal: Respond by voice	
0.1			Method for Goal: Respond by voice	
0.5			1	Move hand to yoke and "Push to talk" button
0.2			2	Press "Push to talk" button
1.8			3 F	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by
0.2			4	Release "Push to talk" button
0.5			5	Return hand to FMS
0.1			6	Return with goal accomplished
0.1		3	Return with goal accomplished	

Value	Step	T/F	Description
0.1	3		Accomplish Goal: Enter a clearance
0.1			Method for Goal: Enter a clearance
0.2	1	T	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1	2	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3		Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1	4	T	IF clearance is crossing restriction with RTA, THEN Accomplish Goal: Enter mixed clearance
0.1			Method for Goal: Enter mixed clearance
0.1	1		Accomplish Goal: Enter crossing restriction
0.1			Method for Goal: Enter crossing restriction
0.1	1		Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1	1		Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.82	2		Search for waypoint
0.1	3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1	2	F	Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter
0.1	3		Remember <menu key> = "/" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	4	T	Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter
0.1			Method for Goal: Enter into scratchpad
0.1	1		Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished

Value						T/F	Description
0.1				2			Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu
0.1							Method for Goal: Menu key
0.51					1		Recall <menu key> and point finger to appropriate menu key
0.38					2		Press and release appropriate menu key
0.1					3		Return with goal accomplished
0.1				3		T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1				2			Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu
0.1							Method for Goal: Menu key
0.51					1		Recall <menu key> and point finger to appropriate menu key
0.38					2		Press and release appropriate menu key
0.1					3		Return with goal accomplished
0.1				3		F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1				4		F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1				5			Return with goal accomplished
0.51	5						Point finger to right line select key next to waypoint
0.38	6						Press and release right line select key next to waypoint
0.1	7						Return with goal accomplished
0.1		2					Accomplish Goal: Enter RTA
0.1							Method for Goal: Enter RTA
0.1			1			F	Decide: IF waypoint not located, THEN Accomplish Goal: Locate waypoint
0.51			2				Point finger to left line select key next to waypoint
0.38			3				Press and release left line select key next to waypoint
0.1			4				Accomplish Goal: Go to RTA page
0.1							Method for Goal: Go to RTA page
0.1				1			Remember <menu key> = "Prog" and Accomplish Goal: Menu key
0.1							Method for Goal: Menu key
0.51					1		Recall <menu key> and point finger to appropriate menu key
0.38					2		Press and release appropriate menu key
0.1					3		Return with goal accomplished
0.1				2			Remember <menu key> = "Next Page" and Accomplish Goal: Menu key
0.1							Method for Goal: Menu key
0.51					1		Recall <menu key> and point finger to appropriate menu key
0.38					2		Press and release appropriate menu key
0.1					3		Return with goal accomplished

0.1		3		Remember <menu key> = "Next Page" and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		4		Return with goal accomplished
0.1	5			Remember <keyword> = "RTA Waypoint" and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51			1	Recall <keyword> and point finger to line select key next to keyword
0.38			2	Press and release appropriate line select key
0.1			3	Return with goal accomplished
0.1	6			Retain <clearance value> = digits/characters in clearance and Accomplish Goal: Enter into scratchpad
0.1				Method for Goal: Enter into scratchpad
0.1		1		Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3 T		Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished

0.1			3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu
0.1			Method for Goal: Menu key		
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1			3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			4	F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection
0.1			5		Return with goal accomplished
0.51			7		Point finger to right line select key next to waypoint
0.38			8		Press and release right line select key next to waypoint
0.1			9		Return with goal accomplished
0.1		3	Return with goal accomplished		
0.1		5	Return with goal accomplished		
0.1	4	Return with goal accomplished			
0.1	4	Selection Rule: Decide on a clearance			
0.1		Selection Rule for Goal: Decide on a clearance			
0.1		3	T	IF clearance includes both RTA and other information, THEN Accomplish Goal: Determine whether mixed clearance is acceptable	
0.1		Method for Goal: Determine whether mixed clearance is acceptable			
0.1		1	Accomplish Goal: Determine whether non-RTA clearance is acceptable		
0.1		Method for Goal: Determine whether non-RTA clearance is acceptable			
1.3			1	Determine whether non-RTA clearance is acceptable	
0.2			2	T	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1			3	Return with goal accomplished	
0.1		2	F	Decide: IF <response> = "Unable," THEN Return with goal accomplished	
0.1		3	Accomplish Goal: Determine whether RTA clearance is acceptable		
0.1		Method for Goal: Determine whether RTA clearance is acceptable			
0.1			1	F	Decide: IF not on RTA page, THEN Accomplish Goal: Go to RTA page
0.1			2	Wait for system response	
1.4			3	F	Decide: IF system returns "Unable RTA", THEN Retain <response> = "Unable," ELSE Retain <response> = "Wilco"
0.1			4	Return with goal accomplished	
0.1		4	Return with goal accomplished		
0.1	4	Return with goal accomplished			

0.1	5	T	Decide: IF \<response\> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember \<menu key\> = "Exec" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall \<menu key\> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.1	6		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1		1 T	IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1			Method for Goal: Respond by voice
0.5		1	Move hand to yoke and "Push to talk" button
0.2		2	Press "Push to talk" button
0.2		3 T	Recall \<response\> and Decide: IF \<response\> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by
0.1			Selection Rule for Goal: Method of clearance readback
0.1		1 T	IF \<clearance information\> is remembered, THEN Accomplish Goal: Readback clearance from memory
0.1			Method for Goal: Readback clearance from memory
6.9		1	Recall \<clearance information\> and state \<clearance information\> followed by call sign
0.1		2	Return with goal accomplished
0.1		3	Return with goal accomplished
0.2		4	Release "Push to talk" button
0.5		5	Return hand to FMS
0.1		6	Return with goal accomplished
0.1		3	Return with goal accomplished
0.1	7	F	Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
49.75			Total time

Trace 15 – Task 4, Data Comm

Equipment: FMS 2
NGOMSL Trace: Cross HELPR at time 1800Z at FL190

Assumptions:
Clearance received by data communications (Data Comm)
Hands do not start on FMS
Entire clearance is read aloud upon receipt
When clearance is read from screen page one is 9 words ("Cross HELPR at time one eight zero zero Zulu") and page two is 6 words ("At flight level one niner zero")
Clearance is two pages
Clearance is printed upon receipt
Printer is available
Response is sent by FMS
Hand is not on FMS after grasping print out
Once opened, clearance remains open until clearance information is entered
Clearance information is not initially remembered, and must be read aloud, when entering the clearance
Paper is not visible after hand moved to FMS
When clearance is read from paper it is 15 words ("Cross HELPR at time one eight zero zero Zulu at flight level one niner zero")
Hand is not on FMS after reading clearance from paper
Desired waypoint is the third waypoint listed on the first page of the flight plan
After initially locating waypoint, it remains located until FMS is navigated to a different page
It takes one mental to determine if non-RTA portion of clearance is acceptable or not
Non-RTA portion of clearance is acceptable
RTA portion of clearance is not acceptable
There is no clearance information to enter into the FMS
Only one clearance was sent

Time	Action			
0.1	Method for Goal: Handle a clearance			
0.1	1	Selection Rule: Receive a clearance		
0.1		Selection Rule for Goal: Receive a clearance		
0.1		1 T	IF clearance is text, THEN Accomplish Goal: Receive an FMS clearance	
0.1		Method for Goal: Receive an FMS clearance		
0.5			1 T Decide: IF hand not on FMS, THEN move hand to FMS	
0.1			2 Accomplish Goal: Open clearance	
0.1			Method for Goal: Open clearance	
0.1				1 Remember <menu key> = "ATC" and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51				1 Recall <menu key> and point finger to appropriate menu key
0.38				2 Press and release appropriate menu key
0.1				3 Return with goal accomplished

0.1	2		Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	3		Accomplish Goal: Read the clearance
0.1			Method for Goal: Read the clearance
3.8	1	T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and
0.1	2	F	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1	3		Remember <menu key> = "Next Page" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	4		GOTO Step 1
2.6	1	T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and
0.1	2	T	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1	4	T	Decide: IF printed clearance is desired, THEN Selection Rule: Get printed copy
0.1			Selection Rule: Get printed copy
0.1	1	T	IF printer is available, THEN Accomplish Goal: Print the clearance
0.1			Method for Goal: Print the clearance
0.1	1		Remember <keyword> = "Print" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished

Time	L1	L2	L3	L4	L5	T/F	Description
0.51					2		Reach for print out
0.8					3		Grasp print out
0.51					4		Transport paper to reading position
0.1					5		Return with goal accomplished
0.1				3			Return with goal accomplished
0.1			5				Return with goal accomplished
0.1		3					Return with goal accomplished
0.1	2					T	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1							Selection Rule: Respond to a clearance
0.1		2				T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1							Method for Goal: Respond by FMS
0.5			1			T	Decide: IF hand not on FMS, THEN move hand to FMS
0.1			2			F	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1			3				Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1							Method for Goal: Line select key
0.51				1			Recall <keyword> and point finger to line select key next to keyword
0.38				2			Press and release appropriate line select key
0.1				3			Return with goal accomplished
0.1			4				Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1							Method for Goal: Line select key
0.51				1			Recall <keyword> and point finger to line select key next to keyword
0.38				2			Press and release appropriate line select key
0.1				3			Return with goal accomplished
0.1			5				Return with goal accomplished
0.1		3					Return with goal accomplished
0.1	3						Accomplish Goal: Enter a clearance
0.1							Method for Goal: Enter a clearance
0.2		1				F	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1							Selection Rule for Goal: Method of reading
0.1			1			T	IF clearance is in writing, THEN Accomplish Goal: Read clearance from paper
0.1							Method for Goal: Read clearance from paper
0.51				1		T	Decide: IF paper not visible, THEN move paper
6.2				2		T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on paper aloud and retain <clearance information>, ELSE Read information on paper and
0.1				3			Return with goal accomplished
0.1		3					Return with goal accomplished

Value	Step	T/F	Description
0.5	2	T	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3		Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1	4	T	IF clearance is crossing restriction with RTA, THEN Accomplish Goal: Enter mixed clearance
0.1			Method for Goal: Enter mixed clearance
0.1	1		Accomplish Goal: Enter crossing restriction
0.1			Method for Goal: Enter crossing restriction
0.1	1		Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1	1		Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.82	2		Search for waypoint
0.1	3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1	2	F	Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter
0.1	3		Remember <menu key> = "/" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	4	T	Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter
0.1			Method for Goal: Enter into scratchpad
0.1	1		Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished

Prob					Description
0.1			3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1			3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			4	F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1			5		Return with goal accomplished
0.51		5			Point finger to right line select key next to waypoint
0.38		6			Press and release right line select key next to waypoint
0.1		7			Return with goal accomplished
0.1	2				Accomplish Goal: Enter RTA
0.1					Method for Goal: Enter RTA
0.1		1	F		Decide: IF waypoint not located, THEN Accomplish Goal: Locate waypoint
0.51		2			Point finger to left line select key next to waypoint
0.38		3			Press and release left line select key next to waypoint
0.1		4			Accomplish Goal: Go to RTA page
0.1					Method for Goal: Go to RTA page
0.1			1		Remember <menu key> = "Prog" and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1			2		Remember <menu key> = "Next Page" and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished

0.1		3	Remember <menu key> = "Next Page" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	5		Remember <keyword> = "RTA Waypoint" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1	6		Retain <clearance value> = digits/characters in clearance and Accomplish Goal: Enter into scratchpad
0.1			Method for Goal: Enter into scratchpad
0.1		1	Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.1		2	Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.1		3 T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2	Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished

Time	L1	L2	L3	L4	L5	L6	L7	L8	T/F	Description
0.1							3		T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1							2			Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu
0.1										Method for Goal: Menu key
0.51								1		Recall <menu key> and point finger to appropriate menu key
0.38								2		Press and release appropriate menu key
0.1								3		Return with goal accomplished
0.1							3		F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1							4		F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1							5			Return with goal accomplished
0.51						7				Point finger to right line select key next to waypoint
0.38						8				Press and release right line select key next to waypoint
0.1						9				Return with goal accomplished
0.1					3					Return with goal accomplished
0.1				5						Return with goal accomplished
0.1			4							Return with goal accomplished
0.1	4									Selection Rule: Decide on a clearance
0.1										Selection Rule for Goal: Decide on a clearance
0.1			3						T	IF clearance includes both RTA and other information, THEN Accomplish Goal: Determine whether mixed clearance is acceptable
0.1										Method for Goal: Determine whether mixed clearance is acceptable
0.1				1						Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1										Method for Goal: Determine whether non-RTA clearance is acceptable
1.3					1					Determine whether non-RTA clearance is acceptable
0.2					2				T	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1					3					Return with goal accomplished
0.1			2						F	Decide: IF <response> = "Unable," THEN Return with goal accomplished
0.1			3							Accomplish Goal: Determine whether RTA clearance is acceptable
0.1										Method for Goal: Determine whether RTA clearance is acceptable
0.1				1					F	Decide: IF not on RTA page, THEN Accomplish Goal: Go to RTA page
0.1				2						Wait for system response
1.4				3					T	Decide: IF system returns "Unable RTA", THEN Retain <response> = "Unable," ELSE Retain <response> = "Wilco"
0.1				4						Return with goal accomplished
0.1			4							Return with goal accomplished
0.1		4								Return with goal accomplished

Time	Step	T/F	Description
0.1	5	F	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key
0.1	6		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1	2	T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1			Method for Goal: Respond by FMS
0.1	1	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	2	T	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1			Method for Goal: Open clearance
0.1	1		Remember <menu key> = "ATC" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	2		Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	3		Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	4		Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	7	F	Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
60.09			Total time

Trace 16 – Task 4, Data Comm

Equipment: FMS 2
NGOMSL Trace: Cross HELPR at time 1800Z at FL190

Assumptions:
Clearance received by data communications (Data Comm)
Hands start on FMS
Entire clearance is read aloud upon receipt
When clearance is read from screen page one is 9 words ("Cross HELPR at time one eight zero zero Zulu") and page two is 6 words ("At flight level one niner zero")
Clearance is two pages
Clearance is not printed upon receipt
Response is sent by FMS
Once opened, clearance remains open until clearance information is entered
Clearance information is remembered when entering the clearance
Desired waypoint is the third waypoint listed on the first page of the flight plan
After initially locating waypoint, it remains located until FMS is navigated to a different page
It takes one mental to determine if non-RTA portion of clearance is acceptable or not
Non-RTA portion of clearance is acceptable
RTA portion of clearance is not acceptable
There is no clearance information to enter into the FMS
Only one clearance was sent

Time	Action				
0.1	Method for Goal: Handle a clearance				
0.1	1	Selection Rule: Receive a clearance			
0.1		Selection Rule for Goal: Receive a clearance			
0.1		1	T	IF clearance is text, THEN Accomplish Goal: Receive an FMS clearance	
0.1		Method for Goal: Receive an FMS clearance			
0.1			1	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1			2	Accomplish Goal: Open clearance	
0.1			Method for Goal: Open clearance		
0.1				1	Remember <menu key> = "ATC" and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key	
0.51					1 Recall <menu key> and point finger to appropriate menu key
0.38					2 Press and release appropriate menu key
0.1					3 Return with goal accomplished

Time	Step	T/F	Description
0.1	2		Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	3		Accomplish Goal: Read the clearance
0.1			Method for Goal: Read the clearance
3.8	1	T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and
0.1	2	F	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1	3		Remember <menu key> = "Next Page" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	4		GOTO Step 1
2.6	1	T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and
0.1	2	T	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1	4	F	Decide: IF printed clearance is desired, THEN Selection Rule: Get printed copy
0.1	5		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	2	T	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1			Selection Rule: Respond to a clearance
0.1	2	T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1			Method for Goal: Respond by FMS
0.1	1	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	2	F	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1	3		Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished

	Step	T/F	Description
0.1	4		Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	3		Accomplish Goal: Enter a clearance
0.1			Method for Goal: Enter a clearance
0.2	1	T	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1	2	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3		Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1	4	T	IF clearance is crossing restriction with RTA, THEN Accomplish Goal: Enter mixed clearance
0.1			Method for Goal: Enter mixed clearance
0.1	1		Accomplish Goal: Enter crossing restriction
0.1			Method for Goal: Enter crossing restriction
0.1	1		Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1	1		Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.82	2		Search for waypoint
0.1	3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1	2	F	Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter
0.1	3		Remember <menu key> = "/" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished

0.1		4	T	Decide: IF altitude restriction, THEN Retain \<clearance value\> = digits in clearance and Accomplish Goal: Enter
0.1				Method for Goal: Enter into scratchpad
0.1		1		Remember \<menu key\> = first digit/character in \<clearance value\> and Accomplish Goal: Menu
0.1				Method for Goal: Menu key
0.51			1	Recall \<menu key\> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		2		Remember \<menu key\> = next digit/character in \<clearance value\> and Accomplish Goal: Menu
0.1				Method for Goal: Menu key
0.51			1	Recall \<menu key\> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2		Remember \<menu key\> = next digit/character in \<clearance value\> and Accomplish Goal: Menu
0.1				Method for Goal: Menu key
0.51			1	Recall \<menu key\> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		4	F	Decide: IF \<clearance value\> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1		5		Return with goal accomplished
0.51	5			Point finger to right line select key next to waypoint
0.38	6			Press and release right line select key next to waypoint
0.1	7			Return with goal accomplished

0.1	2		Accomplish Goal: Enter RTA
0.1			Method for Goal: Enter RTA
0.1	1	F	Decide: IF waypoint not located, THEN Accomplish Goal: Locate waypoint
0.51	2		Point finger to left line select key next to waypoint
0.38	3		Press and release left line select key next to waypoint
0.1	4		Accomplish Goal: Go to RTA page
0.1			Method for Goal: Go to RTA page
0.1	1		Remember <menu key> = "Prog" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	2		Remember <menu key> = "Next Page" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3		Remember <menu key> = "Next Page" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	5		Remember <keyword> = "RTA Waypoint" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished

Prob							Description
0.1				6			Retain <clearance value> = digits/characters in clearance and Accomplish Goal: Enter into scratchpad
0.1							Method for Goal: Enter into scratchpad
0.1					1		Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu
0.1							Method for Goal: Menu key
0.51						1	Recall <menu key> and point finger to appropriate menu key
0.38						2	Press and release appropriate menu key
0.1						3	Return with goal accomplished
0.1					2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu
0.1							Method for Goal: Menu key
0.51						1	Recall <menu key> and point finger to appropriate menu key
0.38						2	Press and release appropriate menu key
0.1						3	Return with goal accomplished
0.1					3 T		Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1					2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu
0.1							Method for Goal: Menu key
0.51						1	Recall <menu key> and point finger to appropriate menu key
0.38						2	Press and release appropriate menu key
0.1						3	Return with goal accomplished
0.1					3 T		Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1					2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu
0.1							Method for Goal: Menu key
0.51						1	Recall <menu key> and point finger to appropriate menu key
0.38						2	Press and release appropriate menu key
0.1						3	Return with goal accomplished
0.1					3 F		Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1					4 F		Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1					5		Return with goal accomplished
0.51				7			Point finger to right line select key next to waypoint
0.38				8			Press and release right line select key next to waypoint
0.1				9			Return with goal accomplished
0.1			3				Return with goal accomplished
0.1		5					Return with goal accomplished
0.1	4						Return with goal accomplished

0.1	4		Selection Rule: Decide on a clearance
0.1			Selection Rule for Goal: Decide on a clearance
0.1		3　T	IF clearance includes both RTA and other information, THEN Accomplish Goal: Determine whether mixed clearance is acceptable
0.1			Method for Goal: Determine whether mixed clearance is acceptable
0.1		1	Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1			Method for Goal: Determine whether non-RTA clearance is acceptable
1.3		1	Determine whether non-RTA clearance is acceptable
0.2		2　T	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1		3	Return with goal accomplished
0.1	2　F		Decide: IF <response> = "Unable," THEN Return with goal accomplished
0.1	3		Accomplish Goal: Determine whether RTA clearance is acceptable
0.1			Method for Goal: Determine whether RTA clearance is acceptable
0.1		1　F	Decide: IF not on RTA page, THEN Accomplish Goal: Go to RTA page
0.1		2	Wait for system response
1.4		3　T	Decide: IF system returns "Unable RTA", THEN Retain <response> = "Unable," ELSE Retain <response> = "Wilco"
0.1		4	Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	5　F		Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key
0.1	6		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1		2　T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1			Method for Goal: Respond by FMS
0.1		1　F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1		2　T	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1			Method for Goal: Open clearance
0.1		1	Remember <menu key> = "ATC" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.1		2	Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		3	Return with goal accomplished

0.1		3	Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		4	Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		5	Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	7 F		Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
48.17			Total time

Trace 17 – Task 5, Voice

Equipment: FMS 2
NGOMSL Trace: Cross HELPR at 1800Z at or above FL190

Assumptions:
Clearance received by voice
When clearance is read from paper or heard over the radio it is 16 words ("Cross HELPR at one eight zero zero Zulu at or above flight level one niner zero")
Call sign is stated before audio clearance
Airline call sign is 3 words
Clearance is written down
Paper is available
Pen is not in hand
Clearance is written as 8 words ("Cross HELPR at 1800Z at or above FL190")
Response is sent by voice
Clearance information is not initially remembered, and must be read aloud, when entering the clearance
Paper is not visible after hand moved to FMS
Hand is not on FMS after reading clearance from paper
Desired waypoint is the third waypoint listed on the first page of the flight plan
After initially locating waypoint, it remains located until FMS is navigated to a different page
It takes one mental to determine if non-RTA portion of clearance is acceptable or not
Non-RTA portion of clearance is acceptable and pilot will comply
RTA portion of clearance is acceptable and pilot will comply
Clearance information is remembered during readback
There is clearance information to enter into the FMS
Only one clearance was sent

Time	Action
0.1	Method for Goal: Handle a clearance
0.1	1 Selection Rule: Receive a clearance
0.1	Selection Rule for Goal: Receive a clearance
0.1	2 T IF clearance is audio, THEN Accomplish Goal: Receive a radio clearance
0.1	Method for Goal: Receive a radio clearance
7.7	1 Listen to clearance and retain <clearance information>
0.1	2 T Decide: IF printed clearance is desired, THEN Accomplish Goal: Write down clearance
0.1	Method for Goal: Write down clearance
0.1	1 F Decide: IF paper is not readily available, THEN Accomplish Goal: Obtain paper
0.1	2 T Decide: IF pen is not in hand, THEN Accomplish Goal: Obtain pen

Time					Step / Flag / Description
0.1					Method for Goal: Obtain pen
0.51			1		Reach for pen
0.8			2		Grasp pen
0.51			3		Transport pen to paper
0.16			4		Position the pen over paper
0.1			5		Return with goal accomplished
21.7		3			Recall <clearance information> and write <clearance information>
0.51		4			Return pen to original location
0.17		5			Release pen
0.5		6			Move hand back to starting location
0.1		7			Return with goal accomplished
0.1	3				Return with goal accomplished
0.1	3				Return with goal accomplished
0.1	2	T			Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1					Selection Rule for Goal: Respond to a clearance
0.1	1	T			IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1					Method for Goal: Respond by voice
0.5		1			Move hand to yoke and "Push to talk" button
0.2		2			Press "Push to talk" button
1.8		3	F		Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by
0.2		4			Release "Push to talk" button
0.5		5			Return hand to FMS
0.1		6			Return with goal accomplished
0.1	3				Return with goal accomplished
0.1	3				Accomplish Goal: Enter a clearance
0.1					Method for Goal: Enter a clearance
0.2	1	F			Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1					Selection Rule for Goal: Method of reading
0.1	1	T			IF clearance is in writing, THEN Accomplish Goal: Read clearance from paper
0.1					Method for Goal: Read clearance from paper
0.51		1	T		Decide: IF paper not visible, THEN move paper
6.6		2	T		Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on paper aloud and retain <clearance information>, ELSE Read information on paper and
0.1		3			Return with goal accomplished
0.1	3				Return with goal accomplished

0.5		2	T	Decide: IF hand not on FMS, THEN move hand to FMS
0.1		3		Selection Rule: Specific clearance type
0.1				Selection Rule for Goal: Specific clearance type
0.1		4	T	IF clearance is crossing restriction with RTA, THEN Accomplish Goal: Enter mixed clearance
0.1				Method for Goal: Enter mixed clearance
0.1		1		Accomplish Goal: Enter crossing restriction
0.1				Method for Goal: Enter crossing restriction
0.1		1		Accomplish Goal: Locate waypoint
0.1				Method for Goal: Locate waypoint
0.1		1		Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51		1		Recall <menu key> and point finger to appropriate menu key
0.38		2		Press and release appropriate menu key
0.1		3		Return with goal accomplished
0.82		2		Search for waypoint
0.1		3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1		2	F	Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter
0.1		3		Remember <menu key> = "/" and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51		1		Recall <menu key> and point finger to appropriate menu key
0.38		2		Press and release appropriate menu key
0.1		3		Return with goal accomplished
0.1		4	T	Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter
0.1				Method for Goal: Enter into scratchpad
0.1		1		Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu
0.1				Method for Goal: Menu key
0.51		1		Recall <menu key> and point finger to appropriate menu key
0.38		2		Press and release appropriate menu key
0.1		3		Return with goal accomplished
0.1		2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu
0.1				Method for Goal: Menu key
0.51		1		Recall <menu key> and point finger to appropriate menu key
0.38		2		Press and release appropriate menu key
0.1		3		Return with goal accomplished

0.1			3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1			3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			4	T	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1					Selection Rule for Goal: At and above or below
0.1				1 T	IF restriction is at or above, THEN Remember <menu key> = "A" and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1				3	Return with goal accomplished
0.1			5		Return with goal accomplished
0.51		5			Point finger to right line select key next to waypoint
0.38		6			Press and release right line select key next to waypoint
0.1		7			Return with goal accomplished
0.1	2				Accomplish Goal: Enter RTA
0.1					Method for Goal: Enter RTA
0.1			1	F	Decide: IF waypoint not located, THEN Accomplish Goal: Locate waypoint
0.51			2		Point finger to left line select key next to waypoint
0.38			3		Press and release left line select key next to waypoint
0.1			4		Accomplish Goal: Go to RTA page
0.1					Method for Goal: Go to RTA page
0.1				1	Remember <menu key> = "Prog" and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished

		Description
0.1	2	Remember <menu key> = "Next Page" and Accomplish Goal: Menu key
0.1		Method for Goal: Menu key
0.51	1	Recall <menu key> and point finger to appropriate menu key
0.38	2	Press and release appropriate menu key
0.1	3	Return with goal accomplished
0.1	3	Remember <menu key> = "Next Page" and Accomplish Goal: Menu key
0.1		Method for Goal: Menu key
0.51	1	Recall <menu key> and point finger to appropriate menu key
0.38	2	Press and release appropriate menu key
0.1	3	Return with goal accomplished
0.1	4	Return with goal accomplished
0.1	5	Remember <keyword> = "RTA Waypoint" and Accomplish Goal: Line select key
0.1		Method for Goal: Line select key
0.51	1	Recall <keyword> and point finger to line select key next to keyword
0.38	2	Press and release appropriate line select key
0.1	3	Return with goal accomplished
0.1	6	Retain <clearance value> = digits/characters in clearance and Accomplish Goal: Enter into scratchpad
0.1		Method for Goal: Enter into scratchpad
0.1	1	Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu
0.1		Method for Goal: Menu key
0.51	1	Recall <menu key> and point finger to appropriate menu key
0.38	2	Press and release appropriate menu key
0.1	3	Return with goal accomplished
0.1	2	Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu
0.1		Method for Goal: Menu key
0.51	1	Recall <menu key> and point finger to appropriate menu key
0.38	2	Press and release appropriate menu key
0.1	3	Return with goal accomplished
0.1	3 T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	2	Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu
0.1		Method for Goal: Menu key
0.51	1	Recall <menu key> and point finger to appropriate menu key
0.38	2	Press and release appropriate menu key
0.1	3	Return with goal accomplished

Value	Step	T/F	Description
0.1	3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	4	F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1	5		Return with goal accomplished
0.51	7		Point finger to right line select key next to waypoint
0.38	8		Press and release right line select key next to waypoint
0.1	9		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	4		Selection Rule: Decide on a clearance
0.1			Selection Rule for Goal: Decide on a clearance
0.1	3	T	IF clearance includes both RTA and other information, THEN Accomplish Goal: Determine whether mixed clearance is acceptable
0.1			Method for Goal: Determine whether mixed clearance is acceptable
0.1	1		Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1			Method for Goal: Determine whether non-RTA clearance is acceptable
1.3	1		Determine whether non-RTA clearance is acceptable
0.2	2	T	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1	3		Return with goal accomplished
0.1	2	F	Decide: IF <response> = "Unable," THEN Return with goal accomplished
0.1	3		Accomplish Goal: Determine whether RTA clearance is acceptable
0.1			Method for Goal: Determine whether RTA clearance is acceptable
0.1	1	F	Decide: IF not on RTA page, THEN Accomplish Goal: Go to RTA page
0.1	2		Wait for system response
1.4	3	F	Decide: IF system returns "Unable RTA", THEN Retain <response> = "Unable," ELSE Retain <response> = "Wilco"
0.1	4		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	4		Return with goal accomplished

Time	Step	Flag	Description
0.1	5	T	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	6		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1	1	T	IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1			Method for Goal: Respond by voice
0.5	1		Move hand to yoke and "Push to talk" button
0.2	2		Press "Push to talk" button
0.2	3	T	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by
0.1			Selection Rule for Goal: Method of clearance readback
0.1	1	T	IF <clearance information> is remembered, THEN Accomplish Goal: Readback clearance from memory
0.1			Method for Goal: Readback clearance from memory
7.7	1		Recall <clearance information> and state <clearance information> followed by call sign
0.1	2		Return with goal accomplished
0.1	3		Return with goal accomplished
0.2	4		Release "Push to talk" button
0.5	5		Return hand to FMS
0.1	6		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	7	F	Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
86.21			Total time

Trace 18 – Task 5, Voice

Equipment: FMS 2
NGOMSL Trace: Cross HELPR at 1800Z at or above FL190

Assumptions:
Clearance received by voice
When clearance is stated aloud or heard over the radio it is 16 words ("Cross HELPR at one eight zero zero Zulu at or above flight level one niner zero")
Call sign is stated before audio clearance
Airline call sign is 3 words
Clearance is not written down
Response is sent by voice
Clearance information is remembered when entering the clearance
Desired waypoint is the third waypoint listed on the first page of the flight plan
After initially locating waypoint, it remains located until FMS is navigated to a different page
It takes one mental to determine if non-RTA portion of clearance is acceptable or not
Non-RTA portion of clearance is acceptable and pilot will comply
RTA portion of clearance is acceptable and pilot will comply
Clearance information is remembered during readback
There is clearance information to enter into the FMS
Only one clearance was sent

Time	Action				
0.1	Method for Goal: Handle a clearance				
0.1	1	Selection Rule: Receive a clearance			
0.1		Selection Rule for Goal: Receive a clearance			
0.1		2	T	IF clearance is audio, THEN Accomplish Goal: Receive a radio clearance	
0.1			Method for Goal: Receive a radio clearance		
7.7			1	Listen to clearance and retain <clearance information>	
0.1			2	F	Decide: IF printed clearance is desired, THEN Accomplish Goal: Write down clearance
0.1			3	Return with goal accomplished	
0.1		3	Return with goal accomplished		

0.1	2	T					Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1							Selection Rule for Goal: Respond to a clearance
0.1			1	T			IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1							Method for Goal: Respond by voice
0.5					1		Move hand to yoke and "Push to talk" button
0.2					2		Press "Push to talk" button
1.8					3	F	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by <response>
0.2					4		Release "Push to talk" button
0.5					5		Return hand to FMS
0.1					6		Return with goal accomplished
0.1			3				Return with goal accomplished
0.1	3						Accomplish Goal: Enter a clearance
0.1							Method for Goal: Enter a clearance
0.2			1	T			Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1			2	F			Decide: IF hand not on FMS, THEN move hand to FMS
0.1			3				Selection Rule: Specific clearance type
0.1							Selection Rule for Goal: Specific clearance type
0.1					4	T	IF clearance is crossing restriction with RTA, THEN Accomplish Goal: Enter mixed clearance
0.1							Method for Goal: Enter mixed clearance
0.1						1	Accomplish Goal: Enter crossing restriction
0.1							Method for Goal: Enter crossing restriction
0.1						1	Accomplish Goal: Locate waypoint
0.1							Method for Goal: Locate waypoint
0.1						1	Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.1							Method for Goal: Menu key
0.51						1	Recall <menu key> and point finger to appropriate menu key
0.38						2	Press and release appropriate menu key
0.1						3	Return with goal accomplished

0.82			2		Search for waypoint
0.1			3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1		2		F	Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1		3			Remember <menu key> = "/" and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51			1		Recall <menu key> and point finger to appropriate menu key
0.38			2		Press and release appropriate menu key
0.1			3		Return with goal accomplished
0.1		4		T	Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1					Method for Goal: Enter into scratchpad
0.1			1		Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1			2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1			3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished

Value	L1	L2	L3	L4	L5	L6	T/F	Description
0.1				3			F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1				4			T	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1								Selection Rule for Goal: At and above or below
0.1					1		T	IF restriction is at or above, THEN Remember <menu key> = "A" and Accomplish Goal: Menu key
0.1								Method for Goal: Menu key
0.51						1		Recall <menu key> and point finger to appropriate menu key
0.38						2		Press and release appropriate menu key
0.1						3		Return with goal accomplished
0.1					3			Return with goal accomplished
0.1				5				Return with goal accomplished
0.51			5					Point finger to right line select key next to waypoint
0.38			6					Press and release right line select key next to waypoint
0.1			7					Return with goal accomplished
0.1		2						Accomplish Goal: Enter RTA
0.1								Method for Goal: Enter RTA
0.1			1				F	Decide: IF waypoint not located, THEN Accomplish Goal: Locate waypoint
0.51			2					Point finger to left line select key next to waypoint
0.38			3					Press and release left line select key next to waypoint
0.1			4					Accomplish Goal: Go to RTA page
0.1								Method for Goal: Go to RTA page
0.1				1				Remember <menu key> = "Prog" and Accomplish Goal: Menu key
0.1								Method for Goal: Menu key
0.51					1			Recall <menu key> and point finger to appropriate menu key
0.38					2			Press and release appropriate menu key
0.1					3			Return with goal accomplished
0.1				2				Remember <menu key> = "Next Page" and Accomplish Goal: Menu key
0.1								Method for Goal: Menu key
0.51					1			Recall <menu key> and point finger to appropriate menu key
0.38					2			Press and release appropriate menu key
0.1					3			Return with goal accomplished

Prob			T		Description
0.1		3			Remember <menu key> = "Next Page" and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1		4			Return with goal accomplished
0.1	5				Remember <keyword> = "RTA Waypoint" and Accomplish Goal: Line select key
0.1					Method for Goal: Line select key
0.51				1	Recall <keyword> and point finger to line select key next to keyword
0.38				2	Press and release appropriate line select key
0.1				3	Return with goal accomplished
0.1	6				Retain <clearance value> = digits/characters in clearance and Accomplish Goal: Enter into scratchpad
0.1					Method for Goal: Enter into scratchpad
0.1		1			Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1		2			Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1		3	T		Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2			Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished

Time								T/F	Description
0.1						3		T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1						2			Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1									Method for Goal: Menu key
0.51							1		Recall <menu key> and point finger to appropriate menu key
0.38							2		Press and release appropriate menu key
0.1							3		Return with goal accomplished
0.1						3		F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1						4		F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1						5			Return with goal accomplished
0.51					7				Point finger to right line select key next to waypoint
0.38					8				Press and release right line select key next to waypoint
0.1					9				Return with goal accomplished
0.1				3					Return with goal accomplished
0.1			5						Return with goal accomplished
0.1		4							Return with goal accomplished
0.1	4								Selection Rule: Decide on a clearance
0.1									Selection Rule for Goal: Decide on a clearance
0.1		3						T	IF clearance includes both RTA and other information, THEN Accomplish Goal: Determine whether mixed clearance is acceptable
0.1									Method for Goal: Determine whether mixed clearance is acceptable
0.1			1						Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1									Method for Goal: Determine whether non-RTA clearance is acceptable
1.3				1					Determine whether non-RTA clearance is acceptable
0.2				2				T	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1				3					Return with goal accomplished
0.1			2					F	Decide: IF <response> = "Unable," THEN Return with goal accomplished
0.1			3						Accomplish Goal: Determine whether RTA clearance is acceptable
0.1									Method for Goal: Determine whether RTA clearance is acceptable
0.1				1				F	Decide: IF not on RTA page, THEN Accomplish Goal: Go to RTA page
0.1				2					Wait for system response
1.4				3				F	Decide: IF system returns "Unable RTA", THEN Retain <response> = "Unable," ELSE Retain <response> = "Wilco"
0.1				4					Return with goal accomplished
0.1			4						Return with goal accomplished
0.1		4							Return with goal accomplished

Time	Step	T/F	Description
0.1	5	T	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	6		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1	1	T	IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1			Method for Goal: Respond by voice
0.5	1		Move hand to yoke and "Push to talk" button
0.2	2		Press "Push to talk" button
0.2	3	T	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by <response>
0.1			Selection Rule for Goal: Method of clearance readback
0.1	1	T	IF <clearance information> is remembered, THEN Accomplish Goal: Readback clearance from memory
0.1			Method for Goal: Readback clearance from memory
7.7	1		Recall <clearance information> and state <clearance information> followed by call sign
0.1	2		Return with goal accomplished
0.1	3		Return with goal accomplished
0.2	4		Release "Push to talk" button
0.5	5		Return hand to FMS
0.1	6		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	7	F	Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
52.74			Total time

Trace 19 – Task 5, Data Comm

Equipment: FMS 2

NGOMSL Trace: Cross HELPR at time 1800Z at or above FL190

Assumptions:

Clearance received by data communications (Data Comm)

Hands do not start on FMS

Entire clearance is read aloud upon receipt

When clearance is read from screen page one is 9 words ("Cross HELPR at time one eight zero zero Zulu") and page two is 8 words ("At or above flight level one niner zero")

Clearance is two pages

Clearance is printed upon receipt

Printer is available

Response is sent by FMS

Hand is not on FMS after grasping print out

Once opened, clearance remains open until clearance information is entered

Clearance information is not initially remembered, and must be read aloud, when entering the clearance

Paper is not visible after hand moved to FMS

When clearance is read from paper it is 17 words ("Cross HELPR at time one eight zero zero Zulu at or above flight level one niner zero")

Hand is not on FMS after reading clearance from paper

Desired waypoint is the third waypoint listed on the first page of the flight plan

After initially locating waypoint, it remains located until FMS is navigated to a different page

It takes one mental to determine if non-RTA portion of clearance is acceptable or not

Non-RTA portion of clearance is acceptable and pilot will comply

RTA portion of clearance is acceptable and pilot will comply

There is clearance information to enter into the FMS

Only one clearance was sent

Time	Action				
0.1	Method for Goal: Handle a clearance				
0.1	1	Selection Rule: Receive a clearance			
0.1		Selection Rule for Goal: Receive a clearance			
0.1		1	T	IF clearance is text, THEN Accomplish Goal: Receive an FMS clearance	
0.1			Method for Goal: Receive an FMS clearance		
0.5			1	T	Decide: IF hand not on FMS, THEN move hand to FMS
0.1			2	Accomplish Goal: Open clearance	
0.1				Method for Goal: Open clearance	
0.1				1	Remember <menu key> = "ATC" and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key	
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished

Value	Level	Step	T/F	Description
0.1		2		Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51		1		Recall <keyword> and point finger to line select key next to keyword
0.38		2		Press and release appropriate line select key
0.1		3		Return with goal accomplished
0.1		3		Return with goal accomplished
0.1	3			Accomplish Goal: Read the clearance
0.1				Method for Goal: Read the clearance
3.8		1	T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and retain <clearance information>
0.1		2	F	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1		3		Remember <menu key> = "Next Page" and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51		1		Recall <menu key> and point finger to appropriate menu key
0.38		2		Press and release appropriate menu key
0.1		3		Return with goal accomplished
0.1		4		GOTO Step 1
3.4		1	T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and retain <clearance information>
0.1		2	T	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1	4		T	Decide: IF printed clearance is desired, THEN Selection Rule: Get printed copy
0.1				Selection Rule: Get printed copy
0.1		1	T	IF printer is available, THEN Accomplish Goal: Print the clearance
0.1				Method for Goal: Print the clearance
0.1		1		Remember <keyword> = "Print" and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51		1		Recall <keyword> and point finger to line select key next to keyword
0.38		2		Press and release appropriate line select key
0.1		3		Return with goal accomplished

Value							Description
0.51					2		Reach for print out
0.8					3		Grasp print out
0.51					4		Transport paper to reading position
0.1					5		Return with goal accomplished
0.1				3			Return with goal accomplished
0.1			5				Return with goal accomplished
0.1		3					Return with goal accomplished
0.1	2					T	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1							Selection Rule: Respond to a clearance
0.1		2				T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1							Method for Goal: Respond by FMS
0.5			1			T	Decide: IF hand not on FMS, THEN move hand to FMS
0.1			2			F	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1			3				Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1							Method for Goal: Line select key
0.51				1			Recall <keyword> and point finger to line select key next to keyword
0.38				2			Press and release appropriate line select key
0.1				3			Return with goal accomplished
0.1			4				Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1							Method for Goal: Line select key
0.51				1			Recall <keyword> and point finger to line select key next to keyword
0.38				2			Press and release appropriate line select key
0.1				3			Return with goal accomplished
0.1			5				Return with goal accomplished
0.1		3					Return with goal accomplished
0.1	3						Accomplish Goal: Enter a clearance
0.1							Method for Goal: Enter a clearance
0.2		1				F	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1							Selection Rule for Goal: Method of reading
0.1			1			T	IF clearance is in writing, THEN Accomplish Goal: Read clearance from paper
0.1							Method for Goal: Read clearance from paper
0.51				1		T	Decide: IF paper not visible, THEN move paper
7				2		T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on paper aloud and retain <clearance information>, ELSE Read information on paper and
0.1				3			Return with goal accomplished
0.1		3					Return with goal accomplished

0.5	2	T		Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3			Selection Rule: Specific clearance type
0.1				Selection Rule for Goal: Specific clearance type
0.1		4	T	IF clearance is crossing restriction with RTA, THEN Accomplish Goal: Enter mixed clearance
0.1				Method for Goal: Enter mixed clearance
0.1		1		Accomplish Goal: Enter crossing restriction
0.1				Method for Goal: Enter crossing restriction
0.1		1		Accomplish Goal: Locate waypoint
0.1				Method for Goal: Locate waypoint
0.1		1		Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51		1		Recall <menu key> and point finger to appropriate menu key
0.38		2		Press and release appropriate menu key
0.1		3		Return with goal accomplished
0.82		2		Search for waypoint
0.1		3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1		2	F	Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1		3		Remember <menu key> = "/" and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51		1		Recall <menu key> and point finger to appropriate menu key
0.38		2		Press and release appropriate menu key
0.1		3		Return with goal accomplished
0.1		4	T	Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1				Method for Goal: Enter into scratchpad
0.1		1		Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51		1		Recall <menu key> and point finger to appropriate menu key
0.38		2		Press and release appropriate menu key
0.1		3		Return with goal accomplished

Value	Step		T/F	Description
0.1		2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		4	T	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1				Selection Rule for Goal: At and above or below
0.1		1	T	IF restriction is at or above, THEN Remember <menu key> = "A" and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3		Return with goal accomplished
0.1		5		Return with goal accomplished
0.51	5			Point finger to right line select key next to waypoint
0.38	6			Press and release right line select key next to waypoint
0.1	7			Return with goal accomplished

0.1	2		Accomplish Goal: Enter RTA
0.1			Method for Goal: Enter RTA
0.1	1	F	Decide: IF waypoint not located, THEN Accomplish Goal: Locate waypoint
0.51	2		Point finger to left line select key next to waypoint
0.38	3		Press and release left line select key next to waypoint
0.1	4		Accomplish Goal: Go to RTA page
0.1			Method for Goal: Go to RTA page
0.1	1		Remember <menu key> = "Prog" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	2		Remember <menu key> = "Next Page" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3		Remember <menu key> = "Next Page" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	5		Remember <keyword> = "RTA Waypoint" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished

0.1	6		Retain <clearance value> = digits/characters in clearance and Accomplish Goal: Enter into scratchpad
0.1			Method for Goal: Enter into scratchpad
0.1	1		Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.1	3 T		Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.1	3 T		Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished

Time	Step	T/F	Operator
0.1	3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	4	F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1	5		Return with goal accomplished
0.51	7		Point finger to right line select key next to waypoint
0.38	8		Press and release right line select key next to waypoint
0.1	9		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	4		Selection Rule: Decide on a clearance
0.1			Selection Rule for Goal: Decide on a clearance
0.1	3	T	IF clearance includes both RTA and other information, THEN Accomplish Goal: Determine whether mixed clearance is acceptable
0.1			Method for Goal: Determine whether mixed clearance is acceptable
0.1	1		Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1			Method for Goal: Determine whether non-RTA clearance is acceptable
1.3	1		Determine whether non-RTA clearance is acceptable
0.2	2	T	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1	3		Return with goal accomplished
0.1	2	F	Decide: IF <response> = "Unable," THEN Return with goal accomplished
0.1	3		Accomplish Goal: Determine whether RTA clearance is acceptable
0.1			Method for Goal: Determine whether RTA clearance is acceptable
0.1	1	F	Decide: IF not on RTA page, THEN Accomplish Goal: Go to RTA page
0.1	2		Wait for system response
1.4	3	F	Decide: IF system returns "Unable RTA", THEN Retain <response> = "Unable," ELSE Retain <response> = "Wilco"
0.1	4		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	5	T	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished

0.1	6			Selection Rule: Respond to a clearance
0.1				Selection Rule for Goal: Respond to a clearance
0.1		2	T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1				Method for Goal: Respond by FMS
0.1			1 F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1			2 T	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1				Method for Goal: Open clearance
0.1			1	Remember <menu key> = "ATC" and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1			2	Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51			1	Recall <keyword> and point finger to line select key next to keyword
0.38			2	Press and release appropriate line select key
0.1			3	Return with goal accomplished
0.1			3	Return with goal accomplished
0.1			3	Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51			1	Recall <keyword> and point finger to line select key next to keyword
0.38			2	Press and release appropriate line select key
0.1			3	Return with goal accomplished
0.1			4	Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51			1	Recall <keyword> and point finger to line select key next to keyword
0.38			2	Press and release appropriate line select key
0.1			3	Return with goal accomplished
0.1			5	Return with goal accomplished
0.1		3		Return with goal accomplished
0.1	7	F		Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8			Return with goal accomplished
64.17				Total time

Trace 20 – Task 5, Data Comm

Equipment: FMS 2

NGOMSL Trace: Cross HELPR at time 1800Z at or above FL190

Assumptions:

Clearance received by data communications (Data Comm)

Hands start on FMS

Entire clearance is read aloud upon receipt

When clearance is read from screen page one is 9 words ("Cross HELPR at time one eight zero zero Zulu") and page two is 8 words ("At or above flight level one niner zero")

Clearance is two pages

Clearance is not printed upon receipt

Response is sent by FMS

Once opened, clearance remains open until clearance information is entered

Clearance information is remembered when entering the clearance

Desired waypoint is the third waypoint listed on the first page of the flight plan

After initially locating waypoint, it remains located until FMS is navigated to a different page

It takes one mental to determine if non-RTA portion of clearance is acceptable or not

Non-RTA portion of clearance is acceptable and pilot will comply

RTA portion of clearance is acceptable and pilot will comply

There is clearance information to enter into the FMS

Only one clearance was sent

Time	Action
0.1	Method for Goal: Handle a clearance
0.1	1　　　Selection Rule: Receive a clearance
0.1	Selection Rule for Goal: Receive a clearance
0.1	1　T　IF clearance is text, THEN Accomplish Goal: Receive an FMS clearance
0.1	Method for Goal: Receive an FMS clearance
0.1	1　F　Decide: IF hand not on FMS, THEN move hand to FMS
0.1	2　Accomplish Goal: Open clearance
0.1	Method for Goal: Open clearance
0.1	1　Remember <menu key> = "ATC" and Accomplish Goal: Menu key
0.1	Method for Goal: Menu key
0.51	1　Recall <menu key> and point finger to appropriate menu key
0.38	2　Press and release appropriate menu key
0.1	3　Return with goal accomplished

0.1		2			Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1					Method for Goal: Line select key
0.51			1		Recall <keyword> and point finger to line select key next to keyword
0.38			2		Press and release appropriate line select key
0.1			3		Return with goal accomplished
0.1		3			Return with goal accomplished
0.1	3				Accomplish Goal: Read the clearance
0.1					Method for Goal: Read the clearance
3.8		1	T		Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and retain <clearance information>
0.1		2	F		Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1		3			Remember <menu key> = "Next Page" and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51			1		Recall <menu key> and point finger to appropriate menu key
0.38			2		Press and release appropriate menu key
0.1			3		Return with goal accomplished
0.1		4			GOTO Step 1
3.4		1	T		Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and retain <clearance information>
0.1		2	T		Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1		4	F		Decide: IF printed clearance is desired, THEN Selection Rule: Get printed copy
0.1		5			Return with goal accomplished
0.1	3				Return with goal accomplished

0.1	2	T		Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1				Selection Rule: Respond to a clearance
0.1		2	T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1				Method for Goal: Respond by FMS
0.1			1 F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1			2 F	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1			3	Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51			1	Recall <keyword> and point finger to line select key next to keyword
0.38			2	Press and release appropriate line select key
0.1			3	Return with goal accomplished
0.1		4		Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51			1	Recall <keyword> and point finger to line select key next to keyword
0.38			2	Press and release appropriate line select key
0.1			3	Return with goal accomplished
0.1		5		Return with goal accomplished
0.1	3			Return with goal accomplished

Value	Step	Flag	Description
0.1	3		Accomplish Goal: Enter a clearance
0.1			Method for Goal: Enter a clearance
0.2	1	T	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1	2	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3		Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1	4	T	IF clearance is crossing restriction with RTA, THEN Accomplish Goal: Enter mixed clearance
0.1			Method for Goal: Enter mixed clearance
0.1	1		Accomplish Goal: Enter crossing restriction
0.1			Method for Goal: Enter crossing restriction
0.1	1		Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1	1		Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.82	2		Search for waypoint
0.1	3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1	2	F	Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1	3		Remember <menu key> = "/" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished

0.1	4	T	Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1			Method for Goal: Enter into scratchpad
0.1	1		Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	4	T	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1			Selection Rule for Goal: At and above or below
0.1	1	T	IF restriction is at or above, THEN Remember <menu key> = "A" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished

Prob.					Step
0.1				3	Return with goal accomplished
0.1			5		Return with goal accomplished
0.51		5			Point finger to right line select key next to waypoint
0.38		6			Press and release right line select key next to waypoint
0.1		7			Return with goal accomplished
0.1	2				Accomplish Goal: Enter RTA
0.1					Method for Goal: Enter RTA
0.1		1 F			Decide: IF waypoint not located, THEN Accomplish Goal: Locate waypoint
0.51		2			Point finger to left line select key next to waypoint
0.38		3			Press and release left line select key next to waypoint
0.1		4			Accomplish Goal: Go to RTA page
0.1					Method for Goal: Go to RTA page
0.1			1		Remember <menu key> = "Prog" and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1			2		Remember <menu key> = "Next Page" and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1			3		Remember <menu key> = "Next Page" and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1			4		Return with goal accomplished
0.1			5		Remember <keyword> = "RTA Waypoint" and Accomplish Goal: Line select key
0.1					Method for Goal: Line select key
0.51				1	Recall <keyword> and point finger to line select key next to keyword
0.38				2	Press and release appropriate line select key
0.1				3	Return with goal accomplished

0.1	6		Retain <clearance value> = digits/characters in clearance and Accomplish Goal: Enter into scratchpad
0.1			Method for Goal: Enter into scratchpad
0.1	1		Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.1	3 T		Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.1	3 T		Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.1	3 F		Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	4 F		Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1	5		Return with goal accomplished

0.51						7	Point finger to right line select key next to waypoint
0.38						8	Press and release right line select key next to waypoint
0.1						9	Return with goal accomplished
0.1					3		Return with goal accomplished
0.1				5			Return with goal accomplished
0.1			4				Return with goal accomplished
0.1	4			Selection Rule: Decide on a clearance			
0.1				Selection Rule for Goal: Decide on a clearance			
0.1		3	T	IF clearance includes both RTA and other information, THEN Accomplish Goal: Determine whether mixed clearance is acceptable			
0.1				Method for Goal: Determine whether mixed clearance is acceptable			
0.1			1	Accomplish Goal: Determine whether non-RTA clearance is acceptable			
0.1				Method for Goal: Determine whether non-RTA clearance is acceptable			
1.3				1	Determine whether non-RTA clearance is acceptable		
0.2				2	T	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"	
0.1				3	Return with goal accomplished		
0.1			2	F	Decide: IF <response> = "Unable," THEN Return with goal accomplished		
0.1			3	Accomplish Goal: Determine whether RTA clearance is acceptable			
0.1				Method for Goal: Determine whether RTA clearance is acceptable			
0.1				1	F	Decide: IF not on RTA page, THEN Accomplish Goal: Go to RTA page	
0.1				2	Wait for system response		
1.4				3	F	Decide: IF system returns "Unable RTA", THEN Retain <response> = "Unable," ELSE Retain <response> = "Wilco"	
0.1				4	Return with goal accomplished		
0.1			4	Return with goal accomplished			
0.1		4	Return with goal accomplished				
0.1	5	T	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key				
0.1		Method for Goal: Menu key					
0.51		1	Recall <menu key> and point finger to appropriate menu key				
0.38		2	Press and release appropriate menu key				
0.1		3	Return with goal accomplished				

Time	Content
0.1	6 Selection Rule: Respond to a clearance
0.1	Selection Rule for Goal: Respond to a clearance
0.1	2 T IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1	Method for Goal: Respond by FMS
0.1	1 F Decide: IF hand not on FMS, THEN move hand to FMS
0.1	2 T Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1	Method for Goal: Open clearance
0.1	1 Remember <menu key> = "ATC" and Accomplish Goal: Menu key
0.1	Method for Goal: Menu key
0.51	1 Recall <menu key> and point finger to appropriate menu key
0.38	2 Press and release appropriate menu key
0.1	3 Return with goal accomplished
0.1	2 Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1	Method for Goal: Line select key
0.51	1 Recall <keyword> and point finger to line select key next to keyword
0.38	2 Press and release appropriate line select key
0.1	3 Return with goal accomplished
0.1	3 Return with goal accomplished
0.1	3 Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1	Method for Goal: Line select key
0.51	1 Recall <keyword> and point finger to line select key next to keyword
0.38	2 Press and release appropriate line select key
0.1	3 Return with goal accomplished
0.1	4 Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1	Method for Goal: Line select key
0.51	1 Recall <keyword> and point finger to line select key next to keyword
0.38	2 Press and release appropriate line select key
0.1	3 Return with goal accomplished
0.1	5 Return with goal accomplished
0.1	3 Return with goal accomplished
0.1	7 F Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8 Return with goal accomplished
51.45	Total time

FMS 3

Trace 1 – Task 1, Voice

Equipment: FMS 3
NGOMSL Trace: Proceed direct to HELPR

Assumptions:
Clearance received by voice
When clearance is stated aloud or heard over the radio it is 4 words ("Proceed direct to HELPR")
Call sign is stated before audio clearance
Airline call sign is 3 words
Clearance is not written down
Clearance information is remembered when entering the clearance
Hands do not start on FMS
Desired waypoint is the third waypoint listed on the first page of the flight plan
It takes one mental to determine if clearance is acceptable or not
Clearance is acceptable and pilot will comply
There is clearance information to enter into the FMS
Response is sent by voice
Clearance information is remembered during readback
Only one clearance was sent

Time	Action
0.1	Method for Goal: Handle a clearance
0.1	1 Selection Rule: Receive a clearance
0.1	Selection Rule for Goal: Receive a clearance
0.1	2 T IF clearance is audio, THEN Accomplish Goal: Receive a radio clearance
0.1	Method for Goal: Receive a radio clearance
2.9	1 Listen to clearance and retain <clearance information>
0.1	2 F Decide: IF printed clearance is desired, THEN Accomplish Goal: Write down clearance
0.1	3 Return with goal accomplished
0.1	3 Return with goal accomplished
0.1	2 F Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1	3 Accomplish Goal: Enter a clearance
0.1	Method for Goal: Enter a clearance
0.2	1 T Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.5	2 T Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3 Selection Rule: Specific clearance type

Value	Content
0.1	Selection Rule for Goal: Specific clearance type
0.1	1 T IF clearance is proceed direct to, THEN Accomplish Goal: Enter proceed direct to
0.1	Method for Goal: Enter proceed direct to
0.1	1 Accomplish Goal: Locate waypoint
0.1	Method for Goal: Locate waypoint
0.1	1 Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.1	Method for Goal: Menu key
0.51	1 Recall <menu key> and point finger to appropriate menu key
0.38	2 Press and release appropriate menu key
0.1	3 Return with goal accomplished
0.82	2 Search for waypoint
0.1	3 T Decide: IF waypoint is found, THEN Return with goal accomplished
0.51	2 Point finger to left line select key next to waypoint
0.38	3 Press and release left line select key next to waypoint
0.1	4 F Decide: IF not on first page of flight plan, THEN Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.51	5 Point finger to first left line select key
0.38	6 Press and release first left line select key
0.1	7 Return with goal accomplished
0.1	5 Return with goal accomplished
0.1	4 Return with goal accomplished
0.1	4 Selection Rule: Decide on a clearance
0.1	Selection Rule for Goal: Decide on a clearance
0.1	2 T IF clearance includes only non-RTA, THEN Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1	Method for Goal: Determine whether non-RTA clearance is acceptable
1.3	1 Determine whether non-RTA clearance is acceptable
0.2	2 T Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1	3 Return with goal accomplished
0.1	4 Return with goal accomplished
0.1	5 T Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key
0.1	Method for Goal: Menu key
0.51	1 Recall <menu key> and point finger to appropriate menu key
0.38	2 Press and release appropriate menu key
0.1	3 Return with goal accomplished

0.1	6		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1		1 T	IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1			Method for Goal: Respond by voice
0.5		1	Move hand to yoke and "Push to talk" button
0.2		2	Press "Push to talk" button
0.2		3 T	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by <response>
0.1			Selection Rule for Goal: Method of clearance readback
0.1		1 T	IF <clearance information> is remembered, THEN Accomplish Goal: Readback clearance from memory
0.1			Method for Goal: Readback clearance from memory
2.9		1	Recall <clearance information> and state <clearance information> followed by call sign
0.1		2	Return with goal accomplished
0.1		3	Return with goal accomplished
0.2		4	Release "Push to talk" button
0.5		5	Return hand to FMS
0.1		6	Return with goal accomplished
0.1		3	Return with goal accomplished
0.1	7 F		Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
18.68			Total time

Trace 2 – Task 1, Voice

Equipment: FMS 3

NGOMSL Trace: Proceed direct to HELPR

Assumptions:

Clearance received by voice

When clearance is stated aloud or heard over the radio it is 4 words ("Proceed direct to HELPR")

Call sign is stated before audio clearance

Airline call sign is 3 words

Clearance is not written down

Clearance information is remembered when entering the clearance

Hands do not start on FMS

Desired waypoint is the third waypoint listed on the first page of the flight plan

It takes one mental to determine if clearance is acceptable or not

Clearance is not acceptable

There is no clearance information to enter into the FMS

Response is sent by voice

Only one clearance was sent

Time	Action			
0.1	Method for Goal: Handle a clearance			
0.1	1	Selection Rule: Receive a clearance		
0.1		Selection Rule for Goal: Receive a clearance		
0.1		2	T	IF clearance is audio, THEN Accomplish Goal: Receive a radio clearance
0.1			Method for Goal: Receive a radio clearance	
2.9			1	Listen to clearance and retain <clearance information>
0.1			2 F	Decide: IF printed clearance is desired, THEN Accomplish Goal: Write down clearance
0.1			3	Return with goal accomplished
0.1		3	Return with goal accomplished	
0.1	2 F	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance		
0.1	3	Accomplish Goal: Enter a clearance		
0.1		Method for Goal: Enter a clearance		
0.2		1 T	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading	
0.5		2 T	Decide: IF hand not on FMS, THEN move hand to FMS	
0.1		3	Selection Rule: Specific clearance type	

0.1				Selection Rule for Goal: Specific clearance type
0.1		1	T	IF clearance is proceed direct to, THEN Accomplish Goal: Enter proceed direct to
0.1				Method for Goal: Enter proceed direct to
0.1			1	Accomplish Goal: Locate waypoint
0.1				Method for Goal: Locate waypoint
0.1			1	Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.82		2		Search for waypoint
0.1		3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.51		2		Point finger to left line select key next to waypoint
0.38		3		Press and release left line select key next to waypoint
0.1		4	F	Decide: IF not on first page of flight plan, THEN Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.51		5		Point finger to first left line select key
0.38		6		Press and release first left line select key
0.1		7		Return with goal accomplished
0.1		5		Return with goal accomplished
0.1		4		Return with goal accomplished
0.1	4			Selection Rule: Decide on a clearance
0.1				Selection Rule for Goal: Decide on a clearance
0.1		2	T	IF clearance includes only non-RTA, THEN Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1				Method for Goal: Determine whether non-RTA clearance is acceptable
1.3		1		Determine whether non-RTA clearance is acceptable
0.2		2	F	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1		3		Return with goal accomplished
0.1	4			Return with goal accomplished

0.1	5	F	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key
0.1	6		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1		1 T	IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1			Method for Goal: Respond by voice
0.5		1	Move hand to yoke and "Push to talk" button
0.2		2	Press "Push to talk" button
1.8		3 F	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by <response>
0.2		4	Release "Push to talk" button
0.5		5	Return hand to FMS
0.1		6	Return with goal accomplished
0.1		3	Return with goal accomplished
0.1	7	F	Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
15.79			Total time

Trace 3 – Task 1, Data Comm

Equipment: FMS 3

NGOMSL Trace: Proceed direct to HELPR

Assumptions:

Clearance received by data communications (Data Comm)

Hands start on FMS

Entire clearance is read aloud upon receipt

When clearance is read from screen or paper it is 4 words ("Proceed direct to HELPR")

Clearance is one page

Clearance is printed upon receipt

Printer is available

Clearance information is remembered when entering clearance

Hand is not on FMS after grasping print out

Desired waypoint is the third waypoint listed on the first page of the flight plan

It takes one mental to determine if clearance is acceptable or not

Clearance is not acceptable

Response is sent by FMS

There is no clearance information to enter into the FMS

Once opened, clearance remains open until clearance information is entered

Only one clearance was sent

Time	Action
0.1	Method for Goal: Handle a clearance
0.1	1 Selection Rule: Receive a clearance
0.1	Selection Rule for Goal: Receive a clearance
0.1	1 T IF clearance is text, THEN Accomplish Goal: Receive an FMS clearance
0.1	Method for Goal: Receive an FMS clearance
0.1	1 F Decide: IF hand not on FMS, THEN move hand to FMS
0.1	2 Accomplish Goal: Open clearance
0.1	Method for Goal: Open clearance
0.1	1 Remember <menu key> = "ATC" and Accomplish Goal: Menu key
0.1	Method for Goal: Menu key
0.51	1 Recall <menu key> and point finger to appropriate menu key
0.38	2 Press and release appropriate menu key
0.1	3 Return with goal accomplished
0.1	2 Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1	Method for Goal: Line select key
0.51	1 Recall <keyword> and point finger to line select key next to keyword
0.38	2 Press and release appropriate line select key
0.1	3 Return with goal accomplished
0.1	3 Return with goal accomplished

0.1			3				Accomplish Goal: Read the clearance
0.1							Method for Goal: Read the clearance
1.8				1 T			Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and retain <clearance information>
0.1				2 T			Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1			4 T				Decide: IF printed clearance is desired, THEN Selection Rule: Get printed copy
0.1							Selection Rule for Goal: Get printed copy
0.1				1 T			IF printer is available, THEN Accomplish Goal: Print the clearance
0.1							Method for Goal: Print the clearance
0.1					1		Remember <keyword> = "Print" and Accomplish Goal: Line select key
0.1							Method for Goal: Line select key
0.51						1	Recall <keyword> and point finger to line select key next to keyword
0.38						2	Press and release appropriate line select key
0.1						3	Return with goal accomplished
0.51					2		Reach for print out
0.8					3		Grasp print out
0.51					4		Transport paper to reading position
0.1					5		Return with goal accomplished
0.1				3			Return with goal accomplished
0.1			5				Return with goal accomplished
0.1		3					Return with goal accomplished
0.1	2 F						Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1	3						Accomplish Goal: Enter a clearance
0.1							Method for Goal: Enter a clearance
0.2			1 T				Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.5			2 T				Decide: IF hand not on FMS, THEN move hand to FMS
0.1			3				Selection Rule: Specific clearance type
0.1							Selection Rule for Goal: Specific clearance type
0.1				1 T			IF clearance is proceed direct to, THEN Accomplish Goal: Enter proceed direct to

0.1				Method for Goal: Enter proceed direct to
0.1			1	Accomplish Goal: Locate waypoint
0.1				Method for Goal: Locate waypoint
0.1				1 Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51				1 Recall <menu key> and point finger to appropriate menu key
0.38				2 Press and release appropriate menu key
0.1				3 Return with goal accomplished
0.82				2 Search for waypoint
0.1				3 T Decide: IF waypoint is found, THEN Return with goal accomplished
0.51			2	Point finger to left line select key next to waypoint
0.38			3	Press and release left line select key next to waypoint
0.1			4 F	Decide: IF not on first page of flight plan, THEN Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.51			5	Point finger to first left line select key
0.38			6	Press and release first left line select key
0.1			7	Return with goal accomplished
0.1		5		Return with goal accomplished
0.1	4			Return with goal accomplished
0.1	4			Selection Rule: Decide on a clearance
0.1				Selection Rule for Goal: Decide on a clearance
0.1		2 T		IF clearance includes only non-RTA, THEN Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1				Method for Goal: Determine whether non-RTA clearance is acceptable
1.3		1		Determine whether non-RTA clearance is acceptable
0.2		2 F		Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1		3		Return with goal accomplished
0.1	4			Return with goal accomplished

Time	Step	Flag	Description
0.1	5	F	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key
0.1	6		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1	2	T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1			Method for Goal: Respond by FMS
0.1	1	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	2	T	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1			Method for Goal: Open clearance
0.1	1		Remember <menu key> = "ATC" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	2		Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	3		Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	4		Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	7	F	Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
23.24			Total time

Trace 4 – Task 1, Data Comm

Equipment: FMS 3
NGOMSL Trace: Proceed direct to HELPR

Assumptions:
Clearance received by data communications (Data Comm)
Hands start on FMS
Entire clearance is read aloud upon receipt
When clearance is read from screen it is 4 words ("Proceed direct to HELPR")
Clearance is one page
Clearance is not printed upon receipt
Clearance information is remembered when entering clearance
Desired waypoint is the third waypoint listed on the first page of the flight plan
It takes one mental to determine if clearance is acceptable or not
Clearance is not acceptable
Response is sent by FMS
Once opened, clearance remains open until clearance information is entered
There is no clearance information to enter into the FMS
Only one clearance was sent

Time	Action
0.1	Method for Goal: Handle a clearance
0.1	1　　　Selection Rule: Receive a clearance
0.1	Selection Rule for Goal: Receive a clearance
0.1	1　T　IF clearance is text, THEN Accomplish Goal: Receive an FMS clearance
0.1	Method for Goal: Receive an FMS clearance
0.1	1　F　Decide: IF hand not on FMS, THEN move hand to FMS
0.1	2　　Accomplish Goal: Open clearance
0.1	Method for Goal: Open clearance
0.1	1　　Remember <menu key> = "ATC" and Accomplish Goal: Menu key
0.1	Method for Goal: Menu key
0.51	1　　Recall <menu key> and point finger to appropriate menu key
0.38	2　　Press and release appropriate menu key
0.1	3　　Return with goal accomplished
0.1	2　　Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1	Method for Goal: Line select key
0.51	1　　Recall <keyword> and point finger to line select key next to keyword
0.38	2　　Press and release appropriate line select key
0.1	3　　Return with goal accomplished
0.1	3　　Return with goal accomplished

0.1	3		Accomplish Goal: Read the clearance
0.1			Method for Goal: Read the clearance
1.8	1	T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and retain <clearance information>
0.1	2	T	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1	4	F	Decide: IF printed clearance is desired, THEN Selection Rule: Get printed copy
0.1	5		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	2	F	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1	3		Accomplish Goal: Enter a clearance
0.1			Method for Goal: Enter a clearance
0.2	1	T	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1	2	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3		Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1	1	T	IF clearance is proceed direct to, THEN Accomplish Goal: Enter proceed direct to
0.1			Method for Goal: Enter proceed direct to
0.1	1		Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1	1		Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.82	2		Search for waypoint
0.1	3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.51	2		Point finger to left line select key next to waypoint
0.38	3		Press and release left line select key next to waypoint
0.1	4	F	Decide: IF not on first page of flight plan, THEN Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.51	5		Point finger to first left line select key
0.38	6		Press and release first left line select key
0.1	7		Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	4		Return with goal accomplished

Time	1	2	3	4	5	6	Flag	Description
0.1	4							Selection Rule: Decide on a clearance
0.1								Selection Rule for Goal: Decide on a clearance
0.1			2				T	IF clearance includes only non-RTA, THEN Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1								Method for Goal: Determine whether non-RTA clearance is acceptable
1.3			1					Determine whether non-RTA clearance is acceptable
0.2			2				F	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1			3					Return with goal accomplished
0.1		4						Return with goal accomplished
0.1	5						F	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key
0.1	6							Selection Rule: Respond to a clearance
0.1								Selection Rule for Goal: Respond to a clearance
0.1			2				T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1								Method for Goal: Respond by FMS
0.1				1			F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1				2			T	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1								Method for Goal: Open clearance
0.1					1			Remember <menu key> = "ATC" and Accomplish Goal: Menu key
0.1								Method for Goal: Menu key
0.51						1		Recall <menu key> and point finger to appropriate menu key
0.38						2		Press and release appropriate menu key
0.1						3		Return with goal accomplished
0.1					2			Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1								Method for Goal: Line select key
0.51						1		Recall <keyword> and point finger to line select key next to keyword
0.38						2		Press and release appropriate line select key
0.1						3		Return with goal accomplished
0.1					3			Return with goal accomplished

0.1		3	Remember \<keyword\> = \<response\> and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall \<keyword\> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		4	Remember \<keyword\> = "Send" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall \<keyword\> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		5	Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	7	F	Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
19.33			Total time

Trace 5 – Task 2, Voice

Equipment: FMS 3
NGOMSL Trace: Cross HELPR at FL190

Assumptions:
Clearance received by voice
When clearance is read from paper or heard over the radio it is 8 words ("Cross HELPR at flight level one niner zero")
Call sign is stated before audio clearance
Airline call sign is 3 words
Clearance is written down
Need to obtain pen and paper
Clearance is written as 4 words ("Cross HELPR at FL190")
Clearance information is not initially remembered, and must be read aloud, when entering the clearance
Once visible, paper will remain visible until hand moved to FMS
Hand returns to paper after replacing pen
Desired waypoint is the third waypoint listed on the first page of the flight plan
It takes one mental to determine if clearance is acceptable or not
Clearance is acceptable and pilot will comply
Response is sent by voice
Clearance information is not remembered during readback
There is clearance information to enter into the FMS
Only one clearance was sent

Time	Action
0.1	Method for Goal: Handle a clearance
0.1	1 Selection Rule: Receive a clearance
0.1	Selection Rule for Goal: Receive a clearance
0.1	2 T IF clearance is audio, THEN Accomplish Goal: Receive a radio clearance
0.1	Method for Goal: Receive a radio clearance
4.5	1 Listen to clearance and retain <clearance information>
0.1	2 T Decide: IF printed clearance is desired, THEN Accomplish Goal: Write down clearance
0.1	Method for Goal: Write down clearance
0.1	1 T Decide: IF paper is not readily available, THEN Accomplish Goal: Obtain paper
0.1	Method for Goal: Obtain paper
0.51	1 Reach for paper
0.8	2 Grasp paper
0.51	3 Transport paper to writing space
0.17	4 Release paper
0.1	5 Return with goal accomplished

Time	Step	Description
0.1	2 T	Decide: IF pen is not in hand, THEN Accomplish Goal: Obtain pen
0.1		Method for Goal: Obtain pen
0.51	1	Reach for pen
0.8	2	Grasp pen
0.51	3	Transport pen to paper
0.16	4	Position the pen over paper
0.1	5	Return with goal accomplished
10.9	3	Recall <clearance information> and write <clearance information>
0.51	4	Return pen to original location
0.17	5	Release pen
0.5	6	Move hand back to starting location
0.1	7	Return with goal accomplished
0.1	3	Return with goal accomplished
0.1	3	Return with goal accomplished
0.1	2 F	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1	3	Accomplish Goal: Enter a clearance
0.1		Method for Goal: Enter a clearance
0.2	1 F	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1		Selection Rule for Goal: Method of reading
0.1	1 T	IF clearance is in writing, THEN Accomplish Goal: Read clearance from paper
0.1		Method for Goal: Read clearance from paper
0.1	1 F	Decide: IF paper not visible, THEN move paper
3.4	2 T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on paper aloud and retain <clearance information>, ELSE Read information on paper and retain <clearance information>
0.1	3	Return with goal accomplished
0.1	3	Return with goal accomplished

Value	Step	T/F	Description
0.5	2	T	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3		Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1	2	T	IF clearance is only crossing restriction, THEN Accomplish Goal: Enter crossing restriction
0.1			Method for Goal: Enter crossing restriction
0.1	1		Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1	1		Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.82	2		Search for waypoint
0.1	3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1	2	F	Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1	3		Remember <menu key> = "/" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	4	T	Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1			Method for Goal: Enter into scratchpad
0.1	1		Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished

0.1				3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1				2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1						Method for Goal: Menu key
0.51					1	Recall <menu key> and point finger to appropriate menu key
0.38					2	Press and release appropriate menu key
0.1					3	Return with goal accomplished
0.1				3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1				4	F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1				5		Return with goal accomplished
0.51			5			Point finger to right line select key next to waypoint
0.38			6			Press and release right line select key next to waypoint
0.1			7			Return with goal accomplished
0.1		5				Return with goal accomplished
0.1		4				Return with goal accomplished
0.1	4					Selection Rule: Decide on a clearance
0.1						Selection Rule for Goal: Decide on a clearance
0.1			2	T		IF clearance includes only non-RTA, THEN Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1						Method for Goal: Determine whether non-RTA clearance is acceptable
1.3				1		Determine whether non-RTA clearance is acceptable
0.2				2	T	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1				3		Return with goal accomplished
0.1			4			Return with goal accomplished
0.1	5	T				Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key
0.1						Method for Goal: Menu key
0.51		1				Recall <menu key> and point finger to appropriate menu key
0.38		2				Press and release appropriate menu key
0.1		3				Return with goal accomplished

Time								Description
0.1	6							Selection Rule: Respond to a clearance
0.1								Selection Rule for Goal: Respond to a clearance
0.1		1	T					IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1								Method for Goal: Respond by voice
0.5			1					Move hand to yoke and "Push to talk" button
0.2			2					Press "Push to talk" button
0.2			3	T				Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by <response>
0.1								Selection Rule for Goal: Method of clearance readback
0.1				2	T			IF <clearance information> is not remembered, THEN Accomplish Goal: Readback clearance by reading
0.1								Method for Goal: Readback clearance by reading
0.1					1			Selection Rule: Method of reading
0.1								Selection Rule for Goal: Method of reading
0.1						1	T	IF clearance is in writing, THEN Accomplish Goal: Read clearance from paper
0.1								Method for Goal: Read clearance from paper
0.51							1	T	Decide: IF paper not visible, THEN move paper
3.4							2	T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on paper aloud and retain <clearance information>, ELSE Read information on paper and retain <clearance information>
0.1							3	Return with goal accomplished
0.1						3		Return with goal accomplished
1.3					2			State call sign
0.1						3		Return with goal accomplished
0.1					3			Return with goal accomplished
0.2			4					Release "Push to talk" button
0.5			5					Return hand to FMS
0.1			6					Return with goal accomplished
0.1			3					Return with goal accomplished
0.1	7	F						Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8							Return with goal accomplished
48.51								Total time

Trace 6 – Task 2, Voice

Equipment: FMS 3
NGOMSL Trace: Cross HELPR at FL190

Assumptions:
Clearance received by voice
When clearance is read stated aloud or heard over the radio it is 8 words ("Cross HELPR at flight level one niner zero")
Call sign is stated before audio clearance
Airline call sign is 3 words
Clearance is not written down
Clearance information is remembered when entering the clearance
Hands do not start on FMS
Desired waypoint is the third waypoint listed on the first page of the flight plan
It takes one mental to determine if clearance is acceptable or not
Clearance is acceptable and pilot will comply
Response is sent by voice
Clearance information is remembered during readback
There is clearance information to enter into the FMS
Only one clearance was sent

Time	Action
0.1	Method for Goal: Handle a clearance
0.1	1 Selection Rule: Receive a clearance
0.1	Selection Rule for Goal: Receive a clearance
0.1	2 T IF clearance is audio, THEN Accomplish Goal: Receive a radio clearance
0.1	Method for Goal: Receive a radio clearance
4.5	1 Listen to clearance and retain <clearance information>
0.1	2 F Decide: IF printed clearance is desired, THEN Accomplish Goal: Write down clearance
0.1	3 Return with goal accomplished
0.1	3 Return with goal accomplished
0.1	2 F Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1	3 Accomplish Goal: Enter a clearance
0.1	Method for Goal: Enter a clearance
0.2	1 T Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.5	2 T Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3 Selection Rule: Specific clearance type
0.1	Selection Rule for Goal: Specific clearance type
0.1	2 T IF clearance is only crossing restriction, THEN Accomplish Goal: Enter crossing restriction

0.1			Method for Goal: Enter crossing restriction
0.1	1		Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1		1	Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51			1 Recall <menu key> and point finger to appropriate menu key
0.38			2 Press and release appropriate menu key
0.1			3 Return with goal accomplished
0.82		2	Search for waypoint
0.1		3 T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1	2 F		Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1	3		Remember <menu key> = "/" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.1	4 T		Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1			Method for Goal: Enter into scratchpad
0.1		1	Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51			1 Recall <menu key> and point finger to appropriate menu key
0.38			2 Press and release appropriate menu key
0.1			3 Return with goal accomplished
0.1		2	Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51			1 Recall <menu key> and point finger to appropriate menu key
0.38			2 Press and release appropriate menu key
0.1			3 Return with goal accomplished

Time						Flag	Description
0.1				3		T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1				2			Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1							Method for Goal: Menu key
0.51					1		Recall <menu key> and point finger to appropriate menu key
0.38					2		Press and release appropriate menu key
0.1					3		Return with goal accomplished
0.1				3		F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1				4		F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1					5		Return with goal accomplished
0.51			5				Point finger to right line select key next to waypoint
0.38			6				Press and release right line select key next to waypoint
0.1			7				Return with goal accomplished
0.1			5				Return with goal accomplished
0.1		4					Return with goal accomplished
0.1	4						Selection Rule: Decide on a clearance
0.1							Selection Rule for Goal: Decide on a clearance
0.1			2			T	IF clearance includes only non-RTA, THEN Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1							Method for Goal: Determine whether non-RTA clearance is acceptable
1.3			1				Determine whether non-RTA clearance is acceptable
0.2			2			T	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1			3				Return with goal accomplished
0.1		4					Return with goal accomplished
0.1	5					T	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key
0.1							Method for Goal: Menu key
0.51		1					Recall <menu key> and point finger to appropriate menu key
0.38		2					Press and release appropriate menu key
0.1		3					Return with goal accomplished

0.1	6		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1		1 T	IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1			Method for Goal: Respond by voice
0.5		1	Move hand to yoke and "Push to talk" button
0.2		2	Press "Push to talk" button
0.2		3 T	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by <response>
0.1			Selection Rule for Goal: Method of clearance readback
0.1		1 T	IF <clearance information> is remembered, THEN Accomplish Goal: Readback clearance from memory
0.1			Method for Goal: Readback clearance from memory
4.5		1	Recall <clearance information> and state <clearance information> followed by call sign
0.1		2	Return with goal accomplished
0.1		3	Return with goal accomplished
0.2		4	Release "Push to talk" button
0.5		5	Return hand to FMS
0.1		6	Return with goal accomplished
0.1		3	Return with goal accomplished
0.1	7 F		Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
26.35			Total time

Trace 7 – Task 2, Data Comm

Equipment: FMS 3
NGOMSL Trace: Cross HELPR at FL190

Assumptions:
Clearance received by data communications (Data Comm)
Hands start on FMS
Entire clearance is read aloud upon receipt
When clearance is read from screen or paper it is 8 words ("Cross HELPR at flight level one niner zero")
Clearance is one page
Clearance is printed upon receipt
Printer is available
Clearance information is not initially remembered, and must be read aloud, when entering the clearance
Once visible, paper will remain visible until hand moved to FMS
Hand is not on FMS after reading clearance from paper
Desired waypoint is the third waypoint listed on the first page of the flight plan
It takes one mental to determine if clearance is acceptable or not
Clearance is acceptable and pilot will comply
Response is sent by FMS
Once opened, clearance remains open until clearance information is entered
There is clearance information to enter into the FMS
Only one clearance was sent

Time	Action
0.1	Method for Goal: Handle a clearance
0.1	1 Selection Rule: Receive a clearance
0.1	Selection Rule for Goal: Receive a clearance
0.1	1 T IF clearance is text, THEN Accomplish Goal: Receive an FMS clearance
0.1	Method for Goal: Receive an FMS clearance
0.1	1 F Decide: IF hand not on FMS, THEN move hand to FMS
0.1	2 Accomplish Goal: Open clearance
0.1	Method for Goal: Open clearance
0.1	1 Remember <menu key> = "ATC" and Accomplish Goal: Menu key
0.1	Method for Goal: Menu key
0.51	1 Recall <menu key> and point finger to appropriate menu key
0.38	2 Press and release appropriate menu key
0.1	3 Return with goal accomplished

Value			T	Description
0.1		2		Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51			1	Recall <keyword> and point finger to line select key next to keyword
0.38			2	Press and release appropriate line select key
0.1			3	Return with goal accomplished
0.1		3		Return with goal accomplished
0.1	3			Accomplish Goal: Read the clearance
0.1				Method for Goal: Read the clearance
3.4		1	T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and retain <clearance information>
0.1		2	T	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1	4		T	Decide: IF printed clearance is desired, THEN Selection Rule: Get printed copy
0.1				Selection Rule for Goal: Get printed copy
0.1		1	T	IF printer is available, THEN Accomplish Goal: Print the clearance
0.1				Method for Goal: Print the clearance
0.1		1		Remember <keyword> = "Print" and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51			1	Recall <keyword> and point finger to line select key next to keyword
0.38			2	Press and release appropriate line select key
0.1			3	Return with goal accomplished
0.51		2		Reach for print out
0.8		3		Grasp print out
0.51		4		Transport paper to reading position
0.1		5		Return with goal accomplished
0.1	3			Return with goal accomplished
0.1	5			Return with goal accomplished
0.1	3			Return with goal accomplished

Time	Step	T/F	Operator / Description
0.1	2	F	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1	3		Accomplish Goal: Enter a clearance
0.1			Method for Goal: Enter a clearance
0.2	1	F	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1			Selection Rule for Goal: Method of reading
0.1	1	T	IF clearance is in writing, THEN Accomplish Goal: Read clearance from paper
0.1			Method for Goal: Read clearance from paper
0.1	1	F	Decide: IF paper not visible, THEN move paper
3.4	2	T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on paper aloud and retain <clearance information>, ELSE Read information on paper and retain <clearance information>
0.1	3		Return with goal accomplished
0.1	3		Return with goal accomplished
0.5	2	T	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3		Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1	2	T	IF clearance is only crossing restriction, THEN Accomplish Goal: Enter crossing restriction
0.1			Method for Goal: Enter crossing restriction
0.1	1		Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1	1		Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.82	2		Search for waypoint
0.1	3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1	2	F	Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1	3		Remember <menu key> = "/" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished

0.1			4	T	Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1					Method for Goal: Enter into scratchpad
0.1			1		Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1			2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1			3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1			3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			4	F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1			5		Return with goal accomplished
0.51		5			Point finger to right line select key next to waypoint
0.38		6			Press and release right line select key next to waypoint
0.1		7			Return with goal accomplished
0.1	5				Return with goal accomplished
0.1	4				Return with goal accomplished

0.1	4		Selection Rule: Decide on a clearance
0.1			Selection Rule for Goal: Decide on a clearance
0.1		2 T	IF clearance includes only non-RTA, THEN Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1			Method for Goal: Determine whether non-RTA clearance is acceptable
1.3		1	Determine whether non-RTA clearance is acceptable
0.2		2 T	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1		3	Return with goal accomplished
0.1		4	Return with goal accomplished
0.1	5 T		Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.1	6		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1		2 T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1			Method for Goal: Respond by FMS
0.1		1 F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1		2 T	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1			Method for Goal: Open clearance
0.1		1	Remember <menu key> = "ATC" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished

0.1		2	Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		3	Return with goal accomplished
0.1		3	Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		4	Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		5	Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	7	F	Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
34.4			Total time

Trace 8 – Task 2, Data Comm

Equipment: FMS 3
NGOMSL Trace: Cross HELPR at FL190
Assumptions:
Clearance received by data communications (Data Comm)
Hands start on FMS
Entire clearance is read aloud upon receipt
When clearance is read from screen it is 8 words ("Cross HELPR at flight level one niner zero")
Clearance is one page
Clearance is not printed upon receipt
Clearance information is remembered when entering the clearance
Desired waypoint is the third waypoint listed on the first page of the flight plan
It takes one mental to determine if clearance is acceptable or not
Clearance is acceptable and pilot will comply
Response is sent by FMS
Once opened, clearance remains open until clearance information is entered
There is clearance information to enter into the FMS
Only one clearance was sent

Time	Action
0.1	Method for Goal: Handle a clearance
0.1	1 Selection Rule: Receive a clearance
0.1	Selection Rule for Goal: Receive a clearance
0.1	1 T IF clearance is text, THEN Accomplish Goal: Receive an FMS clearance
0.1	Method for Goal: Receive an FMS clearance
0.1	1 F Decide: IF hand not on FMS, THEN move hand to FMS
0.1	2 Accomplish Goal: Open clearance
0.1	Method for Goal: Open clearance
0.1	1 Remember <menu key> = "ATC" and Accomplish Goal: Menu key
0.1	Method for Goal: Menu key
0.51	1 Recall <menu key> and point finger to appropriate menu key
0.38	2 Press and release appropriate menu key
0.1	3 Return with goal accomplished
0.1	2 Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1	Method for Goal: Line select key
0.51	1 Recall <keyword> and point finger to line select key next to keyword
0.38	2 Press and release appropriate line select key
0.1	3 Return with goal accomplished
0.1	3 Return with goal accomplished

			Description
0.1	3		Accomplish Goal: Read the clearance
0.1			Method for Goal: Read the clearance
3.4	1	T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and retain <clearance information>
0.1	2	T	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1	4	F	Decide: IF printed clearance is desired, THEN Selection Rule: Get printed copy
0.1	5		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	2	F	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1	3		Accomplish Goal: Enter a clearance
0.1			Method for Goal: Enter a clearance
0.2	1	T	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1	2	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3		Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1	2	T	IF clearance is only crossing restriction, THEN Accomplish Goal: Enter crossing restriction
0.1			Method for Goal: Enter crossing restriction
0.1	1		Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1	1		Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.82	2		Search for waypoint
0.1	3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1	2	F	Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1	3		Remember <menu key> = "/" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished

Prob	Step	T/F	Description
0.1	4	T	Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1			Method for Goal: Enter into scratchpad
0.1	1		Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	4	F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1	5		Return with goal accomplished
0.51	5		Point finger to right line select key next to waypoint
0.38	6		Press and release right line select key next to waypoint
0.1	7		Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	4		Return with goal accomplished

0.1	4			Selection Rule: Decide on a clearance		
0.1				Selection Rule for Goal: Decide on a clearance		
0.1		2	T	IF clearance includes only non-RTA, THEN Accomplish Goal: Determine whether non-RTA clearance is acceptable		
0.1				Method for Goal: Determine whether non-RTA clearance is acceptable		
1.3			1	Determine whether non-RTA clearance is acceptable		
0.2			2	T	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"	
0.1			3	Return with goal accomplished		
0.1		4		Return with goal accomplished		
0.1	5	T	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key			
0.1			Method for Goal: Menu key			
0.51		1	Recall <menu key> and point finger to appropriate menu key			
0.38		2	Press and release appropriate menu key			
0.1		3	Return with goal accomplished			
0.1	6	Selection Rule: Respond to a clearance				
0.1		Selection Rule for Goal: Respond to a clearance				
0.1		2	T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS		
0.1		Method for Goal: Respond by FMS				
0.1		1	F	Decide: IF hand not on FMS, THEN move hand to FMS		
0.1		2	T	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance		
0.1		Method for Goal: Open clearance				
0.1		1	Remember <menu key> = "ATC" and Accomplish Goal: Menu key			
0.1		Method for Goal: Menu key				
0.51		1	Recall <menu key> and point finger to appropriate menu key			
0.38		2	Press and release appropriate menu key			
0.1		3	Return with goal accomplished			
0.1		2	Remember <keyword> = clearance to open and Accomplish Goal: Line select key			
0.1		Method for Goal: Line select key				
0.51		1	Recall <keyword> and point finger to line select key next to keyword			
0.38		2	Press and release appropriate line select key			
0.1		3	Return with goal accomplished			
0.1		3	Return with goal accomplished			

0.1			3	Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51			1	Recall <keyword> and point finger to line select key next to keyword
0.38			2	Press and release appropriate line select key
0.1			3	Return with goal accomplished
0.1		4		Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51			1	Recall <keyword> and point finger to line select key next to keyword
0.38			2	Press and release appropriate line select key
0.1			3	Return with goal accomplished
0.1		5		Return with goal accomplished
0.1	3			Return with goal accomplished
0.1	7	F		Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8			Return with goal accomplished
26.49				Total time

Trace 9 – Task 3, Voice

Equipment: FMS 3
NGOMSL Trace: Cross HELPR at 1800Z

Assumptions:
Clearance received by voice
When clearance is stated aloud or heard over the radio it is 8 words ("Cross HELPR at one eight zero zero Zulu")
Call sign is stated before audio clearance
Airline call sign is 3 words
Clearance is not written down
Response is sent by voice
Clearance information is remembered when entering the clearance
Clearance is acceptable and pilot will comply
Clearance information is remembered during readback
There is clearance information to enter into the FMS
Only one clearance was sent

Time	Action
0.1	Method for Goal: Handle a clearance
0.1	1 Selection Rule: Receive a clearance
0.1	Selection Rule for Goal: Receive a clearance
0.1	2 T IF clearance is audio, THEN Accomplish Goal: Receive a radio clearance
0.1	Method for Goal: Receive a radio clearance
4.5	1 Listen to clearance and retain <clearance information>
0.1	2 F Decide: IF printed clearance is desired, THEN Accomplish Goal: Write down clearance
0.1	3 Return with goal accomplished
0.1	3 Return with goal accomplished
0.1	2 T Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1	Selection Rule for Goal: Respond to a clearance
0.1	1 T IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1	Method for Goal: Respond by voice
0.5	1 Move hand to yoke and "Push to talk" button
0.2	2 Press "Push to talk" button
1.8	3 F Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by <response>
0.2	4 Release "Push to talk" button
0.5	5 Return hand to FMS
0.1	6 Return with goal accomplished
0.1	3 Return with goal accomplished

Value	Step	Flag	Description
0.1	3		Accomplish Goal: Enter a clearance
0.1			Method for Goal: Enter a clearance
0.2	1	T	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1	2	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3		Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1	3	T	IF clearance is only RTA, THEN Accomplish Goal: Enter RTA
0.1			Method for Goal: Enter RTA
0.1	1		Accomplish Goal: Go to RTA page
0.1			Method for Goal: Go to RTA page
0.1	1		Remember <menu key> = "VNAV" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	2		Remember <keyword> = "RTA" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	2		Retain <clearance value> = characters in waypoint and Accomplish Goal: Enter into scratchpad
0.1			Method for Goal: Enter into scratchpad
0.1	1		Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished

0.1		3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		4	F	Decide: IF <clearance value> is an altitude or speed, THEN Selection Rule: At and above or below
0.1		5		Return with goal accomplished
0.1	3			Remember <keyword> = "RTA Waypoint" and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51		1		Recall <keyword> and point finger to line select key next to keyword
0.38		2		Press and release appropriate line select key
0.1		3		Return with goal accomplished

0.1		4		Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1				Method for Goal: Enter into scratchpad
0.1			1	Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1			2	Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1			3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			2	Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1			3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			2	Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1			3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			4	F	Decide: IF <clearance value> is an altitude or speed, THEN Selection Rule: At and above or below
0.1			5	Return with goal accomplished
0.51		5		Point finger to right line select key next to waypoint
0.38		6		Press and release right line select key next to waypoint
0.1		7		Return with goal accomplished
0.1	5			Return with goal accomplished
0.1	4			Return with goal accomplished

Time	Step	T/F	Description
0.1	4		Selection Rule: Decide on a clearance
0.1			Selection Rule for Goal: Decide on a clearance
0.1	1	T	IF clearance includes only RTA, THEN Accomplish Goal: Determine whether RTA clearance is acceptable
0.1			Method for Goal: Determine whether RTA clearance is acceptable
0.1	1	F	Decide: IF not on RTA page, THEN Accomplish Goal: Go to RTA page
1.4	2	T	Decide: IF RTA is between minimum and maximum RTAs, THEN Retain <response> = "Wilco" ELSE Retain <response> = "Unable"
0.1	3		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	5	T	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	6		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1	1	T	IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1			Method for Goal: Respond by voice
0.5	1		Move hand to yoke and "Push to talk" button
0.2	2		Press "Push to talk" button
0.2	3	T	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by
0.1			Selection Rule for Goal: Method of clearance readback
0.1	1	T	IF <clearance information> is remembered, THEN Accomplish Goal: Readback clearance from memory
0.1			Method for Goal: Readback clearance from memory
4.5	1		Recall <clearance information> and state <clearance information> followed by call sign
0.1	2		Return with goal accomplished
0.1	3		Return with goal accomplished
0.2	4		Release "Push to talk" button
0.5	5		Return hand to FMS
0.1	6		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	7	F	Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
37.96			Total time

Trace 10 – Task 3, Voice

Equipment: FMS 3
NGOMSL Trace: Cross HELPR at 1800Z

Assumptions:
Clearance received by voice
When clearance is stated aloud or heard over the radio it is 8 words ("Cross HELPR at one eight zero zero Zulu")
Call sign is stated before audio clearance
Airline call sign is 3 words
Clearance is written down
Paper is available
Pen is not in hand
Clearance is written as 4 words ("Cross HELPR at 1800Z")
Response is sent by voice
Clearance information is remembered when entering the clearance
Clearance is not acceptable
There is no clearance information to enter into the FMS
Only one clearance was sent

Time	Action
0.1	Method for Goal: Handle a clearance
0.1	1 Selection Rule: Receive a clearance
0.1	Selection Rule for Goal: Receive a clearance
0.1	2 T IF clearance is audio, THEN Accomplish Goal: Receive a radio clearance
0.1	Method for Goal: Receive a radio clearance
4.5	1 Listen to clearance and retain <clearance information>
0.1	2 T Decide: IF printed clearance is desired, THEN Accomplish Goal: Write down clearance
0.1	Method for Goal: Write down clearance
0.1	1 F IF paper is not readily available, THEN Accomplish goal: Obtain paper
0.1	2 T IF pen is not in hand, THEN Accomplish goal: Obtain pen
0.1	Method for Goal: Obtain pen
0.51	1 Reach for pen
0.8	2 Grasp pen
0.51	3 Transport pen to paper
0.16	4 Position pen over paper
0.1	5 Return with goal accomplished
10.9	3 Recall <clearance information> and write <clearance information>
0.51	4 Return pen to original location
0.17	5 Release pen
0.5	6 Move hand back to starting location
0.1	7 Return with goal accomplished

Time	Step / Description
0.1	3 Return with goal accomplished
0.1	3 Return with goal accomplished
0.1	2 T Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1	Selection Rule for Goal: Respond to a clearance
0.1	1 T IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1	Method for Goal: Respond by voice
0.5	1 Move hand to yoke and "Push to talk" button
0.2	2 Press "Push to talk" button
1.8	3 F Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by <response>
0.2	4 Release "Push to talk" button
0.5	5 Return hand to FMS
0.1	6 Return with goal accomplished
0.1	3 Return with goal accomplished
0.1	3 Accomplish Goal: Enter a clearance
0.1	Method for Goal: Enter a clearance
0.2	1 T Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1	2 F Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3 Selection Rule: Specific clearance type
0.1	Selection Rule for Goal: Specific clearance type
0.1	3 T IF clearance is only RTA, THEN Accomplish Goal: Enter RTA
0.1	Method for Goal: Enter RTA
0.1	1 Accomplish Goal: Go to RTA page
0.1	Method for Goal: Go to RTA page
0.1	1 Remember <menu key> = "VNAV" and Accomplish Goal: Menu key
0.1	Method for Goal: Menu key
0.51	1 Recall <menu key> and point finger to appropriate menu key
0.38	2 Press and release appropriate menu key
0.1	3 Return with goal accomplished
0.1	2 Remember <keyword> = "RTA" and Accomplish Goal: Line select key
0.1	Method for Goal: Line select key
0.51	1 Recall <keyword> and point finger to line select key next to keyword
0.38	2 Press and release appropriate line select key
0.1	3 Return with goal accomplished
0.1	3 Return with goal accomplished

0.1		2	Retain <clearance value> = characters in waypoint and Accomplish Goal: Enter into scratchpad
0.1			Method for Goal: Enter into scratchpad
0.1		1	Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		2	Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3 T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2	Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3 T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2	Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3 T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2	Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished

Value			Step	Flag	Description
0.1			3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			4	F	Decide: IF <clearance value> is an altitude or speed, THEN Selection Rule: At and above or below
0.1			5		Return with goal accomplished
0.1		3			Remember <keyword> = "RTA Waypoint" and Accomplish Goal: Line select key
0.1					Method for Goal: Line select key
0.51			1		Recall <keyword> and point finger to line select key next to keyword
0.38			2		Press and release appropriate line select key
0.1			3		Return with goal accomplished
0.1		4			Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1					Method for Goal: Enter into scratchpad
0.1			1		Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1			2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1			3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished

0.1			3 T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			2	Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51				1 Recall <menu key> and point finger to appropriate menu key
0.38				2 Press and release appropriate menu key
0.1				3 Return with goal accomplished
0.1			3 F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			4 F	Decide: IF <clearance value> is an altitude or speed, THEN Selection Rule: At and above or below
0.1			5	Return with goal accomplished
0.51		5		Point finger to right line select key next to waypoint
0.38		6		Press and release right line select key next to waypoint
0.1		7		Return with goal accomplished
0.1		5		Return with goal accomplished
0.1	4			Return with goal accomplished
0.1	4	Selection Rule: Decide on a clearance		
0.1		Selection Rule for Goal: Decide on a clearance		
0.1		1 T		IF clearance includes only RTA, THEN Accomplish Goal: Determine whether RTA clearance is acceptable
0.1		Method for Goal: Determine whether RTA clearance is acceptable		
0.1		1 F	Decide: IF not on RTA page, THEN Accomplish Goal: Go to RTA page	
1.4		2 F	Decide: IF RTA is between minimum and maximum RTAs, THEN Retain <response> = "Wilco" ELSE Retain <response> = "Unable"	
0.1		3	Return with goal accomplished	
0.1	4	Return with goal accomplished		

0.1	5	F	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key
0.1	6		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1		1 T	IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1			Method for Goal: Respond by voice
0.5		1	Move hand to yoke and "Push to talk" button
0.2		2	Press "Push to talk" button
1.8		3 F	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by <response>
0.2		4	Release "Push to talk" button
0.5		5	Return hand to FMS
0.1		6	Return with goal accomplished
0.1		3	Return with goal accomplished
0.1	7 F		Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
48.13			Total time

Trace 11 – Task 3, Data Comm

Equipment: FMS 3

NGOMSL Trace: Cross HELPR at time 1800Z

Assumptions:

Clearance received by data communications (Data Comm)

Hands start on FMS

Entire clearance is read aloud upon receipt

When clearance is read from screen it is 9 words ("Cross HELPR at time one eight zero zero Zulu")

Clearance is one page

Clearance is not printed upon receipt

Response is sent by FMS

Once opened, clearance remains open until clearance information is entered

Clearance information is remembered when entering the clearance

Clearance is acceptable and pilot will comply

There is clearance information to enter into the FMS

Only one clearance was sent

Time	Action				
0.1	Method for Goal: Handle a clearance				
0.1	1	Selection Rule: Receive a clearance			
0.1		Selection Rule for Goal: Receive a clearance			
0.1		1	T	IF clearance is text, THEN Accomplish Goal: Receive an FMS clearance	
0.1		Method for Goal: Receive an FMS clearance			
0.1		1	F	Decide: IF hand not on FMS, THEN move hand to FMS	
0.1		2	Accomplish Goal: Open clearance		
0.1		Method for Goal: Open clearance			
0.1			1	Remember <menu key> = "ATC" and Accomplish Goal: Menu key	
0.1			Method for Goal: Menu key		
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1			2	Remember <keyword> = clearance to open and Accomplish Goal: Line select key	
0.1			Method for Goal: Line select key		
0.51				1	Recall <keyword> and point finger to line select key next to keyword
0.38				2	Press and release appropriate line select key
0.1				3	Return with goal accomplished
0.1			3	Return with goal accomplished	

0.1		3		Accomplish Goal: Read the clearance
0.1				Method for Goal: Read the clearance
3.8			1 T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and retain <clearance information>
0.1			2 T	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1			4 F	Decide: IF printed clearance is desired, THEN Selection Rule: Get printed copy
0.1			5	Return with goal accomplished
0.1		3		Return with goal accomplished
0.1	2 T			Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1				Selection Rule for Goal: Respond to a clearance
0.1		2 T		IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1				Method for Goal: Respond by FMS
0.1			1 F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1			2 F	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1			3	Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51			1	Recall <keyword> and point finger to line select key next to keyword
0.38			2	Press and release appropriate line select key
0.1			3	Return with goal accomplished
0.1			4	Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51			1	Recall <keyword> and point finger to line select key next to keyword
0.38			2	Press and release appropriate line select key
0.1			3	Return with goal accomplished
0.1			5	Return with goal accomplished
0.1		3		Return with goal accomplished

0.1	3			Accomplish Goal: Enter a clearance
0.1				Method for Goal: Enter a clearance
0.2		1	T	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1		2	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1		3		Selection Rule: Specific clearance type
0.1				Selection Rule for Goal: Specific clearance type
0.1			3 T	IF clearance is only RTA, THEN Accomplish Goal: Enter RTA
0.1				Method for Goal: Enter RTA
0.1			1	Accomplish Goal: Go to RTA page
0.1				Method for Goal: Go to RTA page
0.1				1 Remember <menu key> = "VNAV" and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51				1 Recall <menu key> and point finger to appropriate menu key
0.38				2 Press and release appropriate menu key
0.1				3 Return with goal accomplished
0.1				2 Remember <keyword> = "RTA" and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51				1 Recall <keyword> and point finger to line select key next to keyword
0.38				2 Press and release appropriate line select key
0.1				3 Return with goal accomplished
0.1			3	Return with goal accomplished
0.1			2	Retain <clearance value> = characters in waypoint and Accomplish Goal: Enter into scratchpad
0.1				Method for Goal: Enter into scratchpad
0.1				1 Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51				1 Recall <menu key> and point finger to appropriate menu key
0.38				2 Press and release appropriate menu key
0.1				3 Return with goal accomplished
0.1				2 Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51				1 Recall <menu key> and point finger to appropriate menu key
0.38				2 Press and release appropriate menu key
0.1				3 Return with goal accomplished

0.1		3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		4	F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1		5		Return with goal accomplished
0.1	3			Remember <keyword> = "RTA Waypoint" and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51		1		Recall <keyword> and point finger to line select key next to keyword
0.38		2		Press and release appropriate line select key
0.1		3		Return with goal accomplished

Value	L1	L2	L3	L4	L5	Cond	Description
0.1				4			Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1							Method for Goal: Enter into scratchpad
0.1				1			Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1							Method for Goal: Menu key
0.51					1		Recall <menu key> and point finger to appropriate menu key
0.38					2		Press and release appropriate menu key
0.1					3		Return with goal accomplished
0.1				2			Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1							Method for Goal: Menu key
0.51					1		Recall <menu key> and point finger to appropriate menu key
0.38					2		Press and release appropriate menu key
0.1					3		Return with goal accomplished
0.1				3		T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1				2			Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1							Method for Goal: Menu key
0.51					1		Recall <menu key> and point finger to appropriate menu key
0.38					2		Press and release appropriate menu key
0.1					3		Return with goal accomplished
0.1				3		T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1				2			Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1							Method for Goal: Menu key
0.51					1		Recall <menu key> and point finger to appropriate menu key
0.38					2		Press and release appropriate menu key
0.1					3		Return with goal accomplished
0.1				3		F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1				4		F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1				5			Return with goal accomplished
0.51			5				Point finger to right line select key next to waypoint
0.38			6				Press and release right line select key next to waypoint
0.1			7				Return with goal accomplished
0.1		5					Return with goal accomplished
0.1	4						Return with goal accomplished

0.1	4			Selection Rule: Decide on a clearance
0.1				Selection Rule for Goal: Decide on a clearance
0.1		1	T	IF clearance includes only RTA, THEN Accomplish Goal: Determine whether RTA clearance is acceptable
0.1				Method for Goal: Determine whether RTA clearance is acceptable
0.1			1 F	Decide: IF not on RTA page, THEN Accomplish Goal: Go to RTA page
1.4			2 T	Decide: IF RTA is between minimum and maximum RTAs, THEN Retain \<response\> = "Wilco" ELSE Retain \<response\> = "Unable"
0.1			3	Return with goal accomplished
0.1		4		Return with goal accomplished
0.1	5	T		Decide: IF \<response\> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember \<menu key\> = "Exec" and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51		1		Recall \<menu key\> and point finger to appropriate menu key
0.38		2		Press and release appropriate menu key
0.1		3		Return with goal accomplished
0.1	6			Selection Rule: Respond to a clearance
0.1				Selection Rule for Goal: Respond to a clearance
0.1		2	T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1				Method for Goal: Respond by FMS
0.1			1 F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1			2 T	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1				Method for Goal: Open clearance
0.1				1 Remember \<menu key\> = "ATC" and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51				1 Recall \<menu key\> and point finger to appropriate menu key
0.38				2 Press and release appropriate menu key
0.1				3 Return with goal accomplished
0.1				2 Remember \<keyword\> = clearance to open and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51				1 Recall \<keyword\> and point finger to line select key next to keyword
0.38				2 Press and release appropriate line select key
0.1				3 Return with goal accomplished
0.1			3	Return with goal accomplished

0.1		3	Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		4	Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		5	Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	7	F	Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
38.28			Total time

Trace 12 – Task 3, Data Comm

<table>
<tr><td colspan="2">Equipment: FMS 3</td></tr>
<tr><td colspan="2">NGOMSL Trace: Cross HELPR at time 1800Z</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td colspan="2">Assumptions:</td></tr>
<tr><td colspan="2">Clearance received by data communications (Data Comm)</td></tr>
<tr><td colspan="2">Hands start on FMS</td></tr>
<tr><td colspan="2">Entire clearance is read aloud upon receipt</td></tr>
<tr><td colspan="2">When clearance is read from screen it is 9 words ("Cross HELPR at time one eight zero zero Zulu")</td></tr>
<tr><td colspan="2">Clearance is one page</td></tr>
<tr><td colspan="2">Clearance is printed upon receipt</td></tr>
<tr><td colspan="2">Printer is available</td></tr>
<tr><td colspan="2">Response is sent by FMS</td></tr>
<tr><td colspan="2">Once opened, clearance remains open until clearance information is entered</td></tr>
<tr><td colspan="2">Clearance information is remembered when entering the clearance</td></tr>
<tr><td colspan="2">Clearance is not acceptable</td></tr>
<tr><td colspan="2">There is no clearance information to enter into the FMS</td></tr>
<tr><td colspan="2">Only one clearance was sent</td></tr>
</table>

Time	Action
0.1	Method for Goal: Handle a clearance
0.1	1 Selection Rule: Receive a clearance
0.1	Selection Rule for Goal: Receive a clearance
0.1	1 T IF clearance is text, THEN Accomplish Goal: Receive an FMS clearance
0.1	Method for Goal: Receive an FMS clearance
0.1	1 F Decide: IF hand not on FMS, THEN move hand to FMS
0.1	2 Accomplish Goal: Open clearance
0.1	Method for Goal: Open clearance
0.1	1 Remember \<menu key> = "ATC" and Accomplish Goal: Menu key
0.1	Method for Goal: Menu key
0.51	1 Recall \<menu key> and point finger to appropriate menu key
0.38	2 Press and release appropriate menu key
0.1	3 Return with goal accomplished
0.1	2 Remember \<keyword> = clearance to open and Accomplish Goal: Line select key
0.1	Method for Goal: Line select key
0.51	1 Recall \<keyword> and point finger to line select key next to keyword
0.38	2 Press and release appropriate line select key
0.1	3 Return with goal accomplished
0.1	3 Return with goal accomplished

Time	Step	T/F	Description
0.1	3		Accomplish Goal: Read the clearance
0.1			Method for Goal: Read the clearance
3.8	1	T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and retain <clearance information>
0.1	2	T	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1	4	T	Decide: IF printed clearance is desired, THEN Selection Rule: Get printed copy
0.1			Selection Rule for Goal: Get printed copy
0.1	1	T	IF printer is available, THEN Accomplish Goal: Print the clearance
0.1			Method for Goal: Print the clearance
0.1	1		Remember <keyword> = "Print" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.51	2		Reach for print out
0.8	3		Grasp print out
0.51	4		Transport paper to reading position
0.1	5		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	2	T	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1	2	T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1			Method for Goal: Respond by FMS
0.1	1	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	2	F	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1	3		Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished

Prob.	Step	Description
0.1	4	Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1		Method for Goal: Line select key
0.51	1	Recall <keyword> and point finger to line select key next to keyword
0.38	2	Press and release appropriate line select key
0.1	3	Return with goal accomplished
0.1	5	Return with goal accomplished
0.1	3	Return with goal accomplished
0.1	3	Accomplish Goal: Enter a clearance
0.1		Method for Goal: Enter a clearance
0.2	1 T	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1	2 F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3	Selection Rule: Specific clearance type
0.1		Selection Rule for Goal: Specific clearance type
0.1	3 T	IF clearance is only RTA, THEN Accomplish Goal: Enter RTA
0.1		Method for Goal: Enter RTA
0.1	1	Accomplish Goal: Go to RTA page
0.1		Method for Goal: Go to RTA page
0.1	1	Remember <menu key> = "VNAV" and Accomplish Goal: Menu key
0.1		Method for Goal: Menu key
0.51	1	Recall <menu key> and point finger to appropriate menu key
0.38	2	Press and release appropriate menu key
0.1	3	Return with goal accomplished
0.1	2	Remember <keyword> = "RTA" and Accomplish Goal: Line select key
0.1		Method for Goal: Line select key
0.51	1	Recall <keyword> and point finger to line select key next to keyword
0.38	2	Press and release appropriate line select key
0.1	3	Return with goal accomplished
0.1	3	Return with goal accomplished
0.1	2	Retain <clearance value> = characters in waypoint and Accomplish Goal: Enter into scratchpad
0.1		Method for Goal: Enter into scratchpad
0.1	1	Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1		Method for Goal: Menu key
0.51	1	Recall <menu key> and point finger to appropriate menu key
0.38	2	Press and release appropriate menu key
0.1	3	Return with goal accomplished

0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	4	F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1	5		Return with goal accomplished

0.1		3		Remember \<keyword\> = "RTA Waypoint" and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51			1	Recall \<keyword\> and point finger to line select key next to keyword
0.38			2	Press and release appropriate line select key
0.1			3	Return with goal accomplished
0.1		4		Retain \<clearance value\> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1				Method for Goal: Enter into scratchpad
0.1			1	Remember \<menu key\> = first digit/character in \<clearance value\> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51				1 Recall \<menu key\> and point finger to appropriate menu key
0.38				2 Press and release appropriate menu key
0.1				3 Return with goal accomplished
0.1			2	Remember \<menu key\> = next digit/character in \<clearance value\> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51				1 Recall \<menu key\> and point finger to appropriate menu key
0.38				2 Press and release appropriate menu key
0.1				3 Return with goal accomplished
0.1			3 T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			2	Remember \<menu key\> = next digit/character in \<clearance value\> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51				1 Recall \<menu key\> and point finger to appropriate menu key
0.38				2 Press and release appropriate menu key
0.1				3 Return with goal accomplished
0.1			3 T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			2	Remember \<menu key\> = next digit/character in \<clearance value\> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51				1 Recall \<menu key\> and point finger to appropriate menu key
0.38				2 Press and release appropriate menu key
0.1				3 Return with goal accomplished

Cost	Level	Flag	Description
0.1	3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	4	F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1	5		Return with goal accomplished
0.51	5		Point finger to right line select key next to waypoint
0.38	6		Press and release right line select key next to waypoint
0.1	7		Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	4		Selection Rule: Decide on a clearance
0.1			Selection Rule for Goal: Decide on a clearance
0.1	1	T	IF clearance includes only RTA, THEN Accomplish Goal: Determine whether RTA clearance is acceptable
0.1			Method for Goal: Determine whether RTA clearance is acceptable
0.1	1	F	Decide: IF not on RTA page, THEN Accomplish Goal: Go to RTA page
1.4	2	F	Decide: IF RTA is between minimum and maximum RTAs, THEN Retain <response> = "Wilco" ELSE Retain <response> = "Unable"
0.1	3		Return with goal accomplished
0.1	4		Return with goal accomplished
0.1	5	F	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key
0.1	6		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1	2	T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1			Method for Goal: Respond by FMS
0.1	1	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	2	T	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1			Method for Goal: Open clearance
0.1	1		Remember <menu key> = "ATC" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	2		Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished

0.1		3	Return with goal accomplished
0.1		3	Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		4	Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		5	Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	7	F	Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
40.7			Total time

Trace 13 – Task 4, Voice

Equipment: FMS 3
NGOMSL Trace: Cross HELPR at 1800Z at FL190

Assumptions:
Clearance received by voice
When clearance is read from paper or heard over the radio it is 14 words ("Cross HELPR at one eight zero zero Zulu at flight level one niner zero")
Call sign is stated before audio clearance
Airline call sign is 3 words
Clearance is written down
Need to obtain pen and paper
Clearance is written as 6 words ("Cross HELPR at 1800Z at FL190")
Response is sent by voice
Clearance information is not initially remembered, and must be read aloud, when entering the clearance
Paper is not visible after hand moved to FMS
Hand is not on FMS after reading clearance from paper
Desired waypoint is the third waypoint listed on the first page of the flight plan
It takes one mental to determine if non-RTA portion of clearance is acceptable or not
Non-RTA portion of clearance is acceptable and pilot will comply
RTA portion of clearance is acceptable and pilot will comply
Clearance information is not remembered during readback
There is clearance information to enter into the FMS
Only one clearance was sent

Time	Action
0.1	Method for Goal: Handle a clearance
0.1	1 Selection Rule: Receive a clearance
0.1	Selection Rule for Goal: Receive a clearance
0.1	2 T IF clearance is audio, THEN Accomplish Goal: Receive a radio clearance
0.1	Method for Goal: Receive a radio clearance
6.9	1 Listen to clearance and retain <clearance information>
0.1	2 T Decide: IF printed clearance is desired, THEN Accomplish Goal: Write down clearance
0.1	Method for Goal: Write down clearance
0.1	1 T Decide: IF paper is not readily available, THEN Accomplish Goal: Obtain paper
0.1	Method for Goal: Obtain paper
0.51	1 Reach for paper
0.8	2 Grasp paper
0.51	3 Transport paper to writing space
0.17	4 Release paper
0.1	5 Return with goal accomplished

Time	Operator
0.1	2 T Decide: IF pen is not in hand, THEN Accomplish Goal: Obtain pen
0.1	Method for Goal: Obtain pen
0.51	1 Reach for pen
0.8	2 Grasp pen
0.51	3 Transport pen to paper
0.16	4 Position the pen over paper
0.1	5 Return with goal accomplished
16.3	3 Recall <clearance information> and write <clearance information>
0.51	4 Return pen to original location
0.17	5 Release pen
0.5	6 Move hand back to starting location
0.1	7 Return with goal accomplished
0.1	3 Return with goal accomplished
0.1	3 Return with goal accomplished
0.1	2 T Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1	Selection Rule for Goal: Respond to a clearance
0.1	1 T IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1	Method for Goal: Respond by voice
0.5	1 Move hand to yoke and "Push to talk" button
0.2	2 Press "Push to talk" button
1.8	3 F Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by <response>
0.2	4 Release "Push to talk" button
0.5	5 Return hand to FMS
0.1	6 Return with goal accomplished
0.1	3 Return with goal accomplished
0.1	3 Accomplish Goal: Enter a clearance
0.1	Method for Goal: Enter a clearance
0.2	1 F Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1	Selection Rule for Goal: Method of reading
0.1	1 T IF clearance is in writing, THEN Accomplish Goal: Read clearance from paper
0.1	Method for Goal: Read clearance from paper
0.51	1 T Decide: IF paper not visible, THEN move paper
5.8	2 T Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on paper aloud and retain <clearance information>, ELSE Read information on paper and retain <clearance information>
0.1	3 Return with goal accomplished
0.1	3 Return with goal accomplished

0.5	2	T	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3		Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1	4	T	IF clearance is crossing restriction with RTA, THEN Accomplish Goal: Enter mixed clearance
0.1			Method for Goal: Enter mixed clearance
0.1	1		Accomplish Goal: Enter crossing restriction
0.1			Method for Goal: Enter crossing restriction
0.1	1		Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1	1		Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.82	2		Search for waypoint
0.1	3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1	2	F	Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1	3		Remember <menu key> = "/" and Accomplish Goal: Menu k
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	4	T	Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1			Method for Goal: Enter into scratchpad
0.1	1		Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished

0.1			2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1			3 T		Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1			3 F		Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			4 F		Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1			5		Return with goal accomplished
0.51		5			Point finger to right line select key next to waypoint
0.38		6			Press and release right line select key next to waypoint
0.1		7			Return with goal accomplished
0.1	2				Accomplish Goal: Enter RTA
0.1					Method for Goal: Enter RTA
0.1		1			Accomplish Goal: Go to RTA page
0.1					Method for Goal: Go to RTA page
0.1			1		Remember <menu key> = "VNAV" and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished

0.1		2		Remember <keyword> = "RTA" and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51			1	Recall <keyword> and point finger to line select key next to keyword
0.38			2	Press and release appropriate line select key
0.1			3	Return with goal accomplished
0.1		3		Return with goal accomplished
0.1	2			Retain <clearance value> = characters in waypoint and Accomplish Goal: Enter into scratchpad
0.1				Method for Goal: Enter into scratchpad
0.1		1		Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3 T		Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished

Prob					
0.1		3	T		Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2			Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1		3	T		Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2			Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1		3	F		Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		4	F		Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1		5			Return with goal accomplished
0.1	3				Remember <keyword> = "RTA Waypoint" and Accomplish Goal: Line select key
0.1					Method for Goal: Line select key
0.51		1			Recall <keyword> and point finger to line select key next to keyword
0.38		2			Press and release appropriate line select key
0.1		3			Return with goal accomplished
0.1	4				Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1					Method for Goal: Enter into scratchpad
0.1		1			Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished

0.1				2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1						Method for Goal: Menu key
0.51					1	Recall <menu key> and point finger to appropriate menu key
0.38					2	Press and release appropriate menu key
0.1					3	Return with goal accomplished
0.1				3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1				2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1						Method for Goal: Menu key
0.51					1	Recall <menu key> and point finger to appropriate menu key
0.38					2	Press and release appropriate menu key
0.1					3	Return with goal accomplished
0.1				3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1				2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1						Method for Goal: Menu key
0.51					1	Recall <menu key> and point finger to appropriate menu key
0.38					2	Press and release appropriate menu key
0.1					3	Return with goal accomplished
0.1				3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1				4	F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1				5		Return with goal accomplished
0.51			5			Point finger to right line select key next to waypoint
0.38			6			Press and release right line select key next to waypoint
0.1			7			Return with goal accomplished
0.1		3				Return with goal accomplished
0.1		5				Return with goal accomplished
0.1	4					Return with goal accomplished

0.1	4					Selection Rule: Decide on a clearance
0.1						Selection Rule for Goal: Decide on a clearance
0.1		3			T	IF clearance includes both RTA and other information, THEN Accomplish Goal: Determine whether mixed clearance is acceptable
0.1						Method for Goal: Determine whether mixed clearance is acceptable
0.1			1			Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1						Method for Goal: Determine whether non-RTA clearance is acceptable
1.3				1		Determine whether non-RTA clearance is acceptable
0.2				2	T	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1				3		Return with goal accomplished
0.1			2		F	Decide: IF <response> = "Unable," THEN Return with goal accomplished
0.1			3			Accomplish Goal: Determine whether RTA clearance is acceptable
0.1						Method for Goal: Determine whether RTA clearance is acceptable
0.1				1	F	Decide: IF not on RTA page, THEN Accomplish Goal: Go to RTA page
1.4				2	T	Decide: IF RTA is between minimum and maximum RTAs, THEN Retain <response> = "Wilco" ELSE Retain <response> = "Unable"
0.1				3		Return with goal accomplished
0.1			4			Return with goal accomplished
0.1		4				Return with goal accomplished
0.1	5				T	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key
0.1						Method for Goal: Menu key
0.51		1				Recall <menu key> and point finger to appropriate menu key
0.38		2				Press and release appropriate menu key
0.1		3				Return with goal accomplished

Time	Step	Flag	Description
0.1	6		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1	1	T	IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1			Method for Goal: Respond by voice
0.5	1		Move hand to yoke and "Push to talk" button
0.2	2		Press "Push to talk" button
0.2	3	T	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by <response>
0.1			Selection Rule for Goal: Method of clearance readback
0.1	2	T	IF <clearance information> is not remembered, THEN Accomplish Goal: Readback clearance by reading
0.1			Method for Goal: Readback clearance by reading
0.1	1		Selection Rule: Method of reading
0.1			Selection Rule for Goal: Method of reading
0.1	1	T	IF clearance is in writing, THEN Accomplish Goal: Read clearance from paper
0.1			Method for Goal: Read clearance from paper
0.51	1	T	Decide: IF paper not visible, THEN move paper
5.8	2	T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on paper aloud and retain <clearance information>, ELSE Read information on paper and retain <clearance information>
0.1	3		Return with goal accomplished
0.1	3		Return with goal accomplished
1.3	2		State call sign
0.1	3		Return with goal accomplished
0.1	3		Return with goal accomplished
0.2	4		Release "Push to talk" button
0.5	5		Return hand to FMS
0.1	6		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	7	F	Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
84.99			Total time

Trace 14 – Task 4, Voice

Equipment: FMS 3
NGOMSL Trace: Cross HELPR at 1800Z at FL190

Assumptions:
Clearance received by voice
When clearance is stated aloud or heard over the radio it is 14 words ("Cross HELPR at one eight zero zero Zulu at flight level one niner zero")
Call sign is stated before audio clearance
Airline call sign is 3 words
Clearance is not written down
Response is sent by voice
Clearance information is remembered when entering the clearance
Desired waypoint is the third waypoint listed on the first page of the flight plan
It takes one mental to determine if non-RTA portion of clearance is acceptable or not
Non-RTA portion of clearance is acceptable and pilot will comply
RTA portion of clearance is acceptable and pilot will comply
Clearance information is remembered during readback
There is clearance information to enter into the FMS
Only one clearance was sent

Time	Action
0.1	Method for Goal: Handle a clearance
0.1	1 Selection Rule: Receive a clearance
0.1	Selection Rule for Goal: Receive a clearance
0.1	2 T IF clearance is audio, THEN Accomplish Goal: Receive a radio clearance
0.1	Method for Goal: Receive a radio clearance
6.9	1 Listen to clearance and retain <clearance information>
0.1	2 F Decide: IF printed clearance is desired, THEN Accomplish Goal: Write down clearance
0.1	3 Return with goal accomplished
0.1	3 Return with goal accomplished
0.1	2 T Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1	Selection Rule for Goal: Respond to a clearance
0.1	1 T IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1	Method for Goal: Respond by voice
0.5	1 Move hand to yoke and "Push to talk" button
0.2	2 Press "Push to talk" button
1.8	3 F Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by <response>
0.2	4 Release "Push to talk" button
0.5	5 Return hand to FMS
0.1	6 Return with goal accomplished

0.1	3		Return with goal accomplished
0.1	3		Accomplish Goal: Enter a clearance
0.1			Method for Goal: Enter a clearance
0.2	1	T	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1	2	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3		Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1	4	T	IF clearance is crossing restriction with RTA, THEN Accomplish Goal: Enter mixed clearance
0.1			Method for Goal: Enter mixed clearance
0.1	1		Accomplish Goal: Enter crossing restriction
0.1			Method for Goal: Enter crossing restriction
0.1	1		Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1	1		Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.82	2		Search for waypoint
0.1	3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1	2	F	Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1	3		Remember <menu key> = "/" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished

0.1		4 T	Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1			Method for Goal: Enter into scratchpad
0.1		1	Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.1		2	Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.1		3 T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2	Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.1		3 F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		4 F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1		5	Return with goal accomplished
0.51	5		Point finger to right line select key next to waypoint
0.38	6		Press and release right line select key next to waypoint
0.1	7		Return with goal accomplished

0.1		2	Accomplish Goal: Enter RTA
0.1			Method for Goal: Enter RTA
0.1		1	Accomplish Goal: Go to RTA page
0.1			Method for Goal: Go to RTA page
0.1		1	Remember <menu key> = "VNAV" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.1		2	Remember <keyword> = "RTA" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		3	Return with goal accomplished
0.1		2	Retain <clearance value> = characters in waypoint and Accomplish Goal: Enter into scratchpad
0.1			Method for Goal: Enter into scratchpad
0.1		1	Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.1		2	Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished

Value	Step	T/F	Description
0.1	3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	4	F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1	5		Return with goal accomplished
0.1	3		Remember <keyword> = "RTA Waypoint" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished

0.1		4		Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1				Method for Goal: Enter into scratchpad
0.1		1		Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3 T		Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3 T		Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3 F		Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		4 F		Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1		5		Return with goal accomplished

0.51			5	Point finger to right line select key next to waypoint
0.38			6	Press and release right line select key next to waypoint
0.1			7	Return with goal accomplished
0.1		3		Return with goal accomplished
0.1		5		Return with goal accomplished
0.1	4			Return with goal accomplished
0.1	4	Selection Rule: Decide on a clearance		
0.1		Selection Rule for Goal: Decide on a clearance		
0.1		3 T		IF clearance includes both RTA and other information, THEN Accomplish Goal: Determine whether mixed clearance is acceptable
0.1		Method for Goal: Determine whether mixed clearance is acceptable		
0.1		1		Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1		Method for Goal: Determine whether non-RTA clearance is acceptable		
1.3		1		Determine whether non-RTA clearance is acceptable
0.2		2 T		Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1		3		Return with goal accomplished
0.1		2 F	Decide: IF <response> = "Unable," THEN Return with goal accomplished	
0.1		3	Accomplish Goal: Determine whether RTA clearance is acceptable	
0.1		Method for Goal: Determine whether RTA clearance is acceptable		
0.1		1 F		Decide: IF not on RTA page, THEN Accomplish Goal: Go to RTA page
1.4		2 T		Decide: IF RTA is between minimum and maximum RTAs, THEN Retain <response> = "Wilco" ELSE Retain <response> = "Unable"
0.1		3		Return with goal accomplished
0.1		4		Return with goal accomplished
0.1	4		Return with goal accomplished	
0.1	5 T	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key		
0.1		Method for Goal: Menu key		
0.51	1	Recall <menu key> and point finger to appropriate menu key		
0.38	2	Press and release appropriate menu key		
0.1	3	Return with goal accomplished		

0.1	6			Selection Rule: Respond to a clearance	
0.1				Selection Rule for Goal: Respond to a clearance	
0.1		1	T	IF responding by voice, THEN Accomplish Goal: Respond by voice	
0.1				Method for Goal: Respond by voice	
0.5			1	Move hand to yoke and "Push to talk" button	
0.2			2	Press "Push to talk" button	
0.2			3 T	Recall \<response\> and Decide: IF \<response\> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by \<response\>	
0.1				Selection Rule for Goal: Method of clearance readback	
0.1				1 T	IF \<clearance information\> is remembered, THEN Accomplish Goal: Readback clearance from memory
0.1				Method for Goal: Readback clearance from memory	
6.9				1	Recall \<clearance information\> and state \<clearance information\> followed by call sign
0.1				2	Return with goal accomplished
0.1			3	Return with goal accomplished	
0.2			4	Release "Push to talk" button	
0.5			5	Return hand to FMS	
0.1			6	Return with goal accomplished	
0.1		3		Return with goal accomplished	
0.1	7	F		Decide: IF there are more clearances, THEN GOTO Step 1	
0.1	8			Return with goal accomplished	
54.22			Total time		

Trace 15 – Task 4, Data Comm

<table>
<tr><td colspan="2">Equipment: FMS 3</td></tr>
<tr><td colspan="2">NGOMSL Trace: Cross HELPR at time 1800Z at FL190</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td colspan="2">Assumptions:</td></tr>
<tr><td colspan="2">Clearance received by data communications (Data Comm)</td></tr>
<tr><td colspan="2">Hands do not start on FMS</td></tr>
<tr><td colspan="2">Entire clearance is read aloud upon receipt</td></tr>
<tr><td colspan="2">When clearance is read from screen page one is 9 words ("Cross HELPR at time one eight zero zero Zulu") and page two is 6 words ("At flight level one niner zero")</td></tr>
<tr><td colspan="2">Clearance is two pages</td></tr>
<tr><td colspan="2">Clearance is printed upon receipt</td></tr>
<tr><td colspan="2">Printer is available</td></tr>
<tr><td colspan="2">Response is sent by FMS</td></tr>
<tr><td colspan="2">Hand is not on FMS after grasping print out</td></tr>
<tr><td colspan="2">Once opened, clearance remains open until clearance information is entered</td></tr>
<tr><td colspan="2">Clearance information is not initially remembered, and must be read aloud, when entering the clearance</td></tr>
<tr><td colspan="2">Paper is not visible after hand moved to FMS</td></tr>
<tr><td colspan="2">When clearance is read from paper it is 15 words ("Cross HELPR at time one eight zero zero Zulu at flight level one niner zero")</td></tr>
<tr><td colspan="2">Hand is not on FMS after reading clearance from paper</td></tr>
<tr><td colspan="2">Desired waypoint is the third waypoint listed on the first page of the flight plan</td></tr>
<tr><td colspan="2">It takes one mental to determine if non-RTA portion of clearance is acceptable or not</td></tr>
<tr><td colspan="2">Non-RTA portion of clearance is acceptable</td></tr>
<tr><td colspan="2">RTA portion of clearance is not acceptable</td></tr>
<tr><td colspan="2">There is no clearance information to enter into the FMS</td></tr>
<tr><td colspan="2">Only one clearance was sent</td></tr>
</table>

Time	Action
0.1	Method for Goal: Handle a clearance
0.1	1 Selection Rule: Receive a clearance
0.1	Selection Rule for Goal: Receive a clearance
0.1	1 T IF clearance is text, THEN Accomplish Goal: Receive an FMS clearance
0.1	Method for Goal: Receive an FMS clearance
0.5	1 T Decide: IF hand not on FMS, THEN move hand to FMS
0.1	2 Accomplish Goal: Open clearance
0.1	Method for Goal: Open clearance
0.1	1 Remember <menu key> = "ATC" and Accomplish Goal: Menu key
0.1	Method for Goal: Menu key
0.51	1 Recall <menu key> and point finger to appropriate menu key
0.38	2 Press and release appropriate menu key
0.1	3 Return with goal accomplished

0.1			2			Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1						Method for Goal: Line select key
0.51				1		Recall <keyword> and point finger to line select key next to keyword
0.38				2		Press and release appropriate line select key
0.1				3		Return with goal accomplished
0.1			3			Return with goal accomplished
0.1		3				Accomplish Goal: Read the clearance
0.1						Method for Goal: Read the clearance
3.8				1	T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and retain <clearance information>
0.1				2	F	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1				3		Remember <menu key> = "Next Page" and Accomplish Goal: Menu key
0.1						Method for Goal: Menu key
0.51					1	Recall <menu key> and point finger to appropriate menu key
0.38					2	Press and release appropriate menu key
0.1					3	Return with goal accomplished
0.1				4		GOTO Step 1
2.6				1	T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and retain <clearance information>
0.1				2	T	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1			4	T		Decide: IF printed clearance is desired, THEN Selection Rule: Get printed copy
0.1						Selection Rule for Goal: Get printed copy
0.1				1	T	IF printer is available, THEN Accomplish Goal: Print the clearance
0.1						Method for Goal: Print the clearance
0.1				1		Remember <keyword> = "Print" and Accomplish Goal: Line select key
0.1						Method for Goal: Line select key
0.51					1	Recall <keyword> and point finger to line select key next to keyword
0.38					2	Press and release appropriate line select key
0.1					3	Return with goal accomplished

Value						Flag	Description
0.51					2		Reach for print out
0.8					3		Grasp print out
0.51					4		Transport paper to reading position
0.1					5		Return with goal accomplished
0.1				3			Return with goal accomplished
0.1			5				Return with goal accomplished
0.1		3					Return with goal accomplished
0.1	2					T	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1							Selection Rule for Goal: Respond to a clearance
0.1		2				T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1							Method for Goal: Respond by FMS
0.5			1			T	Decide: If hand not on FMS, THEN move hand to FMS
0.1			2			F	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1			3				Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1							Method for Goal: Line select key
0.51				1			Recall <keyword> and point finger to line select key next to keyword
0.38				2			Press and release appropriate line select key
0.1				3			Return with goal accomplished
0.1			4				Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1							Method for Goal: Line select key
0.51				1			Recall <keyword> and point finger to line select key next to keyword
0.38				2			Press and release appropriate line select key
0.1				3			Return with goal accomplished
0.1			5				Return with goal accomplished
0.1		3					Return with goal accomplished
0.1	3						Accomplish Goal: Enter a clearance
0.1							Method for Goal: Enter a clearance
0.2		1				F	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1							Selection Rule for Goal: Method of reading
0.1			1			T	IF clearance is in writing, THEN Accomplish Goal: Read clearance from paper
0.1							Method for Goal: Read clearance from paper
0.51				1		T	Decide: IF paper not visible, THEN move paper
6.2				2		T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on paper aloud and retain <clearance information>, ELSE Read information on paper and retain <clearance information>
0.1				3			Return with goal accomplished
0.1			3				Return with goal accomplished

0.5	2 T			Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3			Selection Rule: Specific clearance type
0.1				Selection Rule for Goal: Specific clearance type
0.1		4 T		IF clearance is crossing restriction with RTA, THEN Accomplish Goal: Enter mixed clearance
0.1				Method for Goal: Enter mixed clearance
0.1		1		Accomplish Goal: Enter crossing restriction
0.1				Method for Goal: Enter crossing restriction
0.1			1	Accomplish Goal: Locate waypoint
0.1				Method for Goal: Locate waypoint
0.1			1	Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.82			2	Search for waypoint
0.1			3 T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1		2 F		Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1		3		Remember <menu key> = "/" and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		4 T		Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1				Method for Goal: Enter into scratchpad
0.1			1	Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished

Time						Description
0.1			2			Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1						Method for Goal: Menu key
0.51				1		Recall <menu key> and point finger to appropriate menu key
0.38				2		Press and release appropriate menu key
0.1				3		Return with goal accomplished
0.1			3		T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			2			Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1						Method for Goal: Menu key
0.51				1		Recall <menu key> and point finger to appropriate menu key
0.38				2		Press and release appropriate menu key
0.1				3		Return with goal accomplished
0.1			3		F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			4		F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1			5			Return with goal accomplished
0.51		5				Point finger to right line select key next to waypoint
0.38		6				Press and release right line select key next to waypoint
0.1		7				Return with goal accomplished
0.1	2					Accomplish Goal: Enter RTA
0.1						Method for Goal: Enter RTA
0.1		1				Accomplish Goal: Go to RTA page
0.1						Method for Goal: Go to RTA page
0.1			1			Remember <menu key> = "VNAV" and Accomplish Goal: Menu key
0.1						Method for Goal: Menu key
0.51				1		Recall <menu key> and point finger to appropriate menu key
0.38				2		Press and release appropriate menu key
0.1				3		Return with goal accomplished

Value				Operator / Step
0.1		2		Remember <keyword> = "RTA" and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51			1	Recall <keyword> and point finger to line select key next to keyword
0.38			2	Press and release appropriate line select key
0.1			3	Return with goal accomplished
0.1		3		Return with goal accomplished
0.1	2			Retain <clearance value> = characters in waypoint and Accomplish Goal: Enter into scratchpad
0.1				Method for Goal: Enter into scratchpad
0.1		1		Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished

0.1			3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1			3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1			3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			4	F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1			5		Return with goal accomplished
0.1		3			Remember <keyword> = "RTA Waypoint" and Accomplish Goal: Line select key
0.1					Method for Goal: Line select key
0.51			1		Recall <keyword> and point finger to line select key next to keyword
0.38			2		Press and release appropriate line select key
0.1			3		Return with goal accomplished
0.1		4			Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1					Method for Goal: Enter into scratchpad
0.1			1		Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished

Value							Description
0.1				2			Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1							Method for Goal: Menu key
0.51					1		Recall <menu key> and point finger to appropriate menu key
0.38					2		Press and release appropriate menu key
0.1					3		Return with goal accomplished
0.1				3		T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1				2			Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1							Method for Goal: Menu key
0.51					1		Recall <menu key> and point finger to appropriate menu key
0.38					2		Press and release appropriate menu key
0.1					3		Return with goal accomplished
0.1				3		T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1				2			Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1							Method for Goal: Menu key
0.51					1		Recall <menu key> and point finger to appropriate menu key
0.38					2		Press and release appropriate menu key
0.1					3		Return with goal accomplished
0.1				3		F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1				4		F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1				5			Return with goal accomplished
0.51			5				Point finger to right line select key next to waypoint
0.38			6				Press and release right line select key next to waypoint
0.1			7				Return with goal accomplished
0.1		3					Return with goal accomplished
0.1		5					Return with goal accomplished
0.1	4						Return with goal accomplished

Value							Description
0.1	4						Selection Rule: Decide on a clearance
0.1							Selection Rule for Goal: Decide on a clearance
0.1		3				T	IF clearance includes both RTA and other information, THEN Accomplish Goal: Determine whether mixed clearance is acceptable
0.1							Method for Goal: Determine whether mixed clearance is acceptable
0.1			1				Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1							Method for Goal: Determine whether non-RTA clearance is acceptable
1.3				1			Determine whether non-RTA clearance is acceptable
0.2				2		T	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1				3			Return with goal accomplished
0.1			2			F	Decide: IF <response> = "Unable," THEN Return with goal accomplished
0.1			3				Accomplish Goal: Determine whether RTA clearance is acceptable
0.1							Method for Goal: Determine whether RTA clearance is acceptable
0.1				1		F	Decide: IF not on RTA page, THEN Accomplish Goal: Go to RTA page
1.4				2		F	Decide: IF RTA is between minimum and maximum RTAs, THEN Retain <response> = "Wilco" ELSE Retain <response> = "Unable"
0.1				3			Return with goal accomplished
0.1			4				Return with goal accomplished
0.1		4					Return with goal accomplished
0.1	5					F	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key
0.1	6						Selection Rule: Respond to a clearance
0.1							Selection Rule for Goal: Respond to a clearance
0.1		2				T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1							Method for Goal: Respond by FMS
0.1			1			F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1			2			T	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1							Method for Goal: Open clearance
0.1				1			Remember <menu key> = "ATC" and Accomplish Goal: Menu key
0.1							Method for Goal: Menu key
0.51					1		Recall <menu key> and point finger to appropriate menu key
0.38					2		Press and release appropriate menu key
0.1					3		Return with goal accomplished
0.1				2			Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1							Method for Goal: Line select key
0.51					1		Recall <keyword> and point finger to line select key next to keyword
0.38					2		Press and release appropriate line select key
0.1					3		Return with goal accomplished
0.1			3				Return with goal accomplished

0.1		3	Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		4	Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		5	Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	7	F	Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
64.56			Total time

Trace 16 – Task 4, Data Comm

Equipment: FMS 3
NGOMSL Trace: Cross HELPR at time 1800Z at FL190

Assumptions:
Clearance received by data communications (Data Comm)
Hands start on FMS
Entire clearance is read aloud upon receipt
When clearance is read from screen page one is 9 words ("Cross HELPR at time one eight zero zero Zulu")
and page two is 6 words ("At flight level one niner zero")
Clearance is two pages
Clearance is not printed upon receipt
Response is sent by FMS
Once opened, clearance remains open until clearance information is entered
Clearance information is remembered when entering the clearance
Desired waypoint is the third waypoint listed on the first page of the flight plan
It takes one mental to determine if non-RTA portion of clearance is acceptable or not
Non-RTA portion of clearance is acceptable
RTA portion of clearance is not acceptable
There is no clearance information to enter into the FMS
Only one clearance was sent

Time	Action				
0.1	Method for Goal: Handle a clearance				
0.1	1	Selection Rule: Receive a clearance			
0.1		Selection Rule for Goal: Receive a clearance			
0.1		1	T	IF clearance is text, THEN Accomplish Goal: Receive an FMS clearance	
0.1			Method for Goal: Receive an FMS clearance		
0.1			1	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1			2	Accomplish Goal: Open clearance	
0.1				Method for Goal: Open clearance	
0.1				1	Remember <menu key> = "ATC" and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51					1 Recall <menu key> and point finger to appropriate menu key
0.38					2 Press and release appropriate menu key
0.1					3 Return with goal accomplished
0.1				2	Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1					Method for Goal: Line select key
0.51					1 Recall <keyword> and point finger to line select key next to keyword
0.38					2 Press and release appropriate line select key
0.1					3 Return with goal accomplished

Value	L1	L2	L3	L4	T/F	Description
0.1				3		Return with goal accomplished
0.1		3				Accomplish Goal: Read the clearance
0.1						Method for Goal: Read the clearance
3.8			1		T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and retain <clearance information>
0.1			2		F	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1			3			Remember <menu key> = "Next Page" and Accomplish Goal: Menu key
0.1						Method for Goal: Menu key
0.51				1		Recall <menu key> and point finger to appropriate menu key
0.38				2		Press and release appropriate menu key
0.1				3		Return with goal accomplished
0.1			4			GOTO Step 1
2.6			1		T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and retain <clearance information>
0.1			2		T	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1			4		F	Decide: IF printed clearance is desired, THEN Selection Rule: Get printed copy
0.1			5			Return with goal accomplished
0.1		3				Return with goal accomplished
0.1	2				T	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1						Selection Rule for Goal: Respond to a clearance
0.1		2			T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1						Method for Goal: Respond by FMS
0.1			1		F	Decide: If hand not on FMS, THEN move hand to FMS
0.1			2		F	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1			3			Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1						Method for Goal: Line select key
0.51				1		Recall <keyword> and point finger to line select key next to keyword
0.38				2		Press and release appropriate line select key
0.1				3		Return with goal accomplished

0.1			4	Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51				1 Recall <keyword> and point finger to line select key next to keyword
0.38				2 Press and release appropriate line select key
0.1				3 Return with goal accomplished
0.1			5	Return with goal accomplished
0.1		3		Return with goal accomplished
0.1	3			Accomplish Goal: Enter a clearance
0.1				Method for Goal: Enter a clearance
0.2		1 T		Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1		2 F		Decide: IF hand not on FMS, THEN move hand to FMS
0.1		3		Selection Rule: Specific clearance type
0.1				Selection Rule for Goal: Specific clearance type
0.1			4 T	IF clearance is crossing restriction with RTA, THEN Accomplish Goal: Enter mixed clearance
0.1				Method for Goal: Enter mixed clearance
0.1			1	Accomplish Goal: Enter crossing restriction
0.1				Method for Goal: Enter crossing restriction
0.1				1 Accomplish Goal: Locate waypoint
0.1				Method for Goal: Locate waypoint
0.1				1 Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51				1 Recall <menu key> and point finger to appropriate menu key
0.38				2 Press and release appropriate menu key
0.1				3 Return with goal accomplished
0.82				2 Search for waypoint
0.1				3 T Decide: IF waypoint is found, THEN Return with goal accomplished
0.1				2 F Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1				3 Remember <menu key> = "/" and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51				1 Recall <menu key> and point finger to appropriate menu key
0.38				2 Press and release appropriate menu key
0.1				3 Return with goal accomplished

0.1	4	T	Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1			Method for Goal: Enter into scratchpad
0.1	1		Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	4	F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1	5		Return with goal accomplished
0.51	5		Point finger to right line select key next to waypoint
0.38	6		Press and release right line select key next to waypoint
0.1	7		Return with goal accomplished

0.1		2	Accomplish Goal: Enter RTA
0.1			Method for Goal: Enter RTA
0.1		1	Accomplish Goal: Go to RTA page
0.1			Method for Goal: Go to RTA page
0.1		1	Remember <menu key> = "VNAV" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.1		2	Remember <keyword> = "RTA" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		3	Return with goal accomplished
0.1		2	Retain <clearance value> = characters in waypoint and Accomplish Goal: Enter into scratchpad
0.1			Method for Goal: Enter into scratchpad
0.1		1	Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.1		2	Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished

0.1		3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		4	F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1		5		Return with goal accomplished
0.1	3			Remember <keyword> = "RTA Waypoint" and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51		1		Recall <keyword> and point finger to line select key next to keyword
0.38		2		Press and release appropriate line select key
0.1		3		Return with goal accomplished

0.1		4	Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1			Method for Goal: Enter into scratchpad
0.1		1	Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.1		2	Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.1		3 T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2	Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.1		3 T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2	Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished

Value	Description
0.1	3 F Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	4 F Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.51	5 Point finger to right line select key next to waypoint
0.38	6 Press and release right line select key next to waypoint
0.1	7 Return with goal accomplished
0.1	3 Return with goal accomplished
0.1	5 Return with goal accomplished
0.1	4 Return with goal accomplished
0.1	4 Selection Rule: Decide on a clearance
0.1	Selection Rule for Goal: Decide on a clearance
0.1	3 T IF clearance includes both RTA and other information, THEN Accomplish Goal: Determine whether mixed clearance is acceptable
0.1	Method for Goal: Determine whether mixed clearance is acceptable
0.1	1 Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1	Method for Goal: Determine whether non-RTA clearance is acceptable
1.3	1 Determine whether non-RTA clearance is acceptable
0.2	2 T Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1	3 Return with goal accomplished
0.1	2 F Decide: IF <response> = "Unable," THEN Return with goal accomplished
0.1	3 Accomplish Goal: Determine whether RTA clearance is acceptable
0.1	Method for Goal: Determine whether RTA clearance is acceptable
0.1	1 F Decide: IF not on RTA page, THEN Accomplish Goal: Go to RTA page
1.4	2 F Decide: IF RTA is between minimum and maximum RTAs, THEN Retain <response> = "Wilco" ELSE Retain <response> = "Unable"
0.1	3 Return with goal accomplished
0.1	4 Return with goal accomplished
0.1	4 Return with goal accomplished

0.1	5	F	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key
0.1	6		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1	2	T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1			Method for Goal: Respond by FMS
0.1	1	F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	2	T	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1			Method for Goal: Open clearance
0.1	1		Remember <menu key> = "ATC" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	2		Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	3		Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	4		Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keyword
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	5		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	7	F	Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
52.54			Total time

Trace 17 – Task 5, Voice

Equipment: FMS 3

NGOMSL Trace: Cross HELPR at 1800Z at or above FL190

Assumptions:

Clearance received by voice

When clearance is read from paper or heard over the radio it is 16 words ("Cross HELPR at one eight zero zero Zulu at or above flight level one niner zero")

Call sign is stated before audio clearance

Airline call sign is 3 words

Clearance is written down

Paper is available

Pen is not in hand

Clearance is written as 8 words ("Cross HELPR at 1800Z at or above FL190")

Response is sent by voice

Clearance information is not initially remembered, and must be read aloud, when entering the clearance

Paper is not visible after hand moved to FMS

Hand is not on FMS after reading clearance from paper

Desired waypoint is the third waypoint listed on the first page of the flight plan

It takes one mental to determine if non-RTA portion of clearance is acceptable or not

Non-RTA portion of clearance is acceptable and pilot will comply

RTA portion of clearance is acceptable and pilot will comply

There is clearance information to enter into the FMS

Clearance information is remembered during readback

Only one clearance was sent

Time	Action				
0.1	Method for Goal: Handle a clearance				
0.1	1		Selection Rule: Receive a clearance		
0.1			Selection Rule for Goal: Receive a clearance		
0.1		2	T	IF clearance is audio, THEN Accomplish Goal: Receive a radio clearance	
0.1				Method for Goal: Receive a radio clearance	
7.7				1	Listen to clearance and retain <clearance information>
0.1				2	T	Decide: IF printed clearance is desired, THEN Accomplish Goal: Write down clearance
0.1					Method for Goal: Write down clearance
0.1					1	F	Decide: IF paper is not readily available, THEN Accomplish Goal: Obtain paper
0.1					2	T	Decide: IF pen is not in hand, THEN Accomplish Goal: Obtain pen

Time			Description
0.1			Method for Goal: Obtain pen
0.51		1	Reach for pen
0.8		2	Grasp pen
0.51		3	Transport pen to paper
0.16		4	Position the pen over paper
0.1		5	Return with goal accomplished
21.7		3	Recall <clearance information> and write <clearance information>
0.51		4	Return pen to original location
0.17		5	Release pen
0.5		6	Move hand back to starting location
0.1		7	Return with goal accomplished
0.1		3	Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	2 T		Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1	1 T		IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1			Method for Goal: Respond by voice
0.5		1	Move hand to yoke and "Push to talk" button
0.2		2	Press "Push to talk" button
1.8		3 F	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by <response>
0.2		4	Release "Push to talk" button
0.5		5	Return hand to FMS
0.1		6	Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	3	Accomplish Goal: Enter a clearance	
0.1		Method for Goal: Enter a clearance	
0.2	1 F		Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1			Selection Rule for Goal: Method of reading
0.1	1 T		IF clearance is in writing, THEN Accomplish Goal: Read clearance from paper
0.1			Method for Goal: Read clearance from paper
0.51		1 T	Decide: IF paper not visible, THEN move paper
6.6		2 T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on paper aloud and retain <clearance information>, ELSE Read information on paper and retain <clearance information>
0.1		3	Return with goal accomplished
0.1	3		Return with goal accomplished

0.5	2	T		Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3			Selection Rule: Specific clearance type
0.1				Selection Rule for Goal: Specific clearance type
0.1	4	T		IF clearance is crossing restriction with RTA, THEN Accomplish Goal: Enter mixed clearance
0.1				Method for Goal: Enter mixed clearance
0.1	1			Accomplish Goal: Enter crossing restriction
0.1				Method for Goal: Enter crossing restriction
0.1	1			Accomplish Goal: Locate waypoint
0.1				Method for Goal: Locate waypoint
0.1	1			Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51	1			Recall <menu key> and point finger to appropriate menu key
0.38	2			Press and release appropriate menu key
0.1	3			Return with goal accomplished
0.82	2			Search for waypoint
0.1	3	T		Decide: IF waypoint is found, THEN Return with goal accomplished
0.1	2	F		Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1	3			Remember <menu key> = "/" and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51	1			Recall <menu key> and point finger to appropriate menu key
0.38	2			Press and release appropriate menu key
0.1	3			Return with goal accomplished
0.1	4	T		Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1				Method for Goal: Enter into scratchpad
0.1	1			Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51	1			Recall <menu key> and point finger to appropriate menu key
0.38	2			Press and release appropriate menu key
0.1	3			Return with goal accomplished

0.1			2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1			3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1			3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			4	T	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1					Selection Rule for Goal: At and above or below
0.1			1	T	IF restriction is at or above, THEN Remember <menu key> = "A" and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1			3		Return with goal accomplished
0.1			5		Return with goal accomplished
0.51		5			Point finger to right line select key next to waypoint
0.38		6			Press and release right line select key next to waypoint
0.1		7			Return with goal accomplished

0.1		2	Accomplish Goal: Enter RTA
0.1			Method for Goal: Enter RTA
0.1			1 Accomplish Goal: Go to RTA page
0.1			Method for Goal: Go to RTA page
0.1			1 Remember <menu key> = "VNAV" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51			1 Recall <menu key> and point finger to appropriate menu key
0.38			2 Press and release appropriate menu key
0.1			3 Return with goal accomplished
0.1			2 Remember <keyword> = "RTA" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51			1 Recall <keyword> and point finger to line select key next to keyword
0.38			2 Press and release appropriate line select key
0.1			3 Return with goal accomplished
0.1			3 Return with goal accomplished
0.1		2	Retain <clearance value> = characters in waypoint and Accomplish Goal: Enter into scratchpad
0.1			Method for Goal: Enter into scratchpad
0.1			1 Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51			1 Recall <menu key> and point finger to appropriate menu key
0.38			2 Press and release appropriate menu key
0.1			3 Return with goal accomplished
0.1			2 Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51			1 Recall <menu key> and point finger to appropriate menu key
0.38			2 Press and release appropriate menu key
0.1			3 Return with goal accomplished

0.1		3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2		Remember \<menu key\> = next digit/character in \<clearance value\> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall \<menu key\> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2		Remember \<menu key\> = next digit/character in \<clearance value\> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall \<menu key\> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2		Remember \<menu key\> = next digit/character in \<clearance value\> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall \<menu key\> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		4	F	Decide: IF \<clearance value\> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1		5		Return with goal accomplished
0.1	3			Remember \<keyword\> = "RTA Waypoint" and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51		1		Recall \<keyword\> and point finger to line select key next to keyword
0.38		2		Press and release appropriate line select key
0.1		3		Return with goal accomplished

Value	Step	T/F	Description
0.1	4		Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1			Method for Goal: Enter into scratchpad
0.1	1		Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	4	F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1	5		Return with goal accomplished

0.51					5	Point finger to right line select key next to waypoint
0.38					6	Press and release right line select key next to waypoint
0.1					7	Return with goal accomplished
0.1				3		Return with goal accomplished
0.1			5			Return with goal accomplished
0.1		4				Return with goal accomplished
0.1	4		Selection Rule: Decide on a clearance			
0.1			Selection Rule for Goal: Decide on a clearance			
0.1		3	T			IF clearance includes both RTA and other information, THEN Accomplish Goal: Determine whether mixed clearance is acceptable
0.1			Method for Goal: Determine whether mixed clearance is acceptable			
0.1			1			Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1				Method for Goal: Determine whether non-RTA clearance is acceptable		
1.3				1		Determine whether non-RTA clearance is acceptable
0.2				2	T	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1				3		Return with goal accomplished
0.1			2	F		Decide: IF <response> = "Unable," THEN Return with goal accomplished
0.1			3			Accomplish Goal: Determine whether RTA clearance is acceptable
0.1				Method for Goal: Determine whether RTA clearance is acceptable		
0.1				1	F	Decide: IF not on RTA page, THEN Accomplish Goal: Go to RTA page
1.4				2	T	Decide: IF RTA is between minimum and maximum RTAs, THEN Retain <response> = "Wilco" ELSE Retain <response> = "Unable"
0.1				3		Return with goal accomplished
0.1			4			Return with goal accomplished
0.1		4				Return with goal accomplished
0.1	5	T	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key			
0.1			Method for Goal: Menu key			
0.51		1	Recall <menu key> and point finger to appropriate menu key			
0.38		2	Press and release appropriate menu key			
0.1		3	Return with goal accomplished			

Time							Description
0.1	6						Selection Rule: Respond to a clearance
0.1							Selection Rule for Goal: Respond to a clearance
0.1		1				T	IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1							Method for Goal: Respond by voice
0.5			1				Move hand to yoke and "Push to talk" button
0.2			2				Press "Push to talk" button
0.2			3			T	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by <response>
0.1							Selection Rule for Goal: Method of clearance readback
0.1				1		T	IF <clearance information> is remembered, THEN Accomplish Goal: Readback clearance from memory
0.1							Method for Goal: Readback clearance from memory
7.7					1		Recall <clearance information> and state <clearance information> followed by call sign
0.1					2		Return with goal accomplished
0.1				3			Return with goal accomplished
0.2			4				Release "Push to talk" button
0.5			5				Return hand to FMS
0.1			6				Return with goal accomplished
0.1		3					Return with goal accomplished
0.1	7					F	Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8						Return with goal accomplished
90.68							Total time

Trace 18 – Task 5, Voice

Equipment: FMS 3

NGOMSL Trace: Cross HELPR at 1800Z at or above FL190

Assumptions:

Clearance received by voice

When clearance is stated aloud or heard over the radio it is 16 words ("Cross HELPR at one eight zero zero Zulu at or above flight level one niner zero")

Call sign is stated before audio clearance

Airline call sign is 3 words

Clearance is not written down

Response is sent by voice

Clearance information is remembered when entering the clearance

Desired waypoint is the third waypoint listed on the first page of the flight plan

It takes one mental to determine if non-RTA portion of clearance is acceptable or not

Non-RTA portion of clearance is acceptable and pilot will comply

RTA portion of clearance is acceptable and pilot will comply

There is clearance information to enter into the FMS

Clearance information is remembered during readback

Only one clearance was sent

Time	Action				
0.1	Method for Goal: Handle a clearance				
0.1	1				Selection Rule: Receive a clearance
0.1					Selection Rule for Goal: Receive a clearance
0.1		2	T		IF clearance is audio, THEN Accomplish Goal: Receive a radio clearance
0.1					Method for Goal: Receive a radio clearance
7.7				1	Listen to clearance and retain <clearance information>
0.1				2	F Decide: IF printed clearance is desired, THEN Accomplish Goal: Write down clearance
0.1				3	Return with goal accomplished
0.1			3		Return with goal accomplished
0.1	2	T			Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1					Selection Rule for Goal: Respond to a clearance
0.1			1	T	IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1					Method for Goal: Respond by voice
0.5				1	Move hand to yoke and "Push to talk" button
0.2				2	Press "Push to talk" button
1.8				3	F Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by <response>
0.2				4	Release "Push to talk" button
0.5				5	Return hand to FMS
0.1				6	Return with goal accomplished

0.1		3	Return with goal accomplished
0.1	3		Accomplish Goal: Enter a clearance
0.1			Method for Goal: Enter a clearance
0.2		1 T	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1		2 F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1		3	Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1		4 T	IF clearance is crossing restriction with RTA, THEN Accomplish Goal: Enter mixed clearance
0.1			Method for Goal: Enter mixed clearance
0.1		1	Accomplish Goal: Enter crossing restriction
0.1			Method for Goal: Enter crossing restriction
0.1		1	Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1		1	Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.82		2	Search for waypoint
0.1		3 T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1		2 F	Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1		3	Remember <menu key> = "/" and Accomplish Goal: Menu k
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.1		4 T	Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1			Method for Goal: Enter into scratchpad
0.1		1	Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished

0.1		2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		4	T	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1				Selection Rule for Goal: At and above or below
0.1		1	T	IF restriction is at or above, THEN Remember <menu key> = "A" and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1			3	Return with goal accomplished
0.1		5		Return with goal accomplished
0.51	5			Point finger to right line select key next to waypoint
0.38	6			Press and release right line select key next to waypoint
0.1	7			Return with goal accomplished

0.1		2	Accomplish Goal: Enter RTA
0.1			Method for Goal: Enter RTA
0.1		1	Accomplish Goal: Go to RTA page
0.1			Method for Goal: Go to RTA page
0.1		1	Remember <menu key> = "VNAV" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.1		2	Remember <keyword> = "RTA" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		3	Return with goal accomplished
0.1		2	Retain <clearance value> = characters in waypoint and Accomplish Goal: Enter into scratchpad
0.1			Method for Goal: Enter into scratchpad
0.1		1	Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.1		2	Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished

0.1		3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		4	F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1		5		Return with goal accomplished
0.1	3			Remember <keyword> = "RTA Waypoint" and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51		1		Recall <keyword> and point finger to line select key next to keyword
0.38		2		Press and release appropriate line select key
0.1		3		Return with goal accomplished

0.1		4		Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1				Method for Goal: Enter into scratchpad
0.1		1		Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3 T		Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3 T		Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3 F		Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		4 F		Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1		5		Return with goal accomplished

0.51	5	Point finger to right line select key next to waypoint
0.38	6	Press and release right line select key next to waypoint
0.1	7	Return with goal accomplished
0.1	3	Return with goal accomplished
0.1	5	Return with goal accomplished
0.1	4	Return with goal accomplished
0.1	4	Selection Rule: Decide on a clearance
0.1		Selection Rule for Goal: Decide on a clearance
0.1	3 T	IF clearance includes both RTA and other information, THEN Accomplish Goal: Determine whether mixed clearance is acceptable
0.1		Method for Goal: Determine whether mixed clearance is acceptable
0.1	1	Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1		Method for Goal: Determine whether non-RTA clearance is acceptable
1.3	1	Determine whether non-RTA clearance is acceptable
0.2	2 T	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1	3	Return with goal accomplished
0.1	2 F	Decide: IF <response> = "Unable," THEN Return with goal accomplished
0.1	3	Accomplish Goal: Determine whether RTA clearance is acceptable
0.1		Method for Goal: Determine whether RTA clearance is acceptable
0.1	1 F	Decide: IF not on RTA page, THEN Accomplish Goal: Go to RTA page
1.4	2 T	Decide: IF RTA is between minimum and maximum RTAs, THEN Retain <response> = "Wilco" ELSE Retain <response> = "Unable"
0.1	3	Return with goal accomplished
0.1	4	Return with goal accomplished
0.1	4	Return with goal accomplished
0.1	5 T	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key
0.1		Method for Goal: Menu key
0.51	1	Recall <menu key> and point finger to appropriate menu key
0.38	2	Press and release appropriate menu key
0.1	3	Return with goal accomplished

Time	Step	Flag	Description
0.1	6		Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1	1	T	IF responding by voice, THEN Accomplish Goal: Respond by voice
0.1			Method for Goal: Respond by voice
0.5	1		Move hand to yoke and "Push to talk" button
0.2	2		Press "Push to talk" button
0.2	3	T	Recall <response> and Decide: IF <response> = "Wilco," THEN Selection Rule: Method of clearance readback, ELSE state call sign followed by <response>
0.1			Selection Rule for Goal: Method of clearance readback
0.1	1	T	IF <clearance information> is remembered, THEN Accomplish Goal: Readback clearance from memory
0.1			Method for Goal: Readback clearance from memory
7.7	1		Recall <clearance information> and state <clearance information> followed by call sign
0.1	2		Return with goal accomplished
0.1	3		Return with goal accomplished
0.2	4		Release "Push to talk" button
0.5	5		Return hand to FMS
0.1	6		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	7	F	Decide: IF there are more clearances, THEN GOTO Step 1
0.1	8		Return with goal accomplished
57.21			Total time

Trace 19 – Task 5, Data Comm

Equipment: FMS 3
NGOMSL Trace: Cross HELPR at time 1800Z at or above FL190

Assumptions:
Clearance received by data communications (Data Comm)
Hands do not start on FMS
Entire clearance is read aloud upon receipt
When clearance is read from screen page one is 9 words ("Cross HELPR at time one eight zero zero Zulu") and page two is 8 words ("At or above flight level one niner zero")
Clearance is two pages
Clearance is printed upon receipt
Printer is available
Response is sent by FMS
Hand is not on FMS after grasping print out
Once opened, clearance remains open until clearance information is entered
Clearance information is not initially remembered, and must be read aloud, when entering the clearance
Paper is not visible after hand moved to FMS
When clearance is read from paper it is 17 words ("Cross HELPR at time one eight zero zero Zulu at or above flight level one niner zero")
Hand is not on FMS after reading clearance from paper
Desired waypoint is the third waypoint listed on the first page of the flight plan
It takes one mental to determine if non-RTA portion of clearance is acceptable or not
Non-RTA portion of clearance is acceptable and pilot will comply
RTA portion of clearance is acceptable and pilot will comply
There is clearance information to enter into the FMS
Only one clearance was sent

Time	Action
0.1	Method for Goal: Handle a clearance
0.1	1 Selection Rule: Receive a clearance
0.1	Selection Rule for Goal: Receive a clearance
0.1	1 T IF clearance is text, THEN Accomplish Goal: Receive an FMS clearance
0.1	Method for Goal: Receive an FMS clearance
0.5	1 T Decide: IF hand not on FMS, THEN move hand to FMS
0.1	2 Accomplish Goal: Open clearance
0.1	Method for Goal: Open clearance
0.1	1 Remember <menu key> = "ATC" and Accomplish Goal: Menu key
0.1	Method for Goal: Menu key
0.51	1 Recall <menu key> and point finger to appropriate menu ke
0.38	2 Press and release appropriate menu key
0.1	3 Return with goal accomplished

Time	S1	S2	S3	S4	T/F	Description
0.1		2				Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1						Method for Goal: Line select key
0.51			1			Recall <keyword> and point finger to line select key next to keyword
0.38			2			Press and release appropriate line select key
0.1			3			Return with goal accomplished
0.1		3				Return with goal accomplished
0.1	3					Accomplish Goal: Read the clearance
0.1						Method for Goal: Read the clearance
3.8		1			T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and retain <clearance information>
0.1		2			F	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1		3				Remember <menu key> = "Next Page" and Accomplish Goal: Menu key
0.1						Method for Goal: Menu key
0.51			1			Recall <menu key> and point finger to appropriate menu key
0.38			2			Press and release appropriate menu key
0.1			3			Return with goal accomplished
0.1		4				GOTO Step 1
3.4		1			T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and retain <clearance information>
0.1		2			T	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1	4				T	Decide: IF printed clearance is desired, THEN Selection Rule: Get printed copy
0.1						Selection Rule for Goal: Get printed copy
0.1		1			T	IF printer is available, THEN Accomplish Goal: Print the clearance
0.1						Method for Goal: Print the clearance
0.1			1			Remember <keyword> = "Print" and Accomplish Goal: Line select key
0.1						Method for Goal: Line select key
0.51				1		Recall <keyword> and point finger to line select key next to keyword
0.38				2		Press and release appropriate line select key
0.1				3		Return with goal accomplished

0.51		2	Reach for print out
0.8		3	Grasp print out
0.51		4	Transport paper to reading position
0.1		5	Return with goal accomplished
0.1		3	Return with goal accomplished
0.1		5	Return with goal accomplished
0.1		3	Return with goal accomplished
0.1	2 T		Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1		2 T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1			Method for Goal: Respond by FMS
0.5		1 T	Decide: If hand not on FMS, THEN move hand to FMS
0.1		2 F	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1		3	Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keywor
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		4	Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keywor
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		5	Return with goal accomplished
0.1		3	Return with goal accomplished
0.1	3		Accomplish Goal: Enter a clearance
0.1			Method for Goal: Enter a clearance
0.2		1 F	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading
0.1			Selection Rule for Goal: Method of reading
0.1		1 T	IF clearance is in writing, THEN Accomplish Goal: Read clearance from paper
0.1			Method for Goal: Read clearance from paper
0.51		1 T	Decide: IF paper not visible, THEN move paper
7		2 T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on paper aloud and retain <clearance information>, ELSE Read information on paper and retain <clearance information>
0.1		3	Return with goal accomplished
0.1		3	Return with goal accomplished

Value	Level	Flag	Description
0.5	2	T	Decide: IF hand not on FMS, THEN move hand to FMS
0.1	3		Selection Rule: Specific clearance type
0.1			Selection Rule for Goal: Specific clearance type
0.1	4	T	IF clearance is crossing restriction with RTA, THEN Accomplish Goal: Enter mixed clearance
0.1			Method for Goal: Enter mixed clearance
0.1	1		Accomplish Goal: Enter crossing restriction
0.1			Method for Goal: Enter crossing restriction
0.1	1		Accomplish Goal: Locate waypoint
0.1			Method for Goal: Locate waypoint
0.1	1		Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.82	2		Search for waypoint
0.1	3	T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1	2	F	Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1	3		Remember <menu key> = "/" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	4	T	Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1			Method for Goal: Enter into scratchpad
0.1	1		Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished

0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	4	T	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1			Selection Rule for Goal: At and above or below
0.1	1	T	IF restriction is at or above, THEN Remember <menu key> = "A" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	5		Return with goal accomplished
0.51	5		Point finger to right line select key next to waypoint
0.38	6		Press and release right line select key next to waypoint
0.1	7		Return with goal accomplished

0.1		2	Accomplish Goal: Enter RTA
0.1			Method for Goal: Enter RTA
0.1		1	Accomplish Goal: Go to RTA page
0.1			Method for Goal: Go to RTA page
0.1		1	Remember <menu key> = "VNAV" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.1		2	Remember <keyword> = "RTA" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51		1	Recall <keyword> and point finger to line select key next to keyword
0.38		2	Press and release appropriate line select key
0.1		3	Return with goal accomplished
0.1		3	Return with goal accomplished
0.1		2	Retain <clearance value> = characters in waypoint and Accomplish Goal: Enter into scratchpad
0.1			Method for Goal: Enter into scratchpad
0.1		1	Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished
0.1		2	Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51		1	Recall <menu key> and point finger to appropriate menu key
0.38		2	Press and release appropriate menu key
0.1		3	Return with goal accomplished

0.1			3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1			3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1			3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1			3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1			4	F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1			5		Return with goal accomplished
0.1		3			Remember <keyword> = "RTA Waypoint" and Accomplish Goal: Line select key
0.1					Method for Goal: Line select key
0.51			1		Recall <keyword> and point finger to line select key next to keyword
0.38			2		Press and release appropriate line select key
0.1			3		Return with goal accomplished

0.1	4		Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1			Method for Goal: Enter into scratchpad
0.1	1		Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	4	F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1	5		Return with goal accomplished

Value	Step	Description
0.51	5	Point finger to right line select key next to waypoint
0.38	6	Press and release right line select key next to waypoint
0.1	7	Return with goal accomplished
0.1	3	Return with goal accomplished
0.1	5	Return with goal accomplished
0.1	4	Return with goal accomplished
0.1	4	Selection Rule: Decide on a clearance
0.1		Selection Rule for Goal: Decide on a clearance
0.1	3 T	IF clearance includes both RTA and other information, THEN Accomplish Goal: Determine whether mixed clearance is acceptable
0.1		Method for Goal: Determine whether mixed clearance is acceptable
0.1	1	Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1		Method for Goal: Determine whether non-RTA clearance is acceptable
1.3	1	Determine whether non-RTA clearance is acceptable
0.2	2 T	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1	3	Return with goal accomplished
0.1	2 F	Decide: IF <response> = "Unable," THEN Return with goal accomplished
0.1	3	Accomplish Goal: Determine whether RTA clearance is acceptable
0.1		Method for Goal: Determine whether RTA clearance is acceptable
0.1	1 F	Decide: IF not on RTA page, THEN Accomplish Goal: Go to RTA page
1.4	2 T	Decide: IF RTA is between minimum and maximum RTAs, THEN Retain <response> = "Wilco" ELSE Retain <response> = "Unable"
0.1	3	Return with goal accomplished
0.1	4	Return with goal accomplished
0.1	4	Return with goal accomplished
0.1	5 T	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key
0.1		Method for Goal: Menu key
0.51	1	Recall <menu key> and point finger to appropriate menu key
0.38	2	Press and release appropriate menu key
0.1	3	Return with goal accomplished

0.1	6		Selection Rule: Respond to a clearance	
0.1			Selection Rule for Goal: Respond to a clearance	
0.1		2 T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS	
0.1			Method for Goal: Respond by FMS	
0.1		1 F	Decide: IF hand not on FMS, THEN move hand to FMS	
0.1		2 T	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance	
0.1			Method for Goal: Open clearance	
0.1			1	Remember <menu key> = "ATC" and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51				1 Recall <menu key> and point finger to appropriate menu ke
0.38				2 Press and release appropriate menu key
0.1				3 Return with goal accomplished
0.1			2	Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51				1 Recall <keyword> and point finger to line select key next to keyword
0.38				2 Press and release appropriate line select key
0.1				3 Return with goal accomplished
0.1			3	Return with goal accomplished
0.1		3	Remember <keyword> = <response> and Accomplish Goal: Line select key	
0.1			Method for Goal: Line select key	
0.51			1	Recall <keyword> and point finger to line select key next to keywor
0.38			2	Press and release appropriate line select key
0.1			3	Return with goal accomplished
0.1		4	Remember <keyword> = "Send" and Accomplish Goal: Line select key	
0.1			Method for Goal: Line select key	
0.51			1	Recall <keyword> and point finger to line select key next to keywor
0.38			2	Press and release appropriate line select key
0.1			3	Return with goal accomplished
0.1		5	Return with goal accomplished	
0.1		3	Return with goal accomplished	
0.1	7 F	Decide: IF there are more clearances, THEN GOTO Step 1		
0.1	8	Return with goal accomplished		
68.64		Total time		

Trace 20 – Task 5, Data Comm

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Equipment: FMS 3

NGOMSL Trace: Cross HELPR at time 1800Z at or above FL190

Assumptions:

Clearance received by data communications (Data Comm)

Hands start on FMS

Entire clearance is read aloud upon receipt

When clearance is read from screen page one is 9 words ("Cross HELPR at time one eight zero zero Zulu")

and page two is 8 words ("At or above flight level one niner zero")

Clearance is two pages

Clearance is not printed upon receipt

Response is sent by FMS

Once opened, clearance remains open until clearance information is entered

Clearance information is remembered when entering the clearance

Desired waypoint is the third waypoint listed on the first page of the flight plan

It takes one mental to determine if non-RTA portion of clearance is acceptable or not

Non-RTA portion of clearance is acceptable and pilot will comply

RTA portion of clearance is acceptable and pilot will comply

There is clearance information to enter into the FMS

Only one clearance was sent

</div>

Time	Action
0.1	Method for Goal: Handle a clearance
0.1	1 Selection Rule: Receive a clearance
0.1	Selection Rule for Goal: Receive a clearance
0.1	1 T IF clearance is text, THEN Accomplish Goal: Receive an FMS clearance
0.1	Method for Goal: Receive an FMS clearance
0.1	1 F Decide: IF hand not on FMS, THEN move hand to FMS
0.1	2 Accomplish Goal: Open clearance
0.1	Method for Goal: Open clearance
0.1	1 Remember <menu key> = "ATC" and Accomplish Goal: Menu key
0.1	Method for Goal: Menu key
0.51	1 Recall <menu key> and point finger to appropriate menu ke
0.38	2 Press and release appropriate menu key
0.1	3 Return with goal accomplished
0.1	2 Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1	Method for Goal: Line select key
0.51	1 Recall <keyword> and point finger to line select key next to keyword
0.38	2 Press and release appropriate line select key
0.1	3 Return with goal accomplished
0.1	3 Return with goal accomplished

Value	Step	T/F	Description
0.1	3		Accomplish Goal: Read the clearance
0.1			Method for Goal: Read the clearance
3.8	1	T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and retain <clearance information>
0.1	2	F	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1	3		Remember <menu key> = "Next Page" and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu ke
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	4		GOTO Step 1
3.4	1	T	Decide: IF clearance must be read aloud or crew wants to read aloud, THEN Read information on screen aloud and retain <clearance information>, ELSE Read information on screen and retain <clearance information>
0.1	2	T	Decide: IF there are no more pages of clearances, THEN Return with goal accomplished
0.1	4	F	Decide: IF printed clearance is desired, THEN Selection Rule: Get printed cop
0.1	5		Return with goal accomplished
0.1	3		Return with goal accomplished
0.1	2	T	Decide: IF clearance includes RTA, THEN Retain <response> = "Standby" and Selection Rule: Respond to a clearance
0.1			Selection Rule for Goal: Respond to a clearance
0.1	2	T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS
0.1			Method for Goal: Respond by FMS
0.1	1	F	Decide: If hand not on FMS, THEN move hand to FMS
0.1	2	F	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1	3		Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keywor
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished
0.1	4		Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1			Method for Goal: Line select key
0.51	1		Recall <keyword> and point finger to line select key next to keywor
0.38	2		Press and release appropriate line select key
0.1	3		Return with goal accomplished

0.1					5	Return with goal accomplished
0.1			3			Return with goal accomplished
0.1	3		Accomplish Goal: Enter a clearance			
0.1			Method for Goal: Enter a clearance			
0.2		1	T	Decide: IF clearance is remembered, THEN Recall <clearance information>, ELSE Selection Rule: Method of reading		
0.1		2	F	Decide: IF hand not on FMS, THEN move hand to FMS		
0.1		3		Selection Rule: Specific clearance type		
0.1				Selection Rule for Goal: Specific clearance type		
0.1			4	T	IF clearance is crossing restriction with RTA, THEN Accomplish Goal: Enter mixed clearance	
0.1				Method for Goal: Enter mixed clearance		
0.1				1	Accomplish Goal: Enter crossing restriction	
0.1				Method for Goal: Enter crossing restriction		
0.1				1	Accomplish Goal: Locate waypoint	
0.1				Method for Goal: Locate waypoint		
0.1					1	Remember <menu key> = "Legs" and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key	
0.51						1 Recall <menu key> and point finger to appropriate menu key
0.38						2 Press and release appropriate menu key
0.1						3 Return with goal accomplished
0.82					2	Search for waypoint
0.1					3 T	Decide: IF waypoint is found, THEN Return with goal accomplished
0.1					2 F	Decide: IF speed restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1					3	Remember <menu key> = "/" and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key	
0.51						1 Recall <menu key> and point finger to appropriate menu key
0.38						2 Press and release appropriate menu key
0.1						3 Return with goal accomplished

0.1		4	T	Decide: IF altitude restriction, THEN Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1				Method for Goal: Enter into scratchpad
0.1		1		Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		4	T	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1				Selection Rule for Goal: At and above or below
0.1		1	T	IF restriction is at or above, THEN Remember <menu key> = "A" and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3		Return with goal accomplished

Value					Description
0.1			5		Return with goal accomplished
0.51		5			Point finger to right line select key next to waypoint
0.38		6			Press and release right line select key next to waypoint
0.1		7			Return with goal accomplished
0.1	2				Accomplish Goal: Enter RTA
0.1					Method for Goal: Enter RTA
0.1		1			Accomplish Goal: Go to RTA page
0.1					Method for Goal: Go to RTA page
0.1			1		Remember <menu key> = "VNAV" and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1			2		Remember <keyword> = "RTA" and Accomplish Goal: Line select key
0.1					Method for Goal: Line select key
0.51				1	Recall <keyword> and point finger to line select key next to keyword
0.38				2	Press and release appropriate line select key
0.1				3	Return with goal accomplished
0.1			3		Return with goal accomplished
0.1		2			Retain <clearance value> = characters in waypoint and Accomplish Goal: Enter into scratchpad
0.1					Method for Goal: Enter into scratchpad
0.1			1		Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished
0.1			2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1					Method for Goal: Menu key
0.51				1	Recall <menu key> and point finger to appropriate menu key
0.38				2	Press and release appropriate menu key
0.1				3	Return with goal accomplished

0.1		3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51			1	Recall <menu key> and point finger to appropriate menu key
0.38			2	Press and release appropriate menu key
0.1			3	Return with goal accomplished
0.1		3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1		4	F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1		5		Return with goal accomplished
0.1	3			Remember <keyword> = "RTA Waypoint" and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51		1		Recall <keyword> and point finger to line select key next to keyword
0.38		2		Press and release appropriate line select key
0.1		3		Return with goal accomplished

0.1	4		Retain <clearance value> = digits in clearance and Accomplish Goal: Enter into scratchpad
0.1			Method for Goal: Enter into scratchpad
0.1	1		Remember <menu key> = first digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3	T	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	2		Remember <menu key> = next digit/character in <clearance value> and Accomplish Goal: Menu key
0.1			Method for Goal: Menu key
0.51	1		Recall <menu key> and point finger to appropriate menu key
0.38	2		Press and release appropriate menu key
0.1	3		Return with goal accomplished
0.1	3	F	Decide: IF more digits/characters in restriction to enter, THEN GOTO Step 2
0.1	4	F	Decide: IF <clearance value> is an altitude or speed with an above or below, THEN Selection Rule: At and above or below
0.1	5		Return with goal accomplished

Value	1	2	3	4	5	Flag	Description
0.51					5		Point finger to right line select key next to waypoint
0.38					6		Press and release right line select key next to waypoint
0.1					7		Return with goal accomplished
0.1				3			Return with goal accomplished
0.1			5				Return with goal accomplished
0.1		4					Return with goal accomplished
0.1	4						Selection Rule: Decide on a clearance
0.1							Selection Rule for Goal: Decide on a clearance
0.1		3				T	IF clearance includes both RTA and other information, THEN Accomplish Goal: Determine whether mixed clearance is acceptable
0.1							Method for Goal: Determine whether mixed clearance is acceptable
0.1			1				Accomplish Goal: Determine whether non-RTA clearance is acceptable
0.1							Method for Goal: Determine whether non-RTA clearance is acceptable
1.3				1			Determine whether non-RTA clearance is acceptable
0.2				2		T	Decide: IF clearance is acceptable, THEN Retain <response> = "Wilco," ELSE Retain <response> = "Unable"
0.1				3			Return with goal accomplished
0.1			2			F	Decide: IF <response> = "Unable," THEN Return with goal accomplished
0.1			3				Accomplish Goal: Determine whether RTA clearance is acceptable
0.1							Method for Goal: Determine whether RTA clearance is acceptable
0.1				1		F	Decide: IF not on RTA page, THEN Accomplish Goal: Go to RTA page
1.4				2		T	Decide: IF RTA is between minimum and maximum RTAs, THEN Retain <response> = "Wilco" ELSE Retain <response> = "Unable"
0.1				3			Return with goal accomplished
0.1			4				Return with goal accomplished
0.1		4					Return with goal accomplished
0.1	5					T	Decide: IF <response> = "Wilco" and there is clearance information to enter into the FMS, THEN Remember <menu key> = "Exec" and Accomplish Goal: Menu key
0.1							Method for Goal: Menu key
0.51		1					Recall <menu key> and point finger to appropriate menu key
0.38		2					Press and release appropriate menu key
0.1		3					Return with goal accomplished

0.1	6		Selection Rule: Respond to a clearance	
0.1			Selection Rule for Goal: Respond to a clearance	
0.1		2 T	IF responding by FMS, THEN Accomplish Goal: Respond by FMS	
0.1			Method for Goal: Respond by FMS	
0.1			1 F	Decide: IF hand not on FMS, THEN move hand to FMS
0.1			2 T	Decide: IF clearance is not open, THEN Accomplish Goal: Open clearance
0.1				Method for Goal: Open clearance
0.1				1 Remember <menu key> = "ATC" and Accomplish Goal: Menu key
0.1				Method for Goal: Menu key
0.51				1 Recall <menu key> and point finger to appropriate menu key
0.38				2 Press and release appropriate menu key
0.1				3 Return with goal accomplished
0.1				2 Remember <keyword> = clearance to open and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51				1 Recall <keyword> and point finger to line select key next to keyword
0.38				2 Press and release appropriate line select key
0.1				3 Return with goal accomplished
0.1				3 Return with goal accomplished
0.1			3	Remember <keyword> = <response> and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51				1 Recall <keyword> and point finger to line select key next to keyword
0.38				2 Press and release appropriate line select key
0.1				3 Return with goal accomplished
0.1			4	Remember <keyword> = "Send" and Accomplish Goal: Line select key
0.1				Method for Goal: Line select key
0.51				1 Recall <keyword> and point finger to line select key next to keyword
0.38				2 Press and release appropriate line select key
0.1				3 Return with goal accomplished
0.1			5	Return with goal accomplished
0.1		3	Return with goal accomplished	
0.1	7 F	Decide: IF there are more clearances, THEN GOTO Step 1		
0.1	8	Return with goal accomplished		
55.92		Total time		

Appendix C: CogTool Model for Receiving and Entering Clearances
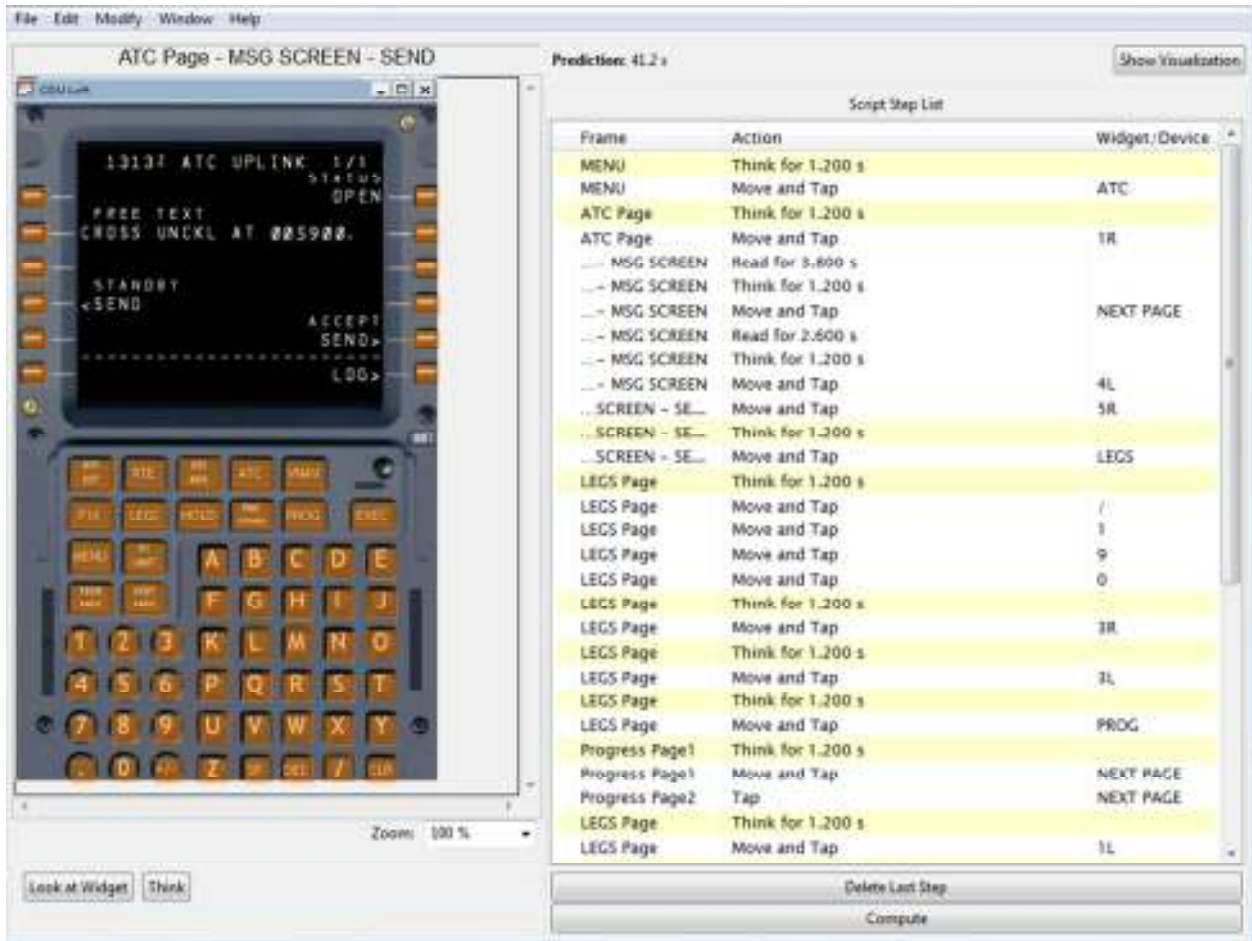

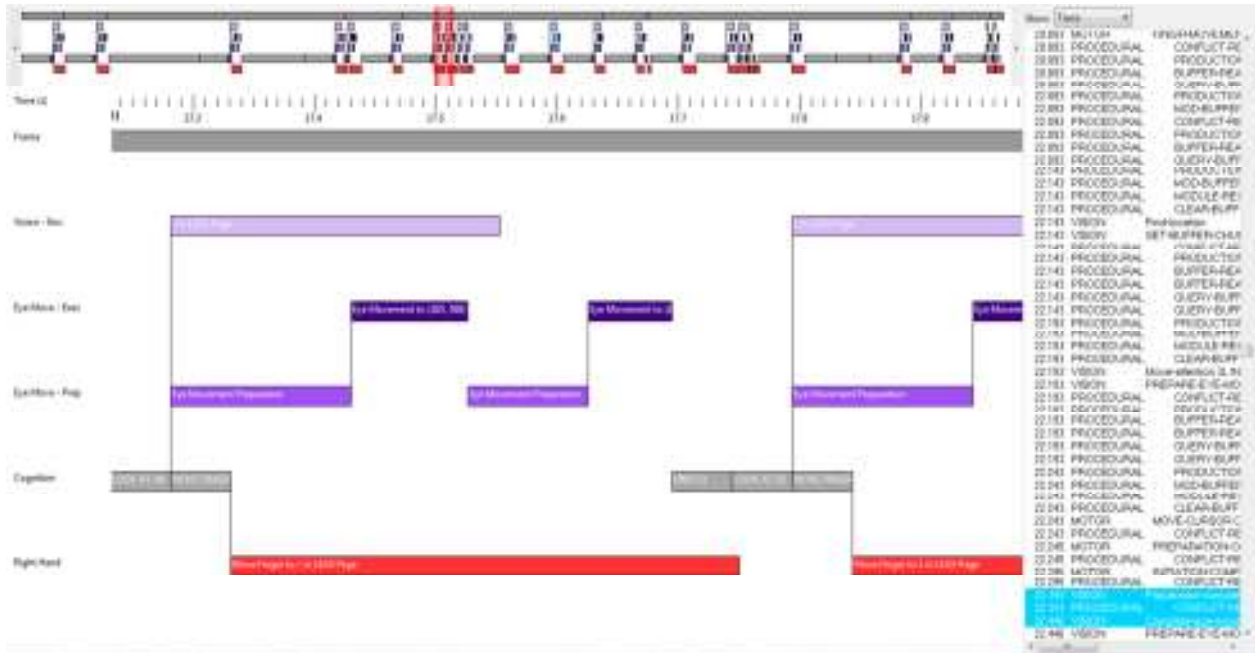**Figure C.1. FMS 2, Trace 16 – CogTool Task Representation**

Figure C.2. FMS 2, Trace 16 – CogTool Trace
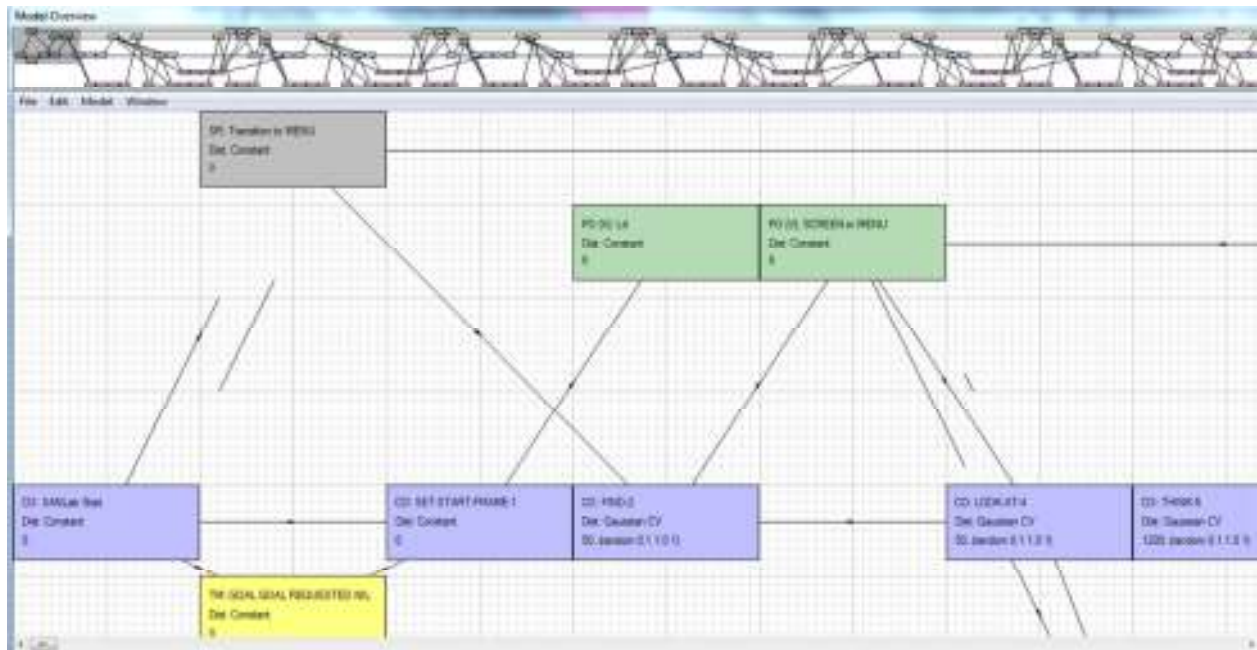
Appendix D: SANLab-CM Model for Receiving and Entering Clearances

Figure D.1. FMS 3, Trace 11 - SANLab-CM Trace