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Introduction

Tiltrotor aircraft combine turboprop performance with the ability to take off and land in a vertical mode like a helicopter. The NASA Short Haul Civil Tiltrotor (SH(CT)) program is concentrating on a 40 passenger civil tiltrotor (CTR) transport concept as the next generation commuter aircraft for short stagelength travel. The program is leveraged with industry, the FAA, and the DoD with a target for technology demonstration by 2007. These aircraft will transport passengers from city center to city center and from satellite airports to major hub airports for connections to long range travel. Studies on a tiltrotor transport concept have been done at Ames Research Center, building on the experience from the XV-15 Tiltrotor aircraft and the V-22 Osprey. The work includes in-flight evaluations with the XV-15 and man-in-the-loop simulations on the Ames Vertical Motion Simulator (VMS). The VMS studies have included control system design and handling qualities evaluations and, more recently, simulations to evaluate terminal area approaches for reducing the noise signature footprint in heavily populated areas where city center vertiports may be located. The Man-machine Integration Design and Analysis System (MIDAS) was applied to this area of research to evaluate human performance in terms of crew procedures and workload for a steep approach to a vertiport.

MIDAS is a human factors tool for constructive simulation, and is used to evaluate human performance in terms of crew procedure, task loading, and decision making. MIDAS provides a means to ask “what if” questions regarding human-system interaction. A Cooperative Research and Development Agreement (CRDA) for MIDAS application between the Army and Boeing Philadelphia is the basis for the simulation described herein. The scenario chosen for the simulation concentrated on a 9° glideslope approach of the tiltrotor to a vertiport. As the tiltrotor approaches landing decision point (LDP), a commanded go-around is made by local Air Traffic Control (ATC) due to problems on the vertiport ramp. A go-around using an automated discrete nacelle system is contrasted with manual nacelle movement to compare pilot performance and timelines for the critical portions of the flight. Crew workload in terms of visual, auditory, cognitive, and psychomotor (VACP) loading and the effect of capacity overload conditions on task performance were major outputs of the simulation.

Background

The concept CTR transport is an outgrowth of the XV-15 and V-22 Osprey programs as a logical commercial application of tiltrotor technology. The first XV-15 flight was over 20 years ago. Since that time, the Bell/Boeing consortium has provided the technology to the military with the V-22 Osprey, now in production, and in a nine passenger business/training tiltrotor aircraft (designated the 609) currently under development with production targeted for 2001. MIDAS is in a design phase moving toward an application tool for the human factors and crew station design communities. This process involves using MIDAS to address operational problems as a means of evaluating the tool in different environments. The CRDA goals are to apply MIDAS to the NASA 40 passenger concept CTR transport design and, in this process, transfer knowledge of MIDAS to Boeing.

The CTR transport will be operating in confined airspace when approaching vertiports. The aircraft must have a landing approach that minimizes noise and must operate safely and efficiently while delivering passengers to their destination. Recent handling qualities evaluations of the concept aircraft on steep descent approach profiles to minimize noise footprint have been done on the VMS. Several glideslopes have been tested and a 9° glideslope, or a segmented glideslope including the 9° slope for final path to landing, was the most promising. This glideslope results in a reasonable LDP (decision height for go-around–one engine out), but the workload perceived by pilots in previous simulations has been rated as high due to constraints of holding the flight path along the glideslope. The MIDAS simulation was designed to evaluate the workload for this flight regime and to contrast automated nacelle movement versus manual movement for the go-around portion of flight.

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MIDAS

The Man-machine Integration Design and Analysis System (MIDAS) (ref. 1) employs human factors principles and human performance models in the analysis of human-machine systems. MIDAS contains a suite of software tools to describe the operating environment, equipment, and operating procedures of manned systems, and uses models of human performance/behavior in static and dynamic modes to evaluate aspects of the crew station design and operator task performance. These tools have been developed and integrated over several design phases and are now being used in applications such as the NASA Advanced Air Transportation Technologies (AATT) initiative and the Army Air Warrior program (ref. 2) and in the concept SH(CT). Each of these applications has required functional additions to MIDAS and these additions are now part of a new redesign of the overall program to make it more suitable for release to the user community. The simulation reported in this paper was performed on MIDAS version 7.2.5, which is the last software release before the new redesign phase was started. Details of MIDAS including plans for the redesign phase are contained in Smith and Tyler (ref. 3) and in references 1 and 2.

CTR Transport Simulation

The flight deck for the CTR transport used in this study was patterned after the Boeing 747-400 cockpit with modifications to emulate a notional future tiltrotor flight deck. Computer-aided design (CAD) data for the flight deck were obtained from Boeing and input into MIDAS. The modifications included (1) replacement of the fixed wing aircraft column control wheel by tiltrotor controls (a helicopter like center stick and a thrust control lever (TCL) patterned after the TCL used in VMS simulations), and (2) a shortened center console. A clean sheet design for a tiltrotor cockpit would likely include additional changes. Figure 1 shows the cockpit in MIDAS.

Figure 1. View of CTR transport cockpit in MIDAS.

The MIDAS simulation was designed with a scenario patterned after the CTR man-in-the-loop simulations (ref. 4) done on the Ames Vertical Motion Simulator, but with the addition of limited crew communication. The scenario is a segment of the landing approach to the vertiport and begins after the aircraft has intercepted the 9° glideslope at 1000-foot altitude and is descending toward the pad. The nacelles are fixed at 80° and the pilot is decelerating the CTR transport along the path to prepare for landing. The approach reflects a normal descent to the vertiport until just before the LDP. When the aircraft reaches approximately 300-foot altitude (100 feet above minimum LDP), a go-around command is made by local ATC because there is trouble on the vertiport ramp. The scenario is then broken into two parts to contrast a go-around using an automated discrete nacelle movement schedule versus manual nacelle movement. Jeppesen charts (ref. 5) were reviewed for this study, and a representative go-around flight path included a climbing right turn to 3000-foot altitude with heading reference to clear local obstacles. The scenario was refined with the help of subject matter experts (SME) that included pilots and an Ames guidance and control engineer responsible for tiltrotor research. Details of the scenario are explained below.

Scenario

The scenario starts with the copilot calling out “one thousand feet” as the CTR transport passes through the 1000-foot altitude along the 9° glideslope. This cues the pilot to begin a normal deceleration to the LDP. The deceleration is from 1000-foot-per-minute sink rate (and approximately 60-knot airspeed) to a sink rate of 800 feet per minute (and approximately 50-knot airspeed). The pilot is flying the aircraft on the backside of the power curve during this portion of flight (i.e., to slow down, more power is required). This requires the pilot to use the TCL to control the altitude sink rate and to use pitch attitude (longitudinal center stick) for airspeed control. Pilot activity, in this portion of flight, is concentrated on maintaining the flight path and on hitting the target airspeed and sink rate at approximately 500-foot altitude above the landing pad. The copilot continues to call out important altitude cross points to give the pilot reference to position. As the CTR descends through 500 feet, the pilot maintains the 800-foot-per-minute sink rate toward the LDP, but when the aircraft reaches approximately 300 feet, a go-around is commanded by the vertiport ATC because of trouble on the ramp. The first response from the pilot is to arrest the descent rate, level the aircraft, and establish a positive rate of climb. The scenario is broken into two options at this point.

Option 1 is to perform the go-around with an automated discrete nacelle mode and with the aid of a TO-GA (take-off, go around) switch. When the positive rate of climb is first established, the pilot pushes the TO-GA button (located on the bottom of the TCL grip). This sends a signal to the flight computer to reconfigure the Primary Flight Display (PFD) and navigation display for go-around and starts a reconfiguration of the aircraft by moving the nacelles forward from 80° to 75°. The nacelles move automatically at a preprogrammed rate (3° per second) and stop at the 75° position (discrete software stop). The flaps are scheduled automatically with nacelle position and airspeed. When the nacelles begin to move forward, the aircraft pitches nose down and the pilot adjusts pitch attitude as necessary to maintain a level cabin attitude (~5° nose up). The gear is pulled up and the go-around continues with a climbing right turn over the center of the vertiport pad. When the turn is completed, the pilot reconfigures the aircraft to the 60° nacelle mode for a quicker climbout with lower energy requirements. In Option 1, the pilot starts the nacelle conversion by simply pushing the auto discrete nacelle toggle switch forward on the TCL grip and releasing. This starts the nacelles toward the 60° position and automatically follows the pitch speed command and auto flap schedule while the pilot adjusts pitch attitude as required. When the nacelles reach the 60° position and the aircraft is trimmed, the pilot sets up for the next waypoint by changing the heading reference on the PFD and the scenario ends.

Option 2 (manual nacelle control) has the same requirements for the go-around. After arresting sink rate and establishing a positive rate of climb, the pilot pushes the TO-GA button, but in this case the TO-GA button only sends a signal to the flight computer to activate changes on the PFD and navigation pages. The nacelle change from 80° to 75° is performed with the manual nacelle control. In this mode, nacelles are controlled with a thumbwheel located on the top of the TCL grip (thumbwheel is to the right of the discrete toggle). The thumbwheel is rotated in the direction the pilot wants to move the nacelles with the amount of thumbwheel rotation proportional to rate of nacelle movement. In the manual mode, the nacelles can be moved at a higher rate than in the discrete auto mode. The drawback is that the pilot has to monitor the movement of the nacelles more closely to match target points in the airspeed-nacelle envelope. Usually, two to three small increments with short duration are done for small changes. This becomes a two part process in that the pilot initiates the movement of the nacelles by rotating the thumbwheel forward, checks nacelle position and pitch rate on the PFD, and adjusts pitch attitude as required (aircraft nose pitches down as nacelles are moved forward). This process is repeated until

the target nacelle angle is reached (75°). The flaps are assumed to be auto scheduled with manual nacelle movement. The climbing right turn is targeted for the center of the pad as with Option 1. The climbout to the go-around path and conversion of the nacelles to 60° after the turn is accomplished manually. In Option 2, the conversion to 60° nacelle position for climbout is assumed to take three movements to reach the target nacelle angle (from 75° to 60°). The pilot monitors the airspeed-nacelle envelope during each movement, adjusts pitch attitude as required, and keeps the aircraft in trim between nacelle movement phases. When the nacelles are at the 60° position, and the aircraft is trimmed, the pilot sets up heading reference for the next waypoint and the scenario ends.

A set of assumptions was established for the approach to the vertiport. These assumptions are:

- The approach to the vertiport is being done under less than ideal visibility in daylight (for example, low ceiling due to fog, hazy conditions due to smog, over water approach with misty conditions) with Global Positioning System (GPS) guidance to the vertiport. Wind and turbulence are considered to be light.
- The CTR is equipped with torque limiting to prevent over torque in rapid high power demand situations, but has short time override capability in emergency conditions.
- The CTR has an auto flap schedule that complements nacelle movement and is based on speed and nacelle position for both auto and manual mode.
- The aircraft has turn coordination.
- The copilot is responsible for radio communications with ATC, but the pilot monitors communications.

Under these assumptions, pilot concentration was primarily inside the cockpit with only periodic glances outside for situation awareness.

Modeling Strategy

The human anthropometric model Jack® (ref. 6) was used to show the pilot motor actions in the simulation graphical interface. The pilot for this study was represented by a 70th percentile (in stature) male figure. This figure size was chosen since a reach and fit study done earlier (Appendix A) showed that the figure could reach all equipment in the cockpit with Level 1 reaches per Mil Standard 1472 (ref. 7) and is representative of the average pilot flying commercial aircraft.

Pilot activities and the equipment functionality model for the accessed equipment (i.e., displays and controllers) were determined from the scenario. The MIDAS scenario was broken down using the progression Phase, Segment, Function, and Task, with Phase defined as the landing at the vertiport. This resulted in a partitioning of the scenario into three segments: the flight along the glideslope to the go-around command; from go-around start to the beginning of the turn over the center of the pad; and the beginning of the right climbing turn to completion of the heading change to the go-around path.

Mission activities were constructed with the task breakdown requiring the most attention. Each task was assigned an associated workload in terms of the Visual, Auditory, Cognitive and Psychomotor (VACP) workload components. The VACP approach is patterned after Aldrich and McCracken (ref. 8) and Aldrich et al. (ref. 9) and their use of these terms. The task-workload VACP values for this simulation were determined by using a Task Analysis and Work Load (TAWL) (ref. 10) prediction model done for a Longbow Apache study as a guide to provide VACP values for such things as button pushes, communications, display checking and monitoring, and simple controls adjustments. The TAWL also included time duration estimates for the tasks. The Workload Component Scales table from reference 9 (with estimated time duration from the SME pilots) was used when matching tasks were not available from the TAWL prediction model. The table uses simple descriptors to describe a task and assigns an interval scale value to reflect the level of effort required. This table was used to determine the VACP values for such tasks as tracking, rotating knobs, visual scans, and checking of information on displays (verification of position, etc.).

The equipment model for the simulation was limited to those controls and displays that are part of the scenario, and only the pilot station was represented. Three flat panel displays were modeled for the simulation: the primary flight display (PFD), the navigation display (NAV), and the engine page (ENG). The PFD was a copy of a current display used in Ames CTR simulations and the navigation page was modeled after a 747-400 Horizontal Situation Indicator (HSI) page. The engine page was designed in house to reflect CTR engine data. Data on the displays were not animated. These displays are shown in figure 2. The heading control panel model was patterned after the 747-400 panel (fig. 3). The two controllers (center stick and thrust control lever (TCL)) were modeled, but were not moved dynamically in the graphical interface. This decision was made to minimize the time required to construct the simulation. These limitations did not affect the simulation since task workload and duration for all actions by the pilot are accounted for in MIDAS models. Limited animation was done for the pilot and

Figure 2. Displays, left to right, ENG, NAV, PFD. TCL in right foreground, center stick to right of TCL.

included visual scans, inside and outside the cockpit, and reaches (except for thumb and finger action) to controllers and knobs or switches on the front instrument panel (fig. 3).

A constant task for the pilot in the tiltrotor, while descending along the 9° glideslope, is maintaining the aircraft on the flight path and keeping the aircraft in trim. Since the pilot is flying on the backside of the power curve, airspeed is changed with pitch attitude using longitudinal center stick input and altitude is controlled with power using the TCL. MIDAS does not have a continuous manual control model for the operator to perform these flying tasks (pilot-aero model feedback). Therefore, the TCL control task along the glideslope was modeled as a continuous task with workload assigned from the Workload Rating Scales (Continuous adjustive–flight control) for cognitive and psychomotor loads. The trim control functions, on the other hand, were handled as random events, but were constrained to certain time intervals. The start times for subtasks of the trim control functions were stochastic, with time intervals between subtasks (to adjust heading, airspeed, and attitude) computed based on a normal distribution with a specified mean and standard deviation. This approach resulted in minor time variation from run to run of the simulation due to the stochastic intervals between trim subtasks. Large control adjustments such as the arrestment of the sink rate before beginning the right climbing turn over the center of the vertiport pad were handled separately, with their VACP loading assigned from the Workload Rating Scales. Crew communication was handled as follows: Each callout from the copilot was placed at the appropriate point in time (i.e., callout for 800 feet occurs as the aircraft passes through 800-foot altitude). Other communications, including pilot to copilot communication such as “gear up,” were inserted as appropriate (when the pilot stabilized the aircraft in the climb and after nacelles reached position). Under the assumption that a verbal message must be attended to at the time it is received, listening tasks were given an above-average priority. This prevented postponement and interruption of listening tasks. (True communications, in which the listener can postpone listening and ask for repeat at a later time, were not modeled.) These procedures were reviewed by the SME pilots for verification and authenticity.

Figure 3. Pilot accessing heading control panel.

Time line data were estimated from the flight conditions in each segment. For example, from 1000- to 500-foot altitude, the pilot is changing the sink rate from 1000 to 800 feet per minute and is changing airspeed from 60 to 50 knots. A simple calculation using a constant change in sink rate per foot of altitude drop results in a duration of approximately 50 seconds to the 300-foot altitude point above the pad (fig. 1 in Appendix B). Similarly, at the callout for go-around, the aircraft is moving toward the vertiport at constant 50-knot airspeed while sinking at 800 feet per minute. The go-around requires that the sink rate be arrested, the altitude stabilized, and a positive rate of climb be established. Time to arrest sink rate was estimated from previous XV-15 experience where approximately 6 seconds elapsed to arrest sink rate and to get a positive rate of climb established. Since the aircraft was moving at 50-knot airspeed toward the pad, with a distance-to-go measurement based on flight path height, ideal time for the intercept of the center of the pad (from commanded go-around point) was estimated to be approximately 22 seconds (fig. 2 in Appendix B). The time from the climbing right turn at the center of the vertiport pad to the completion of the heading change to the go-around path was not estimated. The time recorded for this segment was the result of the cumulative time required for the simulated pilot to perform all necessary tasks during this portion of flight. The time required for Option 2 versus Option 1 was compared. The selected go-around path was a representative flight path for a congested area; excessive time difference may require special handling from ATC to help the slower mode CTR transport to avoid obstacles and traffic congestion in the area.

The final breakdown of the scenario to the task level is included as table 1 in Appendix B.

Data Collection

The collection of data in MIDAS version 7.2.5 was done by writing specific code to extract data of interest. The output files selected for this simulation were an activity tree (structure of activities as the simulation unfolded), an activity output file (activity queue at each tick of the simulation), output summary data (mission duration for each segment, suspended activities, and postponed activities), and the VACP data. These data sets are included in Appendix C for Option 1 and in Appendix D for Option 2.

Analysis

The emphasis for the analysis was on the three segments of the mission scenario: the descent from 1000 feet to the commanded go-around point (approximately 300-foot altitude), the time from commanded go-around to the beginning of the climbing right turn at the center of the vertiport pad, and the final segment from the initiation of the climbing right turn to the completion of the heading change to the go-around flight path. These segments represent the transition points in the scenario from the normal approach to the vertiport, the commanded go-around procedures, and the reconfiguration of the aircraft to the go-around flight path. Options 1 and 2 were compared for the last two segments, since the first segment is identical for both options.

The analysis considered workload estimate and the ramifications of excessive workload on task performance as the prime output of the experiment. The portion of flight chosen for the experiment requires multiple tasks to be done simultaneously on a number of occasions; thus, potential for overload exists. When multiple tasks are to be performed simultaneously, MIDAS uses a simple additive process to determine total workload in each of the four categories used for workload estimates: Visual, Auditory, Cognitive, and Psychomotor (VACP). For the "minimize time" strategy used in this simulation for pilot task scheduling, a threshold of 7.0 represents 100% of workload capacity in each category. On each scheduling cycle, all candidate tasks are sorted according to priority. Within each priority level, tasks that are currently being performed are preferred over those that have not yet started. The pilot attempts to perform as many of the candidate tasks as possible subject to the maximum loading constraint (in any category) and, for motor tasks, subject to the availability of required effectors (e.g., right hand).

With this scheduling scheme, two types of events are of particular interest: interruptions and postponements. Interruption events occur when a high priority task displaces a lower priority task. In this case, the lower priority task is suspended until it can be rescheduled, subject to the VACP loading and the effector availability constraints. Candidate tasks that are not yet active are postponed if there are not sufficient resources to perform them (i.e., VACP loading would be exceeded or effector is busy). Postponed tasks are performed later when enough resources are available. This scheduling method means that, on any given scheduling cycle, the highest priority tasks are performed first, which may cause lower priority tasks to be interrupted (suspended), and new tasks in the queue may have to be postponed. The duration for each interruption (suspension of lower priority tasks) and postponement is computed as a result of rescheduling.

For analysis purposes, interruption and postponement events provide a measure of pilot workload level. They typically occur when the pilot model is attempting to perform several tasks simultaneously. The output files from the simulation included a summary listing of suspended tasks due to interruptions and postponed tasks due to potential overload. The summary includes a description of each event with the duration and context in the form of a list of successfully scheduled tasks at the time the event occurred. The VACP values associated with each task are listed to show the area where potential overload would occur. Occasionally a situation arises where intuitively one knows that the pilot could accomplish several tasks simultaneously but degrades performance by slowing down or multiplexing the tasks with short attention to each phase. MIDAS version 7.2.5 does not model degraded performance effects as a strategy for performing multiple tasks simultaneously. Although the human operator may resort to these strategies under high workload conditions, identifying potential problem areas may give a subject matter expert the data necessary for predicting those effects. These potential high-workload events may prompt investigation of possible redesign of procedures or equipment or the need for additional pilot aids in the cockpit. For example, if the visual channel were overloaded, perhaps some perceptions could be done through audition; an overload in the cognitive channel may prompt the design of computerized decision aids or other types of automation.

Results

Results are discussed corresponding to the three segments of the mission scenario. Results for Segment 1 are common to Option 1 and Option 2 since the nacelles are fixed in the 80° position. Results from Segment 2 and Segment 3 are discussed first for the auto discrete nacelle movement (Option 1), then for the manual nacelle movement (Option 2). The differences observed for

Segments 2 and 3 are compared in tables at the end of each section.

Scenario Segment 1—1000-Foot Altitude to Commanded Go-Around Point

Approach to Vertiport—80° Fixed Nacelles

The pilot is operating the aircraft on the backside of the power curve (slowing requires more power) and the rate of descent is controlled primarily with the thrust control lever while the airspeed is controlled with pitch attitude. Piloting tasks require constant controller manipulation (TCL and pitch control) and constant observation of the primary fight display for feedback on descent rate and airspeed. Interspersed with these tasks are occasional scans outside the cockpit for situation awareness. Communication consists of verification of altitude crossings. When the descent rate reaches 800 feet per minute at 500-foot altitude, the descent rate is then held constant to the LDP. In the scenario, a go-around is commanded by local ATC just before the LDP.

Pilot workload is moderate to high throughout this segment (figs. 4–8). The primary workload is in the cognitive and visual areas. The visual workload (77–100% of capacity) is due to the need for the pilot to monitor the primary flight display for keeping the aircraft on track; in addition, there are several quick scans for situation awareness. The cognitive workload is high (68–95% of capacity) due to resources required to monitor displays (check values or track change), to adjust flight controllers, and to hear or respond to auditory messages. Occasionally, the cognitive workload is pushed toward maximum capacity when visual, auditory, and psychomotor loads overlap in simultaneous operations. The general state of psychomotor workload is moderate (37–75% of capacity) for most of this segment due to adjustments of the thrust controller and the trimming of the aircraft. The auditory workload is nonexistent until messages are received (60% of capacity) from the copilot or when the pilot needs to communicate with the copilot (70% of capacity). Since the workload is high throughout the descent, there is little margin for additional tasking during this segment of flight and there is a tendency for overload.

The summary data (table 1 and Appendix C) show that the duration of Segment 1 was approximately 50 seconds as was determined from the time script imposed for this segment. There were no interrupted tasks, but some tasks were postponed. The first postponement occurs at 1.1 seconds into the simulation when a trim adjustment is postponed for 0.9 second due to possible overload of

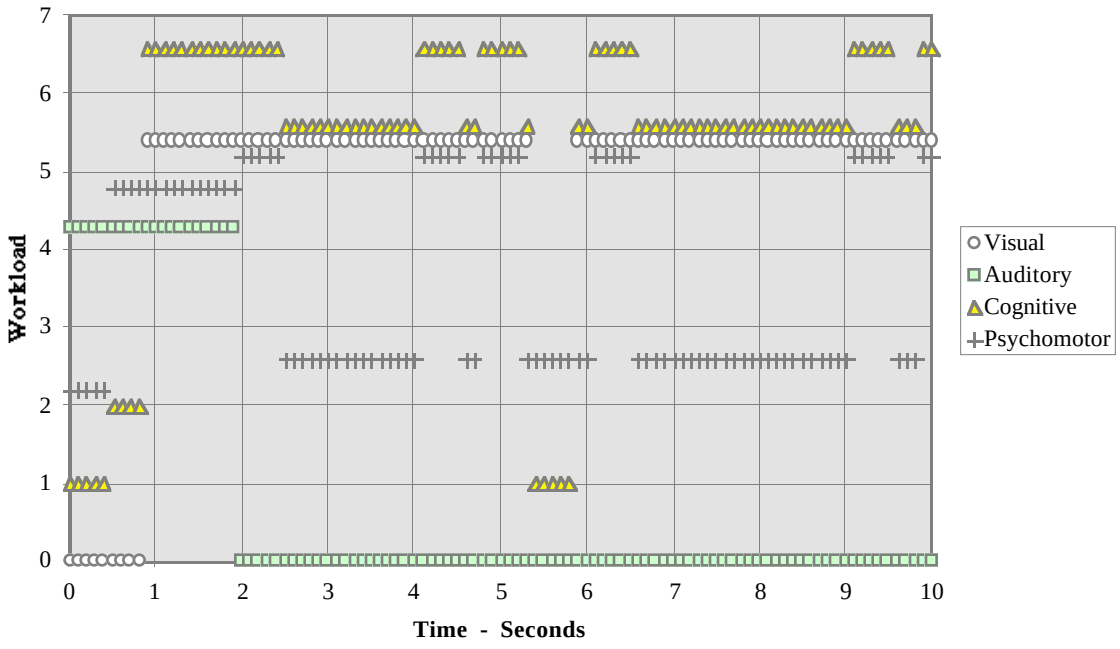

Figure 4. Workload timeline for fixed nacelle Segment 1 (0–10 seconds).

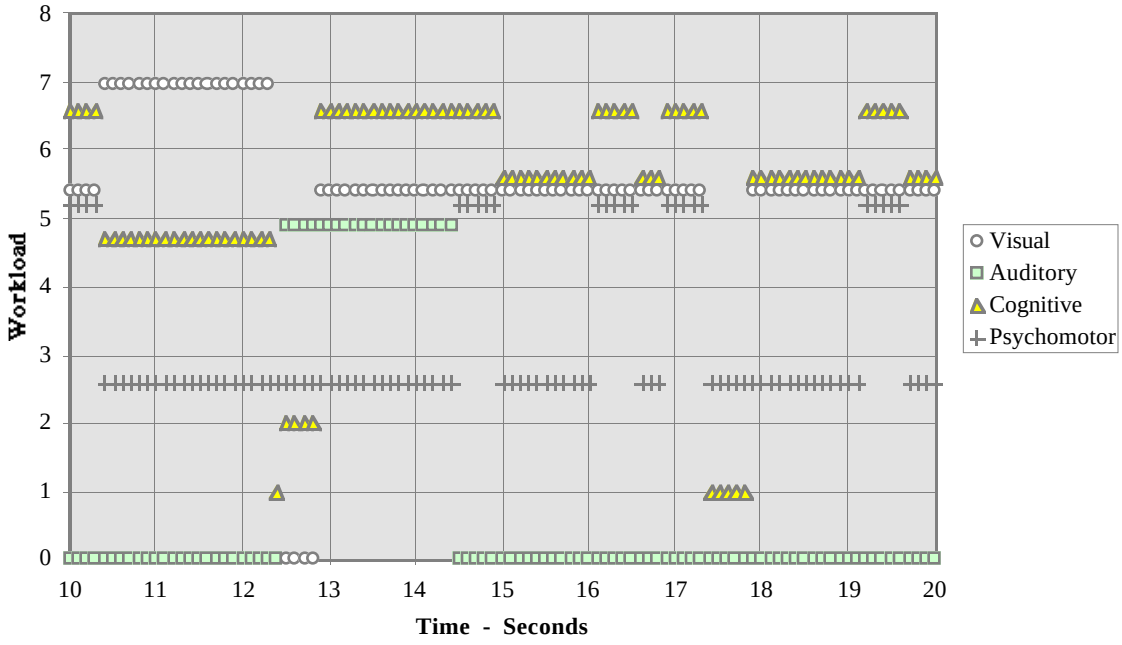

Figure 5. Workload timeline for fixed nacelle Segment 1 (10–20 seconds).

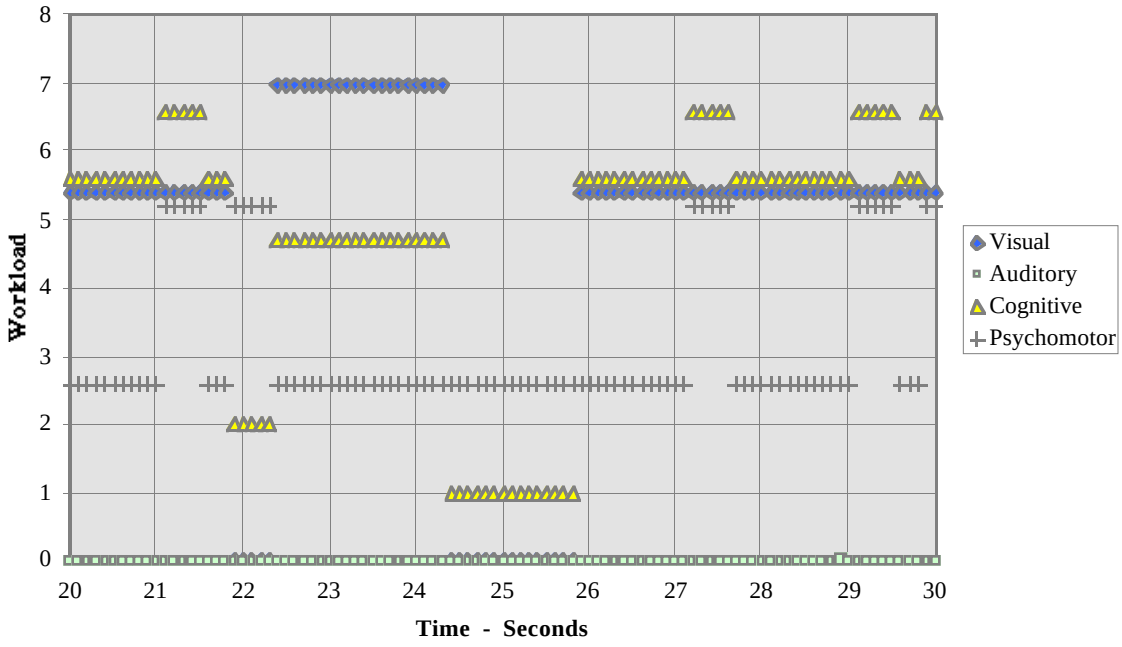

Figure 6. Workload timeline for fixed nacelle Segment 1 (20–30 seconds).

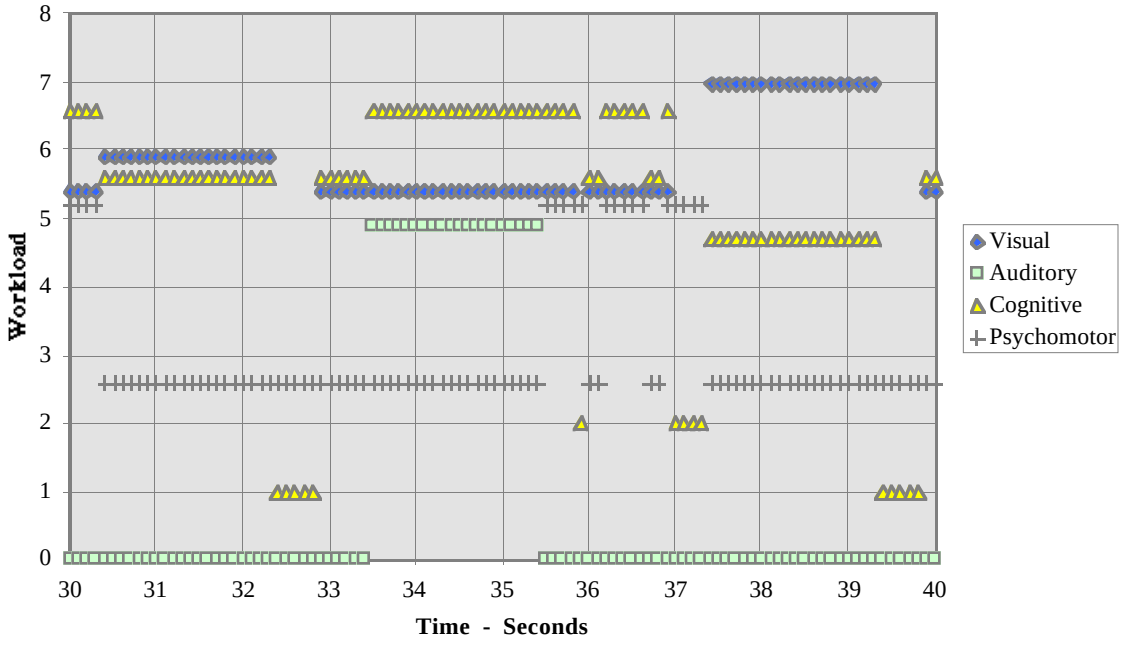

Figure 7. Workload timeline for fixed nacelle Segment 1 (30–40 seconds).

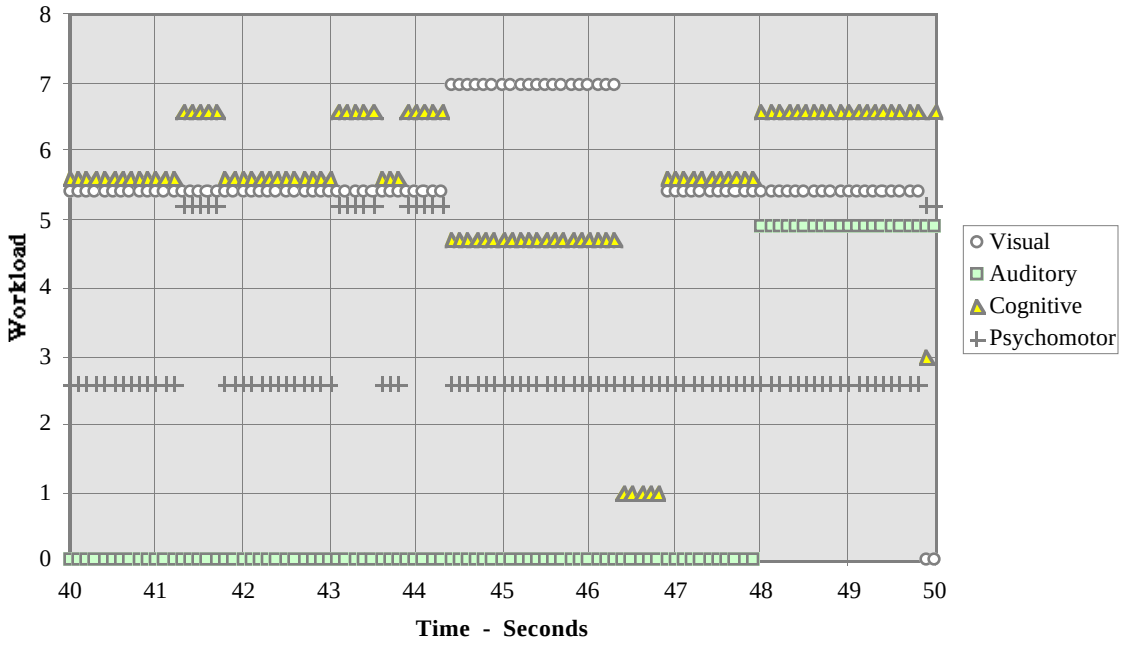

Figure 8. Workload timeline for fixed nacelle Segment 1 (40–50 seconds).

Table 1. Summary data for Segment 1

Option	Σ Tasks	Seg time (sec)	VACP Loading (% of capacity)			
			Visual	Auditory	Cognitive	P-motor
Auto Discrete Nacelle	47	50.0	77–100	0–70	68–95	37–75
Manual Nacelle	47	50.0	77–100	0–70	68–95	37–75

Option	Task Suspensions				
	Event time (sec)	Delay (sec)	Task Suspended	Potential Overload Channels	Context of Suspension
Auto Discrete Nacelle			None		
Manual Nacelle			None		

Option	Task Postponements				
	Event time (sec)	Delay (sec)	Task Suspended	Potential Overload Channels	Context of Postponement
Auto Discrete Nacelle	1.1	0.9	Adjust Airspeed	C,P	"Callout-Decel," "Track Pitch Guidance," "Adjust TCL
	14.2	0.3	Adjust Airspeed	C	"Callout Runway Sighted," "Track Pitch Guidance," "Adjust TCL"
	34.2	1.3	Adjust Airspeed	C	"Callout 500 ft," "Track Pitch Guidance," "Adjust TCL"
	48.2	1.7	Adjust Airspeed	C	"Callout 300 ft," "Track Pitch Guidance," "Adjust TCL"
Manual Nacelle	1.1	0.9	Adjust Airspeed	C,P	Context is identical to the Auto Discrete Nacelle (Nacelles fixed at 80° for Segment 1)
	14.2	0.3	Adjust Airspeed	C	
	34.2	1.3	Adjust Airspeed	C	
	48.2	1.7	Adjust Airspeed	C	

the psychomotor channel. The next postponement took place at 14.2 seconds when the trim task “Adjust Airspeed” was postponed for only 0.3 second to avoid overload of the cognitive channel. The next postponement event occurred at 34.2 seconds when the trim task “Adjust Airspeed” was postponed again for 1.3 seconds to avoid overload in the cognitive channel. The last postponement occurred at 48.2 seconds for 1.7 seconds when the trim task “Adjust Airspeed” was postponed to avoid overload in the cognitive channel. Note: In tables 1–3, “Adjust Airspeed,” “Adjust Roll Attitude,” and “Adjust Heading” are trim adjustments. “Adjust Pitch” is a longitudinal center stick adjustment of pitch attitude to control pitch up or pitch down during nacelle movement.

Task suspension and postponement events that caused delays in task performance are important because their frequency and duration are an indication that maximum workload capacity was exceeded during the scenario. Examination of these task delay events can aid in understanding their characteristics (What tasks were delayed? How often? For how long? Which channels were overloaded?), causes (What was the pilot doing when the potential overload occurred?), and the effect of the delay. Suspensions and postponements in the “real world” may result in degraded pilot performance and a lengthening of time to complete necessary tasks. In the present simulation, the modeled scenario takes longer to unfold if tasks on the critical path are delayed. However, most of the delays occurred when tasks were performed in parallel with other longer duration tasks, and these types of delays did not lengthen the scenario.

Scenario Segment 2—Commanded Go-Around Start to Beginning of Climbing Right Turn

Option 1—Auto Discrete Nacelle Movement

When the commanded go-around is heard, the pilot pulls the TCL to maximum power to arrest descent rate and to establish a positive rate of climb. Once positive rate of climb is established, the pilot pushes the TO-GA switch on the back of the thrust control lever grip. The TO-GA switch sends a signal to the flight computer to reconfigure the PFD and NAV displays for go-around, and starts an auto nacelle conversion from the fixed 80° position forward to 75° (at 3° per second). The nacelles are moved to 75° in a trade of power and speed to get more lift. When the nacelles move forward, there is a tendency for the aircraft to pitch nose down, so the pilot has to adjust pitch attitude to keep the cabin level. When the nacelles reach the 75° position, and with the aircraft in positive climb rate, the pilot calls for gear retraction and targets a climbing right turn over the center of the landing pad to proceed to the go-around path.

The workload timeline data (figs. 9 and 10) show that the cognitive loading is moderately high to very high (70–97% of capacity). The pilot is making judgments concerning adjustments to the thrust control lever and pitch attitude and is monitoring the displays for rate of climb and airspeed feedback. The cognitive load is highest when the pilot has to adjust pitch attitude and a communication interrupts the flow of tasks. Visual workload for this segment is moderate to high (55–85% of capacity) due to the monitoring tasks. Psychomotor workload is moderate to moderately high (37–75% of capacity) with the higher values associated with trim and attitude adjustments associated with nacelle movement. The auditory workload is nonexistent except when messages are received (70%) and when commands are given by the pilot (75%). The automated nacelle movement relieves the pilot from having to check nacelle position until the rotation has been completed.

One task suspension (table 2 and Appendix C) occurred at 60.2 seconds when the “Gear Up” command interrupted the verification of heading task for 1.2 seconds. Postponed activities occurred at 50.6 seconds when the “trim heading” task was postponed for 0.3 second when the go-around command was heard. The postponed activity would have overloaded the cognitive channel. The next event occurred at 60.8 seconds while airspeed trim was postponed for 0.6 second as the “Gear Up” command was given. This activity would have overloaded the cognitive and psychomotor channels.

The summary data for this segment show a time flow of approximately 20 seconds. The estimated time available (fig. 1 in Appendix B) from the beginning of the go-around until the aircraft would reach the center of the pad (assuming a constant airspeed of approximately 50 knots toward the pad) is approximately 22.6 seconds. Therefore, for Segment 2, the auto discrete nacelle movement provides enough time to establish a positive rate of climb before the turn is required, albeit with a high workload. The data are summarized in table 2 following the discussion of the manual nacelle control option for this segment.

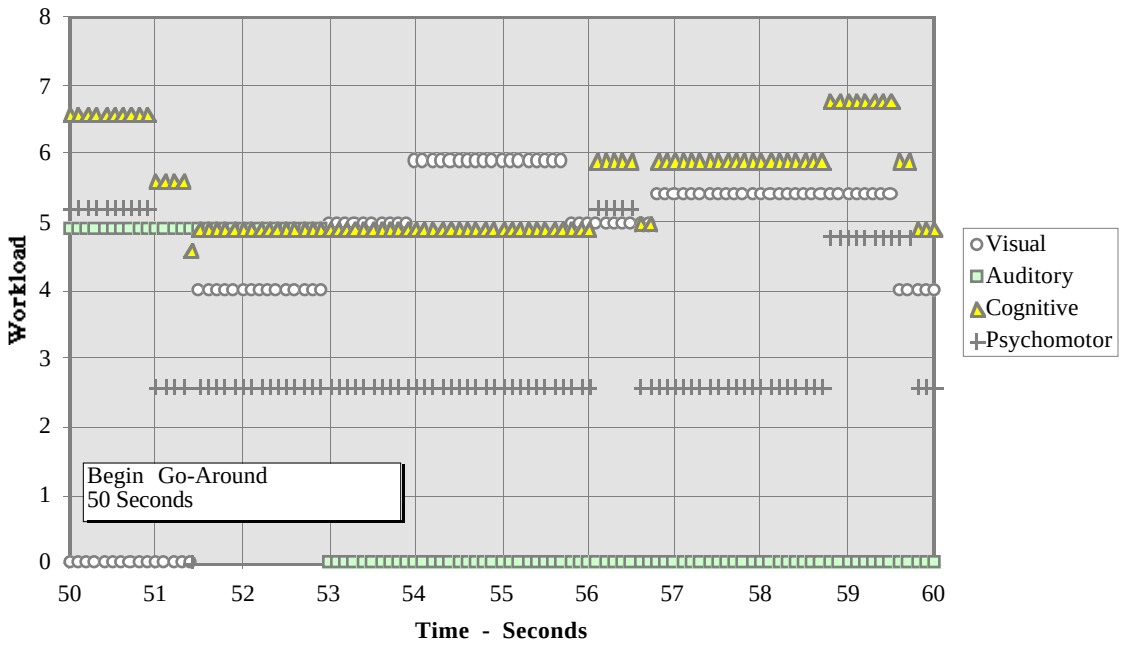

Figure 9. Workload timeline for auto discrete nacelle Segment 2 (50–60 seconds).

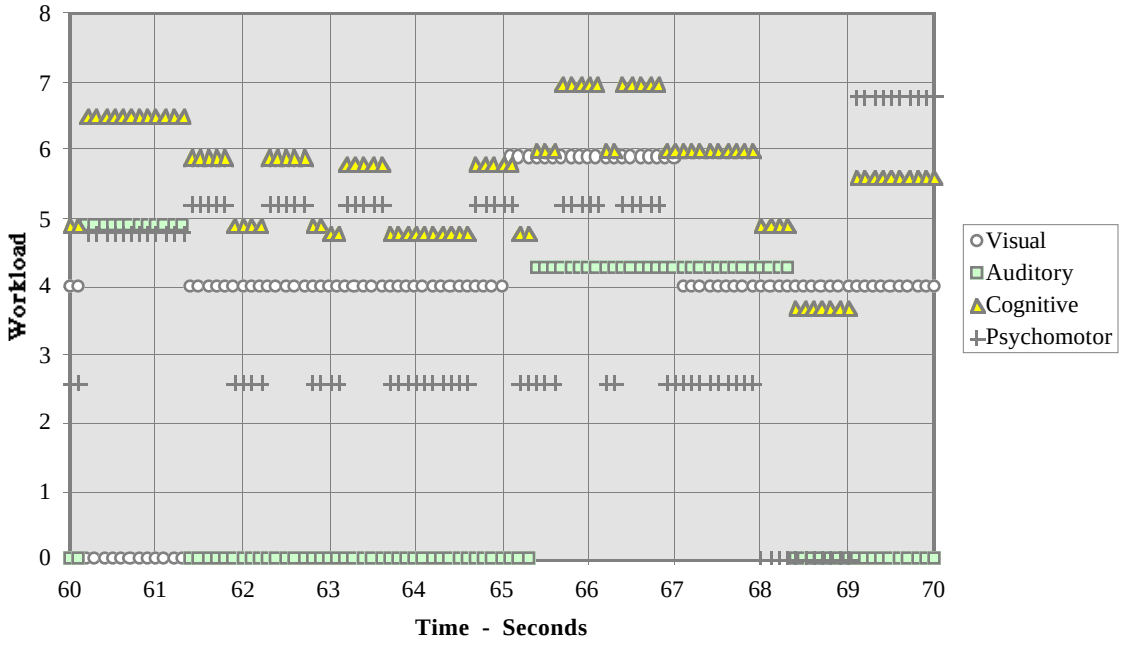

Figure 10. Workload timeline for auto discrete nacelle Segment 2 (60–70 seconds).

Scenario Segment 2 Manual Mode—Commanded Go-Around Start to Beginning of Climbing Right Turn

Option 2—Manual Nacelle Movement

The go-around in the manual nacelle mode has the same goal of making the climbing right turn at the center of the pad. The pilot pulls the TCL as before to arrest descent rate and establish the positive rate of climb. The TO-GA button is pushed when positive climb is established, but in manual mode the button push only signals the flight computer to change the PFD pages for the go-around. The nacelles are moved manually from the 80° fixed position to 75° by pushing forward on the manual nacelle thumb-wheel (on top of the TCL grip head and to the right of the discrete toggle). The thumbwheel is spring-loaded and the rate of change is proportional to the amount of thumb-wheel travel. When the thumbwheel is released the movement stops. In this simulation, it is assumed that the pilot uses two pushes to reach the 75° position. The first push moves the nacelles about half way or more and a second push eases the nacelles into position. The flaps are assumed to move on an automatic schedule dependent on nacelle position. During the push on the thumbwheel, the pilot monitors the speed/pitch information on the PFD and adjusts aircraft pitch attitude to keep the nose up. In between thumbwheel pushes, the pilot trims the aircraft. Pilot concentration increases over the discrete mode because of the increased monitoring tasks and the fine motor control required getting the nacelles into position. When the nacelles are in the 75° position and while maintaining positive rate of climb, the pilot calls for gear retraction and makes the climbing right turn.

Workload traces for this segment are shown in figures 11 through 13. The cognitive loading is moderately high to high (65–97% of capacity) throughout, from the initiation of the go-around to the beginning of the turn. The visual channel is also moderately high (57–84% of capacity) due to the constant scanning of displays to monitor aircraft parameters and nacelle changes. Psychomotor loading increases to ~85% of capacity as the TCL is pulled to maximum value when the thumbwheel is moved and when the trim corrections are made. Auditory loading registers when messages are received (~70% of capacity) or callout is made (75% of capacity), but is otherwise nonexistent.

The relatively high workload for this segment is reflected in the tasks suspended or postponed (Appendix D). The first suspension (for 1.0 second) occurs at 50 seconds (the beginning of the go-around) when the trim adjustment is suspended due to the incoming message for go-around (psychomotor overload). The next suspension (for 1.5 seconds) occurs at 65.2 seconds and suspends the TCL adjustment when the “Gear Up” message is called

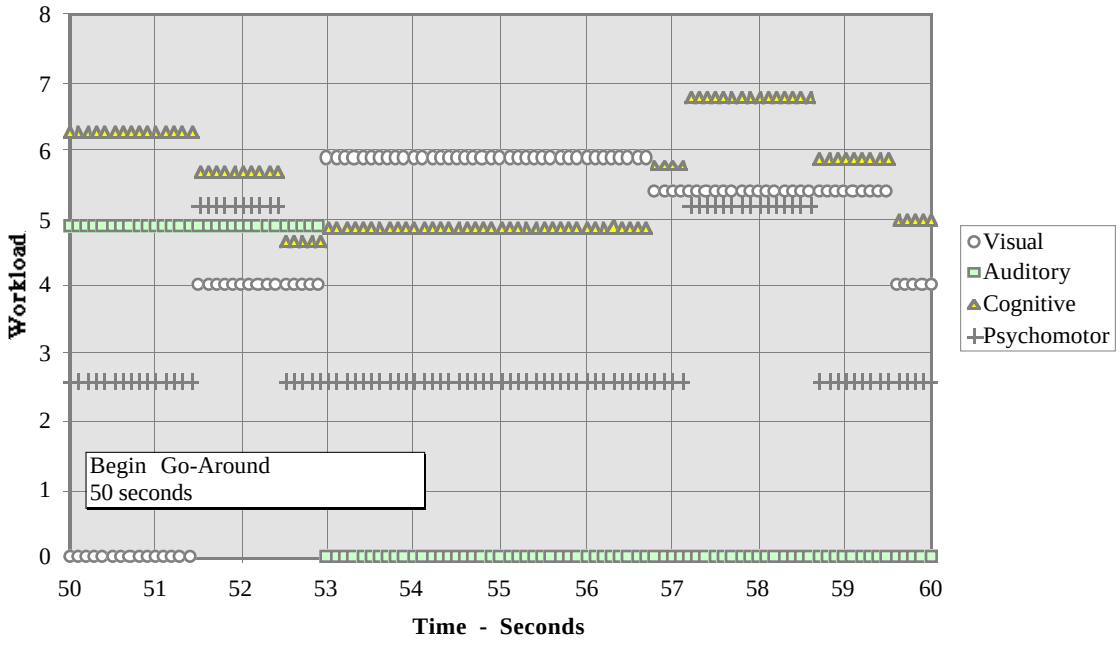

Figure 11. Workload timeline for manual nacelle Segment 2 (50–60 seconds).

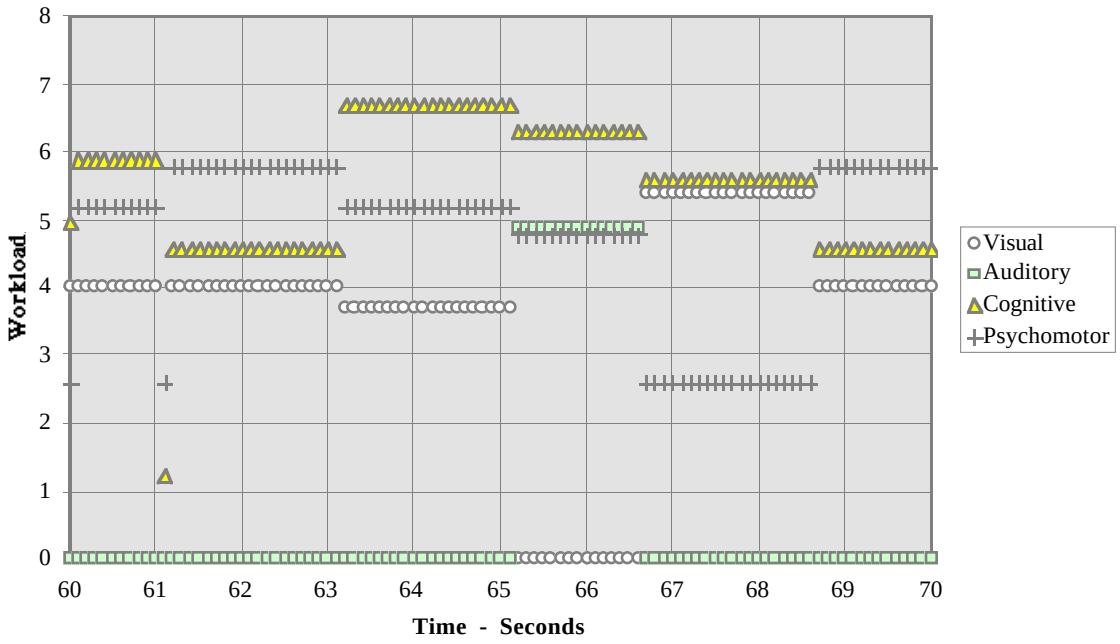

Figure 12. Workload timeline for manual nacelle Segment 2 (60–70 seconds).

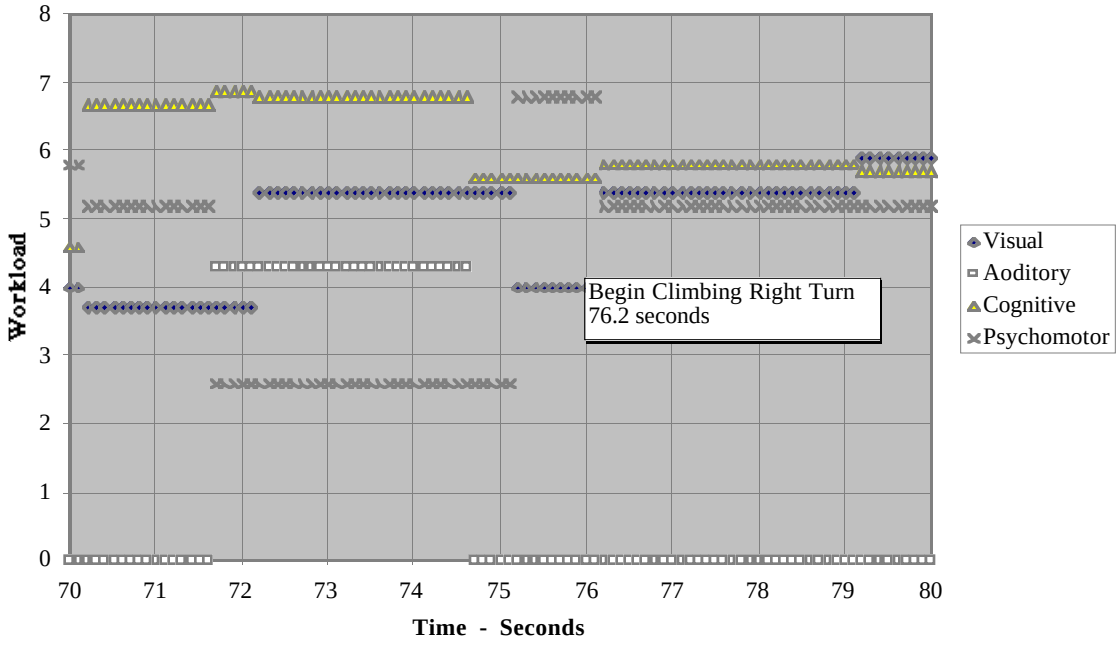

Figure 13. Workload timeline for manual nacelle Segment 2 and beginning of Segment 3 (70–80 seconds).

Table 2. Summary data for Segment 2

Option	Σ Tasks	Seg time (sec)	VACP Loading (% of capacity)			
			Visual	Auditory	Cognitive	P-motor
Auto Discrete Nacelle	22	20.1	55–85	0–75	70–97	37–75
Manual Nacelle	31	26.2	57–84	0–70	65–97	37–85

Option	Task Suspensions				
	Event time (sec)	Delay (sec)	Task Suspended	Potential Overload Channels	Context of Suspension
Auto Discrete Nacelle	60.2	1.2	Verify Conditions	C	"Callout Gear Up," "Maintain TCL"
Manual Nacelle	50.0	1.0	Adjust Airspeed	C	"Hear Commanded Go-Around," "Adjust TCL"
	65.2	1.5	Adjust TCL	C,P	"Adjust Airspeed," "Callout Gear Up"
	68.7	1.5	Adjust TCL	P	"Adjust Nacelle Thumbwheel"
	71.7	2.0	Adjust TCL	C	"Hear Gear Up— Flaps to X degrees," "Adjust Pitch Attitude," "Monitor Pitch Attitude"

Table 2. Concluded

Option	Task Postponements				
	Event time (sec)	Delay (sec)	Task Postponed	Potential Overload Channels	Context of Postponement
Auto Discrete Nacelle	50.2	0.2	Adjust Roll Attitude	C,P	"Hear Commanded Go-Around," "Adjust Airspeed," "Adjust TCL"
	50.6	0.3	Adjust Heading	C,P	"Adjust Attitude," "Hear Commanded Go-Around," "Adjust TCL"
	60.8	0.6	Adjust Airspeed	C,P	"Callout Gear Up," "Maintain TCL"
	60.8	0.6	Check Heading	C	"Callout Gear Up," "Maintain TCL"
Manual Nacelle Control	50.2	1.3	Adjust Roll Attitude	C	"Hear Commanded Go Around," "Adjust TCL"
	51.7	0.3	Adjust Heading	P	"Adjust Attitude," "Increase TCL," "Hear -Climb-Right to 180"
	61.2	2.0	Adjust TCL	P	"Adjust Nacelle-Thumbwheel"
	65.2	1.5	Check Nacelle Position	C	"Adjust Airspeed," "Callout Gear Up"

out (cognitive overload). The next suspension occurs at 68.7 seconds when the "Adjust TCL" task is suspended for 1.5 seconds while the thumbwheel is adjusted to move the nacelles (psychomotor overload). The last task interruption and suspension occurs at 71.7 seconds when the "Adjust TCL" task is suspended again to allow the auditory message from the copilot to be received on "Gear Up" (cognitive overload).

The first activity postponement occurs at 50.2 seconds when a trim adjustment is postponed for 1.3 seconds while the commanded go-around message is received (potential cognitive overload). At 51.7 seconds, the "Adjust Heading" task is postponed for 0.3 second (potential psychomotor overload). A postponement occurs at 61.2 seconds, when the "Adjust TCL" task is postponed for 2 seconds while the "Adjust Thumbwheel" task for moving the nacelles is completed (potential psychomotor overload). The final postponement takes place at 65.2 seconds when the "Check Nacelle Position" task is delayed for 1.5 seconds while the auditory message "Gear Up" is received (potential cognitive overload).

The total run time for segment 2 for Option 2 was 26.2 seconds. This time exceeds the allotted time of 22.6 seconds, which means that the pilot would probably have to adjust airspeed to prevent overshooting the center of the vertiport pad before making the climbing right turn. This adjustment would undoubtedly cause other ramifications because more attention would have to be paid to next step procedures to make the turn safely. These outcomes cannot be predicted.

Scenario Segment 3—Beginning of Climbing Right Turn to Completion of Heading Change to the Go-Around Flight Path

Option 1—Auto Discrete Nacelle

The climbing right turn is started over the center of the pad. Once the turn has been completed, the pilot begins a nacelle conversion to 60° to climb faster to the go-around path. The nacelles are moved from 75° to 60° by a single forward push on the discrete toggle switch (center lower, TCL head). As the nacelles move forward, the pilot makes necessary pitch attitude adjustments and monitors the airspeed, heading, and altitude on the PFD. When the nacelles reach 60°, the pilot calls out nacelle position and then changes the reference heading to the go-around flight path. When the heading change has been entered into the flight computer and observed on the PFD, the task is complete and the scenario ends.

Figures 14 through 16 show the workload timeline for this portion of flight. The turn is initiated at 70.1 seconds. The pilot moves the center stick (laterally) in coordination with power to start the turn. When turn direction is established, the pilot adjusts lateral stick in the opposite direction (while adjusting the power) to roll out of the turn. Trim adjustments are made as required.

The pilot monitors attitude, heading, and power throughout the maneuver keeping the turn radius tight with modest airspeed. A moderately high psychomotor workload (75% of capacity) occurs during this phase and the cognitive and visual channels are loaded to a moderately high level (81–85% of capacity). The auditory channel is unloaded.

When the turn is completed, the pilot pushes the discrete nacelle toggle switch to begin nacelle conversion to the 60° position to increase airspeed. The workload in this portion of flight remains moderately high for psychomotor (75% of capacity) and cognitive loading (65–80% of capacity. The additional tasks of monitoring airspeed, heading, and altitude on the PFD increase cognitive loading and the adjustments to the center stick increase the psychomotor loading. The visual workload stays moderate (55% of capacity) due to the constant scan of the PFD. Postponement of a trim adjustment takes place at 75.1 seconds because adjusting the TCL, pushing the discrete nacelle toggle, and performing trim adjustments cannot take place simultaneously without overloading the psychomotor channel. At 80.1 seconds, a postponement of the "Trim Airspeed" task takes place because the adjustment to trim cannot be done without overload to the psychomotor channel.

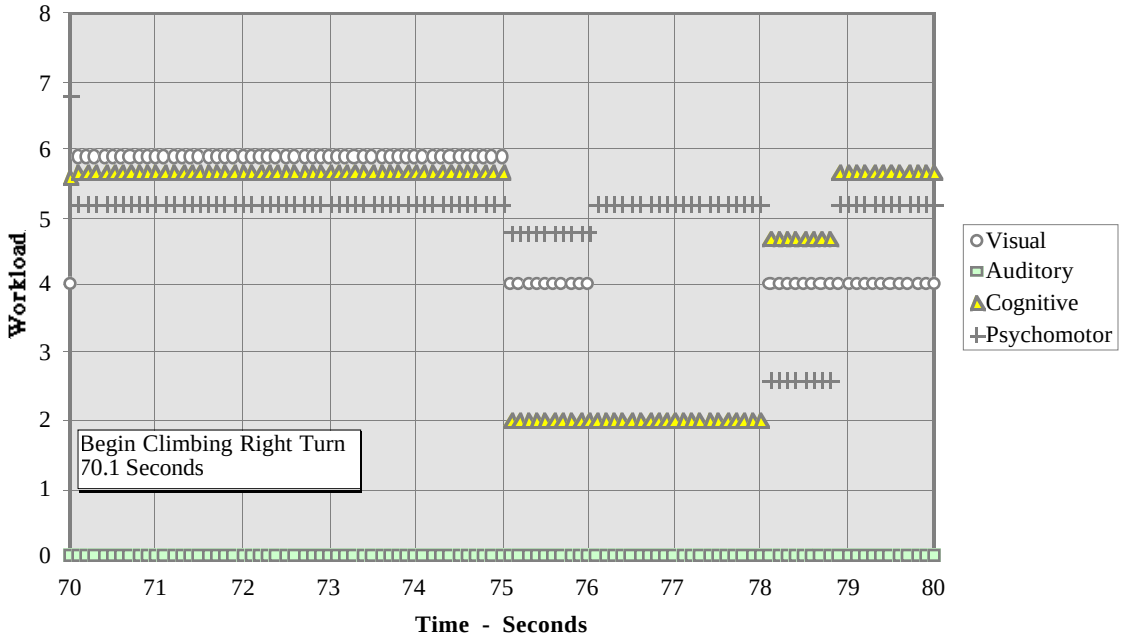

Figure 14. Workload timeline for auto discrete nacelle Segment 3 (70–80 seconds).

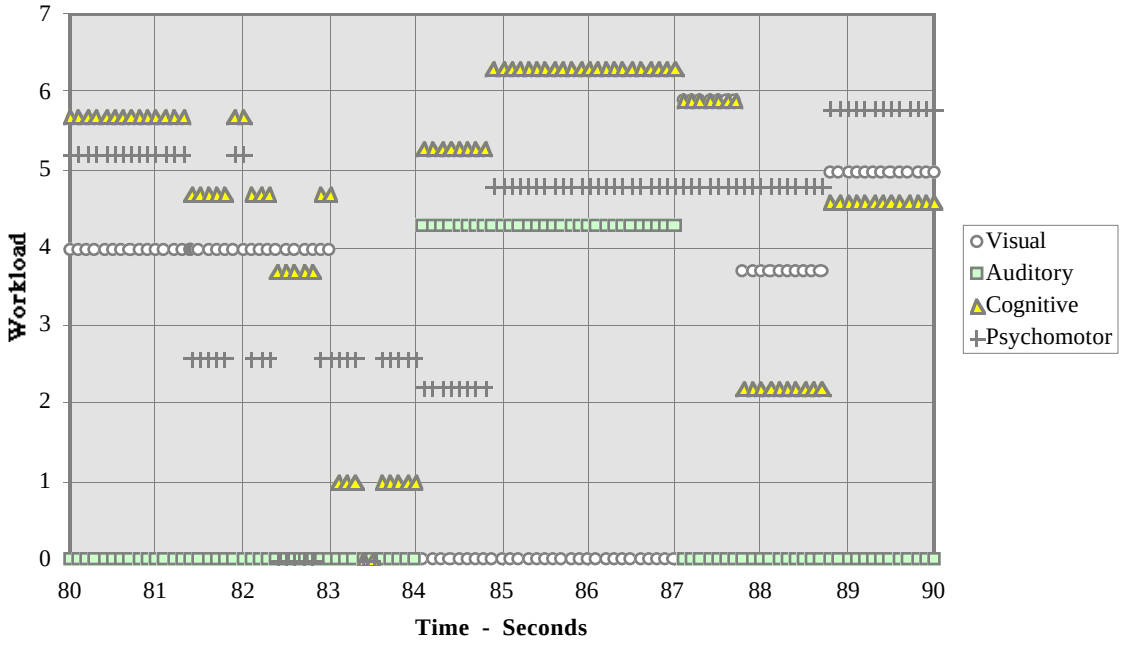

Figure 15. Workload timeline for auto discrete nacelle Segment 3 (80–90 seconds).

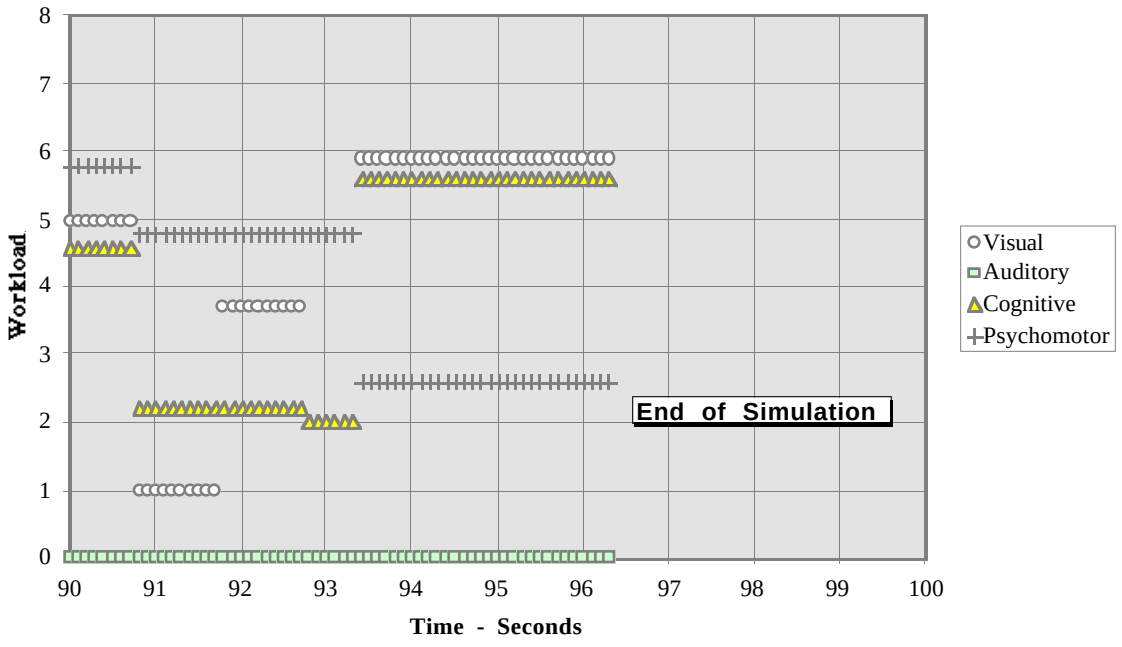

Figure 16. Workload timeline for auto discrete nacelle Segment 3 (90–100 seconds).

When the nacelles reach 60°, the pilot calls out nacelle position and then proceeds to change the heading reference to the go-around path. The workload traces show a high psychomotor loading (85% of capacity) when the pilot reaches and turns the heading select knob. Cognitive loading ranges from 33% to 80% of capacity with the highest loading occurring when the pilot selects the new heading (twist knob to value) and when the new heading is verified on the PFD. Visual loading (15–84% of capacity) follows a similar pattern for those events. The summary data show that the task for monitoring aircraft parameters on the PFD was interrupted and suspended when the knob for heading reference change was moved, since visual and cognitive workload would have exceeded maximum capacity. The monitoring tasks were suspended for approximately 2 seconds until the knob was changed. When the change was completed and the result noted on the PFD, the scenario ended. The time duration of Segment 3 from the start of the climbing right turn to the end of the scenario was approximately 26.2 seconds. These results are summarized in table 3 at the end of the manual mode discussion.

Option 2—Manual Nacelle

The climbing right turn is initiated as before, followed by nacelle conversion to 60° nacelle position. The manual nacelle movement from 75° to 60° is assumed to be accomplished with the thumbwheel in a minimum of three intermediate movements. The pilot adjusts pitch attitude and trims the aircraft between each movement. When the nacelles are at 60°, the pilot calls out nacelle position and then proceeds to change heading reference to the go-around path. When the heading change is completed and observed on the PFD, the simulation ends.

Workload traces for this segment of flight are shown in figures 17 through 20. When the turn is performed, cognitive and visual workloads are moderately high (~80% of capacity) and the psychomotor loading is moderately high (~77% of capacity); auditory load is nonexistent. After the turn, workload increases as the nacelles are moved in the manual mode toward 60°. Cognitive and visual loading are high (~85–97% of capacity) and the psychomotor loading, due to manual operation of the nacelle movement, is high (~82–97% of capacity). Cognitive loading is highest when multiple tasks (“Monitor Controls,” “Call out 60° Nacelles”) are executed. Visual loading is due to monitoring tasks associated with moving the nacelles. Auditory loading does not register until the pilot calls out the new position (auditory is then at 60% of capacity). With the nacelles in position, the pilot proceeds with the change of heading to the go-around path. Cognitive workload moderates and ranges from 30% to 80% of capacity. The highest loading occurs when the knob is rotated and when the heading is verified on the PFD. The visual loading ranges from 15% to 85% in that same time interval, with the highest levels corresponding to the final check of the PFD to verify the new heading. Psychomotor loading remains high, since the pilot is adjusting knobs and setting the heading numbers. Psychomotor workload ranges from ~68% to 97% of capacity with the highest loading due to heading knob adjustment and trim adjustments. When the heading change is verified, the simulation ends.

The first task suspension (table 3 and Appendix D) during Segment 3 occurs at 89.6 seconds, when the thumbwheel is adjusted to move the nacelles toward 60°. The suspended task is “Adjust TCL” and is delayed for 1.8 seconds. The second suspension event takes place at 95.4 seconds when the thumbwheel is moved again. The suspended task is again “Adjust TCL,” which is suspended for 2.5 seconds. The last suspension occurs at 107.1 seconds, when the heading select knob is being rotated. The suspended task is “Monitor Controls,” which is suspended for 2 seconds.

The first and only postponement occurs at 83.7 seconds, when the thumbwheel is being adjusted to move the nacelles toward the 60° stopping point. The suspended task is “Adjust TCL,” which is postponed for 1.5 seconds to prevent psychomotor overload.

Workload remained high throughout this segment and the pilot was loaded near capacity in visual, cognitive, and psychomotor areas. Suspensions and postponements of activities, due to potential overload and the additional tasks that were required for manual nacelle movement, added more time to the completion of the segment. Comparing Option 2 to Option 1 (table 3) for Segment 3 shows that Option 2 time exceeds Option 1 time by 12.4 seconds.

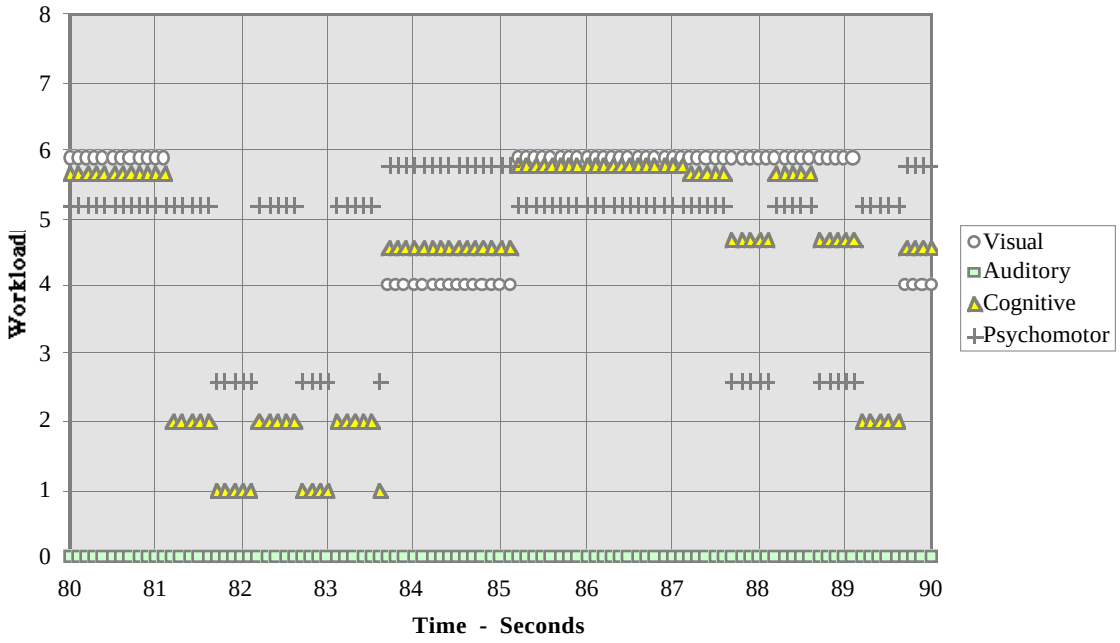

Figure 17. Workload timeline for manual nacelle Segment 3 (80–90 seconds).

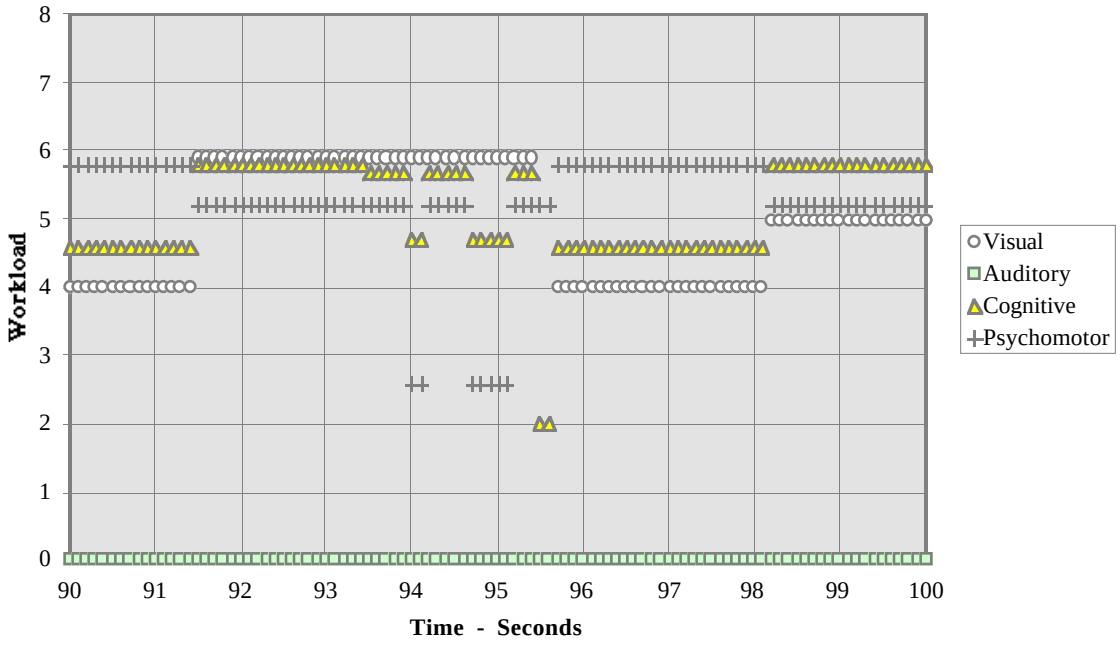

Figure 18. Workload timeline for manual nacelle Segment 3 (90–100 seconds).

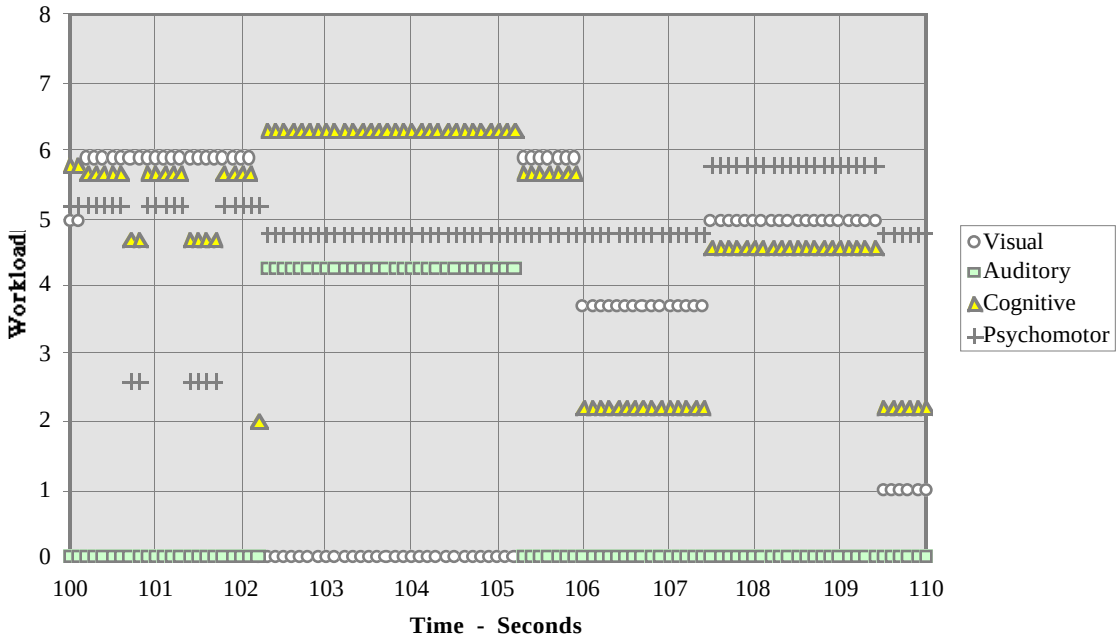

Figure 19. Workload timeline for manual nacelle Segment 3 (100–110 seconds).

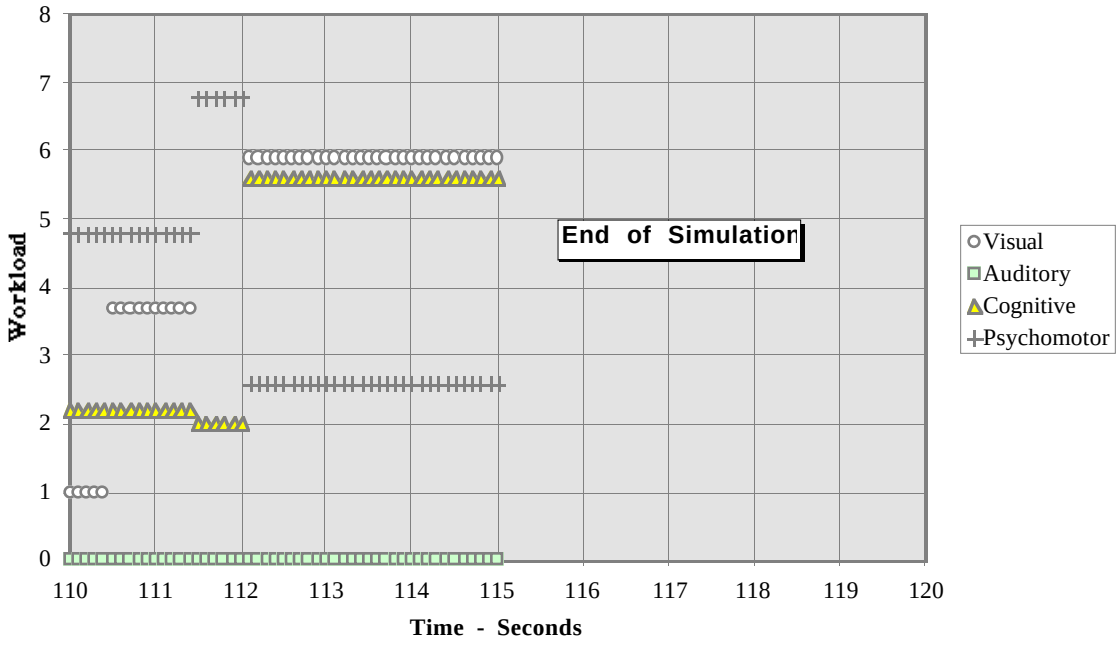

Figure 20. Workload timeline for manual nacelle Segment 3 (110–120 seconds).

Table 3. Summary data for Segment 3

Option	∑ Tasks	Seg time (sec)	VACP Loading (% of capacity)			
			Visual	Auditory	Cognitive	P-motor
Auto Discrete Nacelle	26	26.2	15–84	0–61	20–90	37–85
Manual Nacelle	37	38.6	15–84	0–61	20–90	37–85

Option	Task Suspensions				
	Event time (sec)	Delay	Task Suspended	Potential Overload Channels	Context of Suspension
Auto Discrete Nacelle	88.6	2.0	Monitor Aircraft	P	"Rotate-Hdg-Sel-Knob"
Manual Nacelle	89.6	1.8	Adjust TCL	P	"Adjust Nacelle Thumbwheel"
	95.4	2.5	Adjust TCL	P	"Adjust Nacelle Thumbwheel"
	107.1	2.0	Monitor Controls	P	"Rotate-Hdg-Sel-Knob"

Option	Task Postponements				
	Event time (sec)	Delay (sec)	Task Postponed	Potential Overload Channels	Context of Postponement
Auto Discrete Nacelle	75.1	1.0	Adjust Pitch	P	"Adjust TCL," "Push Nacelle Discrete Switch"
	80.1	0.8	Adjust Airspeed	P	"Adjust Pitch." "Monitor Nacelle," "Adjust TCL"
Manual Nacelle	83.7	1.5	Adjust TCL	P	"Adjust Nacelle Thumbwheel"

Summary

This section summarizes results from the simulation for each of the three scenario segments, for both the auto discrete nacelle option and the manual nacelle option.

1. Segment 1—Workload along the steep glideslope approach is high

- Segment 1 starts with the aircraft already on the 9° glideslope and making a normal approach to the vertiport. The nacelles are fixed at the 80° position and the pilot is slowing the aircraft from 60- to

50-knot airspeed and reducing the sink rate from 1000 to 800 feet per minute. The slowdown is accomplished as the 500-foot altitude point is reached. The sink rate and airspeed are then held constant to the LDP. Segment 1 was constrained in the simulation to stay within the allocated time estimates to reach altitude callout points. Therefore, tasks were scripted within each altitude segment (tasks that had to be accomplished before the callout).

- The pilot tracks within a gate along the flight path as the aircraft descends toward the vertiport landing pad (e.g., one dot out maximum deviation). To maintain the path, constant adjustments to the TCL and to pitch attitude are required since the pilot is flying on the backside of the power curve (reducing speed requires higher power input). Pitch attitude adjustment (longitudinal stick) is used to control airspeed and the TCL is used to control altitude. Constant task loading and the resulting high demand on VACP resources left little capacity for performing additional tasks. Although no tasks were interrupted in this segment, several were postponed due to high workload.
- The primary VACP loading was on the visual and cognitive channels. Visual workload was due to constant monitoring of the displays for flight management and occasional glances outside the cockpit for situation awareness. Cognitive workload was due to resources required to check display pages, monitor flight controls, and listen to communications.

2. Segment 2—Workload from the commanded go-around command to the beginning of the climbing right turn is high

- Segment 2 begins when the commanded go-around command is received from the local ATC. The pilot must arrest the sink rate of the aircraft, establish a positive rate of climb, push the TO-GA button, start nacelle conversion (from 80° to 75°), raise the gear, and then target a climbing right turn over the center of the vertiport pad. The simulation contrasted an automated discrete position nacelle change with a purely manual change schedule.
- **Option 1—Automated Discrete Nacelle**. The visual workload during this segment is moderate to high due to monitoring flight displays to check rate of climb, airspeed, heading, and nacelle position. Cognitive loading is moderate to high due to monitoring of displays to verify rate of climb, adjusting pitch attitude to keep the aircraft in level attitude, receiving and sending communication, and keeping the aircraft in trim. Although the nacelles move in the auto discrete mode with auto flap scheduling, psychomotor workload is moderate to moderately high, with the higher values associated with trim and attitude adjustments as the nacelles move into position. The auditory workload registers when messages are received/sent, but is otherwise nonexistent.

  The time to complete Segment 2 with the auto discrete mode was approximately 20 seconds. The estimated time for getting to the turn point was 22.6 seconds. Therefore, the auto discrete nacelle mode provides enough time to accomplish the necessary tasks before making the turn.
- **Option 2—Manual Nacelle**. The goals of Option 2 are the same as Option 1. Since the nacelles are moved in manual mode, the almost constant monitoring of displays and the motor adjustment required to move the nacelles into position cause the visual, cognitive, and psychomotor workloads to remain high. Auditory workload only registers when messages are sent or received.

  Run time for Segment 2, Option 2, was 26.2 seconds. This time exceeds the estimated time of 22.6 seconds. This result is primarily due to the additional tasks required to move the nacelles into position. The pilot will have to adjust airspeed to prevent overshooting the center of the vertiport pad before making the turn. This adjustment could cause other ramifications, because more attention would have to be paid to next step procedures to make the turn safely.

3. Segment 3—Workload from the beginning of the right climbing turn to the heading change is high

- **Option 1—Auto Discrete Nacelle**. Psychomotor, visual, and cognitive workloads are moderately high due to adjustments the pilot makes to the lateral stick and TCL to roll into and out of the turn, and due to the visual concentration on the trim ball and roll angle on the PFD. When the turn is completed, psychomotor, cognitive, and visual loading is due to trim adjustment and monitoring the displays. The turn is followed by a nacelle conversion to 60°. The workload in this portion of flight remains moderately high for psychomotor and cognitive workloads, but the visual workload is moderate. Auditory loading occurred only when the pilot confirmed nacelles at 60° and airspeed at 120 knots. With the nacelles at 60°,

the pilot changes heading reference to the go-around path. The workload traces show a high psychomotor loading due to reaching and turning the heading select knob. The highest cognitive loading during this phase occurs when the pilot has to select the new heading and when the new heading is verified on the PFD. The visual loading was highest as the knob was rotated to select heading and as the final heading value was verified on the PFD.

The time duration for Option 1, Segment 3, from the start of the climbing right turn to the end of the scenario was approximately 26.2 seconds.

- **Option 2—Manual Nacelle**. The climbing turn is made as in Option 1. The cognitive and visual workloads are moderately high and the psychomotor loading is moderately high during the roll into and out of the turn. After the pilot rolls out of the turn and trims the aircraft, the nacelles are manually moved to the 60° position. The workload traces show increase due to the manual task. The cognitive and visual loads are high and the psychomotor is high. When the nacelles are in position, the pilot changes the heading reference. The task was the same as for Option 1 and, therefore, the workload was the same.

- Total time for Segment 3, Option 2, was 38.6 seconds. The additional 12.4 seconds for manual versus auto discrete nacelle operations was due primarily to the additional tasks required to move the nacelles manually. This time difference may make it difficult for the aircraft to make altitude and waypoints in a timely manner and, as a result, the local ATC may have to remain with the aircraft longer to avoid conflicts with other aircraft in the local airspace.

4. Mission Summary for Option 1 versus Option 2

- The total time for the mission for Option 1 with the auto discrete nacelle mode and active TO-GA button was approximately 96 seconds. The total mission time for Option 2 with manual nacelle movement and non-active TO-GA button was approximately 115 seconds. This approximately 20-second difference was due to manual versus auto nacelle movement.
- Total of suspended activities for Option 1 was 2. Total of postponement events for Option 1 was 10.
- Total of suspended activities for Option 2 was 7. Total of postponement events for Option 2 was 9.

Table 4. Mission summary

Auto Discrete Nacelle Control				
Phase	Time (sec)	∑ Tasks	Postponement	Suspension
Segment 1	50.0	47	4	none
Segment 2	20.1	22	4	1
Segment 3	26.2	26	2	1
Overall	96.3	95	10	2

Manual Nacelle Control				
Phase	Time (sec)	∑ Tasks	Postponement	Suspension
Segment 1	50.0	47	4	none
Segment 2	26.2	31	4	4
Segment 3	38.6	37	1	3
Overall	114.8	115	9	7

Conclusions

- The workload along the 9° glideslope, commanded go-around, and climbing turn remained high at all times. The high workload meant that the pilot had little or no spare capacity. Tasks were often postponed to avoid overload. Suspended tasks due to interrupts occurred more often in the manual nacelle mode.
- The commanded go-around (Segment 2) can be accomplished best with an automated discrete nacelle movement versus the manual movement mode. Although the nacelles can be moved faster in the manual mode, the movement must be in an iterative fashion to avoid pitch upset and to ease nacelles into final position. The manual mode required more time to accomplish the additional tasks (20% more tasks were required). The excess time could result in an overshoot of the center of the pad. The pilot may have to slow the aircraft along the path to make the turn. This alternative may require more fuel to achieve positive rate of climb, and passenger comfort may suffer. A new procedure for the manual nacelle mode may help avoid these problems.
- The excess time required to move the nacelles in manual mode for Segment 3 could result in problems in the local air space depending on the requirements to reach waypoints on the go-around path. The manual mode aircraft may miss important altitude and turn points while proceeding to the go-around path. Special treatment of the manual mode aircraft may be required to avoid traffic problems in the terminal airspace.

Recommendations for Future Research

This study has shown that although the auto discrete nacelle automation helps the pilot to perform a go-around within time requirements the workload is very high. The noise abatement steep-approach profile is a demanding flight regime in a confined airspace. Future studies should concentrate in several areas:

- Crew coordination tasks need more study; the distribution of tasks between pilot and copilot is not well understood.
- Simulations in MIDAS should include a full communication environment. Communication between the pilot and copilot and between the copilot and ATC should be modeled. The level of communication in the terminal area may suggest that:
    - Additional cockpit aids to cue the pilot in this flight regime need to be examined.
    - New procedures for this flight regime should be studied to help reduce the pilot/copilot workload.
- The modeling strategy used for this scenario was to impose a ceiling on pilot workload to see what tasks would be rescheduled as a consequence. An alternative strategy is to lift the upper limit on pilot workload (that is, postulate a perfect pilot who can handle any level of workload) and examine those portions of the scenario where workload thresholds (original limits) are exceeded along various channels. Investigation of “over-threshold” workload portions of the scenario could help to identify areas that could be improved by such measures as revising procedures, redesigning equipment, and changing automation levels. The extent and magnitude of such “over-threshold” portions of the scenario could also be used to do comparative studies. Alternatively, the MIDAS operator model could be altered to degrade task performance when workload exceeds maximum capacity. Simulation results could then assist in understanding the potential consequences of high workload situations.

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Appendix A

Field of View and Reach Study for SH(CT)

MEMO To: Record

FROM: Adolph Atencio, Jr, Aerospace Engineer

SUBJECT: Field-of-view and reach study performed with MIDAS in a notional future cockpit for a civil tiltrotor transport.

1. The NASA Advanced Tiltrotor Technology program has concentrated on demonstrating tiltrotor technology for commuter aircraft. Studies of the NASA baseline 40 passenger civil tiltrotor (CTR) transport have been concentrated in several areas including, airframe design, rotor/engine design, performance projections, and handling qualities evaluations. The Man-machine Integration Design and Analysis System (MIDAS) is being used to study crew procedures in the CTR transport by designing operational scenarios in a notional future CTR flight deck. The work is part of a Cooperative Research and Development Agreement (CRDA) with the Boeing Helicopter Company (Philadelphia).

2. The present studies are using a cockpit based on the 747-400 commercial transport layout. This cockpit design was chosen to reflect current glass cockpit design as a stage for a 2010 Tiltrotor cockpit. The 747-400 layout has been modified to reflect the difference between a commercial fixed wing transport flight deck and the flight deck of a tiltrotor. The tiltrotor controls consist of a helicopter like cyclic stick (center stick) and a thrust control lever (TCL) patterned after the XV-15 tiltrotor TCL. The conventional “control wheel” has been removed and unnecessary displays and switches that are not required for tiltrotor operation have been removed. This memo a reach analysis in the new cockpit and a field-of-view mapping from the pilot seat.

3. The pilot seat is on the right hand side of the cockpit. The center stick and TCL addition to the flight deck were done using Mil Standard 1333B as a guide for placement in the pilot crew station. The neutral seat reference point (NSRP) and the design eye point (DEP) were verified against the mil spec to make sure that all reaches would be as they would be in the 747-400 sans the “wheel”. The over head control panel was reduced to just the middle portion. Since all control switches and buttons are not yet defined for a tiltrotor design, this study concentrated on reaches to the extremes of the overhead panel switches in place for the 747-400 recognizing that the area would be used to maximum utility. The rear portion of the 747-400 center counsel was also removed from the cockpit since most of the function will be put into other locations to reduce space requirement in the commuter Tiltrotor. The Engine Indicating and Crew Alert System (EICAS) displays were removed to reduce complexity of the system (Future studies may replace these with a single Multifunction Display (MFD)). The Primary Flight Display (PFD) and Navigation Display (ND) were left in place. All front panel switches and buttons were left, but not all of them will be utilized and only those pertinent to the PFD and ND were accessed for this study. Finally, the field-of view plot was made from the right hand pilot seat.

4. The reach analysis concentrated on three anthropometric figure sizes, a 70th percentile in stature male (Boeing data shows this figure size to be representative of the average commercial pilot), a 50th percentile in stature male to reflect the average of the data base used, and a 50th percentile in stature female to reflect the average female. Note that a 50th percentile in stature male is approximately equivalent to a 70th percentile in stature female. Although this range does not cover the traditional 5th through 95th percentile in stature male used for design of military aircraft, it will reflect the expected commercial pilot population. The reach analysis was performed using Mil Standard 1472 as a guideline.

5. The results from this study are given in Table 1 for the reach analysis and in figure 1 for the field of view plot. Figures 2 and 3 show MIDAS views of the anthropometric figure accessing the overhead panel and looking out the chin window.

References

1. Cooperative Research and Development Agreement for Application of Aerospace Human Factors Research to Short Haul Civil Tiltrotor, June 1994.
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Table 1. Reach zone results

Figure size		70th percentile Male	50th percentile Male	50th percentile Female
Reach	Condition	Reach zone	Reach zone	Reach zone
1. Left hand to thrust control lever - full up and full down positions	Up	1	1	1
	Down	1	1	1
2. Right hand to center stick controller grip		1	1	1
3. Right hand to instrument source select switches top and bottom switches	Top	1	1	2
	Bottom	1	1	2
4. Right hand to lower right hand corner of clock and to lower right corner of radio magneticindicator display	Clock	1	1	2
	Radio	1	1	2
5. Left hand to display switching panel - right knob and left knob	R knob	1	1	2
	L knob	1	1	2
6. Left hand to AFCS mode control panel - far left switch and then far right switch	Far L	3	3	3
	Far R	1	1	1
7. Left hand to CDU upper left button and lower left button then to upper right button and lower right button	Upper L	2	3	3
	Lower L	2	2	3
	Upper R	1	2	3
	Lower R	1	1	2
8. Left hand to engine thrust lever on center aisle stand		1	1	2
9. Left hand to overhead panel- to switch set 1 - to switch set 11, 12 - to switch set 7. Access outer most switches on right and left in each location	Lower L	1	1	3
	Lower R	1	1	1
	Middle L	2	3	3
	Middle R	1	1	1
	Upper L	NR	NR	NR
	Upper R	NR	NR	NR

Note: Reaches for this study were done using Mil Standard 1472

Zone 1 reach: shoulder harness locked, lap belt snug and w/o stretching arm, shoulder or leg muscles.

Zone 2 reach: shoulder harness locked, lap belt snug and using maximum stretching of arm, shoulder or leg muscles.

Zone 3 reach: shoulder harness unlocked, seat belt snug and using full travel allowed by unlocked harness, but w/o adjusting seat.

NR - Not reachable with seat belt snug.

Appendix B

Task Network/Equipment—Scenario for MIDAS Simulation of SH(CT)

Table 1. Task Network/Equipment Guide—Scenario for MIDAS Simulation of SH(CT)

Approach to Vertiport

Segment 1—9° Glide Slope Approach to Vertiport—Nacelles Fixed at 80°

* S = scripted, P = probabalistic

Task No.	Description of Task	Duration	Elapsed time	Equipment	Type *	V	A	C	P
	Co-pilot calls off altitude as aircraft sinks toward landing pad. When co-pilot calls out that aircraft has reached the 1000 ft point, the pilot calls out "decelerating to landing decision speed." (50 knots).								
			Start						
1	Co-pilot calls off 1000 ft - receive cockpit comm	2.0		Intercom	S		4.9	1.0	
2	Pilot calls out "Decelerating to landing decision point." Transmit cockpit communication	2.0		Microphone	S		4.3	1.0	2.2
	Pilot is decelerating along glide slope at 1000 ft/min sink rate and when 1000 ft altitude is reached begins to decelerate the aircraft to 50 knots. Pilot decelerates the aircraft with landing decision point as a target to be at 50 knots.								
1	Pilot adjusts TCL	Continuous		Thrust control lever	S			1.0	2.6
2	Pilot tracks pitch guidance - check PFD CRT	3.0		Primary flight display (PFD) on pilot left CRT	S	5.4		4.6	
3	Pilot tracks lateral guidance - check PFD CRT	1.5		Pilot PFD	S	5.4		4.6	
4	Adjust heading - probalistic	0.5		Cyclic stick	p			1.0	2.6
5	Adjust attitude - probalistic	0.5		Trim hat cyclic	p			1.0	2.6

Segment 1—9° Glide Slope Approach to Vertiport—Nacelles Fixed at 80° (continued)

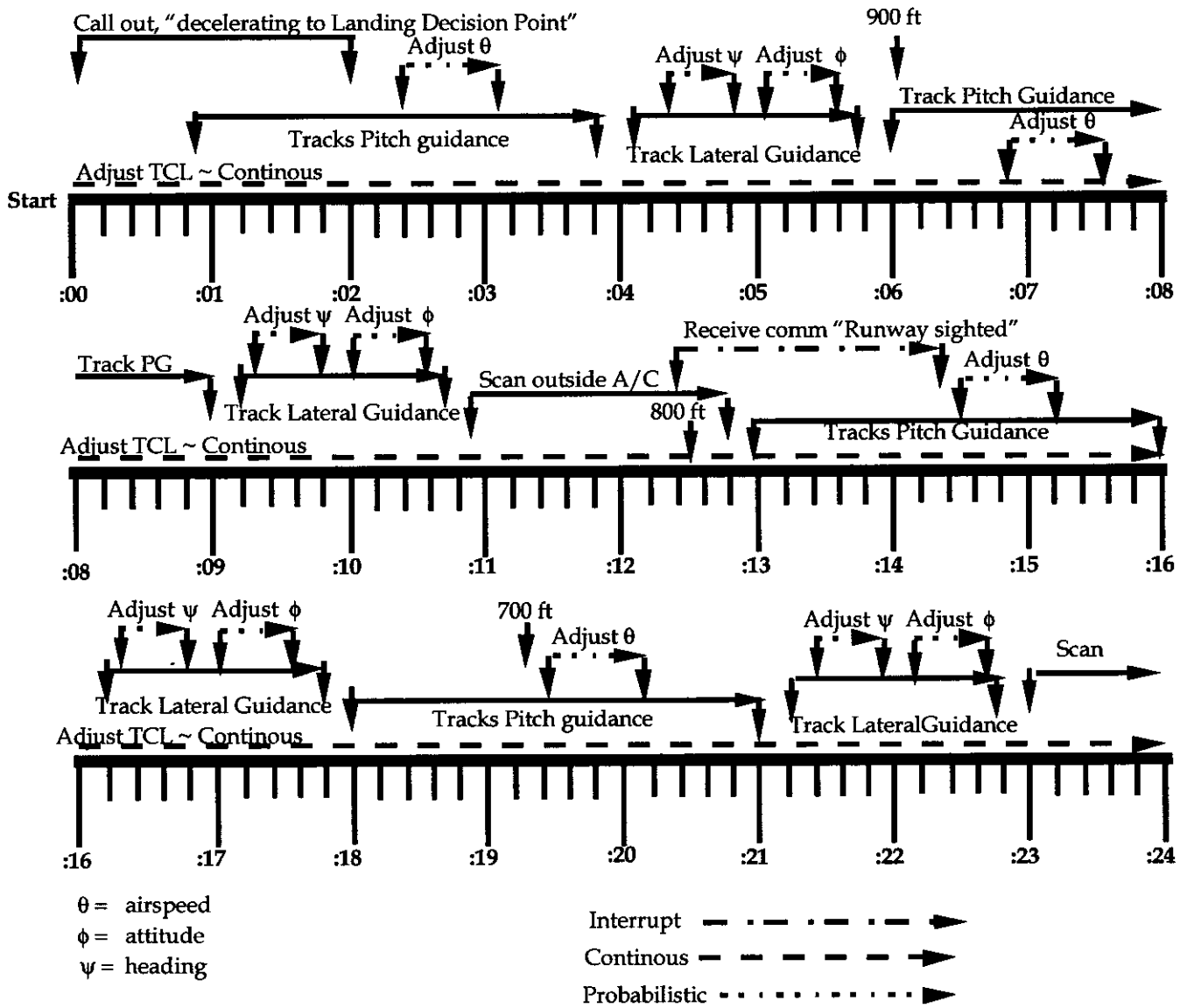
Task No.	Description of Task	Duration	Elapsed time	Equipment	Type *	V	A	C	P
6	Adjust airspeed - probalistic	0.5		Trim hat cyclic	p			1.0	2.6
7	900 ft - time only		6.1		S				
8	Pilot tracks pitch guidance - check PFD CRT	3.0		Pilot PFD	S	5.4		4.6	
9	Pilot tracks lateral guidance - check PFD CRT	1.5		Pilot PFD	S	5.4		4.6	
10	Pilot scan outside aircraft	2.0		Eyes out	S	7.0		3.7	
11	Adjust heading - probalistic	0.5		Cyclic stick	p			1.0	2.6
12	Adjust attitude - probalistic	0.5		Trim hat cyclic	p			1.0	2.6
13	Adjust airspeed - probalistic	0.5		Trim hat cyclic	p			1.0	2.6
14	Co-pilot calls off “Runway sighted.” Cockpit com - 800 ft	2.0	12.5	Intercom	S		4.9	1.0	
15	Pilot tracks pitch guidance - check PFD CRT	3.0		Pilot PFD	S	5.4		4.6	
16	Pilot tracks lateral guidance - check PFD CRT	1.5		Pilot PFD	S	5.4		4.6	
17	Adjust heading - probalistic	0.5		Cyclic stick	p			1.0	2.6
18	Adjust attitude - probalistic	0.5		Trim hat cyclic	p			1.0	2.6
19	Adjust airspeed - probalistic	0.5		Trim hat cyclic	p			1.0	2.6
20	700 ft - time only		19.3	Intercom	S				
21	Pilot tracks pitch guidance - check PFD CRT	3.0		Pilot PFD	S	5.4		4.6	
22	Pilot tracks lateral guidance - check PFD CRT	1.0		Pilot PFD	S	5.4		4.6	
23	Adjust heading - probalistic	0.5		Cyclic stick	p			1.0	2.6

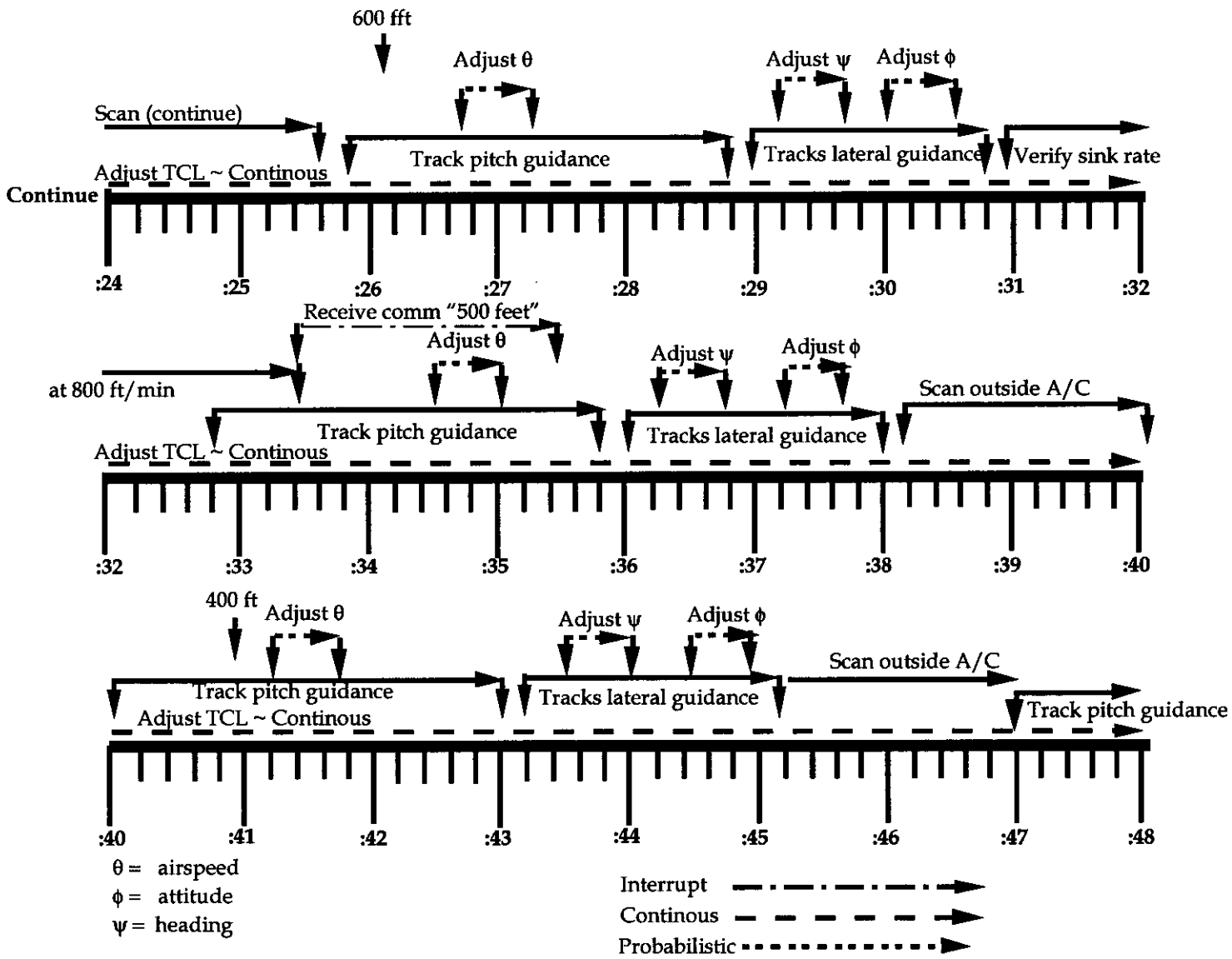
Segment 1—9° Glide Slope Approach to Vertiport—Nacelles Fixed at 80° (continued)

Task No.	Description of Task	Duration	Elapsed time	Equipment	Type *	V	A	C	P
24	Adjust attitude - probalistic	0.5		Trim hat cyclic	p			1.0	2.6
25	Adjust airspeed - probalistic	0.5		Trim hat cyclic	p			1.0	2.6
26	Pilot scans outside aircraft	2.0		Eyes out		7.0		3.7	
27	600 ft - time only	2.0	26.2		S				
28	Pilot tracks pitch guidance - check PFD CRT	3.0		Pilot PFD	S	5.4		4.6	
29	Pilot tracks lateral guidance - check PFD CRT	1.5		Pilot PFD	S	5.4		4.6	
30	Adjust heading - probalistic	0.5		cyclic stick	p			1.0	2.6
31	Adjust attitude - probalistic	0.5		Trim hat cyclic	p			1.0	2.6
32	Adjust airspeed - probalistic	0.5		Trim hat cyclic	p			1.0	2.6
33	Verify sink rate at 800 ft/min	2.0		Pilot PFD	S	5.9		6.8	
34	Co-pilot call off 500 ft- receive cockpit com	2.0	33.5	Intercom	S		4.9	1.0	
35	Pilot tracks pitch guidance - check PFD CRT	3.0		Pilot PFD	S	5.4		4.6	
36	Pilot tracks lateral guidance - check PFD CRT	1.0		Pilot PFD	S	5.4		4.6	
37	Adjust heading - probalistic	0.5		Cyclic stick	p			1.0	2.6
38	Adjust attitude - probalistic	0.5		Trim hat cyclic	p			1.0	2.6
39	Adjust airspeed - probalistic	0.5		Trim hat cyclic	p			1.0	2.6
40	Pilot scans outside aircraft	2.0		Eyes out		7.0		3.7	
41	400 ft - time only		41		S				
42	Pilot tracks pitch guidance - check PFD CRT	3.0		Pilot PFD	S	5.4		4.6	

Segment 1—9° Glide Slope Approach to Vertiport—Nacelles Fixed at 80° (continued)

Task No.	Description of Task	Duration	Elapsed time	Equipment	Type *	V	A	C	P
43	Pilot tracks lateral guidance - check PFD CRT	1.5		Pilot PFD	S	5.4		4.6	
44	Adjust heading - probalistic	0.5		Cyclic stick	p			1.0	2.6
45	Adjust attitude - probalistic	0.5		Trim hat cyclic	p			1.0	2.6
46	Adjust airspeed - probalistic	0.5		Trim hat cyclic	p			1.0	2.6
47	Scan outside A/C	2.0		Eyes out	S	7.0		3.7	
48	Co-pilot call off 300 ft - receive cockpit com	2.0	48.5	Intercom	S		4.9	1.0	
49	Pilot tracks pitch guidance - check PFD CRT	3.0		Pilot PFD	S	5.4		4.6	
50	Pilot tracks lateral guidance - check PFD CRT	1.5		Pilot PFD	S	5.4		4.6	
51	Adjust airspeed - probalistic	0.5		Trim hat cyclic	S			1.0	2.6


Call out, "decelerating to Landing Decision Point"
Adjust θ
Tracks Pitch guidance
Adjust TCL ~ Continous
Start
Adjust ψ Adjust ϕ
Track Lateral Guidance
900 ft
Track Pitch Guidance
Adjust θ
:00
:01
:02
:03
:04
:05
:06
:07
:08
Adjust ψ Adjust ϕ
Track PG
Track Lateral Guidance
Scan outside A/C
800 ft
Receive comm "Runway sighted"
Adjust θ
Tracks Pitch Guidance
Adjust TCL ~ Continous
:08
:09
:10
:11
:12
:13
:14
:15
:16
Adjust ψ Adjust ϕ
Track Lateral Guidance
700 ft
Adjust θ
Tracks Pitch guidance
Adjust TCL ~ Continous
Adjust ψ Adjust ϕ
Track LateralGuidance
Scan
:16
:17
:18
:19
:20
:21
:22
:23
:24
θ = airspeed
ϕ = attitude
ψ = heading
Interrupt
Continous
Probabilistic


600 fft
Adjust θ
Adjust ψ
Adjust ϕ
Scan (continue)
Track pitch guidance
Tracks lateral guidance
Verify sink rate
Adjust TCL ~ Continous
Continue
:24
:25
:26
:27
:28
:29
:30
:31
:32
Receive comm "500 feet"
Adjust θ
Adjust ψ
Adjust ϕ
at 800 ft/min
Scan outside A/C
Track pitch guidance
Tracks lateral guidance
Adjust TCL ~ Continous
:32
:33
:34
:35
:36
:37
:38
:39
:40
400 ft
Adjust θ
Adjust ψ
Adjust ϕ
Scan outside A/C
Track pitch guidance
Tracks lateral guidance
Adjust TCL ~ Continous
Track pitch guidance
:40
:41
:42
:43
:44
:45
:46
:47
:48
θ = airspeed
ϕ = attitude
ψ = heading
Interrupt
Continous
Probabilistic

Commanded Go-Around and Climbing Turn to Go-Around Path

Segment 2—Commanded Go-Around to Beginning of Right Climbing Turn—Auto Discrete Nacelle Mode—Option 1

Task No.	Description of Task	Duration	Elapsed time	Equipment	Type *	V	A	C	P
1	Receive comm “Go Around!”	1.5	50.0				4.9	4.6	
2	Continue comm “Climb right to 180.”	1.5					4.9	1.2	
3	Pilot increases power - pull up on TCL to MAX. Pilot arrests the descent rate and starts + rate of climb	1.5		Thrust control lever - move up to max	S	4.0		3.7	2.6
4	Maintain TCL at max power point	~ 9.5			S			1.2	2.6
5	Pilot checks engine page for torque level	1.0		Center panel CRT display	S	5.0		3.7	
5	Adjust heading - probalistic	0.5		Cyclic lat stick	p			1.0	2.6
7	Adjust attitude - probalistic	0.5		Cyclic trim	p			1.0	2.6
8	Adjust airspeed - probalistic	0.5		Cyclic trim	p			1.0	2.6
9	Pilot checks airspeed	1.8		Pilot PFD	S	5.9		3.7	
10	Pilot checks engine torque level	1.0				5.0		3.7	
11	Pilot monitors rate of climb to determine when + ROC established	2.8		Pilot PFD	S	4.0		3.7	
12	Pilot pushes TO-GA button, which reconfigures the flight director PFD and auto starts the nacelles forward to 75° (This occurs ~6 sec after pilot pulls TCL Max power)	1.0		Button on bottom of TCL grip	S			1.0	2.2
13	Pilot calls out “Gear up.”	1.2			S		4.9	5.3	2.2
14	Pilot checks heading	1.5		Pilot PFD lower center	S	4.0		3.7	

Segment 2—Commanded Go-Around to Beginning of Right Climbing Turn—Auto Discrete Nacelle Mode—Option 1 (continued)

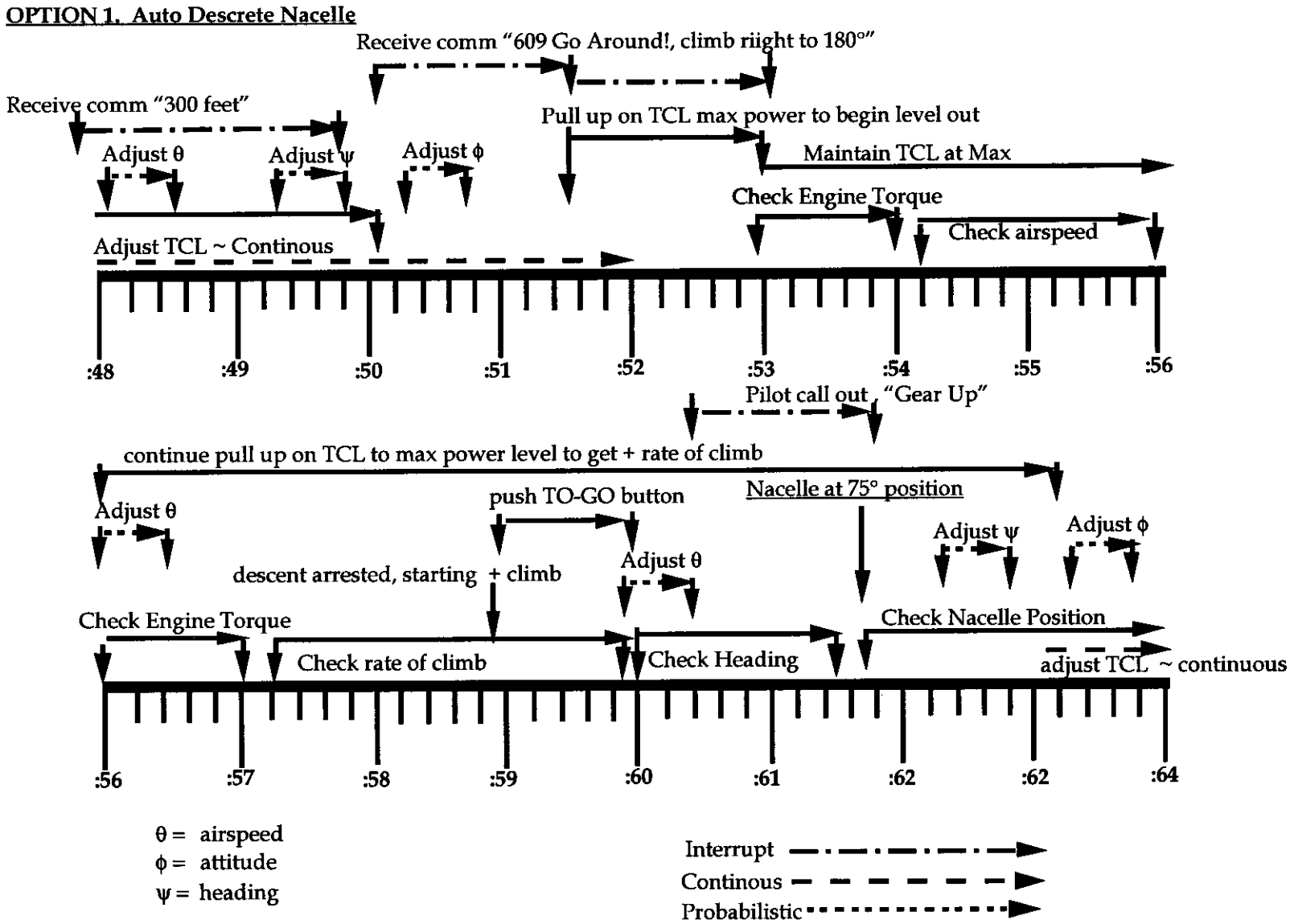
Task No.	Description of Task	Duration	Elapsed time	Equipment	Type *	V	A	C	P
15	Check nacelle position, 75° position reached ~1.6 sec after TO-GA button pushed	2.2		Pilot PFD upper left corner	S	4.0		3.7	
16	Pilot maintains positive rate of climb - adjust TCL, cyclic input to pitch axis	continuous		TCL, cyclic inputs	S			1.0	2.6
17	Adjust heading - probalistic	0.5		Cyclic lat stick	p			1.0	2.6
18	Adjust attitude - probalistic	0.5		Cyclic trim	p			1.0	2.6
19	Adjust airspeed - probalistic	0.5		Cyclic trim	p			1.0	2.6
20	Hear “Gear up, flaps x deg	3.0		Auditory	S		4.3	1.2	

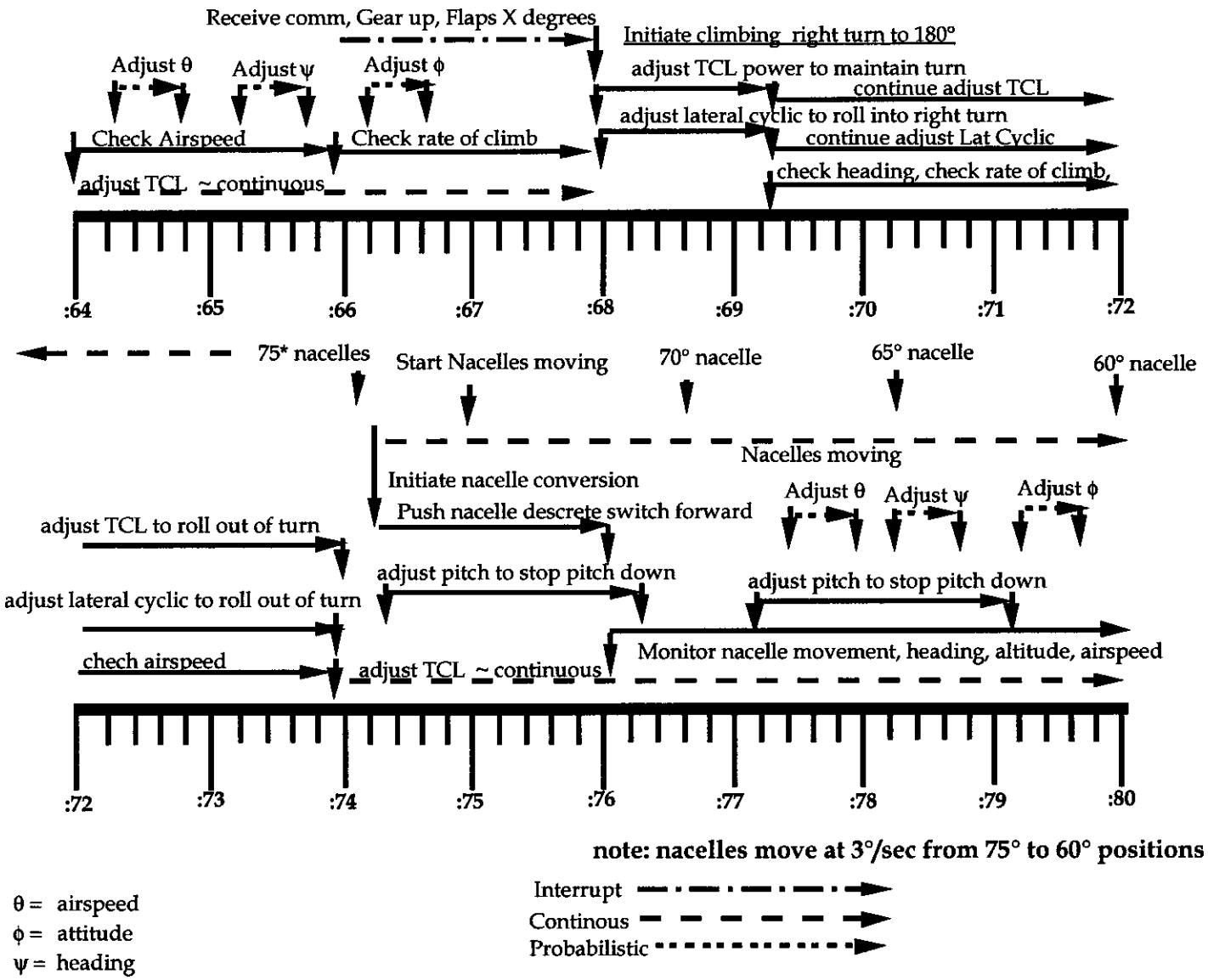
Segment 3—Climbing Right Turn to Go-Around Path—Option 1

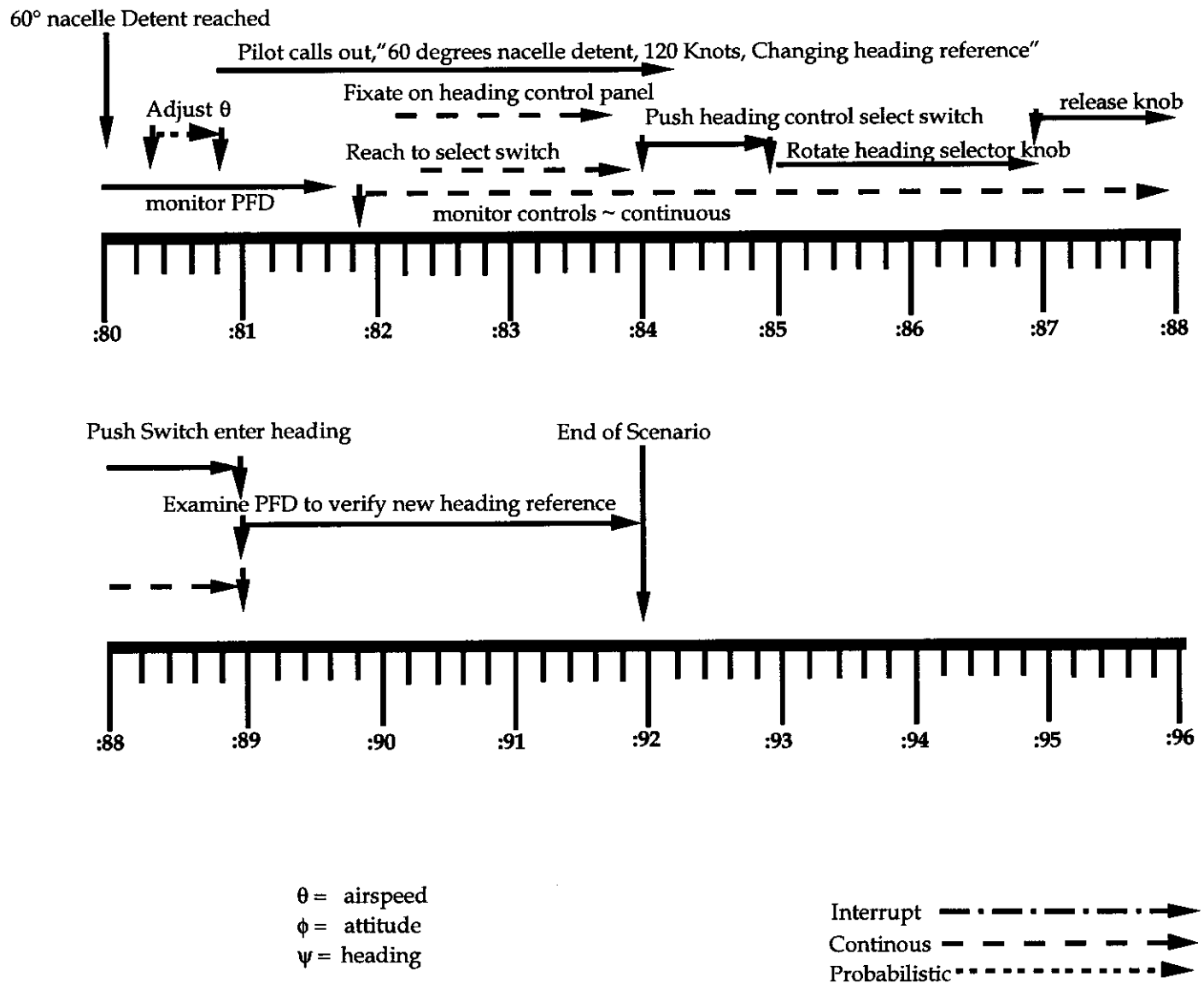
Task No.	Description of Task	Duration	Elapsed time	Equipment	Type *	V	A	C	P
21	Pilot initiates the climbing right turn to heading 180° by moving lateral cyclic in direction of turn - adjust lat cyclic stick	1.0		Lat cyclic stick	S	4.0		4.6	4.6
22	Continue adjust lateral stick	3.0		Lat cyclic stick	S			1.1	2.6
23	Adjust TCL - power into turn	1.0		TCL	S			1.0	2.2
24	Continue adjust TCL for turn	3.0		TCL	S			1.0	2.6
25	Check heading, rate of climb, airspeed	scan PFD 5.0		Pilot PFD bottom	S	5.9		3.7	
26	Adjust lat cyclic stick to roll out of turn	2.0		Cyclic stick	S			1.0	2.6
27	Adjust TCL as roll out of turn	2.0		TCL	S			1.0	2.6
28	Pilot initiates conversion of nacelles to 60° detent - push forward on descrete nacelle switch	1.0		Switch on top of TCL box - left thumb control	S	4.0		1.0	2.2
29	Adjust pitch to keep from diving	2.0		Cyclic long stick forward				1.0	2.6
30	Monitor nacelle movement monitor heading monitor altitude monitor airspeed	scan 5.0		PFD - heading, altitude, airspeed , from bottom CCW		4.0		3.7	
31	Adjust pitch to keep from diving	2.0		Cyclic long stick forward		0		1.0	2.6
32	Adjust heading - probalistic	0.5		Cyclic lat stick	p			1.0	2.6
33	Adjust attitude - probalistic	0.5		Cyclic trim	p			1.0	2.6
34	Adjust airspeed - probalistic	0.5		Cyclic trim	p			1.0	2.6

Segment 3—Climbing Right Turn to Go-Around Path—Option 1 (continued)

Task No.	Description of Task	Duration	Elapsed time	Equipment	Type *	V	A	C	P
35	Pilot verifies 60° Detent, 120 knots airspeed - call out “60° detent, airspeed 120 knots”	3.0		Intercom			4.3	5.3	2.2
36	Pilot initiates heading change. Examine flight director panel - fixate on heading controls	1.0		Center panel below glare shield		5.9		3.7	
37	Reach to heading control panel select switch	Fitts law		Heading control select switch				1.0	2.2
38	Push heading select switch to engage change mode	1.5		Heading control select switch		3.7		1.2	2.2
39	Monitor controls	continuous						1.0	2.6
40	Rotate heading selector knob to desired heading	2.0		Heading selector knob	S	5.0		4.6	5.8
41	Release heading select knob	1.0		Heading selector knob		1.0		1.2	2.2
42	Push heading select to switch to enter new heading	1.0		Heading select switch		3.7		1.2	2.2
43	Examine PFD to verify new heading	3.0		PFD bottom of page		5.9		4.6	
44	END OF SCENARIO								


OPTION 1. Auto Descrete Nacelle
Receive comm "609 Go Around!, climb riight to 180°"
Receive comm "300 feet"
Pull up on TCL max power to begin level out
Adjust θ
Adjust ψ
Adjust ϕ
Maintain TCL at Max
Check Engine Torque
Check airspeed
Adjust TCL ~ Continous
:48
:49
:50
:51
:52
:53
:54
:55
:56
Pilot call out, "Gear Up"
continue pull up on TCL to max power level to get + rate of climb
Adjust θ
push TO-GO button
Nacelle at 75° position
Adjust ψ
Adjust ϕ
descent arrested, starting + climb
Adjust θ
Check Engine Torque
Check Nacelle Position
Check rate of climb
Check Heading
adjust TCL ~ continuous
:56
:57
:58
:59
:60
:61
:62
:62
:64
θ = airspeed
ϕ = attitude
ψ = heading
Interrupt
Continous
Probabilistic


Receive comm, Gear up, Flaps X degrees
Initiate climbing right turn to 180°
Adjust θ
Adjust ψ
Adjust ϕ
adjust TCL power to maintain turn
continue adjust TCL
adjust lateral cyclic to roll into right turn
continue adjust Lat Cyclic
Check Airspeed
Check rate of climb
adjust TCL ~ continuous
check heading, check rate of climb,
:64
:65
:66
:67
:68
:69
:70
:71
:72
75* nacelles
Start Nacelles moving
70° nacelle
65° nacelle
60° nacelle
Nacelles moving
Initiate nacelle conversion
Push nacelle descrete switch forward
Adjust θ
Adjust ψ
Adjust ϕ
adjust TCL to roll out of turn
adjust pitch to stop pitch down
adjust pitch to stop pitch down
adjust lateral cyclic to roll out of turn
chech airspeed
adjust TCL ~ continuous
Monitor nacelle movement, heading, altitude, airspeed
:72
:73
:74
:75
:76
:77
:78
:79
:80
note: nacelles move at 3°/sec from 75° to 60° positions
Interrupt
Continous
Probabilistic
θ = airspeed
ϕ = attitude
ψ = heading


60° nacelle Detent reached
Pilot calls out,"60 degrees nacelle detent, 120 Knots, Changing heading reference"
Adjust θ
Fixate on heading control panel
Push heading control select switch
release knob
Reach to select switch
Rotate heading selector knob
monitor PFD
monitor controls ~ continuous
:80
:81
:82
:83
:84
:85
:86
:87
:88
Push Switch enter heading
End of Scenario
Examine PFD to verify new heading reference
:88
:89
:90
:91
:92
:93
:94
:95
:96
θ = airspeed
ϕ = attitude
ψ = heading
Interrupt
Continous
Probabilistic

Segment 2—Commanded Go-Around to Beginning of Right Climbing Turn—Manual Nacelle Mode—Option 2

Task No.	Description of Task	Duration	Elapsed Time	Equipment	Type *	V	A	C	P
1	Receive comm “Go around!”	1.5.	50.0	Intercom	S		4.9	5.3	
2	Continue receive comm “Climb right to 180”	1.5		Intercom	S		4.9	1.0	
3	Pilot increases power - pull up on TCL to MAX. Pilot arrests the descent rate and starts + rate of climb	1.5		Thrust control lever - move up to max	S	4.0		3.7	2.6
4	Pilot continues to hold TCL at full power position to establish + rate of climb	9.5		TCL maintained at max	S			1.2	2.6
5	Pilot checks engine torque	1.0		Center panel CRT display	S	5.9		3.7	
6	Pilot checks airspeed	1.8		Pilot PFD left side	S	5.9		3.7	
7	Adjust heading - probalistic	0.5		Cyclic lat stick	p			1.0	2.6
8	Adjust attitude - probalistic	0.5		Cyclic trim	p			1.0	2.6
9	Adjust airspeed - probalistic	0.5		Cyclic trim	p			1.0	2.6
10	Pilot checks engine torque	1.0		Center panel CRT display	S	5.9		3.7	
11	Check rate of climb - determine when + ROC occurs	2.8		Pilot PFD right side	S	5.9		4.6	
12	Pilot pushes TO-GA button, which reconfigures the flight director and PFD (~ 6 sec after pilot pulls MAX TCL power)	1.0		Button on bottom of TCL grip	S			1.0	2.6
13	Check heading	1.0		Pilot PFD bottom	S	4.0		3.7	
14	Pilot adjusts manual nacelle thumbwheel control forward to start nacelles moving toward 75° - short duration tweeks and moniors results	2.0		Thumbwheel on top of TCL box. Use left thumb to move	S	4.0		4.6	5.8

Segment 2—Commanded Go-Around to Beginning of Right Climbing Turn—Manual Nacelle Mode—Option 2 (continued)

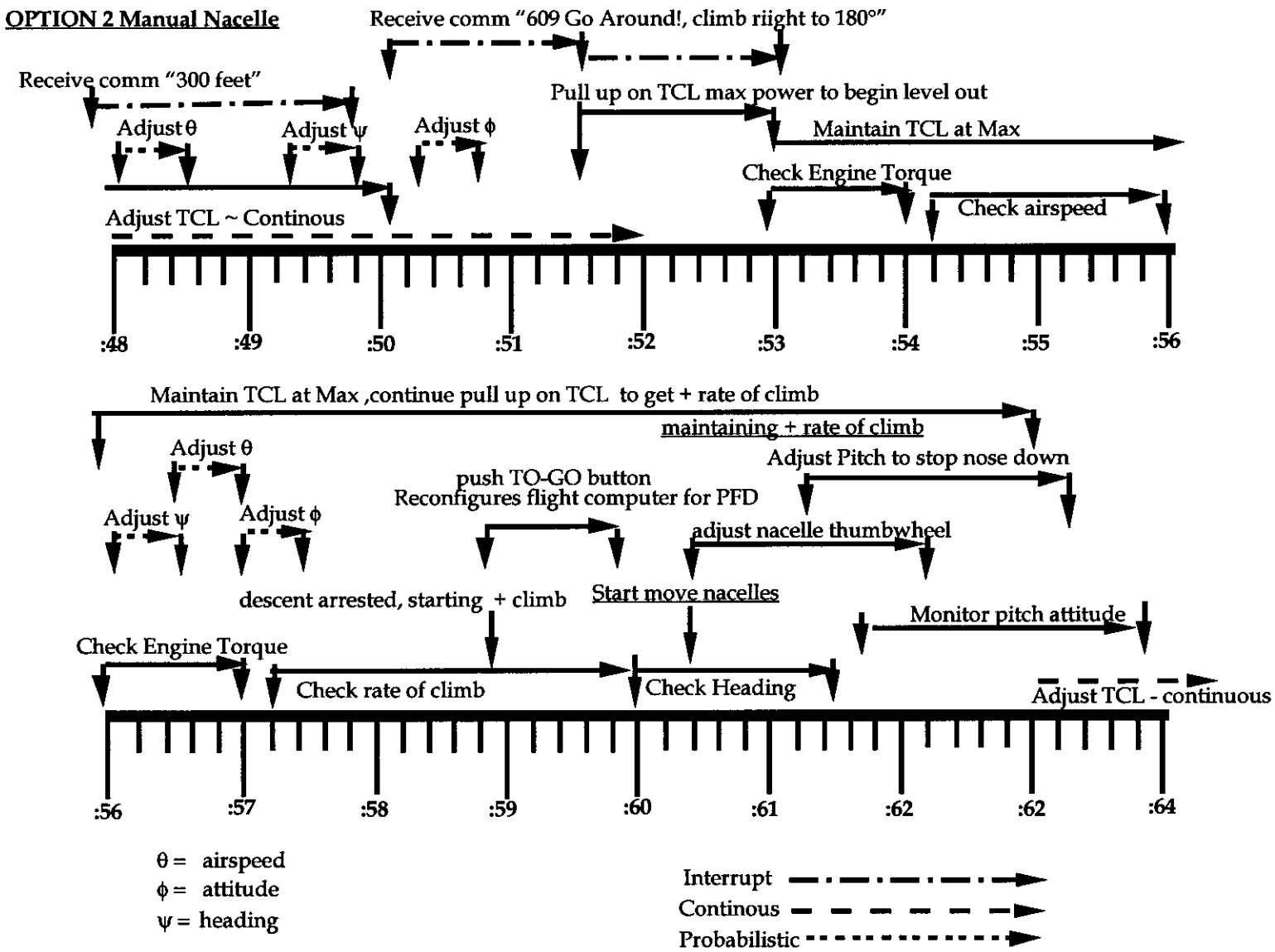
Task No.	Description of Task	Duration	Elapsed Time	Equipment	Type *	V	A	C	P
15	Pilot monitors speed/pitch attitude on PFD	2.0		Pilot PFD - center display	S	3.7		4.6	
16	Adjust pitch to keep from going nose down	2.0		Cyclic long stick forward	S			1.1	2.6
17	Pilot cecks nacelle position	2.0		Pilot PFD upper left corner	S	5.4		4.6	
18	Adjust heading - probalistic	0.5		Cyclic lat stick	p			1.0	2.6
19	Adjust attitude - probalistic	0.5		Cyclic trim	p			1.0	2.6
20	Adjust airspeed - probalistic	0.5		Cyclic trim	p			1.0	2.6
21	Pilot maintains positive rate of climb	continuous		TCL inputs	S			1.0	2.6
22	Pilot calls out “Gear up”	1.4		Intercom	S		4.9	5.3	2.2
23	Pilot pushes nacelle thumbwheel forward	1.5		On TCL right of descrete button	S	4.0		4.6	5.8
24	Adjust pitch attitude	2.0		Cyclic stick				1.1	2.6
25	Monitor speed/pitch command on PFD for pitch attitude	2.0		Pilot PFD centerdisplay	S	3.7		4.6	
26	Pilot checks nacelle display on PFD	3.0		Pilot PFD upper right	S	5.4		4.6	
27	Adjust heading - probalistic	0.5		Cyclic lat stick	p			1.0	2.6
28	Adjust attitude - probalistic	0.5		Cyclic trim	p			1.0	2.6
29	Adjust Airspeed - probalistic	0.5		Cyclic trim	p			1.0	2.6
30	Receive comm “Gear up, flaps at X degrees”	3.0		Intercom	S		4.3	1.2	

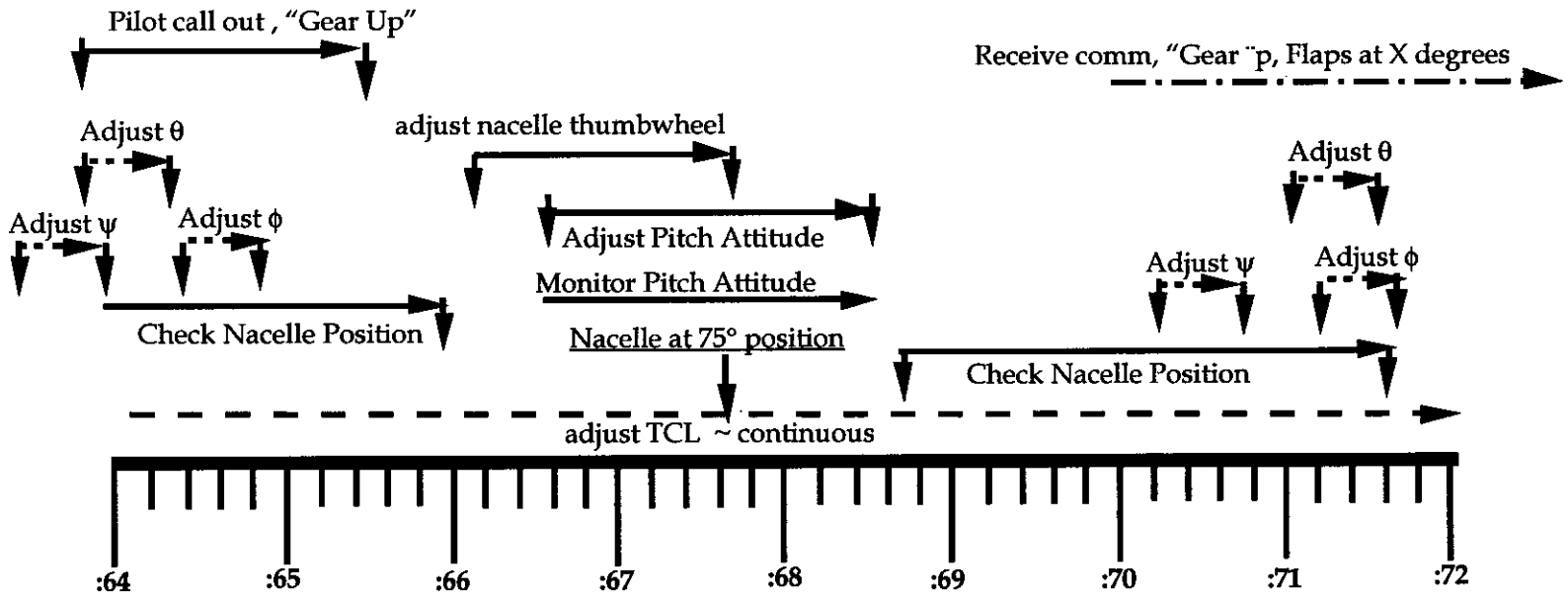
Segment 3—Climbing Right Turn to Go-Around Path—Option 2

Task No.	Description of Task	Duration	Elapsed time	Equipment	Type *	V	A	C	P
31	Pilot initiates climbing right turn to heading 180° by moving lat cyclic in direction of turn - adjust lat cyclic stick	1.5		Lat cyclic stick	S	4.0		4.6	4.6
32	Continue adjust lat stick	2.5		Lat cyclic stick	S			1.0	2.6
33	Adjust TCL to maintain power into turn	1.5		TCL	S			1.0	2.2
34	Continue adjust TCL	2.5		TCL	S			1.0	2.6
35	Check heading, check rate of climb, check airspeed	5.0 scan		PFD - bottom,right, left	S	5.4		3.7	
36	Adjust lat cyclic stick to roll out of turn	2.0		Lateral cyclic	S	4.0		1.0	2.6
37	Adjust TCL as roll out of turn to maintain flight path	2.0		TCL	S	0		1.0	2.6
38	Pilot initiates conversion of nacelles to 60° - push forward on manual nacelle thumbwheel	1.5		Thumbwheel TCL box - left thumb control	S	4.0		4.6	5.8
39	Pilot monitors nacelle position, airspeed, pitch attitude	8.5 scan		Pilot PFD - CCW scan	S	5.9		3.7	
40	Adjust pitch attitude	2.0		Cyclic long stick forward	S			1.1	2.6
41	Adjust heading - probalistic	0.5		Cyclic lat stick	p			1.0	2.6
42	Adjust attitude - probalistic	0.5		Cyclic trim	p			1.0	2.6
43	Adjust airspeed - probalistic	0.5		Cyclic trim	p			1.0	2.6
44	Pilot pushes forward manual nacelle thumbwheel	1.8		Thumbwheel TCL box - left thumb control	S	4.0		4.6	5.8
45	Adjust pitch attitude	2.0		Cyclic long stick forward	S			1.1	2.6

Segment 3—Climbing Right Turn to Go-Around Path—Option 2 (continued)

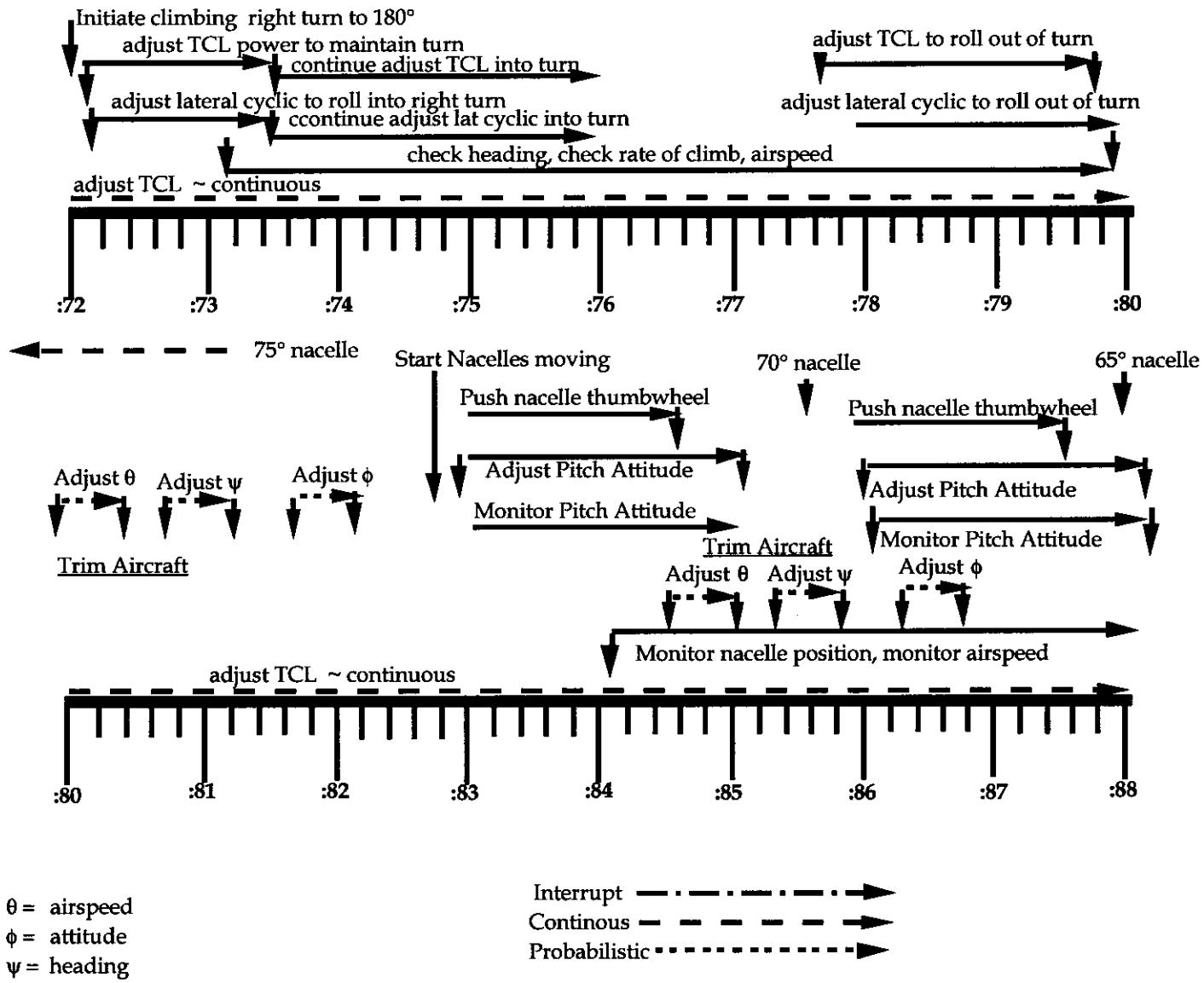
Task No.	Description of Task	Duration	Elapsed time	Equipment	Type *	V	A	C	P
46	Pilot pushes forward manual nacelle thumbwheel - variable rate as 60° nacelle position aproched	2.5		Thumbwheel TCL box - left thumb	S	4.0		4.6	5.8
47	Adjust pitch Attitude	2.0		Cyclic long stick forward	S			1.1	2.6
48	Adjust heading - probalistic	0.5		Cyclic lat stick	p			1.0	2.6
49	Adjust attitude - probalistic	0.5		Cyclic trim	p			1.0	2.6
50	Adjust airspeed - probalistic	0.5		Cyclic trim	p			1.0	2.6
51	Pilot calls out “60° detent, airspeed 120 knots”	3.0		Intercom			4.3	5.3	2.2
52	Pilot initiates heading change to next waypoint Examine flight director panel - fixate on heading controls	1.5		Center panel below glare shield		5.9		3.7	
53	Reach to heading control panel select switch	?		Heading control select switch				1.0	2.2
54	Push heading select switch to engage change mode	1.5		Heading control select switch		3.7		1.2	2.2
55	Rotate heading selector knob to desired heading	2.0		Heading selector knob	S	5.0		4.6	5.8
56	Release heading select knob	1.0		Heading selector knob		1.0		1.2	2.2
57	Push heading select to switch to enter new heading	1.0		Heading select switch		3.7		1.2	2.2
58	Examine PFD to verify new heading	3.0		PFD bottom of page		5.9		4.6	
59	Pilot continues toward waypoint								
60	END OF SCENARIO								

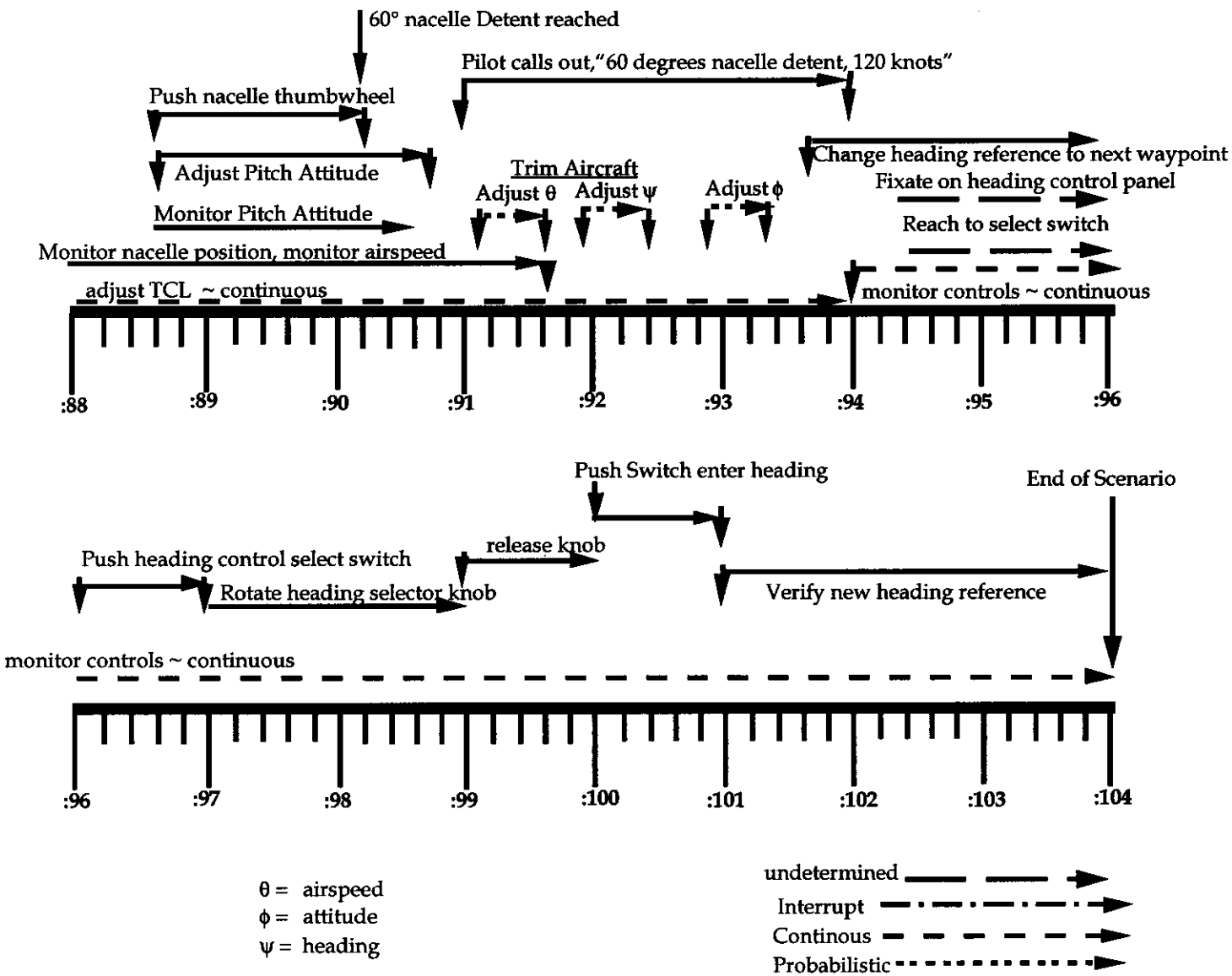

OPTION 2 Manual Nacelle
Receive comm "609 Go Around!, climb riight to 180°"
Receive comm "300 feet"
Pull up on TCL max power to begin level out
Adjust θ
Adjust ψ
Adjust ϕ
Maintain TCL at Max
Check Engine Torque
Check airspeed
Adjust TCL ~ Continous
:48
:49
:50
:51
:52
:53
:54
:55
:56
Maintain TCL at Max ,continue pull up on TCL to get + rate of climb
maintaining + rate of climb
Adjust θ
Adjust Pitch to stop nose down
push TO-GO button
Reconfigures flight computer for PFD
Adjust ψ
Adjust ϕ
adjust nacelle thumbwheel
descent arrested, starting + climb
Start move nacelles
Monitor pitch attitude
Check Engine Torque
Check rate of climb
Check Heading
Adjust TCL - continuous
:56
:57
:58
:59
:60
:61
:62
:62
:64
θ = airspeed
ϕ = attitude
ψ = heading
Interrupt
Continous
Probabilistic



θ = airspeed
ϕ = attitude
ψ = heading

Interrupt
Continous
Probabilistic


Initiate climbing right turn to 180°
adjust TCL power to maintain turn
continue adjust TCL into turn
adjust lateral cyclic to roll into right turn
ccontinue adjust lat cyclic into turn
check heading, check rate of climb, airspeed
adjust TCL to roll out of turn
adjust lateral cyclic to roll out of turn
adjust TCL ~ continuous
:72
:73
:74
:75
:76
:77
:78
:79
:80
75° nacelle
Start Nacelles moving
70° nacelle
65° nacelle
Push nacelle thumbwheel
Push nacelle thumbwheel
Adjust θ
Adjust ψ
Adjust ϕ
Adjust Pitch Attitude
Adjust Pitch Attitude
Monitor Pitch Attitude
Monitor Pitch Attitude
Trim Aircraft
Trim Aircraft
Adjust θ
Adjust ψ
Adjust ϕ
Monitor nacelle position, monitor airspeed
adjust TCL ~ continuous
:80
:81
:82
:83
:84
:85
:86
:87
:88
θ = airspeed
ϕ = attitude
ψ = heading
Interrupt
Continous
Probabilistic


60° nacelle Detent reached
Pilot calls out,"60 degrees nacelle detent, 120 knots"
Push nacelle thumbwheel
Adjust Pitch Attitude
Trim Aircraft
Adjust θ
Adjust ψ
Adjust ϕ
Change heading reference to next waypoint
Fixate on heading control panel
Monitor Pitch Attitude
Reach to select switch
Monitor nacelle position, monitor airspeed
adjust TCL ~ continuous
monitor controls ~ continuous
:88
:89
:90
:91
:92
:93
:94
:95
:96
Push Switch enter heading
End of Scenario
release knob
Push heading control select switch
Rotate heading selector knob
Verify new heading reference
monitor controls ~ continuous
:96
:97
:98
:99
:100
:101
:102
:103
:104
θ = airspeed
ϕ = attitude
ψ = heading
undetermined
Interrupt
Continous
Probabilistic

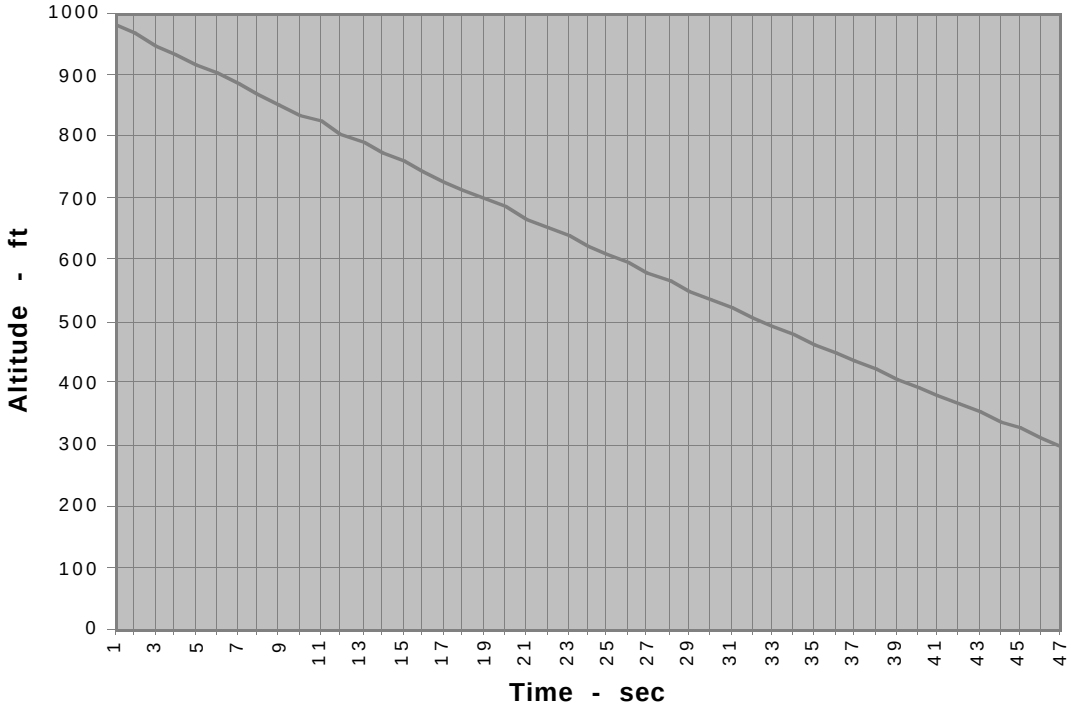


Figure 1. Altitude versus time.

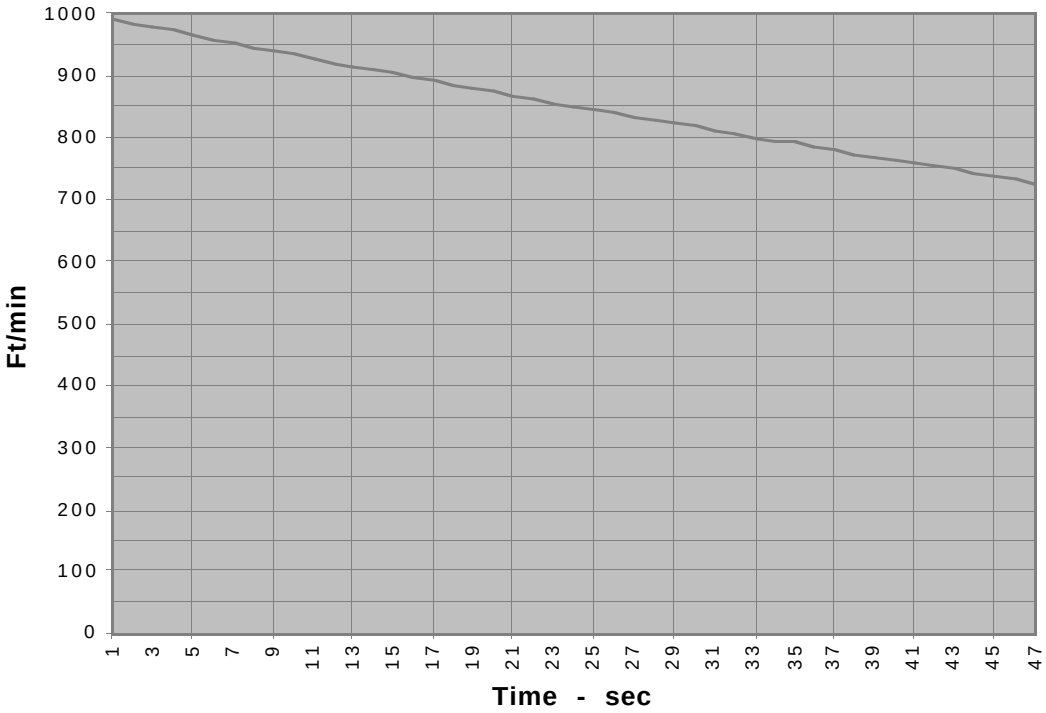
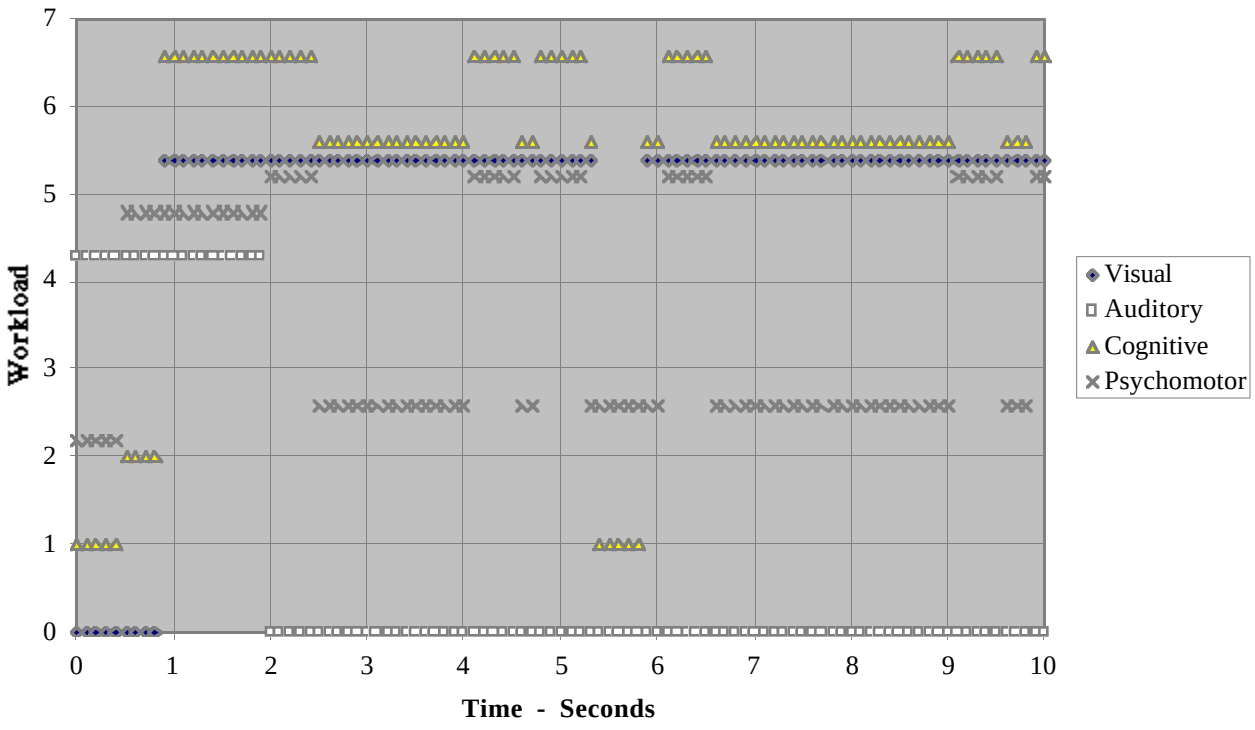


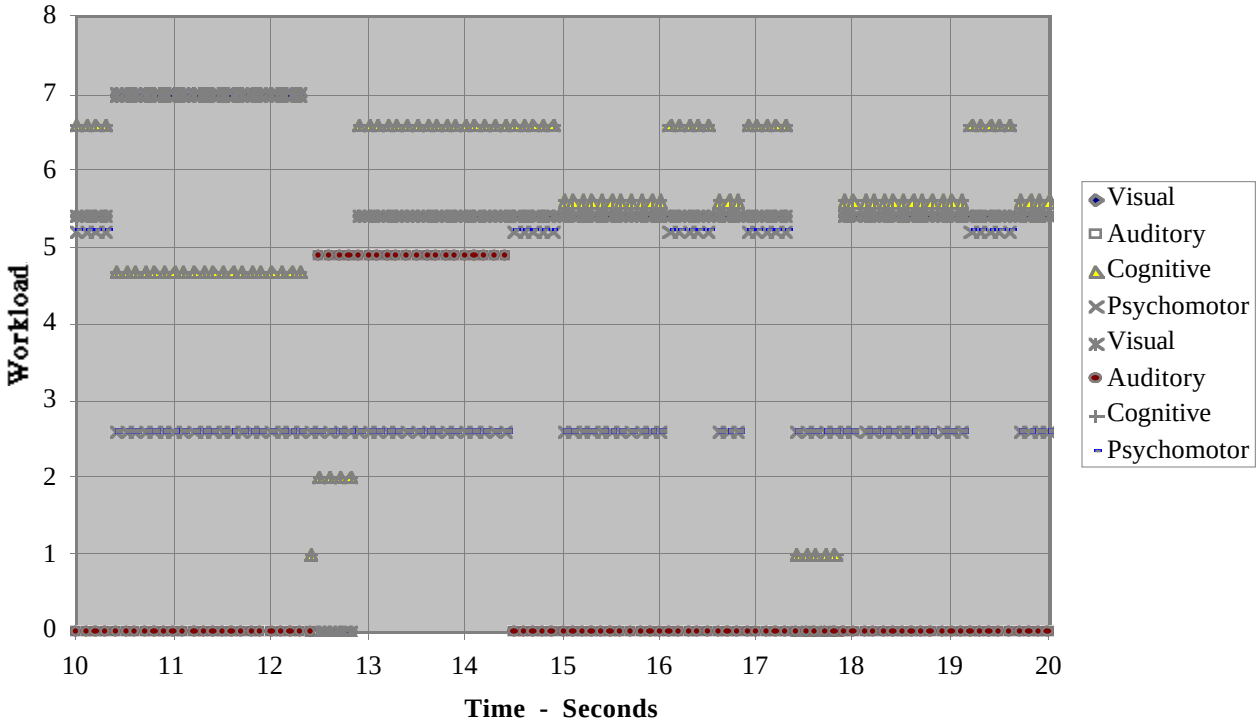
Figure 2. Sink rate versus time.

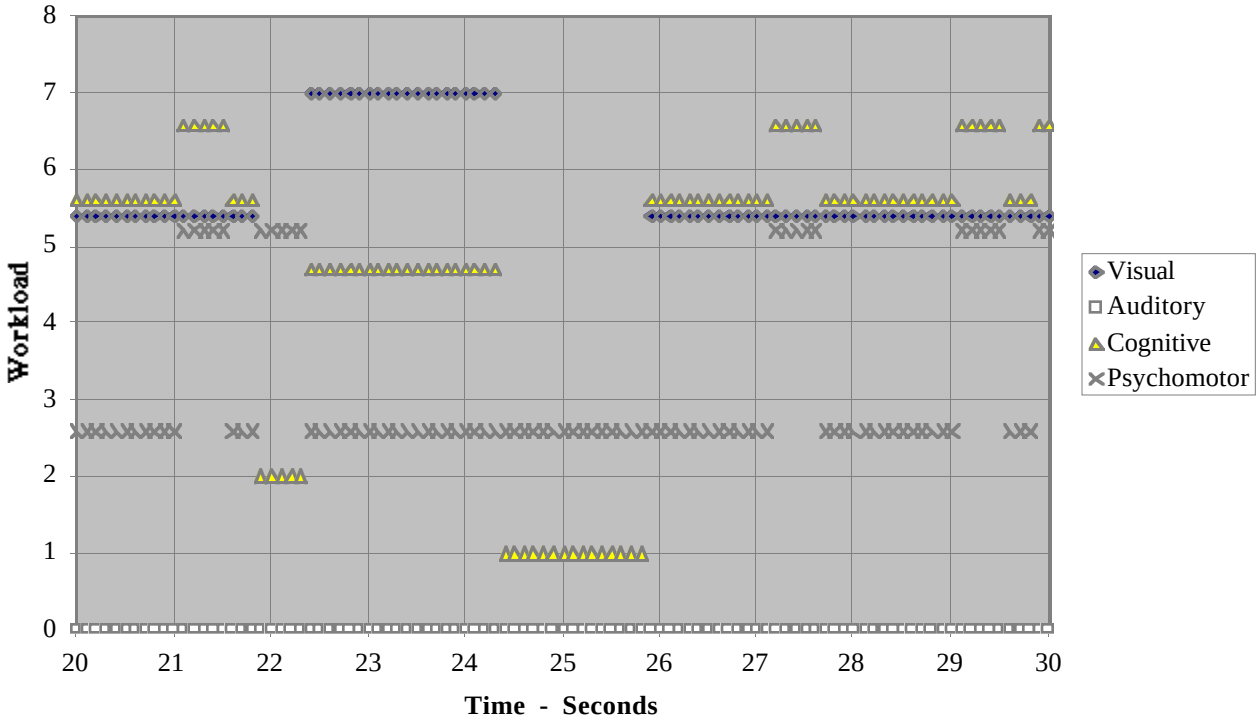
Appendix C

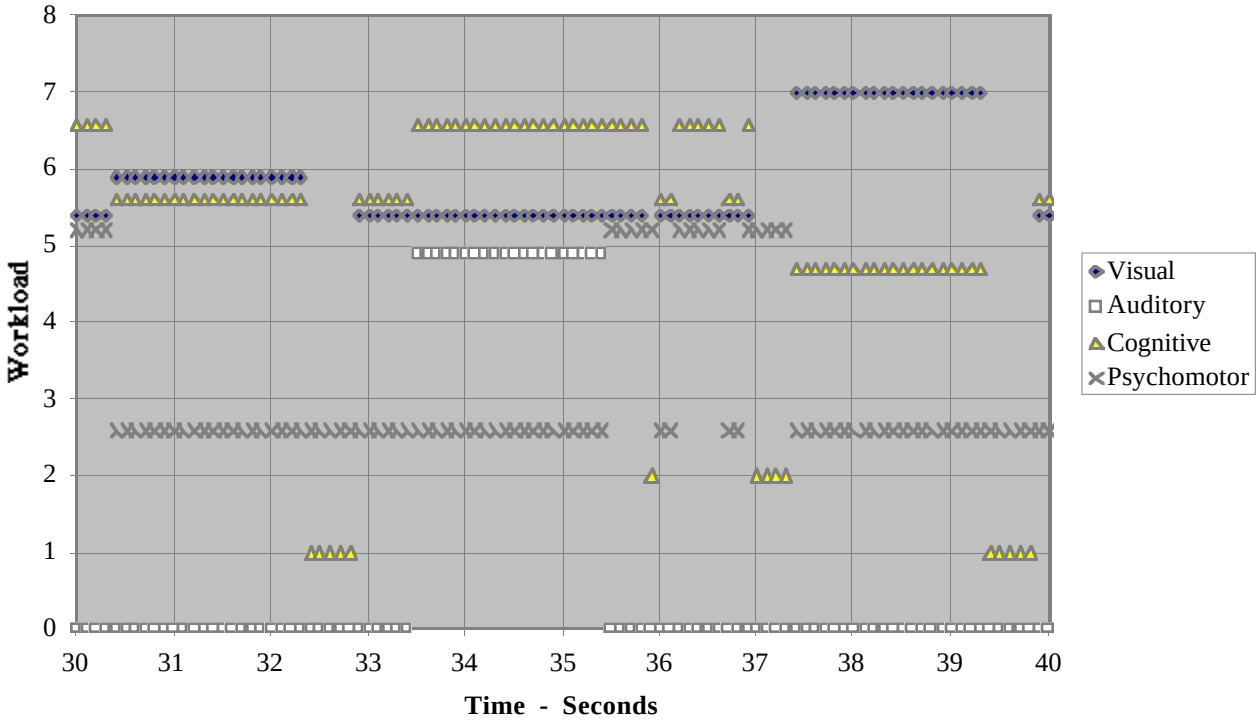
Auto Discrete Nacelle Option

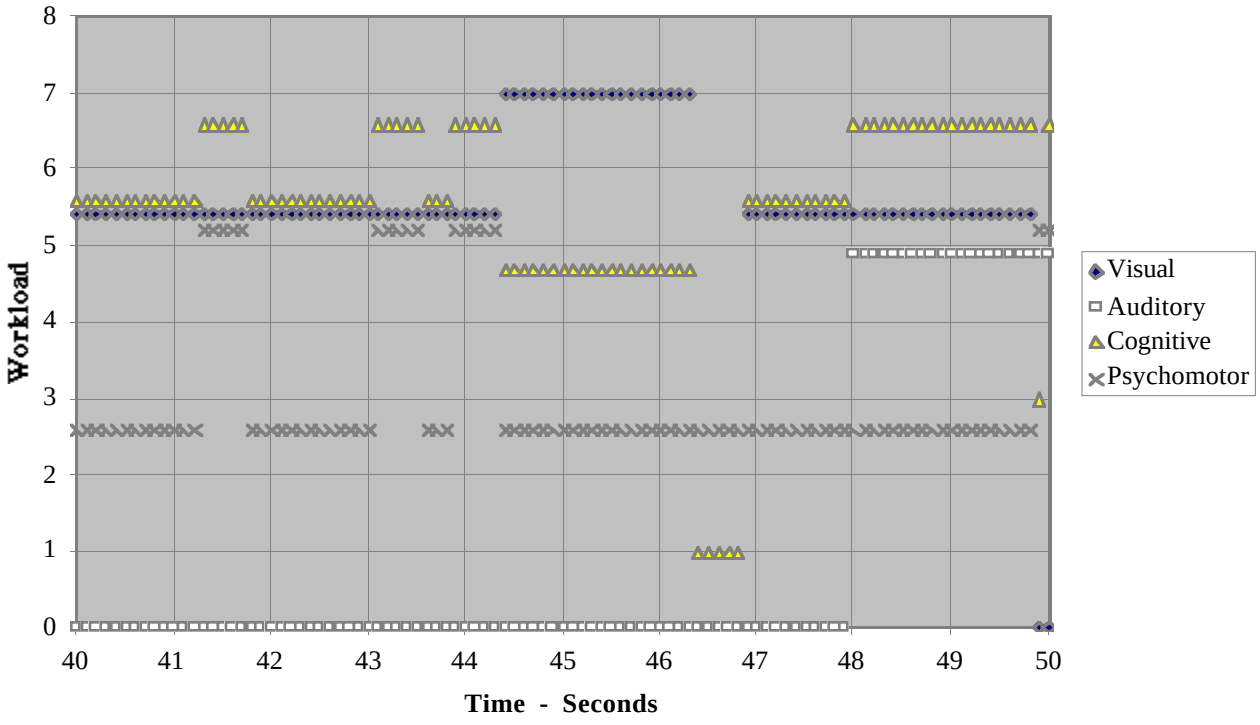
- Workload Timelines
  - VACP
- Output Summary
  - Mission Segment Duration
  - History of Suspended Activities
  - History of Postponed Activities
- Activity Queue
  - Current Activities
  - Working Goals
  - VACP Tabulation
- Activity Tree Structure

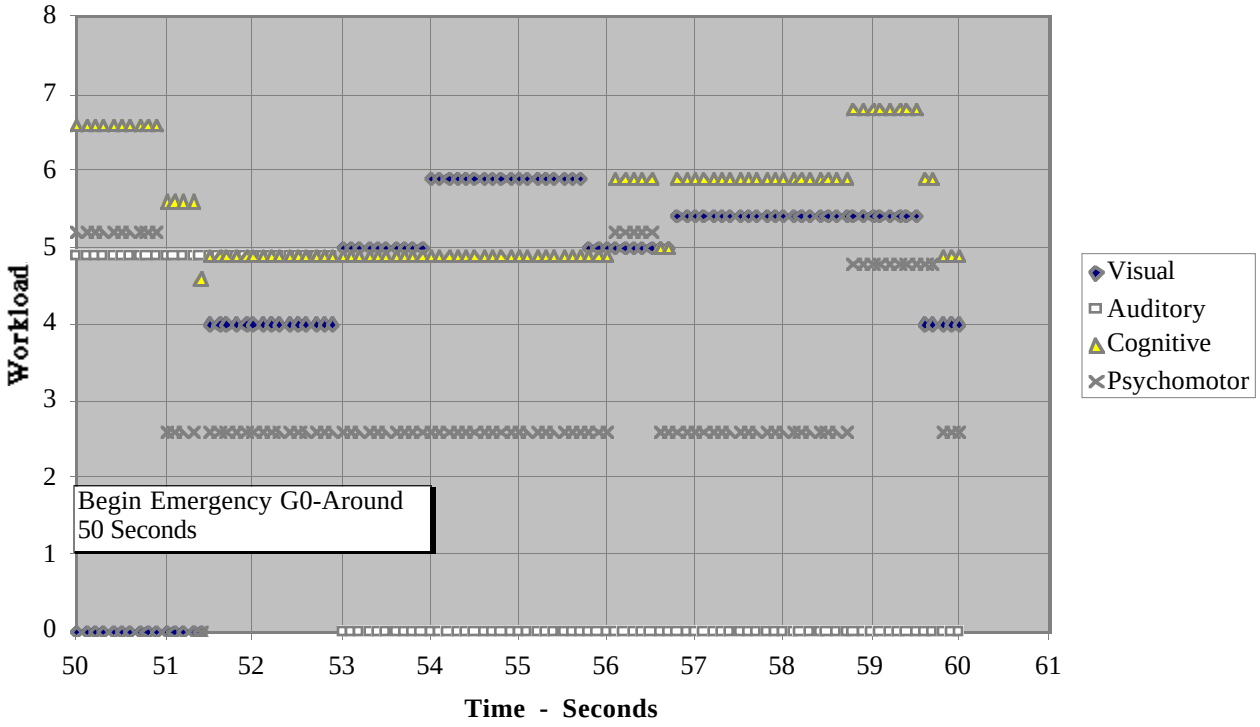

Workload
Time - Seconds
Visual
Auditory
Cognitive
Psychomotor

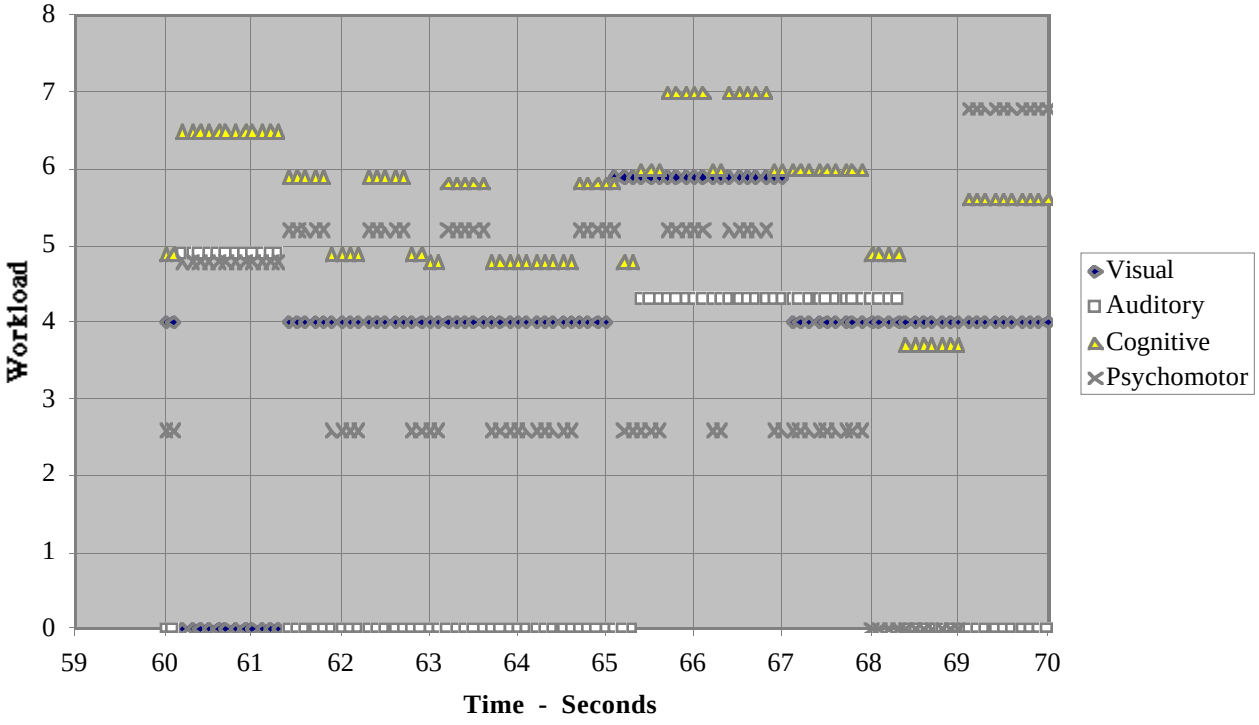

Workload
Time - Seconds
Visual
Auditory
Cognitive
Psychomotor
Visual
Auditory
Cognitive
Psychomotor

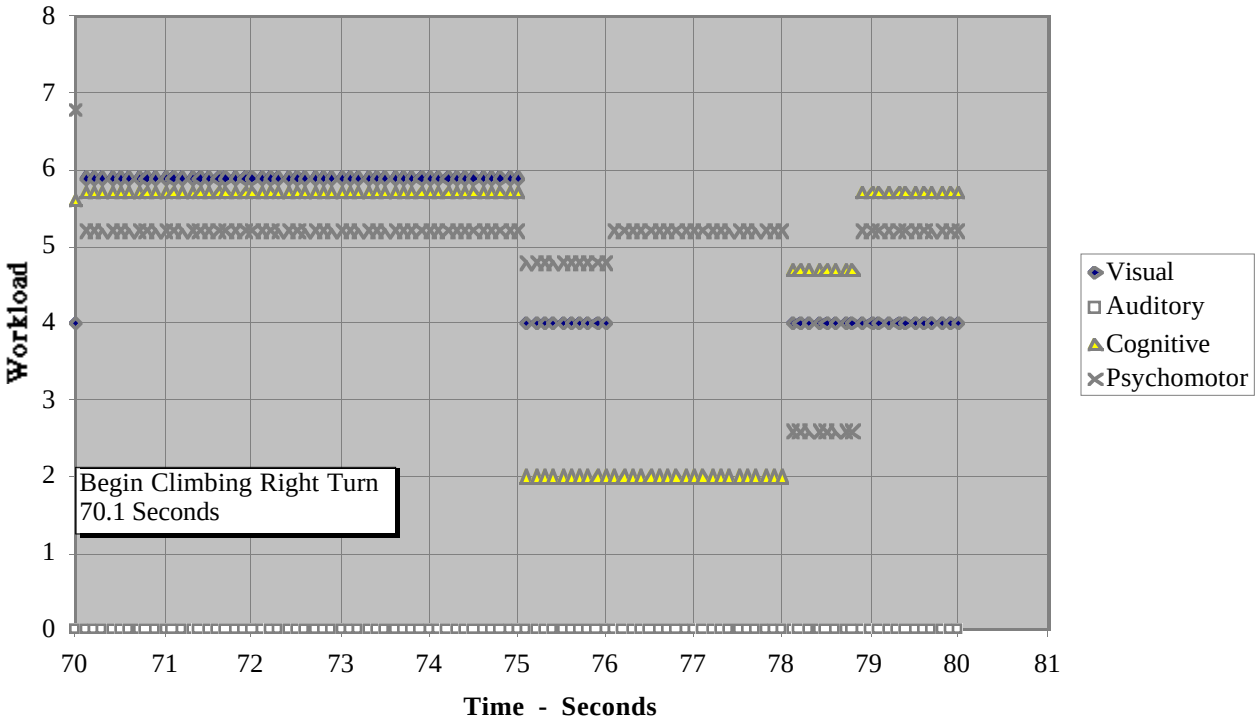

Workload
Time - Seconds
Visual
Auditory
Cognitive
Psychomotor

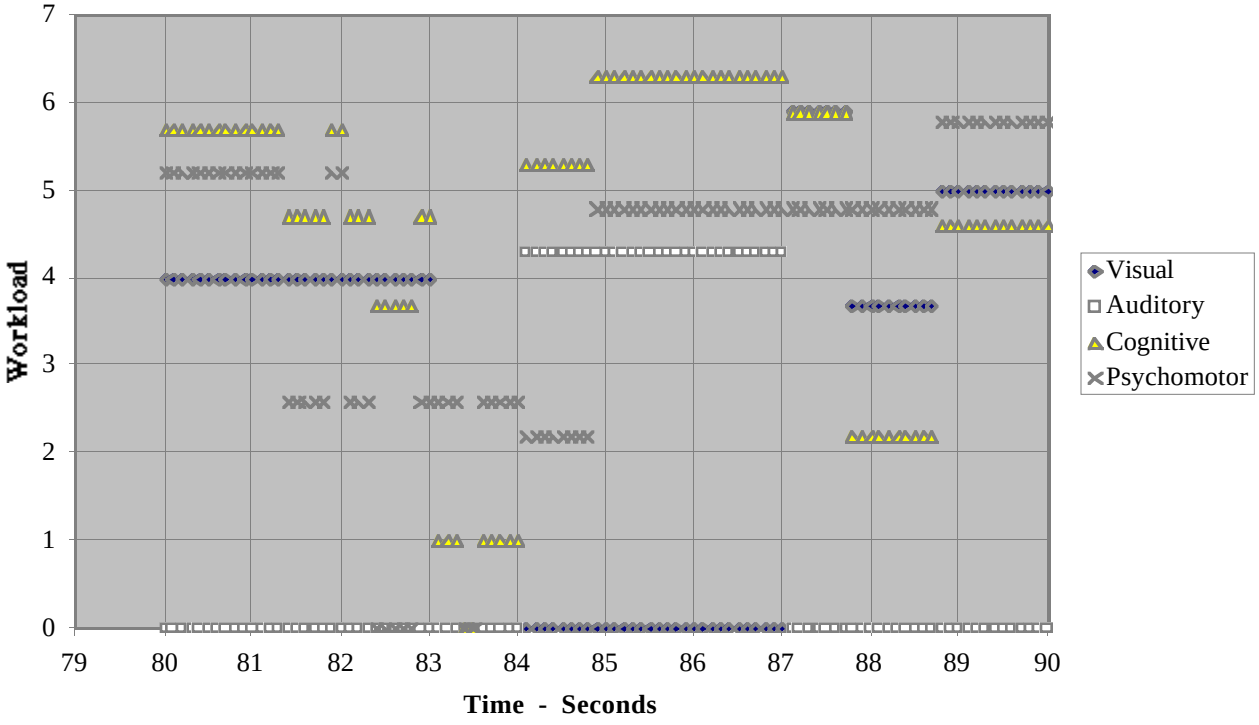

Workload
Time - Seconds
Visual
Auditory
Cognitive
Psychomotor

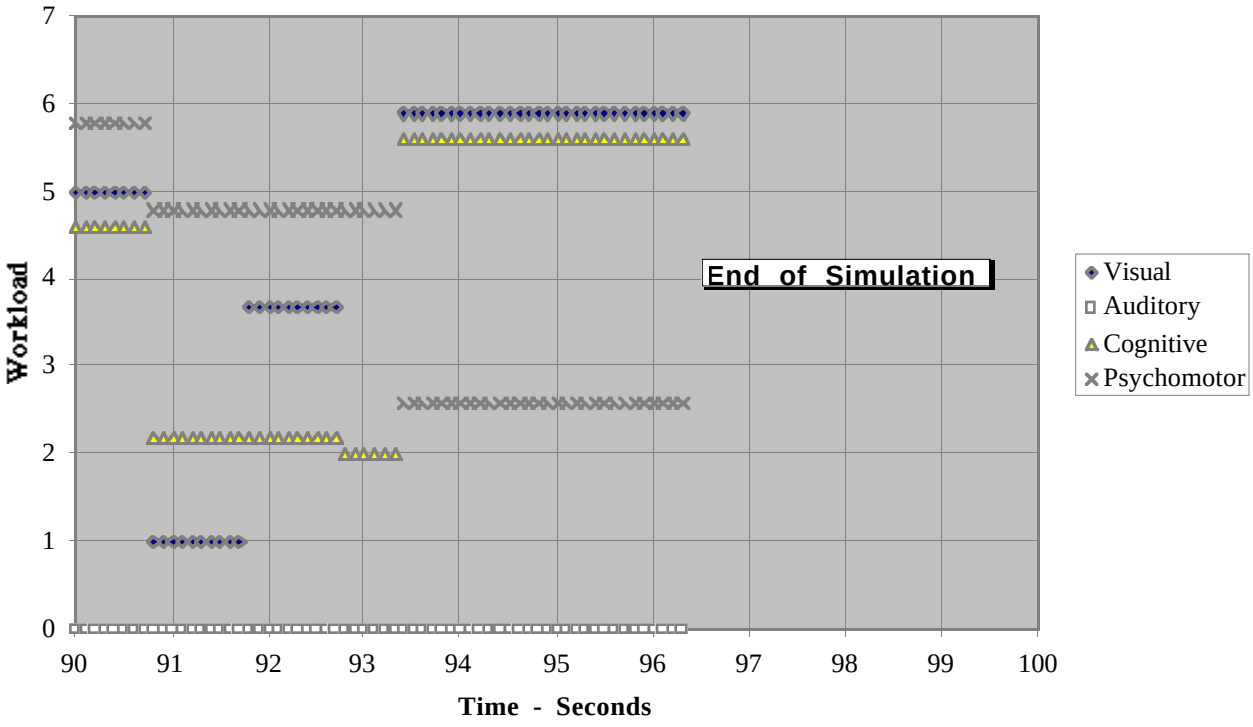

Workload
Time - Seconds
Visual
Auditory
Cognitive
Psychomotor


Workload
Time - Seconds
Begin Emergency G0-Around
50 Seconds
Visual
Auditory
Cognitive
Psychomotor


Workload
Time - Seconds
Visual
Auditory
Cognitive
Psychomotor


Workload
Time - Seconds
Begin Climbing Right Turn
70.1 Seconds
Visual
Auditory
Cognitive
Psychomotor


Workload
Time - Seconds
Visual
Auditory
Cognitive
Psychomotor


Workload
Time - Seconds
End of Simulation
Visual
Auditory
Cognitive
Psychomotor

Output Summary for Auto nacelle

```
==============================================================
Count and Duration Summary for Selected Leaf Activity Types
==============================================================

Activity Type                                  Count          Duration
                                                               (msecs)
-------------------------------------------------------------------

FIXATE-LOCATION                                  30             64100
FIXED-DURATION-MOTOR-ACTIVITY                    54             72500
REACH                                             4              2200
REMEMBER-ACTIVITY                                 2              3200
SCAN-WITH-PATTERN                                 4              8000

Mission Duration (msecs) =  96300


==================================
Mission Segment Durations (msecs)
==================================

Segment 1:
  "Start"                                        0
  "Hear-Emergency-Go-Around"                 50000
  Duration:                                          50000

Segment 2:
  "Hear-Emergency-Go-Around"                 50000
  "Start-climb"                              70100
  Duration:                                          20100

Segment 3:
  "Start-climb"                              70100
  "End"                                      96300
  Duration:                                          26200

================================
History of Suspended Activities
================================

Note: The VACP load for a suspended activity is only shown
      if the suspended activity is a leaf activity,
      since goal activities have no VACP load.


Suspension Event # 1 occurred at time 60200 msecs
Suspended Activity: "verify-conditions"
Length of time suspended (msec): 1200
Context (Current leaf activities and VACPs):
                                                  V    A    C    P
  "Call-out-GearUP"                              0.0  4.9  5.3  2.2
  ACTIVITY-SPACE:REMEMBER-ACTIVITY               0.0  0.0  0.0  0.0
  "PrepareToTrimAircraft"                        0.0  0.0  0.0  0.0
  "Maintain-TCL"                                 0.0  0.0  1.2  2.6
Total VACM load
 (without suspended/postponed activities):       0.0  4.9  6.5  4.8
```

```
Suspension Event # 2 occurred at time 88600 msecs
Suspended Activity: "Monitor-Aircraft"
Length of time suspended (msec): 2000
Context (Current leaf activities and VACPs):
                                                V    A    C    P
  "Rotate-Hdg-Sel-Knob"                        5.0  0.0  4.6  5.8
  ACTIVITY-SPACE:REMEMBER-ACTIVITY             0.0  0.0  0.0  0.0
Total VACM load
 (without suspended/postponed activities):     5.0  0.0  4.6  5.8


Suspension summary:
  Number of activities suspended: 2

================================
History of Postponed Activities
================================

Note: The VACP load for a postponed activity is only shown
      if the postponed activity is a leaf activity,
      since goal activities have no VACP load.


Postponement Event # 1 occurred at time 1100 msecs
Postponed Activity: "Adjust Airspeed"
   with VACP load:                             0.0  0.0  1.0  2.6
Length of time postponed (msec): 900
Context (Current leaf activities and VACPs):
                                                V    A    C    P
  "TrackPitchGuide"                            5.4  0.0  4.6  0.0
  "anticipate 900 ft"                          0.0  0.0  0.0  0.0
  "Adjust-TCL"                                 0.0  0.0  1.0  2.6
  "Callout-Decelerating"                       0.0  4.3  1.0  2.2
Total VACM load
 (without suspended/postponed activities):     5.4  4.3  6.6  4.8


Postponement Event # 2 occurred at time 14200 msecs
Postponed Activity: "Adjust Airspeed"
   with VACP load:                             0.0  0.0  1.0  2.6
Length of time postponed (msec): 300
Context (Current leaf activities and VACPs):
                                                V    A    C    P
  "TrackPitchGuide"                            5.4  0.0  4.6  0.0
  "anticipate 700 ft"                          0.0  0.0  0.0  0.0
  "RunwaySightedCallout"                       0.0  4.9  1.0  0.0
  "Adjust-TCL"                                 0.0  0.0  1.0  2.6
Total VACM load
 (without suspended/postponed activities):     5.4  4.9  6.6  2.6
```

```
Postponement Event # 3 occurred at time 34200 msecs
Postponed Activity: "Adjust Airspeed"
   with VACP load:                              0.0  0.0  1.0  2.6
Length of time postponed (msec): 1300
Context (Current leaf activities and VACPs):
                                                 V    A    C    P
  "500 ft Callout"                              0.0  4.9  1.0  0.0
  "TrackPitchGuide"                             5.4  0.0  4.6  0.0
  "anticipate 400 ft"                           0.0  0.0  0.0  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
Total VACM load
 (without suspended/postponed activities):      5.4  4.9  6.6  2.6


Postponement Event # 4 occurred at time 48200 msecs
Postponed Activity: "Adjust Airspeed"
   with VACP load:                              0.0  0.0  1.0  2.6
Length of time postponed (msec): 1700
Context (Current leaf activities and VACPs):
                                                 V    A    C    P
  "300 ft Callout"                              0.0  4.9  1.0  0.0
  "TrackPitchGuide@300"                         5.4  0.0  4.6  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
Total VACM load
 (without suspended/postponed activities):      5.4  4.9  6.6  2.6


Postponement Event # 5 occurred at time 50200 msecs
Postponed Activity: "AdjustAttitude"
   with VACP load:                              0.0  0.0  1.0  2.6
Length of time postponed (msec): 200
Context (Current leaf activities and VACPs):
                                                 V    A    C    P
  "PrepareToCheckEngTorque"                     0.0  0.0  0.0  0.0
  "PrepareToPullUp"                             0.0  0.0  0.0  0.0
  "Prepare-for-Callout"                         0.0  0.0  0.0  0.0
  "Hear-Emergency-Go-Around"                    0.0  4.9  4.6  0.0
  "Adjust Airspeed"                             0.0  0.0  1.0  2.6
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
Total VACM load
 (without suspended/postponed activities):      0.0  4.9  6.6  5.2


Postponement Event # 6 occurred at time 50600 msecs
Postponed Activity: "Adjust Heading"
   with VACP load:                              0.0  0.0  1.0  2.6
Length of time postponed (msec): 300
Context (Current leaf activities and VACPs):
                                                 V    A    C    P
  "AdjustAttitude"                              0.0  0.0  1.0  2.6
  "PrepareToCheckEngTorque"                     0.0  0.0  0.0  0.0
  "PrepareToPullUp"                             0.0  0.0  0.0  0.0
  "Prepare-for-Callout"                         0.0  0.0  0.0  0.0
  "Hear-Emergency-Go-Around"                    0.0  4.9  4.6  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
Total VACM load
 (without suspended/postponed activities):      0.0  4.9  6.6  5.2
```

```
Postponement Event # 7 occurred at time 60800 msecs
Postponed Activity: "Adjust Airspeed"
   with VACP load:                              0.0  0.0  1.0  2.6
Length of time postponed (msec): 600
Context (Current leaf activities and VACPs):
                                                 V    A    C    P
  "Call-out-GearUP"                             0.0  4.9  5.3  2.2
  ACTIVITY-SPACE:REMEMBER-ACTIVITY              0.0  0.0  0.0  0.0
  "Maintain-TCL"                                0.0  0.0  1.2  2.6
Total VACM load
 (without suspended/postponed activities):      0.0  4.9  6.5  4.8


Postponement Event # 8 occurred at time 60800 msecs
Postponed Activity: "CheckHeading"
   with VACP load:                              4.0  0.0  3.7  0.0
Length of time postponed (msec): 600
Context (Current leaf activities and VACPs):
                                                 V    A    C    P
  "Call-out-GearUP"                             0.0  4.9  5.3  2.2
  ACTIVITY-SPACE:REMEMBER-ACTIVITY              0.0  0.0  0.0  0.0
  "Maintain-TCL"                                0.0  0.0  1.2  2.6
Total VACM load
 (without suspended/postponed activities):      0.0  4.9  6.5  4.8


Postponement Event # 9 occurred at time 75100 msecs
Postponed Activity: "Adjust-Pitch"
   with VACP load:                              0.0  0.0  1.0  2.6
Length of time postponed (msec): 1000
Context (Current leaf activities and VACPs):
                                                 V    A    C    P
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
  "Push-Nacelle-Discrete-Switch"                4.0  0.0  1.0  2.2
Total VACM load
 (without suspended/postponed activities):      4.0  0.0  2.0  4.8


Postponement Event # 10 occurred at time 80100 msecs
Postponed Activity: "Adjust Airspeed"
   with VACP load:                              0.0  0.0  1.0  2.6
Length of time postponed (msec): 800
Context (Current leaf activities and VACPs):
                                                 V    A    C    P
  "Adjust-Pitch"                                0.0  0.0  1.0  2.6
  "Monitor-Nacelles"                            4.0  0.0  3.7  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
Total VACM load
 (without suspended/postponed activities):      4.0  0.0  5.7  5.2


Postponement summary:
  Number of activities postponed: 10
```

Activity Queue Auto Discrete Nacelle

```
Time (millisecs):        0
CURRENT ACTIVITIES
  "WAIT"                                    0.0  0.0  0.0  0.0
  "Callout-Decelerating"                    0.0  4.3  1.0  2.2
  "Reach-TCL"                               0.0  0.0  0.0  0.0
  "Reach-cyclic"                            0.0  0.0  0.0  0.0
WORKING GOALS
  "Glide-Slope-Intercept"
  "CallOut-Decel"
  "Control-TCL"
  "SHCT-Mission"

Time (millisecs):      500
CURRENT ACTIVITIES
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
  "WAIT"                                    0.0  0.0  0.0  0.0
  "Callout-Decelerating"                    0.0  4.3  1.0  2.2
WORKING GOALS
  "Glide-Slope-Intercept"
  "CallOut-Decel"
  "Control-TCL"

Time (millisecs):      900
CURRENT ACTIVITIES
  "wait"                                    0.0  0.0  0.0  0.0
  "TrackPitchGuide"                         5.4  0.0  4.6  0.0
  "anticipate 900 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
  "Callout-Decelerating"                    0.0  4.3  1.0  2.2
WORKING GOALS
  "Adjust-Airspeed"
  "pitch&airspeed@1000"
  "900&above acts"
  "Glide-Slope-Intercept"
  "CallOut-Decel"
  "Control-TCL"

Time (millisecs):     1100
CURRENT ACTIVITIES
  "TrackPitchGuide"                         5.4  0.0  4.6  0.0
  "anticipate 900 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
  "Callout-Decelerating"                    0.0  4.3  1.0  2.2
WORKING GOALS
  "Adjust-Airspeed"
  "pitch&airspeed@1000"
  "900&above acts"
  "Glide-Slope-Intercept"
  "CallOut-Decel"
  "Control-TCL"
POSTPONED ACTIVITIES
  "Adjust Airspeed"
```

```
Time (millisecs):     2000
CURRENT ACTIVITIES
  "Adjust Airspeed"                              0.0  0.0  1.0  2.6
  "TrackPitchGuide"                              5.4  0.0  4.6  0.0
  "anticipate 900 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Airspeed"
  "pitch&airspeed@1000"
  "900&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):     2500
CURRENT ACTIVITIES
  "TrackPitchGuide"                              5.4  0.0  4.6  0.0
  "anticipate 900 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "pitch&airspeed@1000"
  "900&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):     3900
CURRENT ACTIVITIES
  "wait"                                         0.0  0.0  0.0  0.0
  "TrackLatGuide"                                5.4  0.0  4.6  0.0
  "anticipate 900 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "1000-900 ft."
  "900&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):     4100
CURRENT ACTIVITIES
  "Adjust Heading"                               0.0  0.0  1.0  2.6
  "TrackLatGuide"                                5.4  0.0  4.6  0.0
  "anticipate 900 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "1000-900 ft."
  "900&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"
```

```
Time (millisecs):     4600
CURRENT ACTIVITIES
  "wait"                                    0.0  0.0  0.0  0.0
  "TrackLatGuide"                           5.4  0.0  4.6  0.0
  "anticipate 900 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "1000-900 ft."
  "900&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):     4800
CURRENT ACTIVITIES
  "Adjust Attitude"                         0.0  0.0  1.0  2.6
  "TrackLatGuide"                           5.4  0.0  4.6  0.0
  "anticipate 900 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "1000-900 ft."
  "900&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):     5300
CURRENT ACTIVITIES
  "TrackLatGuide"                           5.4  0.0  4.6  0.0
  "anticipate 900 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "lateral&heading-att"
  "1000-900 ft."
  "900&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):     5400
CURRENT ACTIVITIES
  "anticipate 900 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "900&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"
```

```
Time (millisecs):     5900
CURRENT ACTIVITIES
  "wait"                                    0.0  0.0  0.0  0.0
  "TrackPitchGuide"                         5.4  0.0  4.6  0.0
  "anticipate 800 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Airspeed"
  "pitch&airspeed@900"
  "800&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):     7200
CURRENT ACTIVITIES
  "Adjust Airspeed"                         0.0  0.0  1.0  2.6
  "TrackPitchGuide"                         5.4  0.0  4.6  0.0
  "anticipate 800 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Airspeed"
  "pitch&airspeed@900"
  "800&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):     7700
CURRENT ACTIVITIES
  "TrackPitchGuide"                         5.4  0.0  4.6  0.0
  "anticipate 800 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "pitch&airspeed@900"
  "800&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):     8900
CURRENT ACTIVITIES
  "wait"                                    0.0  0.0  0.0  0.0
  "TrackLatGuide"                           5.4  0.0  4.6  0.0
  "anticipate 800 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "900-800 ft."
  "800&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"
```

```
Time (millisecs):     9100
CURRENT ACTIVITIES
  "Adjust Heading"                              0.0  0.0  1.0  2.6
  "TrackLatGuide"                               5.4  0.0  4.6  0.0
  "anticipate 800 ft"                           0.0  0.0  0.0  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "900-800 ft."
  "800&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):     9600
CURRENT ACTIVITIES
  "wait"                                        0.0  0.0  0.0  0.0
  "TrackLatGuide"                               5.4  0.0  4.6  0.0
  "anticipate 800 ft"                           0.0  0.0  0.0  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "900-800 ft."
  "800&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):     9900
CURRENT ACTIVITIES
  "Adjust Attitude"                             0.0  0.0  1.0  2.6
  "TrackLatGuide"                               5.4  0.0  4.6  0.0
  "anticipate 800 ft"                           0.0  0.0  0.0  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "900-800 ft."
  "800&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    10400
CURRENT ACTIVITIES
  "Scan"                                        7.0  0.0  3.7  0.0
  "anticipate 800 ft"                           0.0  0.0  0.0  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "900-800 ft."
  "800&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    12400
CURRENT ACTIVITIES
  "anticipate 800 ft"                           0.0  0.0  0.0  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
```

```
WORKING GOALS
  "800&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"
```

```
Time (millisecs):    12500
CURRENT ACTIVITIES
  "RunwaySightedCallout"                        0.0  4.9  1.0  0.0
  "anticipate 800 ft"                           0.0  0.0  0.0  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "HearRunwaySighted"
  "800&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    12900
CURRENT ACTIVITIES
  "wait"                                        0.0  0.0  0.0  0.0
  "TrackPitchGuide"                             5.4  0.0  4.6  0.0
  "anticipate 700 ft"                           0.0  0.0  0.0  0.0
  "RunwaySightedCallout"                        0.0  4.9  1.0  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Airspeed"
  "pitch&airspeed@800"
  "700&above acts"
  "HearRunwaySighted"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    14200
CURRENT ACTIVITIES
  "TrackPitchGuide"                             5.4  0.0  4.6  0.0
  "anticipate 700 ft"                           0.0  0.0  0.0  0.0
  "RunwaySightedCallout"                        0.0  4.9  1.0  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Airspeed"
  "pitch&airspeed@800"
  "700&above acts"
  "HearRunwaySighted"
  "Glide-Slope-Intercept"
  "Control-TCL"
POSTPONED ACTIVITIES
  "Adjust Airspeed"

Time (millisecs):    14500
CURRENT ACTIVITIES
  "Adjust Airspeed"                             0.0  0.0  1.0  2.6
  "TrackPitchGuide"                             5.4  0.0  4.6  0.0
  "anticipate 700 ft"                           0.0  0.0  0.0  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Airspeed"
  "pitch&airspeed@800"
  "700&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"
```

```
Time (millisecs):    15000
CURRENT ACTIVITIES
  "TrackPitchGuide"                              5.4  0.0  4.6  0.0
  "anticipate 700 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "pitch&airspeed@800"
  "700&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    15900
CURRENT ACTIVITIES
  "wait"                                         0.0  0.0  0.0  0.0
  "TrackLatGuide"                                5.4  0.0  4.6  0.0
  "anticipate 700 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "800-700 ft."
  "700&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    16100
CURRENT ACTIVITIES
  "Adjust Heading"                               0.0  0.0  1.0  2.6
  "TrackLatGuide"                                5.4  0.0  4.6  0.0
  "anticipate 700 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "800-700 ft."
  "700&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    16600
CURRENT ACTIVITIES
  "wait"                                         0.0  0.0  0.0  0.0
  "TrackLatGuide"                                5.4  0.0  4.6  0.0
  "anticipate 700 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "800-700 ft."
  "700&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"
```

```
Time (millisecs):    16900
CURRENT ACTIVITIES
  "Adjust Attitude"                              0.0  0.0  1.0  2.6
  "TrackLatGuide"                                5.4  0.0  4.6  0.0
  "anticipate 700 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "800-700 ft."
  "700&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    17400
CURRENT ACTIVITIES
  "anticipate 700 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "700&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    17900
CURRENT ACTIVITIES
  "wait"                                         0.0  0.0  0.0  0.0
  "TrackPitchGuide"                              5.4  0.0  4.6  0.0
  "anticipate 600 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Airspeed"
  "pitch&airspeed@700"
  "600&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    19300
CURRENT ACTIVITIES
  "Adjust Airspeed"                              0.0  0.0  1.0  2.6
  "TrackPitchGuide"                              5.4  0.0  4.6  0.0
  "anticipate 600 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Airspeed"
  "pitch&airspeed@700"
  "600&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"
```

```
Time (millisecs):    19800
CURRENT ACTIVITIES
  "TrackPitchGuide"                              5.4  0.0  4.6  0.0
  "anticipate 600 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "pitch&airspeed@700"
  "600&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    20900
CURRENT ACTIVITIES
  "wait"                                         0.0  0.0  0.0  0.0
  "TrackLatGuide"                                5.4  0.0  4.6  0.0
  "anticipate 600 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "700-600 ft."
  "600&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    21100
CURRENT ACTIVITIES
  "Adjust Heading"                               0.0  0.0  1.0  2.6
  "TrackLatGuide"                                5.4  0.0  4.6  0.0
  "anticipate 600 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "700-600 ft."
  "600&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    21600
CURRENT ACTIVITIES
  "wait"                                         0.0  0.0  0.0  0.0
  "TrackLatGuide"                                5.4  0.0  4.6  0.0
  "anticipate 600 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "700-600 ft."
  "600&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"
```

```
Time (millisecs):    21900
CURRENT ACTIVITIES
  "Adjust Attitude"                              0.0  0.0  1.0  2.6
  "anticipate 600 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "700-600 ft."
  "600&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    22400
CURRENT ACTIVITIES
  "Scan"                                         7.0  0.0  3.7  0.0
  "anticipate 600 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "700-600 ft."
  "600&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    24400
CURRENT ACTIVITIES
  "anticipate 600 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "600&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    25900
CURRENT ACTIVITIES
  "wait"                                         0.0  0.0  0.0  0.0
  "TrackPitchGuide"                              5.4  0.0  4.6  0.0
  "anticipate 500 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Airspeed"
  "pitch&airspeed@600"
  "500&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    27200
CURRENT ACTIVITIES
  "Adjust Airspeed"                              0.0  0.0  1.0  2.6
  "TrackPitchGuide"                              5.4  0.0  4.6  0.0
  "anticipate 500 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Airspeed"
  "pitch&airspeed@600"
  "500&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"
```

```
Time (millisecs):    27700
CURRENT ACTIVITIES
  "TrackPitchGuide"                              5.4  0.0  4.6  0.0
  "anticipate 500 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "pitch&airspeed@600"
  "500&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    28900
CURRENT ACTIVITIES
  "wait"                                         0.0  0.0  0.0  0.0
  "TrackLatGuide"                                5.4  0.0  4.6  0.0
  "anticipate 500 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "600-500 ft."
  "500&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    29100
CURRENT ACTIVITIES
  "Adjust Heading"                               0.0  0.0  1.0  2.6
  "TrackLatGuide"                                5.4  0.0  4.6  0.0
  "anticipate 500 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "600-500 ft."
  "500&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    29600
CURRENT ACTIVITIES
  "wait"                                         0.0  0.0  0.0  0.0
  "TrackLatGuide"                                5.4  0.0  4.6  0.0
  "anticipate 500 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "600-500 ft."
  "500&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"
```

```
Time (millisecs):    29900
CURRENT ACTIVITIES
  "Adjust Attitude"                              0.0  0.0  1.0  2.6
  "TrackLatGuide"                                5.4  0.0  4.6  0.0
  "anticipate 500 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "600-500 ft."
  "500&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    30400
CURRENT ACTIVITIES
  "Verify-sink-rate"                             5.9  0.0  4.6  0.0
  "anticipate 500 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "600-500 ft."
  "500&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    32400
CURRENT ACTIVITIES
  "anticipate 500 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "500&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    32900
CURRENT ACTIVITIES
  "wait"                                         0.0  0.0  0.0  0.0
  "TrackPitchGuide"                              5.4  0.0  4.6  0.0
  "anticipate 400 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Airspeed"
  "pitch&airspeed@500"
  "400&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"
```

```
Time (millisecs):    33500
CURRENT ACTIVITIES
  "500 ft Callout"                              0.0  4.9  1.0  0.0
  "wait"                                        0.0  0.0  0.0  0.0
  "TrackPitchGuide"                             5.4  0.0  4.6  0.0
  "anticipate 400 ft"                           0.0  0.0  0.0  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "Hear500Ft"
  "Adjust-Airspeed"
  "pitch&airspeed@500"
  "400&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    34200
CURRENT ACTIVITIES
  "500 ft Callout"                              0.0  4.9  1.0  0.0
  "TrackPitchGuide"                             5.4  0.0  4.6  0.0
  "anticipate 400 ft"                           0.0  0.0  0.0  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "Hear500Ft"
  "Adjust-Airspeed"
  "pitch&airspeed@500"
  "400&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"
POSTPONED ACTIVITIES
  "Adjust Airspeed"

Time (millisecs):    35500
CURRENT ACTIVITIES
  "Adjust Airspeed"                             0.0  0.0  1.0  2.6
  "TrackPitchGuide"                             5.4  0.0  4.6  0.0
  "anticipate 400 ft"                           0.0  0.0  0.0  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Airspeed"
  "pitch&airspeed@500"
  "400&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    36000
CURRENT ACTIVITIES
  "wait"                                        0.0  0.0  0.0  0.0
  "TrackLatGuide"                               5.4  0.0  4.6  0.0
  "anticipate 400 ft"                           0.0  0.0  0.0  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "500-400 ft."
  "400&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"
```

```
Time (millisecs):    36200
CURRENT ACTIVITIES
  "Adjust Heading"                              0.0  0.0  1.0  2.6
  "TrackLatGuide"                               5.4  0.0  4.6  0.0
  "anticipate 400 ft"                           0.0  0.0  0.0  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "500-400 ft."
  "400&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    36700
CURRENT ACTIVITIES
  "wait"                                        0.0  0.0  0.0  0.0
  "TrackLatGuide"                               5.4  0.0  4.6  0.0
  "anticipate 400 ft"                           0.0  0.0  0.0  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "500-400 ft."
  "400&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    37000
CURRENT ACTIVITIES
  "Adjust Attitude"                             0.0  0.0  1.0  2.6
  "anticipate 400 ft"                           0.0  0.0  0.0  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "500-400 ft."
  "400&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    37500
CURRENT ACTIVITIES
  "Scan"                                        7.0  0.0  3.7  0.0
  "anticipate 400 ft"                           0.0  0.0  0.0  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "500-400 ft."
  "400&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"
```

```
Time (millisecs):    39500
CURRENT ACTIVITIES
  "anticipate 400 ft"                          0.0  0.0  0.0  0.0
  "Adjust-TCL"                                 0.0  0.0  1.0  2.6
WORKING GOALS
  "400&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    39900
CURRENT ACTIVITIES
  "wait"                                       0.0  0.0  0.0  0.0
  "TrackPitchGuide"                            5.4  0.0  4.6  0.0
  "anticipate 300 ft"                          0.0  0.0  0.0  0.0
  "Adjust-TCL"                                 0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Airspeed"
  "pitch&airspeed@400"
  "300&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    41200
CURRENT ACTIVITIES
  "Adjust Airspeed"                            0.0  0.0  1.0  2.6
  "TrackPitchGuide"                            5.4  0.0  4.6  0.0
  "anticipate 300 ft"                          0.0  0.0  0.0  0.0
  "Adjust-TCL"                                 0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Airspeed"
  "pitch&airspeed@400"
  "300&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    41700
CURRENT ACTIVITIES
  "TrackPitchGuide"                            5.4  0.0  4.6  0.0
  "anticipate 300 ft"                          0.0  0.0  0.0  0.0
  "Adjust-TCL"                                 0.0  0.0  1.0  2.6
WORKING GOALS
  "pitch&airspeed@400"
  "300&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"
```

```
Time (millisecs):    42900
CURRENT ACTIVITIES
  "wait"                                    0.0  0.0  0.0  0.0
  "TrackLatGuide"                           5.4  0.0  4.6  0.0
  "anticipate 300 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "400-300 ft."
  "300&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    43100
CURRENT ACTIVITIES
  "Adjust Heading"                          0.0  0.0  1.0  2.6
  "TrackLatGuide"                           5.4  0.0  4.6  0.0
  "anticipate 300 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "400-300 ft."
  "300&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    43600
CURRENT ACTIVITIES
  "wait"                                    0.0  0.0  0.0  0.0
  "TrackLatGuide"                           5.4  0.0  4.6  0.0
  "anticipate 300 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "400-300 ft."
  "300&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    43900
CURRENT ACTIVITIES
  "Adjust Attitude"                         0.0  0.0  1.0  2.6
  "TrackLatGuide"                           5.4  0.0  4.6  0.0
  "anticipate 300 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "400-300 ft."
  "300&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"
```

```
Time (millisecs):    44400
CURRENT ACTIVITIES
  "Scan"                                    7.0  0.0  3.7  0.0
  "anticipate 300 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "400-300 ft."
  "300&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    46400
CURRENT ACTIVITIES
  "anticipate 300 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "300&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    46900
CURRENT ACTIVITIES
  "wait"                                    0.0  0.0  0.0  0.0
  "TrackPitchGuide@300"                     5.4  0.0  4.6  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Airspeed"
  "300-200 ft."
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    48000
CURRENT ACTIVITIES
  "300 ft Callout"                          0.0  4.9  1.0  0.0
  "wait"                                    0.0  0.0  0.0  0.0
  "TrackPitchGuide@300"                     5.4  0.0  4.6  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Hear300Ft"
  "Adjust-Airspeed"
  "300-200 ft."
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    48200
CURRENT ACTIVITIES
  "300 ft Callout"                          0.0  4.9  1.0  0.0
  "TrackPitchGuide@300"                     5.4  0.0  4.6  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Hear300Ft"
  "Adjust-Airspeed"
  "300-200 ft."
  "Glide-Slope-Intercept"
  "Control-TCL"
POSTPONED ACTIVITIES
  "Adjust Airspeed"
```

```
Time (millisecs):    49900
CURRENT ACTIVITIES
  "Adjust Airspeed"                              0.0  0.0  1.0  2.6
  "300 ft Callout"                               0.0  4.9  1.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Hear300Ft"
  "Adjust-Airspeed"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    50000
CURRENT ACTIVITIES
  "MonitorState"                                 0.0  0.0  0.0  0.0
  "PrepareToCheckEngTorque"                      0.0  0.0  0.0  0.0
  "PrepareToPullUp"                              0.0  0.0  0.0  0.0
  "Prepare-for-Callout"                          0.0  0.0  0.0  0.0
  "Hear-Emergency-Go-Around"                     0.0  4.9  4.6  0.0
  "Adjust Airspeed"                              0.0  0.0  1.0  2.6
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Trim-aircraft-and-push-TO-GO-button"
  "verify-conditions"
  "Incr&Maintain-TCL"
  "Gear-and-Flaps-Comms"
  "Hear-GA-Messages"
  "Adjust-Airspeed"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    50200
CURRENT ACTIVITIES
  "PrepareToCheckEngTorque"                      0.0  0.0  0.0  0.0
  "PrepareToPullUp"                              0.0  0.0  0.0  0.0
  "Prepare-for-Callout"                          0.0  0.0  0.0  0.0
  "Hear-Emergency-Go-Around"                     0.0  4.9  4.6  0.0
  "Adjust Airspeed"                              0.0  0.0  1.0  2.6
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Trim-aircraft-and-push-TO-GO-button"
  "verify-conditions"
  "Incr&Maintain-TCL"
  "Gear-and-Flaps-Comms"
  "Hear-GA-Messages"
  "Adjust-Airspeed"
  "Glide-Slope-Intercept"
  "Control-TCL"
POSTPONED ACTIVITIES
  "AdjustAttitude"
```

```
Time (millisecs):    50400
CURRENT ACTIVITIES
  "AdjustAttitude"                              0.0  0.0  1.0  2.6
  "Wait"                                        0.0  0.0  0.0  0.0
  "PrepareToCheckEngTorque"                     0.0  0.0  0.0  0.0
  "PrepareToPullUp"                             0.0  0.0  0.0  0.0
  "Prepare-for-Callout"                         0.0  0.0  0.0  0.0
  "Hear-Emergency-Go-Around"                    0.0  4.9  4.6  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Airspeed&Heading"
  "Trim-aircraft-and-push-TO-GO-button"
  "verify-conditions"
  "Incr&Maintain-TCL"
  "Gear-and-Flaps-Comms"
  "Hear-GA-Messages"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    50600
CURRENT ACTIVITIES
  "AdjustAttitude"                              0.0  0.0  1.0  2.6
  "PrepareToCheckEngTorque"                     0.0  0.0  0.0  0.0
  "PrepareToPullUp"                             0.0  0.0  0.0  0.0
  "Prepare-for-Callout"                         0.0  0.0  0.0  0.0
  "Hear-Emergency-Go-Around"                    0.0  4.9  4.6  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Airspeed&Heading"
  "Trim-aircraft-and-push-TO-GO-button"
  "verify-conditions"
  "Incr&Maintain-TCL"
  "Gear-and-Flaps-Comms"
  "Hear-GA-Messages"
  "Glide-Slope-Intercept"
  "Control-TCL"
POSTPONED ACTIVITIES
  "Adjust Heading"

Time (millisecs):    50900
CURRENT ACTIVITIES
  "Adjust Heading"                              0.0  0.0  1.0  2.6
  "Wait"                                        0.0  0.0  0.0  0.0
  "PrepareToCheckEngTorque"                     0.0  0.0  0.0  0.0
  "PrepareToPullUp"                             0.0  0.0  0.0  0.0
  "Prepare-for-Callout"                         0.0  0.0  0.0  0.0
  "Hear-Emergency-Go-Around"                    0.0  4.9  4.6  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Airspeed&Heading"
  "Trim-aircraft-and-push-TO-GO-button"
  "verify-conditions"
  "Incr&Maintain-TCL"
  "Gear-and-Flaps-Comms"
  "Hear-GA-Messages"
  "Glide-Slope-Intercept"
  "Control-TCL"
```

```
Time (millisecs):    51400
CURRENT ACTIVITIES
  "Wait"                                    0.0  0.0  0.0  0.0
  "PrepareToCheckEngTorque"                 0.0  0.0  0.0  0.0
  "PrepareToPullUp"                         0.0  0.0  0.0  0.0
  "Prepare-for-Callout"                     0.0  0.0  0.0  0.0
  "Hear-Emergency-Go-Around"                0.0  4.9  4.6  0.0
WORKING GOALS
  "Trim-aircraft-and-push-TO-GO-button"
  "verify-conditions"
  "Incr&Maintain-TCL"
  "Gear-and-Flaps-Comms"
  "Hear-GA-Messages"

Time (millisecs):    51500
CURRENT ACTIVITIES
  "Increase-TCL"                            4.0  0.0  3.7  2.6
  "Hear-Climb-Right-to-180"                 0.0  4.9  1.2  0.0
  "Wait"                                    0.0  0.0  0.0  0.0
  "PrepareToCheckEngTorque"                 0.0  0.0  0.0  0.0
  "Prepare-for-Callout"                     0.0  0.0  0.0  0.0
WORKING GOALS
  "Trim-aircraft-and-push-TO-GO-button"
  "verify-conditions"
  "Incr&Maintain-TCL"
  "Gear-and-Flaps-Comms"
  "Hear-GA-Messages"

Time (millisecs):    53000
CURRENT ACTIVITIES
  "Maintain-TCL"                            0.0  0.0  1.2  2.6
  "CheckEngineTorque"                       5.0  0.0  3.7  0.0
  "Wait"                                    0.0  0.0  0.0  0.0
  "Prepare-for-Callout"                     0.0  0.0  0.0  0.0
WORKING GOALS
  "Trim-aircraft-and-push-TO-GO-button"
  "verify-conditions"
  "Incr&Maintain-TCL"
  "Gear-and-Flaps-Comms"

Time (millisecs):    54000
CURRENT ACTIVITIES
  "CheckAirspeed"                           5.9  0.0  3.7  0.0
  "Maintain-TCL"                            0.0  0.0  1.2  2.6
  "Wait"                                    0.0  0.0  0.0  0.0
  "Prepare-for-Callout"                     0.0  0.0  0.0  0.0
WORKING GOALS
  "Trim-aircraft-and-push-TO-GO-button"
  "verify-conditions"
  "Incr&Maintain-TCL"
  "Gear-and-Flaps-Comms"
```

```
Time (millisecs):    55800
CURRENT ACTIVITIES
  "CheckEngineTorque"                          5.0  0.0  3.7  0.0
  "Maintain-TCL"                               0.0  0.0  1.2  2.6
  "Wait"                                       0.0  0.0  0.0  0.0
  "Prepare-for-Callout"                        0.0  0.0  0.0  0.0
WORKING GOALS
  "Trim-aircraft-and-push-TO-GO-button"
  "verify-conditions"
  "Incr&Maintain-TCL"
  "Gear-and-Flaps-Comms"

Time (millisecs):    56100
CURRENT ACTIVITIES
  "AdjustAirspeed"                             0.0  0.0  1.0  2.6
  "CheckEngineTorque"                          5.0  0.0  3.7  0.0
  "Maintain-TCL"                               0.0  0.0  1.2  2.6
  "Prepare-for-Callout"                        0.0  0.0  0.0  0.0
WORKING GOALS
  "Trim-aircraft-and-push-TO-GO-button"
  "verify-conditions"
  "Incr&Maintain-TCL"
  "Gear-and-Flaps-Comms"

Time (millisecs):    56600
CURRENT ACTIVITIES
  "PrepareToPressTO-GA"                        0.0  0.0  0.1  0.0
  "CheckEngineTorque"                          5.0  0.0  3.7  0.0
  "Maintain-TCL"                               0.0  0.0  1.2  2.6
  "Prepare-for-Callout"                        0.0  0.0  0.0  0.0
WORKING GOALS
  "Trim-aircraft-and-push-TO-GO-button"
  "verify-conditions"
  "Incr&Maintain-TCL"
  "Gear-and-Flaps-Comms"

Time (millisecs):    56800
CURRENT ACTIVITIES
  "MonitorRateofClimb"                         5.4  0.0  4.6  0.0
  "PrepareToPressTO-GA"                        0.0  0.0  0.1  0.0
  "Maintain-TCL"                               0.0  0.0  1.2  2.6
  "Prepare-for-Callout"                        0.0  0.0  0.0  0.0
WORKING GOALS
  "Trim-aircraft-and-push-TO-GO-button"
  "verify-conditions"
  "Incr&Maintain-TCL"
  "Gear-and-Flaps-Comms"
```

```
Time (millisecs):    58800
CURRENT ACTIVITIES
  "PressTO-GA"                                0.0  0.0  1.0  2.2
  "MonitorRateofClimb"                        5.4  0.0  4.6  0.0
  "Maintain-TCL"                              0.0  0.0  1.2  2.6
  "Prepare-for-Callout"                       0.0  0.0  0.0  0.0
WORKING GOALS
  "Trim-aircraft-and-push-TO-GO-button"
  "verify-conditions"
  "Incr&Maintain-TCL"
  "Gear-and-Flaps-Comms"

Time (millisecs):    59600
CURRENT ACTIVITIES
  "CheckHeading"                              4.0  0.0  3.7  0.0
  "PressTO-GA"                                0.0  0.0  1.0  2.2
  "Maintain-TCL"                              0.0  0.0  1.2  2.6
  "Prepare-for-Callout"                       0.0  0.0  0.0  0.0
WORKING GOALS
  "Trim-aircraft-and-push-TO-GO-button"
  "verify-conditions"
  "Incr&Maintain-TCL"
  "Gear-and-Flaps-Comms"

Time (millisecs):    59800
CURRENT ACTIVITIES
  "PrepareToTrimAircraft"                     0.0  0.0  0.0  0.0
  "CheckHeading"                              4.0  0.0  3.7  0.0
  "Maintain-TCL"                              0.0  0.0  1.2  2.6
  "Prepare-for-Callout"                       0.0  0.0  0.0  0.0
WORKING GOALS
  "Trim-aircraft-and-push-TO-GO-button"
  "verify-conditions"
  "Incr&Maintain-TCL"
  "Gear-and-Flaps-Comms"

Time (millisecs):    60200
CURRENT ACTIVITIES
  "Call-out-GearUP"                           0.0  4.9  5.3  2.2
  ACTIVITY-SPACE:REMEMBER-ACTIVITY            0.0  0.0  0.0  0.0
  "PrepareToTrimAircraft"                     0.0  0.0  0.0  0.0
  "Maintain-TCL"                              0.0  0.0  1.2  2.6
WORKING GOALS
  "Trim-aircraft-and-push-TO-GO-button"
  "Incr&Maintain-TCL"
  "Gear-and-Flaps-Comms"
SUSPENDED ACTIVITIES
  "verify-conditions"
```

```
Time (millisecs):    60800
CURRENT ACTIVITIES
  "Call-out-GearUP"                          0.0  4.9  5.3  2.2
  ACTIVITY-SPACE:REMEMBER-ACTIVITY           0.0  0.0  0.0  0.0
  "Maintain-TCL"                             0.0  0.0  1.2  2.6
WORKING GOALS
  "Trim-aircraft-and-push-TO-GO-button"
  "Incr&Maintain-TCL"
  "Gear-and-Flaps-Comms"
SUSPENDED ACTIVITIES
  "verify-conditions"
POSTPONED ACTIVITIES
  "CheckHeading"
  "Adjust Airspeed"

Time (millisecs):    61400
CURRENT ACTIVITIES
  "Adjust Airspeed"                          0.0  0.0  1.0  2.6
  "CheckHeading"                             4.0  0.0  3.7  0.0
  "Wait"                                     0.0  0.0  0.0  0.0
  "Maintain-TCL"                             0.0  0.0  1.2  2.6
WORKING GOALS
  "Trim-Aircraft"
  "verify-conditions"
  "Trim-aircraft-and-push-TO-GO-button"
  "Incr&Maintain-TCL"
  "Gear-and-Flaps-Comms"

Time (millisecs):    61900
CURRENT ACTIVITIES
  "wait"                                     0.0  0.0  0.0  0.0
  "CheckHeading"                             4.0  0.0  3.7  0.0
  "Wait"                                     0.0  0.0  0.0  0.0
  "Maintain-TCL"                             0.0  0.0  1.2  2.6
WORKING GOALS
  "Trim-Aircraft"
  "verify-conditions"
  "Trim-aircraft-and-push-TO-GO-button"
  "Incr&Maintain-TCL"
  "Gear-and-Flaps-Comms"

Time (millisecs):    62300
CURRENT ACTIVITIES
  "Adjust Heading"                           0.0  0.0  1.0  2.6
  "CheckHeading"                             4.0  0.0  3.7  0.0
  "Wait"                                     0.0  0.0  0.0  0.0
  "Maintain-TCL"                             0.0  0.0  1.2  2.6
WORKING GOALS
  "Trim-Aircraft"
  "verify-conditions"
  "Trim-aircraft-and-push-TO-GO-button"
  "Incr&Maintain-TCL"
  "Gear-and-Flaps-Comms"
```

```
Time (millisecs):    62800
CURRENT ACTIVITIES
  "wait"                                    0.0  0.0  0.0  0.0
  "CheckHeading"                            4.0  0.0  3.7  0.0
  "Wait"                                    0.0  0.0  0.0  0.0
  "Maintain-TCL"                            0.0  0.0  1.2  2.6
WORKING GOALS
  "Trim-Aircraft"
  "verify-conditions"
  "Trim-aircraft-and-push-TO-GO-button"
  "Incr&Maintain-TCL"
  "Gear-and-Flaps-Comms"

Time (millisecs):    62900
CURRENT ACTIVITIES
  "CheckNacellePos"                         4.0  0.0  3.7  0.0
  "wait"                                    0.0  0.0  0.0  0.0
  "Wait"                                    0.0  0.0  0.0  0.0
  "Maintain-TCL"                            0.0  0.0  1.2  2.6
WORKING GOALS
  "Trim-Aircraft"
  "verify-conditions"
  "Trim-aircraft-and-push-TO-GO-button"
  "Incr&Maintain-TCL"
  "Gear-and-Flaps-Comms"

Time (millisecs):    63000
CURRENT ACTIVITIES
  "Adjust-TCL&Cyclic"                       0.0  0.0  1.1  2.6
  "CheckNacellePos"                         4.0  0.0  3.7  0.0
  "wait"                                    0.0  0.0  0.0  0.0
  "Wait"                                    0.0  0.0  0.0  0.0
WORKING GOALS
  "Trim-Aircraft"
  "verify-conditions"
  "Trim-aircraft-and-push-TO-GO-button"
  "Incr&Maintain-TCL"
  "Gear-and-Flaps-Comms"

Time (millisecs):    63200
CURRENT ACTIVITIES
  "Adjust Attitude"                         0.0  0.0  1.0  2.6
  "Adjust-TCL&Cyclic"                       0.0  0.0  1.1  2.6
  "CheckNacellePos"                         4.0  0.0  3.7  0.0
  "Wait"                                    0.0  0.0  0.0  0.0
WORKING GOALS
  "Trim-Aircraft"
  "verify-conditions"
  "Trim-aircraft-and-push-TO-GO-button"
  "Incr&Maintain-TCL"
  "Gear-and-Flaps-Comms"
```

```
Time (millisecs):    63700
CURRENT ACTIVITIES
  "PrepareToTrimAircraft"                      0.0  0.0  0.0  0.0
  "Adjust-TCL&Cyclic"                          0.0  0.0  1.1  2.6
  "CheckNacellePos"                            4.0  0.0  3.7  0.0
  "Wait"                                       0.0  0.0  0.0  0.0
WORKING GOALS
  "verify-conditions"
  "Trim-aircraft-and-push-TO-GO-button"
  "Incr&Maintain-TCL"
  "Gear-and-Flaps-Comms"

Time (millisecs):    64700
CURRENT ACTIVITIES
  "Adjust Airspeed"                            0.0  0.0  1.0  2.6
  "Adjust-TCL&Cyclic"                          0.0  0.0  1.1  2.6
  "CheckNacellePos"                            4.0  0.0  3.7  0.0
  "Wait"                                       0.0  0.0  0.0  0.0
WORKING GOALS
  "Trim-Aircraft"
  "verify-conditions"
  "Trim-aircraft-and-push-TO-GO-button"
  "Incr&Maintain-TCL"
  "Gear-and-Flaps-Comms"

Time (millisecs):    65100
CURRENT ACTIVITIES
  "CheckAirpeed"                               5.9  0.0  3.7  0.0
  "Adjust Airspeed"                            0.0  0.0  1.0  2.6
  "Adjust-TCL&Cyclic"                          0.0  0.0  1.1  2.6
  "Wait"                                       0.0  0.0  0.0  0.0
WORKING GOALS
  "Trim-Aircraft"
  "verify-conditions"
  "Trim-aircraft-and-push-TO-GO-button"
  "Incr&Maintain-TCL"
  "Gear-and-Flaps-Comms"

Time (millisecs):    65200
CURRENT ACTIVITIES
  "wait"                                       0.0  0.0  0.0  0.0
  "CheckAirpeed"                               5.9  0.0  3.7  0.0
  "Adjust-TCL&Cyclic"                          0.0  0.0  1.1  2.6
  "Wait"                                       0.0  0.0  0.0  0.0
WORKING GOALS
  "Trim-Aircraft"
  "verify-conditions"
  "Trim-aircraft-and-push-TO-GO-button"
  "Incr&Maintain-TCL"
  "Gear-and-Flaps-Comms"
```

```
Time (millisecs):    65400
CURRENT ACTIVITIES
  "Hear-GearUP-Flaps-X-degrees"                0.0  4.3  1.2  0.0
  "wait"                                       0.0  0.0  0.0  0.0
  "CheckAirpeed"                               5.9  0.0  3.7  0.0
  "Adjust-TCL&Cyclic"                          0.0  0.0  1.1  2.6
WORKING GOALS
  "Trim-Aircraft"
  "verify-conditions"
  "Trim-aircraft-and-push-TO-GO-button"
  "Incr&Maintain-TCL"
  "Gear-and-Flaps-Comms"

Time (millisecs):    65700
CURRENT ACTIVITIES
  "Adjust Heading"                             0.0  0.0  1.0  2.6
  "Hear-GearUP-Flaps-X-degrees"                0.0  4.3  1.2  0.0
  "CheckAirpeed"                               5.9  0.0  3.7  0.0
  "Adjust-TCL&Cyclic"                          0.0  0.0  1.1  2.6
WORKING GOALS
  "Trim-Aircraft"
  "verify-conditions"
  "Trim-aircraft-and-push-TO-GO-button"
  "Incr&Maintain-TCL"
  "Gear-and-Flaps-Comms"

Time (millisecs):    66200
CURRENT ACTIVITIES
  "wait"                                       0.0  0.0  0.0  0.0
  "Hear-GearUP-Flaps-X-degrees"                0.0  4.3  1.2  0.0
  "CheckAirpeed"                               5.9  0.0  3.7  0.0
  "Adjust-TCL&Cyclic"                          0.0  0.0  1.1  2.6
WORKING GOALS
  "Trim-Aircraft"
  "verify-conditions"
  "Trim-aircraft-and-push-TO-GO-button"
  "Incr&Maintain-TCL"
  "Gear-and-Flaps-Comms"

Time (millisecs):    66600
CURRENT ACTIVITIES
  "Adjust Attitude"                            0.0  0.0  1.0  2.6
  "Hear-GearUP-Flaps-X-degrees"                0.0  4.3  1.2  0.0
  "CheckAirpeed"                               5.9  0.0  3.7  0.0
  "Adjust-TCL&Cyclic"                          0.0  0.0  1.1  2.6
WORKING GOALS
  "Trim-Aircraft"
  "verify-conditions"
  "Trim-aircraft-and-push-TO-GO-button"
  "Incr&Maintain-TCL"
  "Gear-and-Flaps-Comms"
```

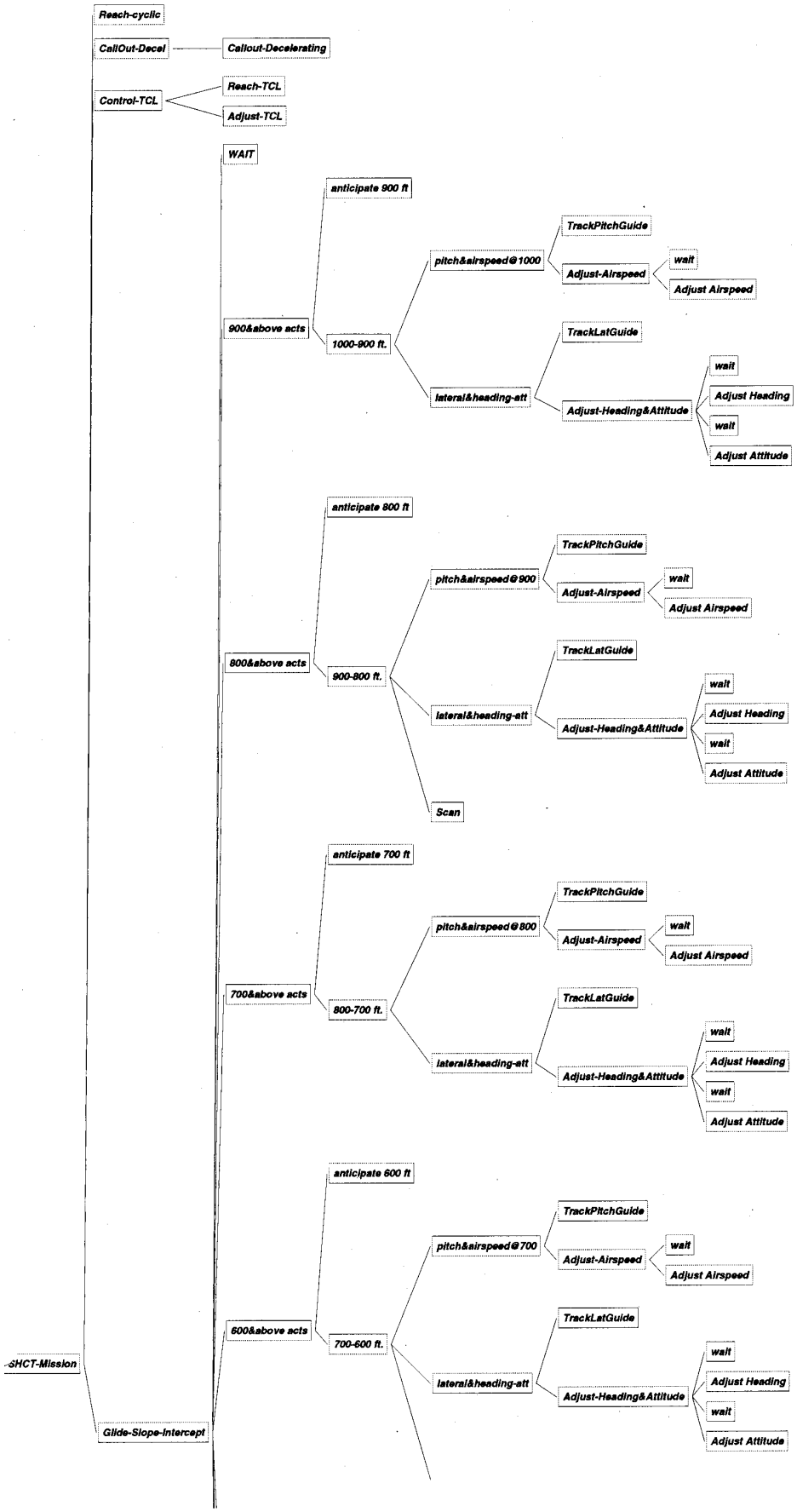
```
Time (millisecs):    67100
CURRENT ACTIVITIES
  "CheckClimbRate"                              4.0  0.0  3.7  0.0
  "Hear-GearUP-Flaps-X-degrees"                 0.0  4.3  1.2  0.0
  "Adjust-TCL&Cyclic"                           0.0  0.0  1.1  2.6
WORKING GOALS
  "verify-conditions"
  "Incr&Maintain-TCL"
  "Gear-and-Flaps-Comms"

Time (millisecs):    69100
CURRENT ACTIVITIES
  "Adjust-Lat-Cyclic-into-turn"                 4.0  0.0  4.6  4.6
  "Adjust-TCL-into-turn"                        0.0  0.0  1.0  2.2
WORKING GOALS
  "Start-climb-right-turn"
  "Emergency-Go-Around"

Time (millisecs):    70100
CURRENT ACTIVITIES
  "Check-Heading-and-Climb-Rate"                5.9  0.0  3.7  0.0
  "Cont-Adjust-Lat-Cyclic"                      0.0  0.0  1.0  2.6
  "Cont-Adjust-TCL"                             0.0  0.0  1.0  2.6
WORKING GOALS
  "Maintain-turn"
  "Start-Climb"
  "Emergency-Go-Around"

Time (millisecs):    73100
CURRENT ACTIVITIES
  "Check-Airspeed"                              5.9  0.0  3.7  0.0
  "Adjust-Lat-Cyclic-out-of-turn"               0.0  0.0  1.0  2.6
  "Adjust-TCL-rollout-of-turn"                  0.0  0.0  1.0  2.6
WORKING GOALS
  "Rollout-of-turn"
  "Start-Climb"
  "Emergency-Go-Around"

Time (millisecs):    75100
CURRENT ACTIVITIES
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
  "Push-Nacelle-Discrete-Switch"                4.0  0.0  1.0  2.2
WORKING GOALS
  "Start-nacelle-conversion"
  "Emergency-Go-Around"
POSTPONED ACTIVITIES
  "Adjust-Pitch"

Time (millisecs):    76100
CURRENT ACTIVITIES
  "Adjust-Pitch"                                0.0  0.0  1.0  2.6
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "Start-nacelle-conversion"
  "Emergency-Go-Around"
```

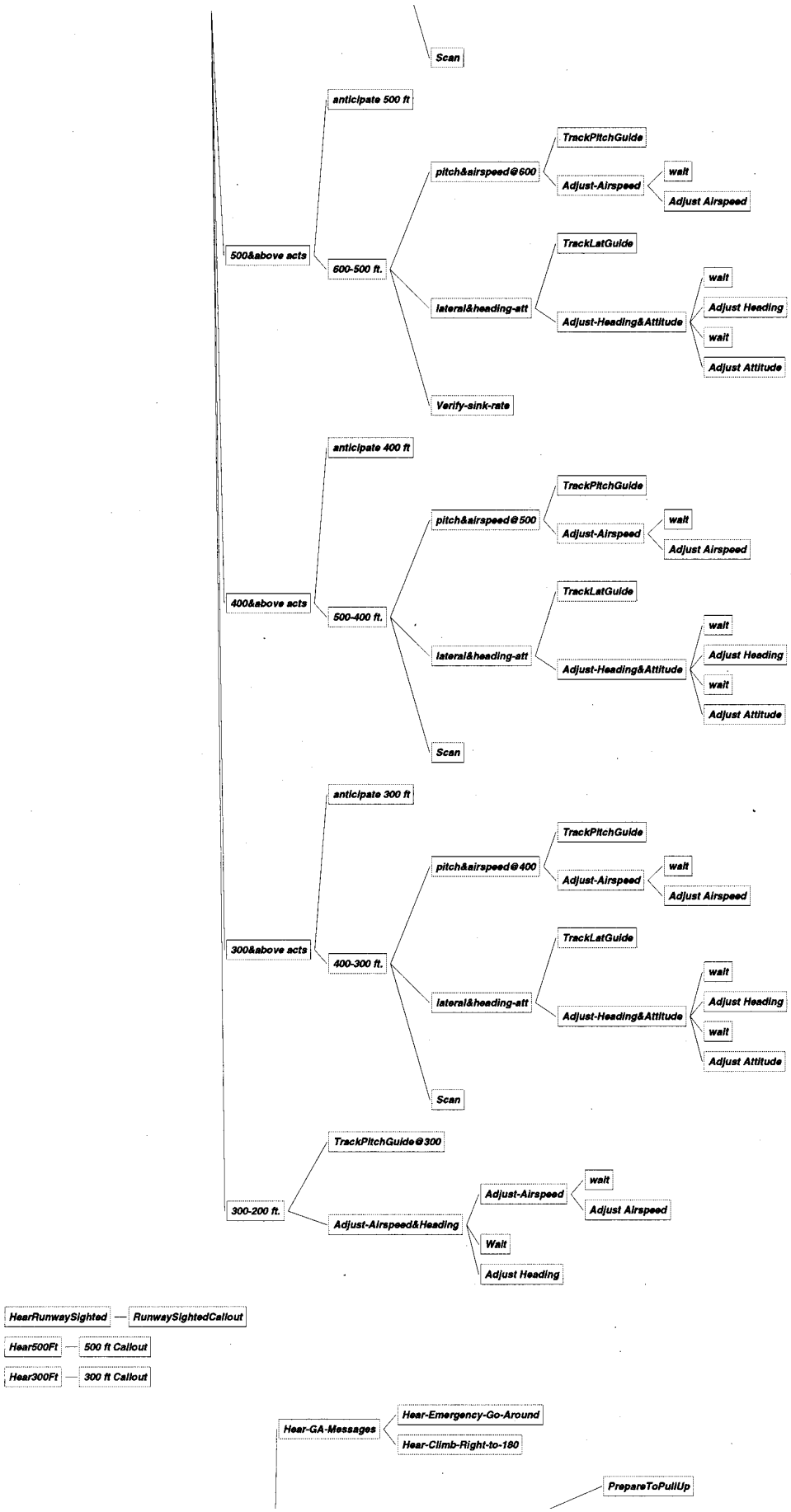
```
Time (millisecs):    78100
CURRENT ACTIVITIES
  "Prepare-to-trim-AC"                          0.0  0.0  0.0  0.0
  "Prepare to adjust pitch"                     0.0  0.0  0.0  0.0
  "Monitor-Nacelles"                            4.0  0.0  3.7  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "Trim-Aircraft"
  "Adjust-Pitch-Sequence"
  "Control-AC"
  "Cvt-Nacelles&Control-AC"
  "Emergency-Go-Around"

Time (millisecs):    78900
CURRENT ACTIVITIES
  "Adjust-Pitch"                                0.0  0.0  1.0  2.6
  "Prepare-to-trim-AC"                          0.0  0.0  0.0  0.0
  "Monitor-Nacelles"                            4.0  0.0  3.7  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "Trim-Aircraft"
  "Adjust-Pitch-Sequence"
  "Control-AC"
  "Cvt-Nacelles&Control-AC"
  "Emergency-Go-Around"

Time (millisecs):    80100
CURRENT ACTIVITIES
  "Adjust-Pitch"                                0.0  0.0  1.0  2.6
  "Monitor-Nacelles"                            4.0  0.0  3.7  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "Trim-Aircraft"
  "Adjust-Pitch-Sequence"
  "Control-AC"
  "Cvt-Nacelles&Control-AC"
  "Emergency-Go-Around"
POSTPONED ACTIVITIES
  "Adjust Airspeed"

Time (millisecs):    80900
CURRENT ACTIVITIES
  "Adjust Airspeed"                             0.0  0.0  1.0  2.6
  "Monitor-Nacelles"                            4.0  0.0  3.7  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "Trim-AC"
  "Trim-Aircraft"
  "Cvt-Nacelles&Control-AC"
  "Emergency-Go-Around"
```

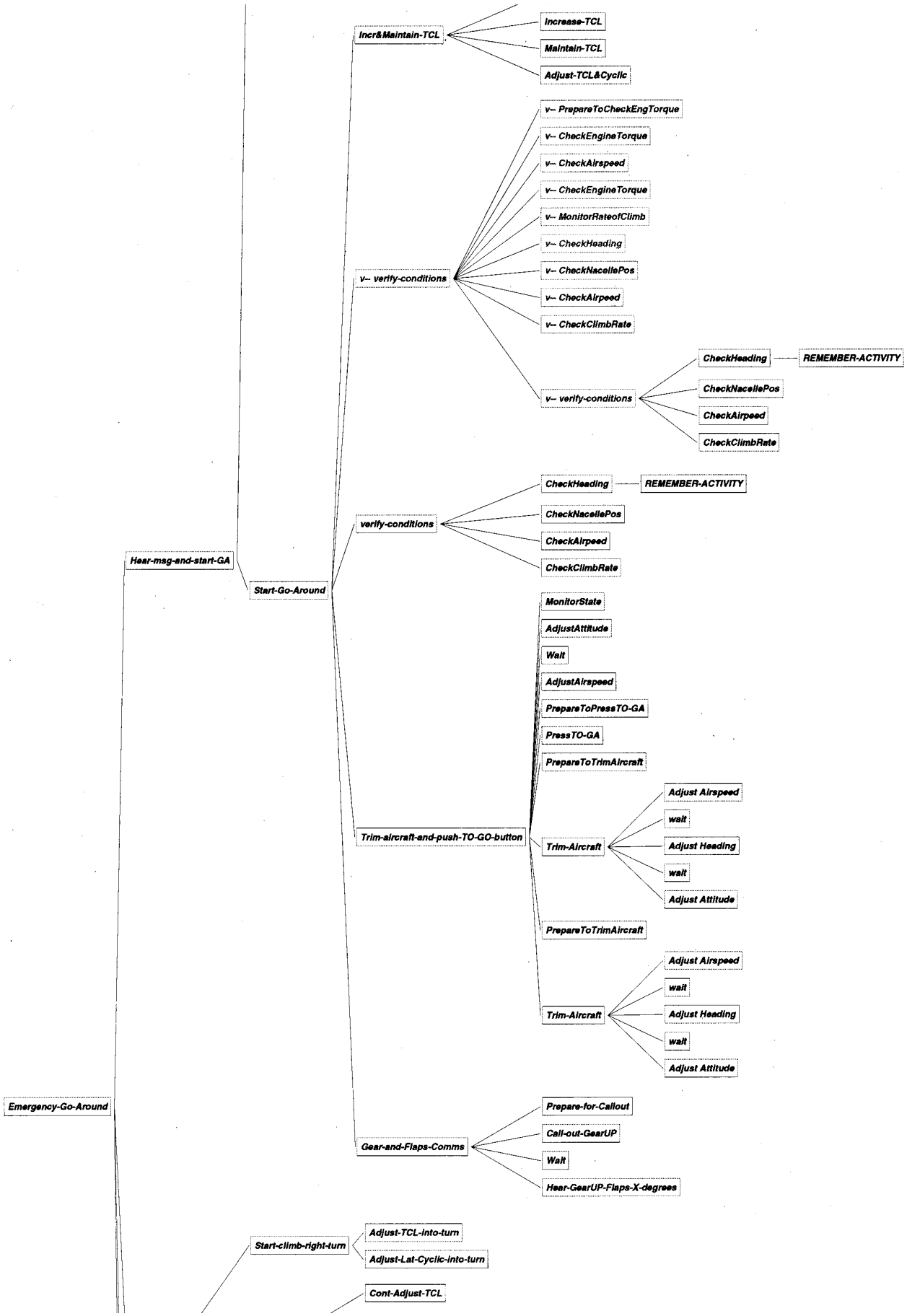
```
Time (millisecs):    81400
CURRENT ACTIVITIES
  "wait"                                    0.0  0.0  0.0  0.0
  "Monitor-Nacelles"                        4.0  0.0  3.7  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Trim-AC"
  "Trim-Aircraft"
  "Cvt-Nacelles&Control-AC"
  "Emergency-Go-Around"

Time (millisecs):    81900
CURRENT ACTIVITIES
  "Adjust Heading"                          0.0  0.0  1.0  2.6
  "Monitor-Nacelles"                        4.0  0.0  3.7  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Trim-AC"
  "Trim-Aircraft"
  "Cvt-Nacelles&Control-AC"
  "Emergency-Go-Around"

Time (millisecs):    82400
CURRENT ACTIVITIES
  "wait"                                    0.0  0.0  0.0  0.0
  "Monitor-Nacelles"                        4.0  0.0  3.7  0.0
WORKING GOALS
  "Trim-AC"
  "Trim-Aircraft"
  "Cvt-Nacelles&Control-AC"
  "Emergency-Go-Around"

Time (millisecs):    82600
CURRENT ACTIVITIES
  "Adjust Attitude"                         0.0  0.0  1.0  2.6
  "Monitor-Nacelles"                        4.0  0.0  3.7  0.0
WORKING GOALS
  "Trim-AC"
  "Trim-Aircraft"
  "Cvt-Nacelles&Control-AC"
  "Emergency-Go-Around"

Time (millisecs):    83100
CURRENT ACTIVITIES
  "Wait"                                    0.0  0.0  0.0  0.0
WORKING GOALS
  "Trim-Aircraft"
  "Cvt-Nacelles&Control-AC"
  "Emergency-Go-Around"

Time (millisecs):    83400
CURRENT ACTIVITIES
  "Adjust-Airspeed"                         0.0  0.0  1.0  2.6
WORKING GOALS
  "Trim-Aircraft"
  "Cvt-Nacelles&Control-AC"
  "Emergency-Go-Around"
```

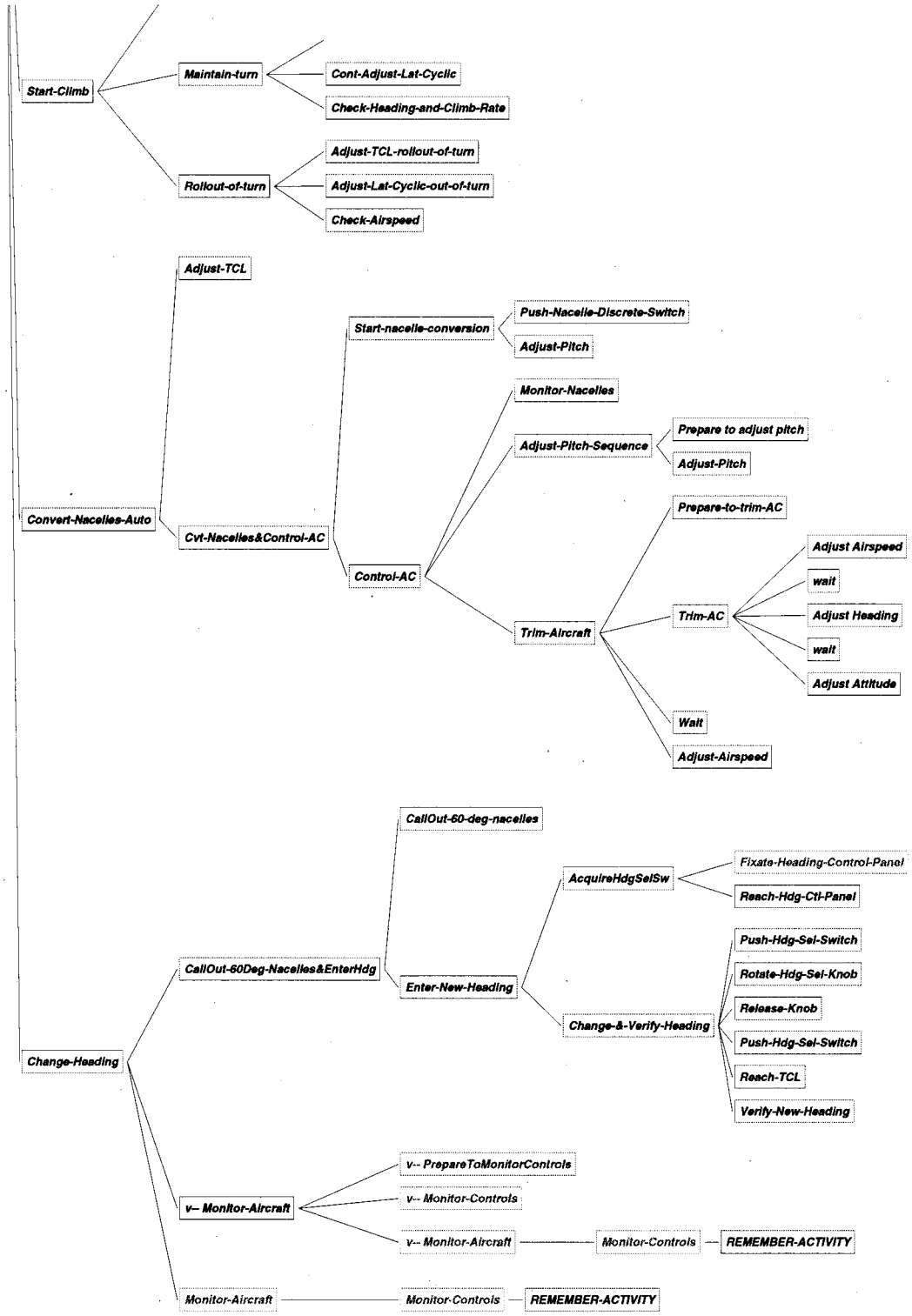
```
Time (millisecs):    83900
CURRENT ACTIVITIES
  "PrepareToMonitorControls"                    0.0  0.0  0.0  0.0
  "CallOut-60-deg-nacelles"                     0.0  4.3  5.3  2.2
WORKING GOALS
  "Monitor-Aircraft"
  "CallOut-60Deg-Nacelles&EnterHdg"
  "Emergency-Go-Around"

Time (millisecs):    84700
CURRENT ACTIVITIES
  "Monitor-Controls"                            0.0  0.0  1.0  2.6
  "CallOut-60-deg-nacelles"                     0.0  4.3  5.3  2.2
WORKING GOALS
  "Monitor-Aircraft"
  "CallOut-60Deg-Nacelles&EnterHdg"
  "Emergency-Go-Around"

Time (millisecs):    86900
CURRENT ACTIVITIES
  "Reach-Hdg-Ctl-Panel"                         0.0  0.0  1.2  2.2
  "Fixate-Heading-Control-Panel"                5.9  0.0  3.7  0.0
  "Monitor-Controls"                            0.0  0.0  1.0  2.6
WORKING GOALS
  "AcquireHdgSelSw"
  "Monitor-Aircraft"
  "CallOut-60Deg-Nacelles&EnterHdg"
  "Emergency-Go-Around"

Time (millisecs):    87600
CURRENT ACTIVITIES
  "Push-Hdg-Sel-Switch"                         3.7  0.0  1.2  2.2
  "Monitor-Controls"                            0.0  0.0  1.0  2.6
WORKING GOALS
  "Change-&-Verify-Heading"
  "Enter-New-Heading"
  "Monitor-Aircraft"
  "CallOut-60Deg-Nacelles&EnterHdg"
  "Emergency-Go-Around"

Time (millisecs):    88600
CURRENT ACTIVITIES
  "Rotate-Hdg-Sel-Knob"                         5.0  0.0  4.6  5.8
  ACTIVITY-SPACE:REMEMBER-ACTIVITY              0.0  0.0  0.0  0.0
WORKING GOALS
  "Change-&-Verify-Heading"
  "Enter-New-Heading"
  "CallOut-60Deg-Nacelles&EnterHdg"
  "Emergency-Go-Around"
SUSPENDED ACTIVITIES
  "Monitor-Aircraft"
```

```
Time (millisecs):    90600
CURRENT ACTIVITIES
  "Monitor-Controls"                          0.0  0.0  1.0  2.6
  "Release-Knob"                              1.0  0.0  1.2  2.2
WORKING GOALS
  "Monitor-Aircraft"
  "Change-&-Verify-Heading"
  "Enter-New-Heading"
  "CallOut-60Deg-Nacelles&EnterHdg"
  "Emergency-Go-Around"

Time (millisecs):    91600
CURRENT ACTIVITIES
  "Push-Hdg-Sel-Switch"                       3.7  0.0  1.2  2.2
  "Monitor-Controls"                          0.0  0.0  1.0  2.6
WORKING GOALS
  "Monitor-Aircraft"
  "Change-&-Verify-Heading"
  "Enter-New-Heading"
  "CallOut-60Deg-Nacelles&EnterHdg"
  "Emergency-Go-Around"

Time (millisecs):    92600
CURRENT ACTIVITIES
  "Reach-TCL"                                 0.0  0.0  1.0  2.2
  "Monitor-Controls"                          0.0  0.0  1.0  2.6
WORKING GOALS
  "Monitor-Aircraft"
  "Change-&-Verify-Heading"
  "Enter-New-Heading"
  "CallOut-60Deg-Nacelles&EnterHdg"
  "Emergency-Go-Around"

Time (millisecs):    93200
CURRENT ACTIVITIES
  "Verify-New-Heading"                        5.9  0.0  4.6  0.0
  "Monitor-Controls"                          0.0  0.0  1.0  2.6
WORKING GOALS
  "Monitor-Aircraft"
  "Change-&-Verify-Heading"
  "Enter-New-Heading"
  "CallOut-60Deg-Nacelles&EnterHdg"
  "Emergency-Go-Around"

Time (millisecs):    96200
CURRENT ACTIVITIES
WORKING GOALS
```


Reach-cyclic
CallOut-Decel
Callout-Decelerating
Control-TCL
Reach-TCL
Adjust-TCL
WAIT
anticipate 900 ft
900&above acts
1000-900 ft.
pitch&airspeed@1000
TrackPitchGuide
Adjust-Airspeed
wait
Adjust Airspeed
lateral&heading-att
TrackLatGuide
Adjust-Heading&Attitude
wait
Adjust Heading
wait
Adjust Attitude
anticipate 800 ft
800&above acts
900-800 ft.
pitch&airspeed@900
TrackPitchGuide
Adjust-Airspeed
wait
Adjust Airspeed
lateral&heading-att
TrackLatGuide
Adjust-Heading&Attitude
wait
Adjust Heading
wait
Adjust Attitude
Scan
anticipate 700 ft
700&above acts
800-700 ft.
pitch&airspeed@800
TrackPitchGuide
Adjust-Airspeed
wait
Adjust Airspeed
lateral&heading-att
TrackLatGuide
Adjust-Heading&Attitude
wait
Adjust Heading
wait
Adjust Attitude
anticipate 600 ft
600&above acts
700-600 ft.
pitch&airspeed@700
TrackPitchGuide
Adjust-Airspeed
wait
Adjust Airspeed
lateral&heading-att
TrackLatGuide
Adjust-Heading&Attitude
wait
Adjust Heading
wait
Adjust Attitude
-SHCT-Mission
Glide-Slope-Intercept


Scan
anticipate 500 ft
500&above acts
600-500 ft.
pitch&airspeed@600
TrackPitchGuide
Adjust-Airspeed
wait
Adjust Airspeed
TrackLatGuide
lateral&heading-att
Adjust-Heading&Attitude
wait
Adjust Heading
wait
Adjust Attitude
Verify-sink-rate
anticipate 400 ft
400&above acts
500-400 ft.
pitch&airspeed@500
TrackPitchGuide
Adjust-Airspeed
wait
Adjust Airspeed
TrackLatGuide
lateral&heading-att
Adjust-Heading&Attitude
wait
Adjust Heading
wait
Adjust Attitude
Scan
anticipate 300 ft
300&above acts
400-300 ft.
pitch&airspeed@400
TrackPitchGuide
Adjust-Airspeed
wait
Adjust Airspeed
TrackLatGuide
lateral&heading-att
Adjust-Heading&Attitude
wait
Adjust Heading
wait
Adjust Attitude
Scan
TrackPitchGuide@300
300-200 ft.
Adjust-Airspeed&Heading
Adjust-Airspeed
wait
Adjust Airspeed
Wait
Adjust Heading
HearRunwaySighted
RunwaySightedCallout
Hear500Ft
500 ft Callout
Hear300Ft
300 ft Callout
Hear-GA-Messages
Hear-Emergency-Go-Around
Hear-Climb-Right-to-180
PrepareToPullUp

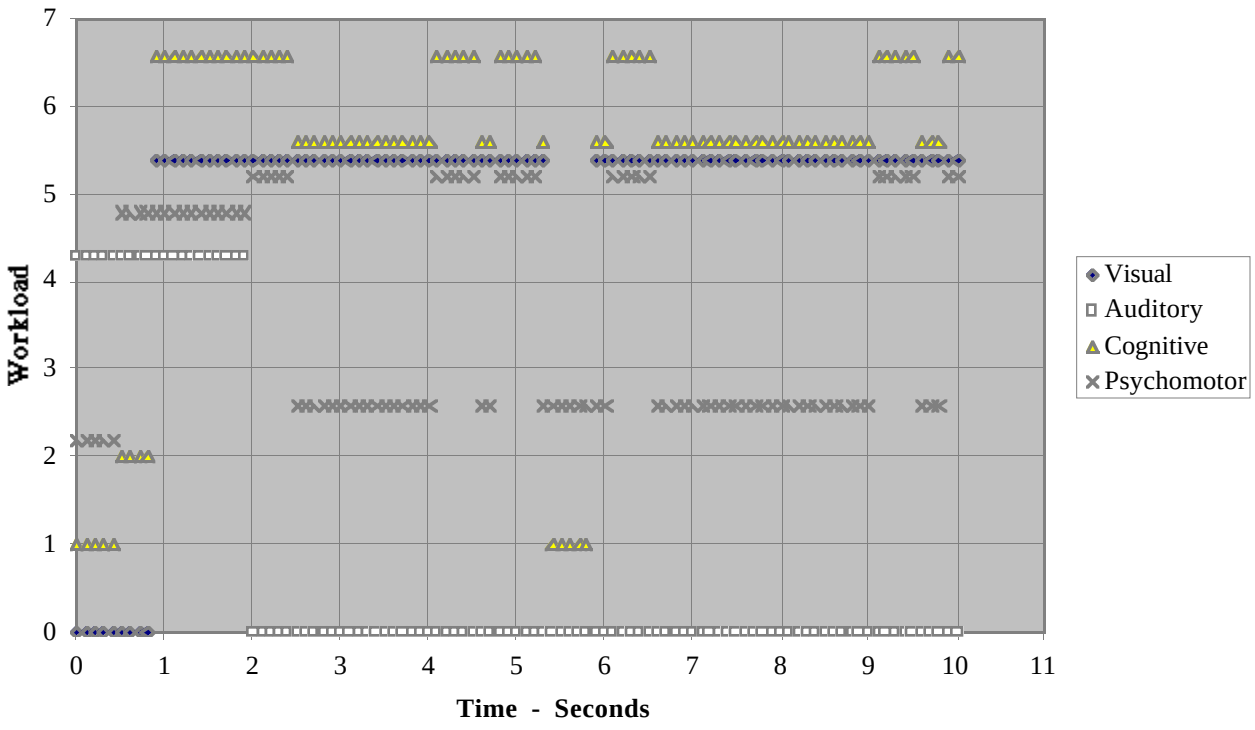

Emergency-Go-Around
Hear-msg-and-start-GA
Start-Go-Around
Incr&Maintain-TCL
Increase-TCL
Maintain-TCL
Adjust-TCL&Cyclic
v-- verify-conditions
v-- PrepareToCheckEngTorque
v-- CheckEngineTorque
v-- CheckAirspeed
v-- CheckEngineTorque
v-- MonitorRateofClimb
v-- CheckHeading
v-- CheckNacellePos
v-- CheckAirpeed
v-- CheckClimbRate
v-- verify-conditions
CheckHeading
REMEMBER-ACTIVITY
CheckNacellePos
CheckAirpeed
CheckClimbRate
verify-conditions
CheckHeading
REMEMBER-ACTIVITY
CheckNacellePos
CheckAirpeed
CheckClimbRate
Trim-aircraft-and-push-TO-GO-button
MonitorState
AdjustAttitude
Wait
AdjustAirspeed
PrepareToPressTO-GA
PressTO-GA
PrepareToTrimAircraft
Trim-Aircraft
Adjust Airspeed
wait
Adjust Heading
wait
Adjust Attitude
PrepareToTrimAircraft
Trim-Aircraft
Adjust Airspeed
wait
Adjust Heading
wait
Adjust Attitude
Gear-and-Flaps-Comms
Prepare-for-Callout
Call-out-GearUP
Wait
Hear-GearUP-Flaps-X-degrees
Start-climb-right-turn
Adjust-TCL-into-turn
Adjust-Lat-Cyclic-into-turn
Cont-Adjust-TCL

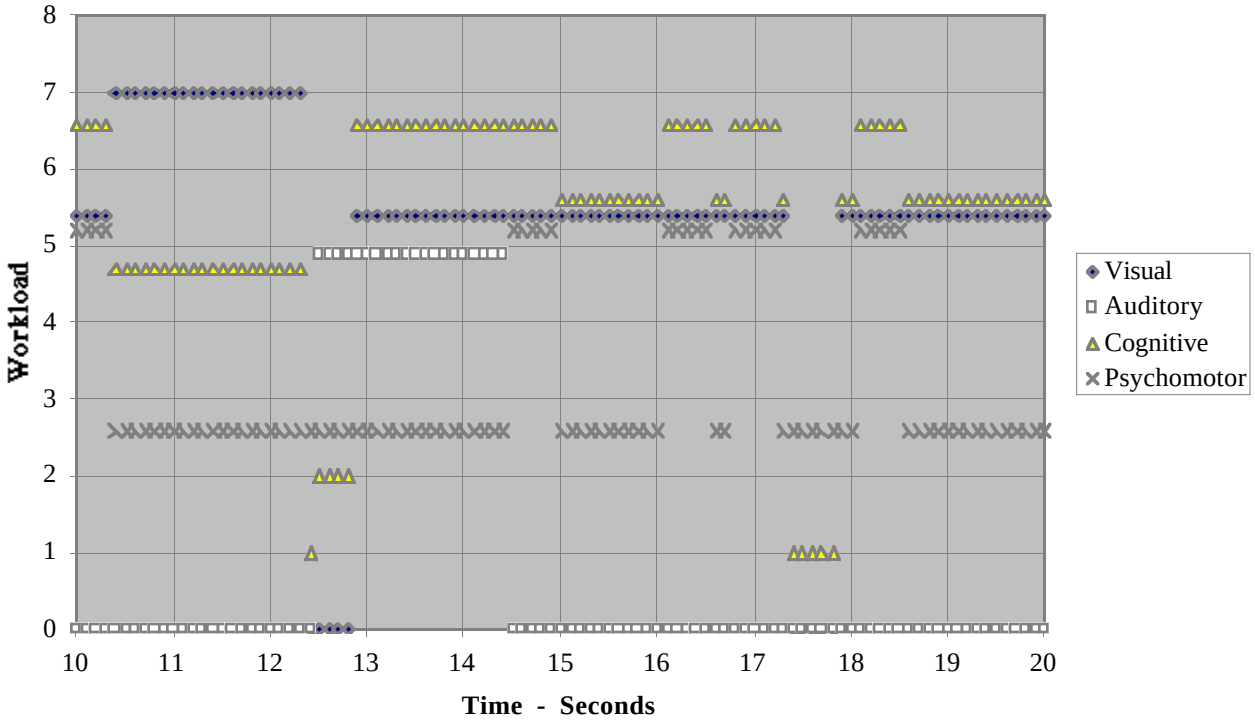

Start-Climb
Maintain-turn
Cont-Adjust-Lat-Cyclic
Check-Heading-and-Climb-Rate
Rollout-of-turn
Adjust-TCL-rollout-of-turn
Adjust-Lat-Cyclic-out-of-turn
Check-Airspeed
Convert-Nacelles-Auto
Adjust-TCL
Cvt-Nacelles&Control-AC
Start-nacelle-conversion
Push-Nacelle-Discrete-Switch
Adjust-Pitch
Control-AC
Monitor-Nacelles
Adjust-Pitch-Sequence
Prepare to adjust pitch
Adjust-Pitch
Trim-Aircraft
Prepare-to-trim-AC
Trim-AC
Adjust Airspeed
wait
Adjust Heading
wait
Adjust Attitude
Wait
Adjust-Airspeed
Change-Heading
CallOut-60Deg-Nacelles&EnterHdg
CallOut-60-deg-nacelles
Enter-New-Heading
AcquireHdgSelSw
Fixate-Heading-Control-Panel
Reach-Hdg-Ctl-Panel
Change-&-Verify-Heading
Push-Hdg-Sel-Switch
Rotate-Hdg-Sel-Knob
Release-Knob
Push-Hdg-Sel-Switch
Reach-TCL
Verify-New-Heading
v-- Monitor-Aircraft
v-- PrepareToMonitorControls
v-- Monitor-Controls
v-- Monitor-Aircraft
Monitor-Controls
REMEMBER-ACTIVITY
Monitor-Aircraft
Monitor-Controls
REMEMBER-ACTIVITY

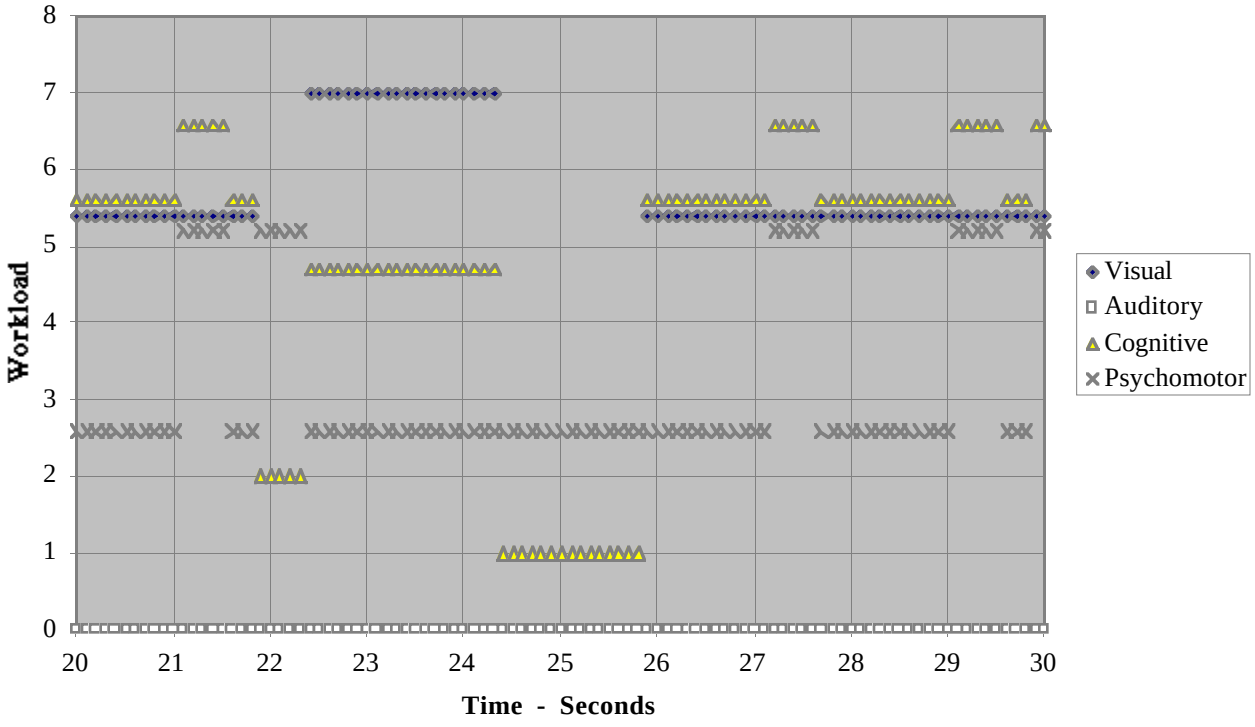
Appendix D

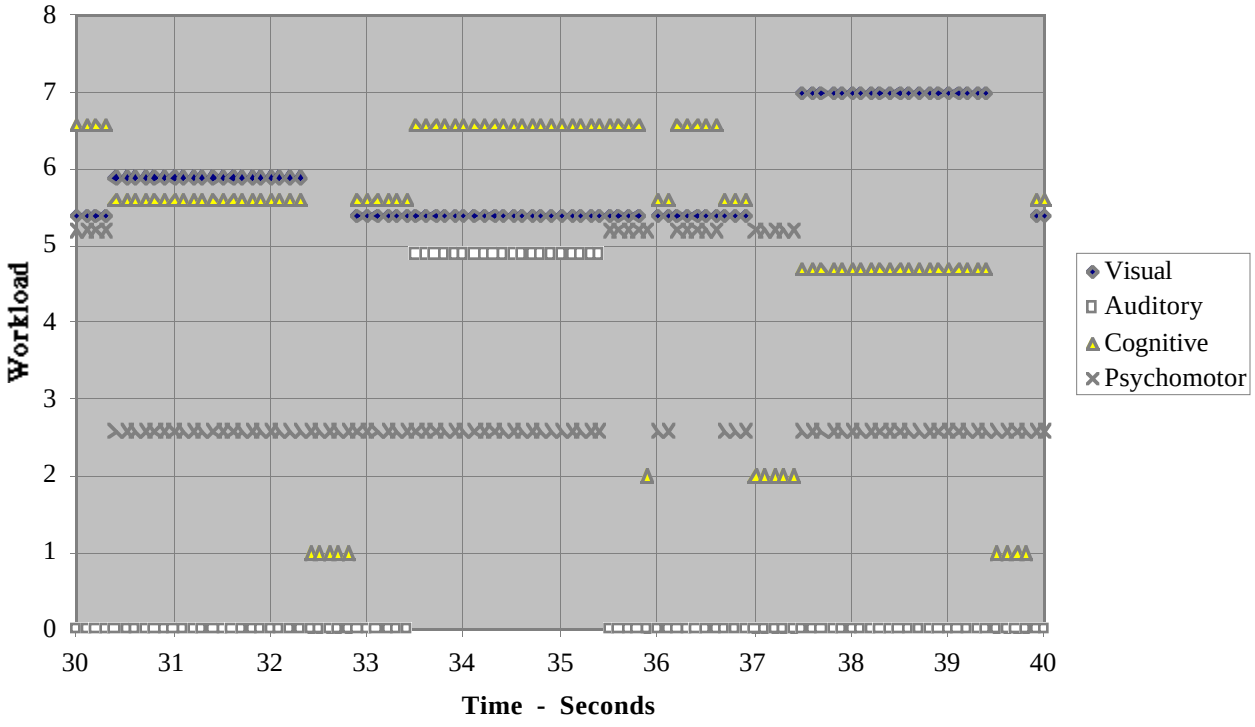
Manual Nacelle Option

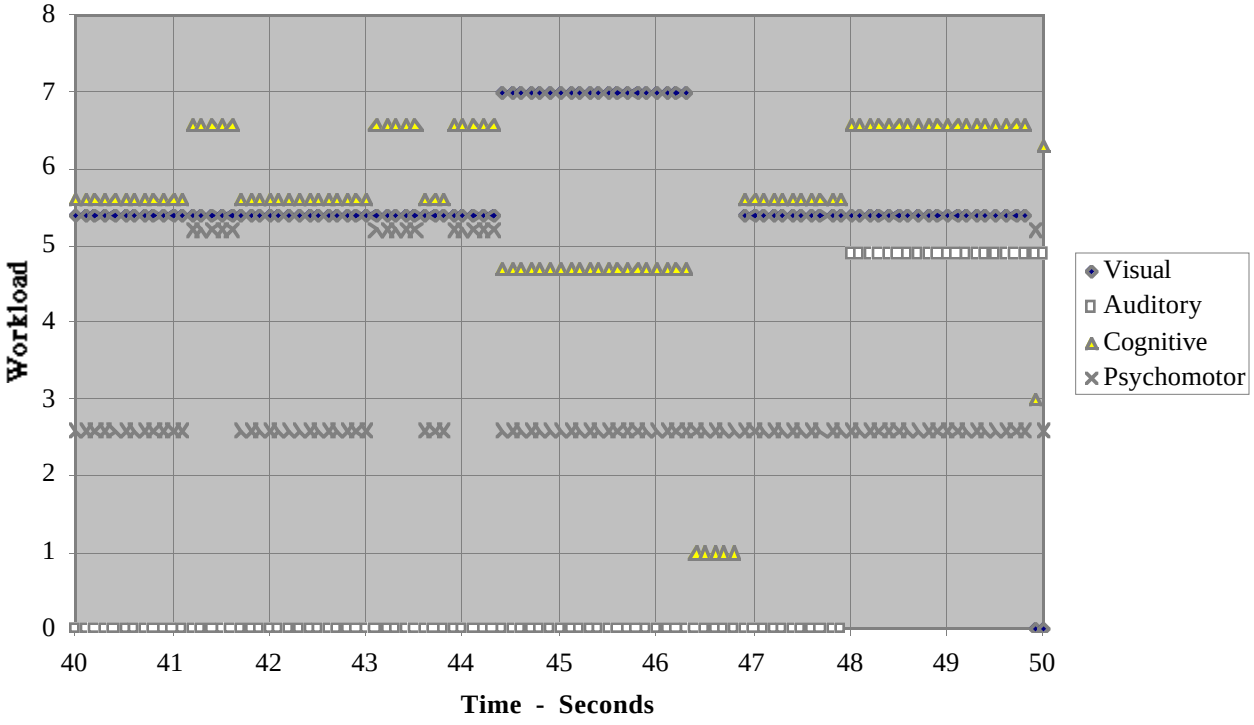
- Workload Timelines
  - VACP
- Output Summary
  - Mission Segment Duration
  - History of Suspended Activities
  - History of Postponed Activities
- Activity Queue
  - Current Activities
  - Working Goals
  - VACP Tabulation
- Activity Tree Structure

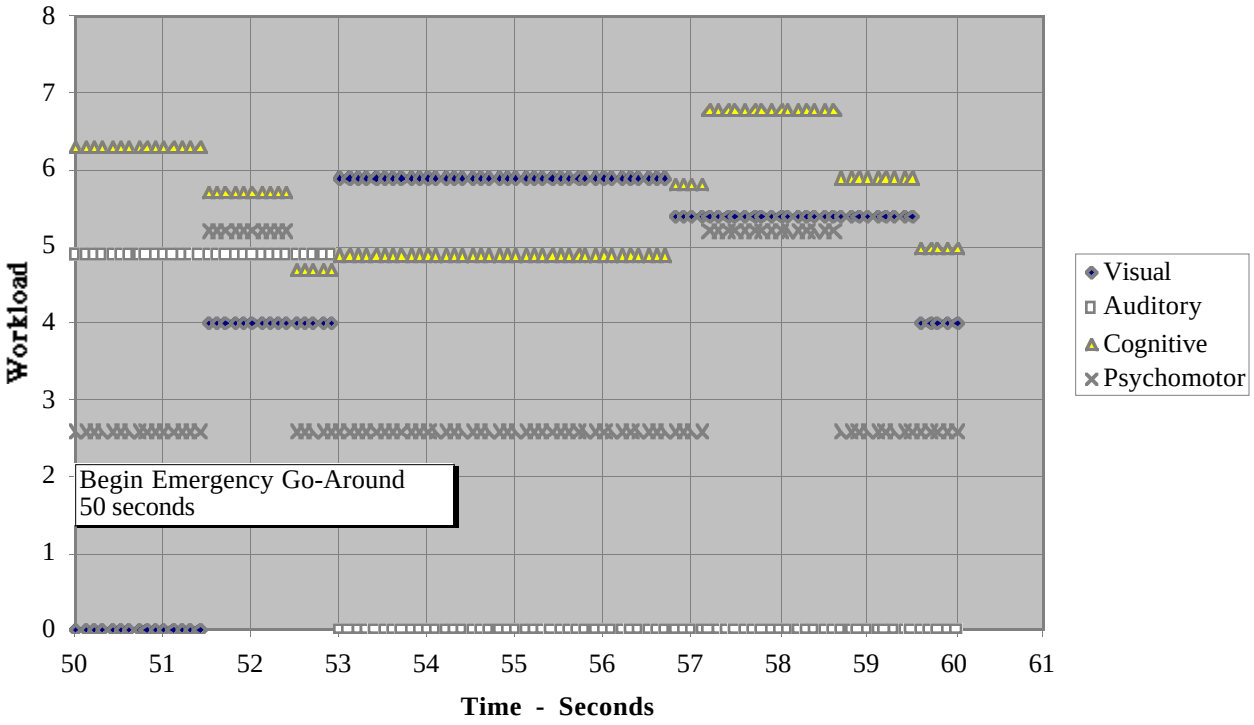

Workload
Time - Seconds
Visual
Auditory
Cognitive
Psychomotor

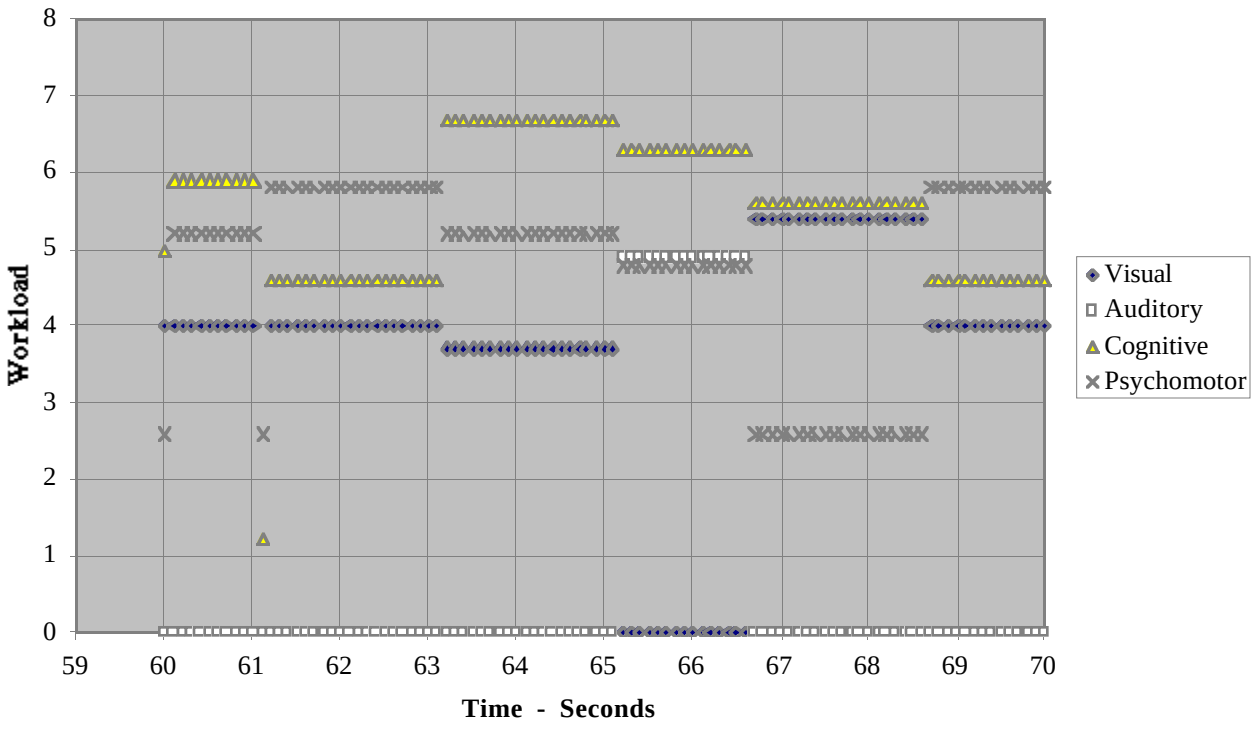

Workload
Time - Seconds
Visual
Auditory
Cognitive
Psychomotor

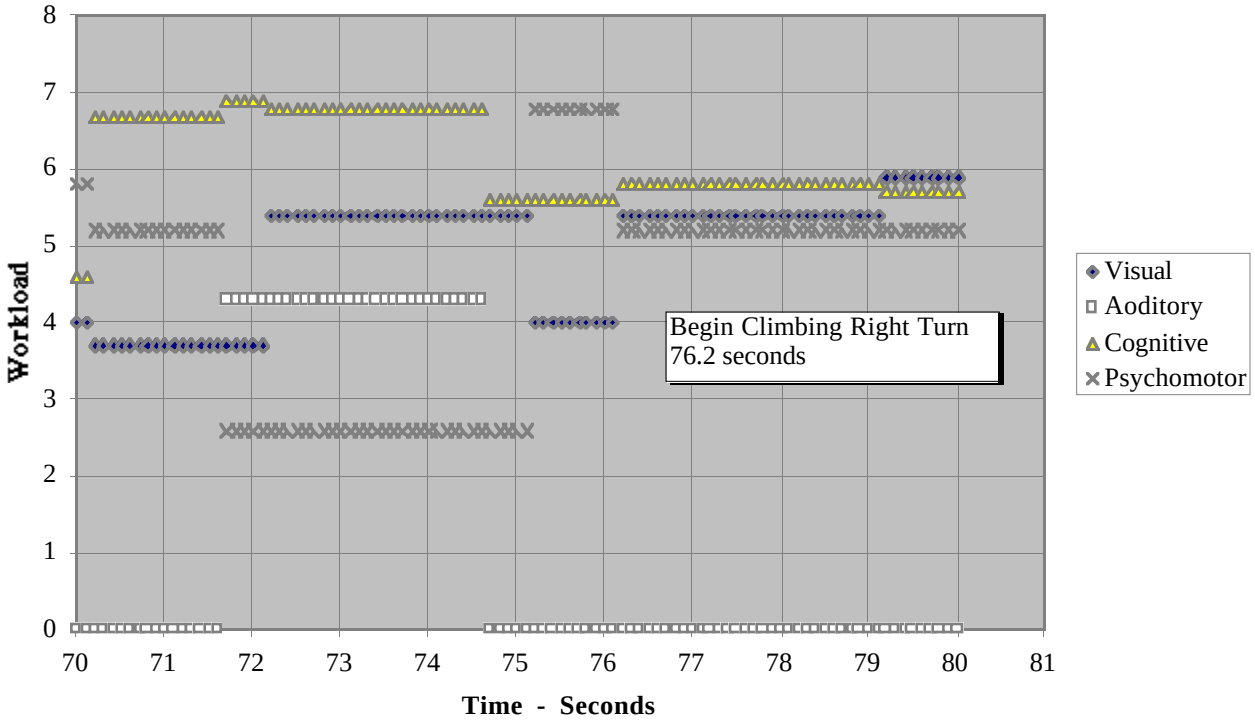

Workload
Time - Seconds
Visual
Auditory
Cognitive
Psychomotor

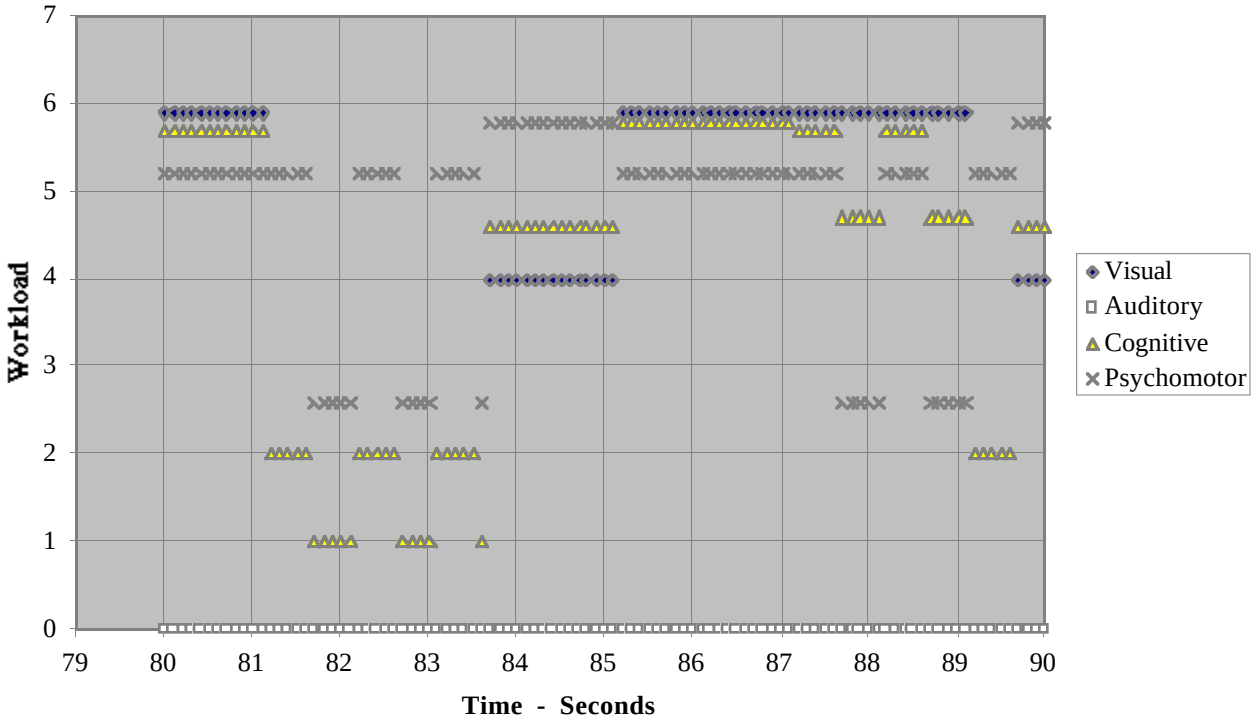

Workload
Time - Seconds
Visual
Auditory
Cognitive
Psychomotor

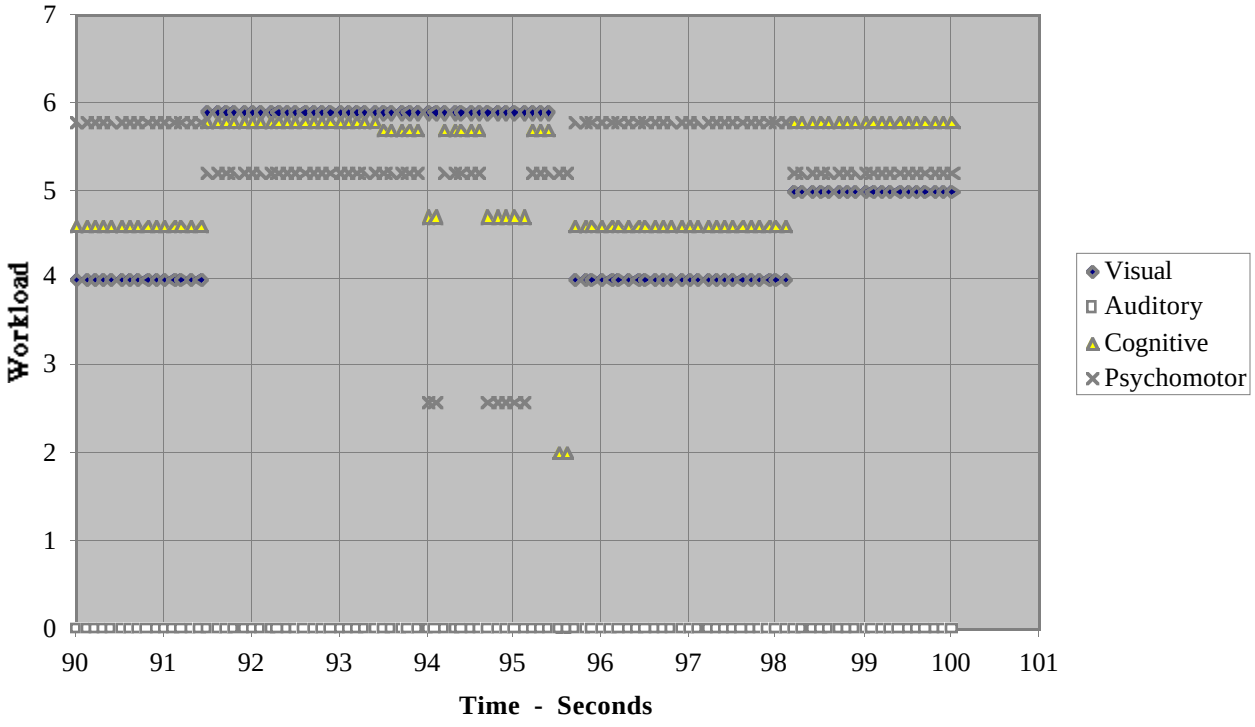

Workload
Time - Seconds
Visual
Auditory
Cognitive
Psychomotor

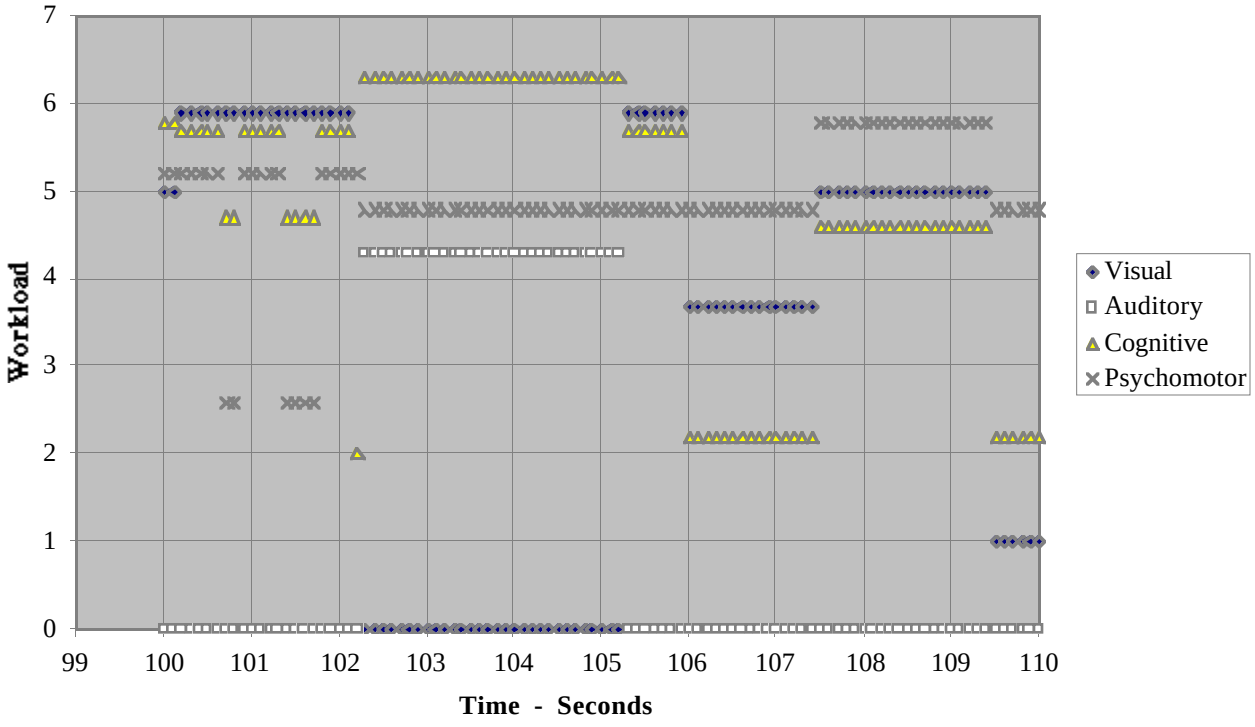

Workload
Time - Seconds
Begin Emergency Go-Around
50 seconds
Visual
Auditory
Cognitive
Psychomotor

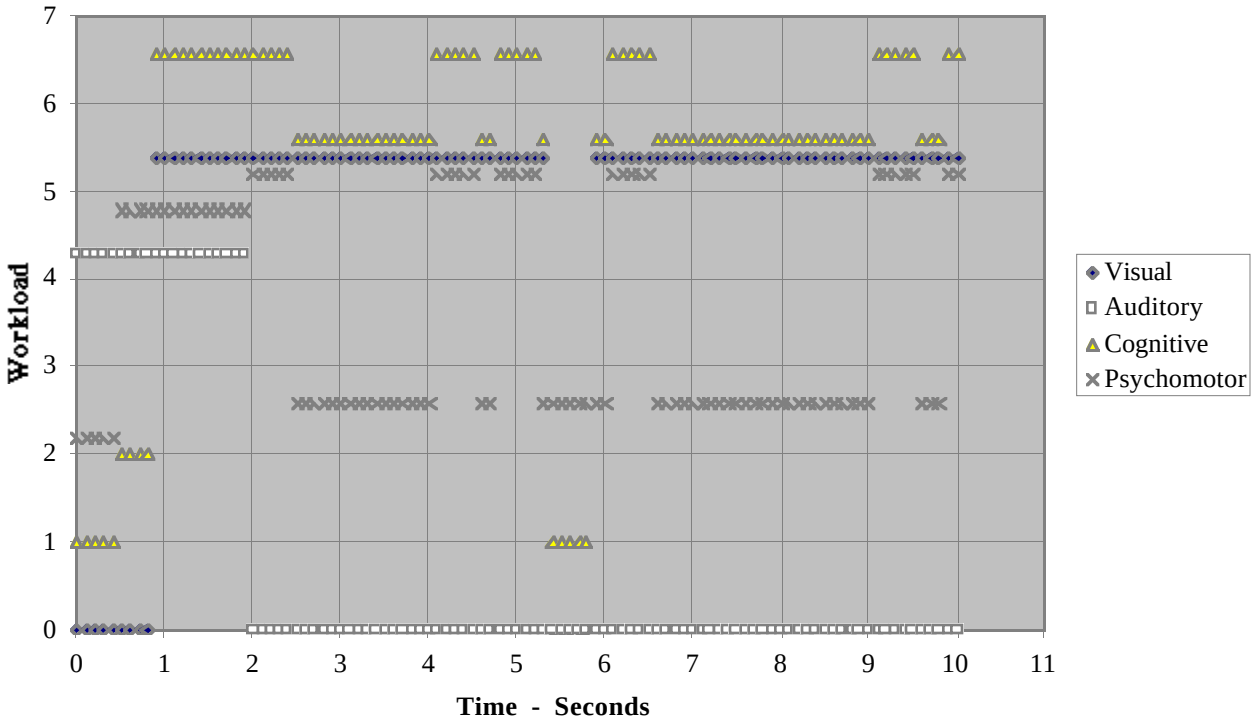

Workload
Time - Seconds
Visual
Auditory
Cognitive
Psychomotor


Workload
Time - Seconds
Begin Climbing Right Turn
76.2 seconds
Visual
Aoditory
Cognitive
Psychomotor


Workload
Time - Seconds
Visual
Auditory
Cognitive
Psychomotor


Workload
Time - Seconds
Visual
Auditory
Cognitive
Psychomotor


Workload
Time - Seconds
Visual
Auditory
Cognitive
Psychomotor


Workload
Time - Seconds
Visual
Auditory
Cognitive
Psychomotor

Output Summary for Manual Nacelle

```
==============================================================
Count and Duration Summary for Selected Leaf Activity Types
==============================================================

Activity Type                                  Count          Duration
                                                               (msecs)
-------------------------------------------------------------------------
FIXATE-LOCATION                                  35             73300
FIXED-DURATION-MOTOR-ACTIVITY                    78            101800
REACH                                             4              2200
REMEMBER-ACTIVITY                                 7             12300
SCAN-WITH-PATTERN                                 4              8000

Mission Duration (msecs) =  114800

==================================
Mission Segment Durations (msecs)
==================================

Segment 1:
  "Start"                                0
  "Hear-Emergency-Go-Around"             50000
  Duration:                                      50000

Segment 2:
  "Hear-Emergency-Go-Around"             50000
  "Start-climb"                          76200
  Duration:                                      26200

Segment 3:
  "Start-climb"                          76200
  "End"                                  114800
  Duration:                                      38600

================================
History of Suspended Activities
================================

Note: The VACP load for a suspended activity is only shown
      if the suspended activity is a leaf activity,
      since goal activities have no VACP load.


Suspension Event # 1 occurred at time 50000 msecs
Suspended Activity: "Adjust-Airspeed"
Length of time suspended (msec): 1000
Context (Current leaf activities and VACPs):
                                                  V    A    C    P
  "MonitorState"                                 0.0  0.0  0.0  0.0
  "PrepareToCheckEngTorque"                      0.0  0.0  0.0  0.0
  "PrepareToPullUp"                              0.0  0.0  0.0  0.0
  "Hear-Emergency-Go-Around"                     0.0  4.9  5.3  0.0
  ACTIVITY-SPACE:REMEMBER-ACTIVITY               0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
Total VACM load
 (without suspended/postponed activities):       0.0  4.9  6.3  2.6
```

```
Suspension Event # 2 occurred at time 65200 msecs
Suspended Activity: "Adjust-TCL"
   with VACP load:                              0.0  0.0  1.0  2.6
Length of time suspended (msec): 1500
Context (Current leaf activities and VACPs):
                                                 V    A    C    P
  "Adjust Airspeed"                             0.0  0.0  1.0  2.6
  "Call-out-GearUP"                             0.0  4.9  5.3  2.2
  ACTIVITY-SPACE:REMEMBER-ACTIVITY              0.0  0.0  0.0  0.0
Total VACM load
 (without suspended/postponed activities):      0.0  4.9  6.3  4.8


Suspension Event # 3 occurred at time 68700 msecs
Suspended Activity: "Adjust-TCL"
   with VACP load:                              0.0  0.0  1.0  2.6
Length of time suspended (msec): 1500
Context (Current leaf activities and VACPs):
                                                 V    A    C    P
  "Adj-Nac-Thumbwheel"                          4.0  0.0  4.6  5.8
  ACTIVITY-SPACE:REMEMBER-ACTIVITY              0.0  0.0  0.0  0.0
  "ExpectGearUpConfirm"                         0.0  0.0  0.0  0.0
Total VACM load
 (without suspended/postponed activities):      4.0  0.0  4.6  5.8


Suspension Event # 4 occurred at time 71700 msecs
Suspended Activity: "Adjust-TCL"
   with VACP load:                              0.0  0.0  1.0  2.6
Length of time suspended (msec): 2000
Context (Current leaf activities and VACPs):
                                                 V    A    C    P
  "Hear-GearUP-Flaps-X-degrees"                 0.0  4.3  1.2  0.0
  ACTIVITY-SPACE:REMEMBER-ACTIVITY              0.0  0.0  0.0  0.0
  "AdjustPitchAtt"                              0.0  0.0  1.1  2.6
  "MonitorPitchAtt"                             3.7  0.0  4.6  0.0
Total VACM load
 (without suspended/postponed activities):      3.7  4.3  6.9  2.6


Suspension Event # 5 occurred at time 89600 msecs
Suspended Activity: "Adjust-TCL"
   with VACP load:                              0.0  0.0  1.0  2.6
Length of time suspended (msec): 1800
Context (Current leaf activities and VACPs):
                                                 V    A    C    P
  "Adj-Nac-Thumbwheel"                          4.0  0.0  4.6  5.8
  ACTIVITY-SPACE:REMEMBER-ACTIVITY              0.0  0.0  0.0  0.0
Total VACM load
 (without suspended/postponed activities):      4.0  0.0  4.6  5.8
```

```
Suspension Event # 6 occurred at time 95400 msecs
Suspended Activity: "Adjust-TCL"
   with VACP load:                              0.0  0.0  1.0  2.6
Length of time suspended (msec): 2500
Context (Current leaf activities and VACPs):
                                                 V    A    C    P
  "Adj-Nac-Thumbwheel"                          4.0  0.0  4.6  5.8
  ACTIVITY-SPACE:REMEMBER-ACTIVITY              0.0  0.0  0.0  0.0
Total VACM load
 (without suspended/postponed activities):      4.0  0.0  4.6  5.8


Suspension Event # 7 occurred at time 107100 msecs
Suspended Activity: "Monitor-Controls"
   with VACP load:                              0.0  0.0  1.0  2.6
Length of time suspended (msec): 2000
Context (Current leaf activities and VACPs):
                                                 V    A    C    P
  "Rotate-Hdg-Sel-Knob"                         5.0  0.0  4.6  5.8
  ACTIVITY-SPACE:REMEMBER-ACTIVITY              0.0  0.0  0.0  0.0
Total VACM load
 (without suspended/postponed activities):      5.0  0.0  4.6  5.8


Suspension summary:
  Number of activities suspended: 7

================================
History of Postponed Activities
================================

Note: The VACP load for a postponed activity is only shown
      if the postponed activity is a leaf activity,
      since goal activities have no VACP load.


Postponement Event # 1 occurred at time 1100 msecs
Postponed Activity: "Adjust Airspeed"
   with VACP load:                              0.0  0.0  1.0  2.6
Length of time postponed (msec): 900
Context (Current leaf activities and VACPs):
                                                 V    A    C    P
  "TrackPitchGuide"                             5.4  0.0  4.6  0.0
  "anticipate 900 ft"                           0.0  0.0  0.0  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
  "Callout-Decelerating"                        0.0  4.3  1.0  2.2
Total VACM load
 (without suspended/postponed activities):      5.4  4.3  6.6  4.8
```

```
Postponement Event # 2 occurred at time 14200 msecs
Postponed Activity: "Adjust Airspeed"
   with VACP load:                              0.0  0.0  1.0  2.6
Length of time postponed (msec): 300
Context (Current leaf activities and VACPs):
                                                 V    A    C    P
  "TrackPitchGuide"                             5.4  0.0  4.6  0.0
  "anticipate 700 ft"                           0.0  0.0  0.0  0.0
  "RunwaySightedCallout"                        0.0  4.9  1.0  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
Total VACM load
 (without suspended/postponed activities):      5.4  4.9  6.6  2.6


Postponement Event # 3 occurred at time 34200 msecs
Postponed Activity: "Adjust Airspeed"
   with VACP load:                              0.0  0.0  1.0  2.6
Length of time postponed (msec): 1300
Context (Current leaf activities and VACPs):
                                                 V    A    C    P
  "500 ft Callout"                              0.0  4.9  1.0  0.0
  "TrackPitchGuide"                             5.4  0.0  4.6  0.0
  "anticipate 400 ft"                           0.0  0.0  0.0  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
Total VACM load
 (without suspended/postponed activities):      5.4  4.9  6.6  2.6


Postponement Event # 4 occurred at time 48200 msecs
Postponed Activity: "Adjust Airspeed"
   with VACP load:                              0.0  0.0  1.0  2.6
Length of time postponed (msec): 1700
Context (Current leaf activities and VACPs):
                                                 V    A    C    P
  "300 ft Callout"                              0.0  4.9  1.0  0.0
  "TrackPitchGuide@300"                         5.4  0.0  4.6  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
Total VACM load
 (without suspended/postponed activities):      5.4  4.9  6.6  2.6


Postponement Event # 5 occurred at time 50200 msecs
Postponed Activity: "AdjustAttitude"
   with VACP load:                              0.0  0.0  1.0  2.6
Length of time postponed (msec): 1300
Context (Current leaf activities and VACPs):
                                                 V    A    C    P
  "PrepareToCheckEngTorque"                     0.0  0.0  0.0  0.0
  "PrepareToPullUp"                             0.0  0.0  0.0  0.0
  "Hear-Emergency-Go-Around"                    0.0  4.9  5.3  0.0
  ACTIVITY-SPACE:REMEMBER-ACTIVITY              0.0  0.0  0.0  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
Total VACM load
 (without suspended/postponed activities):      0.0  4.9  6.3  2.6
```

```
Postponement Event # 6 occurred at time 51700 msecs
Postponed Activity: "Adjust Heading"
   with VACP load:                              0.0  0.0  1.0  2.6
Length of time postponed (msec): 300
Context (Current leaf activities and VACPs):
                                                 V    A    C    P
  "AdjustAttitude"                              0.0  0.0  1.0  2.6
  "Increase-TCL"                                4.0  0.0  3.7  2.6
  "Hear-Climb-Right-to-180"                     0.0  4.9  1.0  0.0
  "PrepareToCheckEngTorque"                     0.0  0.0  0.0  0.0
Total VACM load
 (without suspended/postponed activities):      4.0  4.9  5.7  5.2


Postponement Event # 7 occurred at time 61200 msecs
Postponed Activity: "Adjust-TCL"
   with VACP load:                              0.0  0.0  1.0  2.6
Length of time postponed (msec): 2000
Context (Current leaf activities and VACPs):
                                                 V    A    C    P
  "Adj-Nac-Thumbwheel"                          4.0  0.0  4.6  5.8
  "Prepare-for-Callout"                         0.0  0.0  0.0  0.0
Total VACM load
 (without suspended/postponed activities):      4.0  0.0  4.6  5.8


Postponement Event # 8 occurred at time 65200 msecs
Postponed Activity: "CheckNacellePos"
   with VACP load:                              5.4  0.0  4.6  0.0
Length of time postponed (msec): 1500
Context (Current leaf activities and VACPs):
                                                 V    A    C    P
  "Adjust Airspeed"                             0.0  0.0  1.0  2.6
  "Call-out-GearUP"                             0.0  4.9  5.3  2.2
  ACTIVITY-SPACE:REMEMBER-ACTIVITY              0.0  0.0  0.0  0.0
Total VACM load
 (without suspended/postponed activities):      0.0  4.9  6.3  4.8

Postponement Event # 9 occurred at time 83700 msecs
Postponed Activity: "Adjust-TCL"
   with VACP load:                              0.0  0.0  1.0  2.6
Length of time postponed (msec): 1500
Context (Current leaf activities and VACPs):
                                                 V    A    C    P
  "Adj-Nac-Thumbwheel"                          4.0  0.0  4.6  5.8
Total VACM load
 (without suspended/postponed activities):      4.0  0.0  4.6  5.8


Postponement summary:
  Number of activities postponed: 9
```

Activity Queue Manual Nacelle

```
Time (millisecs):        0
CURRENT ACTIVITIES
  "WAIT"                                    0.0  0.0  0.0  0.0
  "Callout-Decelerating"                    0.0  4.3  1.0  2.2
  "Reach-TCL"                               0.0  0.0  0.0  0.0
  "Reach-cyclic"                            0.0  0.0  0.0  0.0
WORKING GOALS
  "Glide-Slope-Intercept"
  "CallOutDecel"
  "Control-TCL"
  "SHCT-Mission"

Time (millisecs):      500
CURRENT ACTIVITIES
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
  "WAIT"                                    0.0  0.0  0.0  0.0
  "Callout-Decelerating"                    0.0  4.3  1.0  2.2
WORKING GOALS
  "Glide-Slope-Intercept"
  "CallOutDecel"
  "Control-TCL"

Time (millisecs):      900
CURRENT ACTIVITIES
  "wait"                                    0.0  0.0  0.0  0.0
  "TrackPitchGuide"                         5.4  0.0  4.6  0.0
  "anticipate 900 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
  "Callout-Decelerating"                    0.0  4.3  1.0  2.2
WORKING GOALS
  "Adjust-Airspeed"
  "pitch&airspeed@1000"
  "900&above acts"
  "Glide-Slope-Intercept"
  "CallOutDecel"
  "Control-TCL"

Time (millisecs):     1100
CURRENT ACTIVITIES
  "TrackPitchGuide"                         5.4  0.0  4.6  0.0
  "anticipate 900 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
  "Callout-Decelerating"                    0.0  4.3  1.0  2.2
WORKING GOALS
  "Adjust-Airspeed"
  "pitch&airspeed@1000"
  "900&above acts"
  "Glide-Slope-Intercept"
  "CallOutDecel"
  "Control-TCL"
POSTPONED ACTIVITIES
  "Adjust Airspeed"
```

```
Time (millisecs):     2000
CURRENT ACTIVITIES
  "Adjust Airspeed"                              0.0  0.0  1.0  2.6
  "TrackPitchGuide"                              5.4  0.0  4.6  0.0
  "anticipate 900 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Airspeed"
  "pitch&airspeed@1000"
  "900&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):     2500
CURRENT ACTIVITIES
  "TrackPitchGuide"                              5.4  0.0  4.6  0.0
  "anticipate 900 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "pitch&airspeed@1000"
  "900&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):     3900
CURRENT ACTIVITIES
  "wait"                                         0.0  0.0  0.0  0.0
  "TrackLatGuide"                                5.4  0.0  4.6  0.0
  "anticipate 900 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "1000-900 ft."
  "900&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):     4100
CURRENT ACTIVITIES
  "Adjust Heading"                               0.0  0.0  1.0  2.6
  "TrackLatGuide"                                5.4  0.0  4.6  0.0
  "anticipate 900 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "1000-900 ft."
  "900&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"
```

```
Time (millisecs):     4600
CURRENT ACTIVITIES
  "wait"                                    0.0  0.0  0.0  0.0
  "TrackLatGuide"                           5.4  0.0  4.6  0.0
  "anticipate 900 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "1000-900 ft."
  "900&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):     4800
CURRENT ACTIVITIES
  "Adjust Attitude"                         0.0  0.0  1.0  2.6
  "TrackLatGuide"                           5.4  0.0  4.6  0.0
  "anticipate 900 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "1000-900 ft."
  "900&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):     5300
CURRENT ACTIVITIES
  "TrackLatGuide"                           5.4  0.0  4.6  0.0
  "anticipate 900 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "lateral&heading-att"
  "1000-900 ft."
  "900&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):     5400
CURRENT ACTIVITIES
  "anticipate 900 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "900&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"
```

```
Time (millisecs):     5900
CURRENT ACTIVITIES
  "wait"                                    0.0  0.0  0.0  0.0
  "TrackPitchGuide"                         5.4  0.0  4.6  0.0
  "anticipate 800 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Airspeed"
  "pitch&airspeed@900"
  "800&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):     6100
CURRENT ACTIVITIES
  "Adjust Airspeed"                         0.0  0.0  1.0  2.6
  "TrackPitchGuide"                         5.4  0.0  4.6  0.0
  "anticipate 800 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Airspeed"
  "pitch&airspeed@900"
  "800&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):     6600
CURRENT ACTIVITIES
  "TrackPitchGuide"                         5.4  0.0  4.6  0.0
  "anticipate 800 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "pitch&airspeed@900"
  "800&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):     8900
CURRENT ACTIVITIES
  "wait"                                    0.0  0.0  0.0  0.0
  "TrackLatGuide"                           5.4  0.0  4.6  0.0
  "anticipate 800 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "900-800 ft."
  "800&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"
```

```
Time (millisecs):     9100
CURRENT ACTIVITIES
  "Adjust Heading"                                0.0  0.0  1.0  2.6
  "TrackLatGuide"                                 5.4  0.0  4.6  0.0
  "anticipate 800 ft"                             0.0  0.0  0.0  0.0
  "Adjust-TCL"                                    0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "900-800 ft."
  "800&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):     9600
CURRENT ACTIVITIES
  "wait"                                          0.0  0.0  0.0  0.0
  "TrackLatGuide"                                 5.4  0.0  4.6  0.0
  "anticipate 800 ft"                             0.0  0.0  0.0  0.0
  "Adjust-TCL"                                    0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "900-800 ft."
  "800&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):     9900
CURRENT ACTIVITIES
  "Adjust Attitude"                               0.0  0.0  1.0  2.6
  "TrackLatGuide"                                 5.4  0.0  4.6  0.0
  "anticipate 800 ft"                             0.0  0.0  0.0  0.0
  "Adjust-TCL"                                    0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "900-800 ft."
  "800&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    10400
CURRENT ACTIVITIES
  "Scan"                                          7.0  0.0  3.7  0.0
  "anticipate 800 ft"                             0.0  0.0  0.0  0.0
  "Adjust-TCL"                                    0.0  0.0  1.0  2.6
WORKING GOALS
  "900-800 ft."
  "800&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"
```

```
Time (millisecs):    12400
CURRENT ACTIVITIES
  "anticipate 800 ft"                          0.0  0.0  0.0  0.0
  "Adjust-TCL"                                 0.0  0.0  1.0  2.6
WORKING GOALS
  "800&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    12500
CURRENT ACTIVITIES
  "RunwaySightedCallout"                       0.0  4.9  1.0  0.0
  "anticipate 800 ft"                          0.0  0.0  0.0  0.0
  "Adjust-TCL"                                 0.0  0.0  1.0  2.6
WORKING GOALS
  "HearRunwaySighted"
  "800&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    12900
CURRENT ACTIVITIES
  "wait"                                       0.0  0.0  0.0  0.0
  "TrackPitchGuide"                            5.4  0.0  4.6  0.0
  "anticipate 700 ft"                          0.0  0.0  0.0  0.0
  "RunwaySightedCallout"                       0.0  4.9  1.0  0.0
  "Adjust-TCL"                                 0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Airspeed"
  "pitch&airspeed@800"
  "700&above acts"
  "HearRunwaySighted"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    14200
CURRENT ACTIVITIES
  "TrackPitchGuide"                            5.4  0.0  4.6  0.0
  "anticipate 700 ft"                          0.0  0.0  0.0  0.0
  "RunwaySightedCallout"                       0.0  4.9  1.0  0.0
  "Adjust-TCL"                                 0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Airspeed"
  "pitch&airspeed@800"
  "700&above acts"
  "HearRunwaySighted"
  "Glide-Slope-Intercept"
  "Control-TCL"
POSTPONED ACTIVITIES
  "Adjust Airspeed"
```

```
Time (millisecs):    14500
CURRENT ACTIVITIES
  "Adjust Airspeed"                              0.0  0.0  1.0  2.6
  "TrackPitchGuide"                              5.4  0.0  4.6  0.0
  "anticipate 700 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Airspeed"
  "pitch&airspeed@800"
  "700&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    15000
CURRENT ACTIVITIES
  "TrackPitchGuide"                              5.4  0.0  4.6  0.0
  "anticipate 700 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "pitch&airspeed@800"
  "700&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    15900
CURRENT ACTIVITIES
  "wait"                                         0.0  0.0  0.0  0.0
  "TrackLatGuide"                                5.4  0.0  4.6  0.0
  "anticipate 700 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "800-700 ft."
  "700&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    16100
CURRENT ACTIVITIES
  "Adjust Heading"                               0.0  0.0  1.0  2.6
  "TrackLatGuide"                                5.4  0.0  4.6  0.0
  "anticipate 700 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "800-700 ft."
  "700&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"
```

```
Time (millisecs):    16600
CURRENT ACTIVITIES
  "wait"                                    0.0  0.0  0.0  0.0
  "TrackLatGuide"                           5.4  0.0  4.6  0.0
  "anticipate 700 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "800-700 ft."
  "700&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    16800
CURRENT ACTIVITIES
  "Adjust Attitude"                         0.0  0.0  1.0  2.6
  "TrackLatGuide"                           5.4  0.0  4.6  0.0
  "anticipate 700 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "800-700 ft."
  "700&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    17300
CURRENT ACTIVITIES
  "TrackLatGuide"                           5.4  0.0  4.6  0.0
  "anticipate 700 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "lateral&heading-att"
  "800-700 ft."
  "700&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    17400
CURRENT ACTIVITIES
  "anticipate 700 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "700&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"
```

```
Time (millisecs):    17900
CURRENT ACTIVITIES
  "wait"                                    0.0  0.0  0.0  0.0
  "TrackPitchGuide"                         5.4  0.0  4.6  0.0
  "anticipate 600 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Airspeed"
  "pitch&airspeed@700"
  "600&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    18100
CURRENT ACTIVITIES
  "Adjust Airspeed"                         0.0  0.0  1.0  2.6
  "TrackPitchGuide"                         5.4  0.0  4.6  0.0
  "anticipate 600 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Airspeed"
  "pitch&airspeed@700"
  "600&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    18600
CURRENT ACTIVITIES
  "TrackPitchGuide"                         5.4  0.0  4.6  0.0
  "anticipate 600 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "pitch&airspeed@700"
  "600&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    20900
CURRENT ACTIVITIES
  "wait"                                    0.0  0.0  0.0  0.0
  "TrackLatGuide"                           5.4  0.0  4.6  0.0
  "anticipate 600 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "700-600 ft."
  "600&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"
```

```
Time (millisecs):    21100
CURRENT ACTIVITIES
  "Adjust Heading"                                0.0  0.0  1.0  2.6
  "TrackLatGuide"                                 5.4  0.0  4.6  0.0
  "anticipate 600 ft"                             0.0  0.0  0.0  0.0
  "Adjust-TCL"                                    0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "700-600 ft."
  "600&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    21600
CURRENT ACTIVITIES
  "wait"                                          0.0  0.0  0.0  0.0
  "TrackLatGuide"                                 5.4  0.0  4.6  0.0
  "anticipate 600 ft"                             0.0  0.0  0.0  0.0
  "Adjust-TCL"                                    0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "700-600 ft."
  "600&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    21900
CURRENT ACTIVITIES
  "Adjust Attitude"                               0.0  0.0  1.0  2.6
  "anticipate 600 ft"                             0.0  0.0  0.0  0.0
  "Adjust-TCL"                                    0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "700-600 ft."
  "600&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    22400
CURRENT ACTIVITIES
  "Scan"                                          7.0  0.0  3.7  0.0
  "anticipate 600 ft"                             0.0  0.0  0.0  0.0
  "Adjust-TCL"                                    0.0  0.0  1.0  2.6
WORKING GOALS
  "700-600 ft."
  "600&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"
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```
Time (millisecs):    24400
CURRENT ACTIVITIES
  "anticipate 600 ft"                          0.0  0.0  0.0  0.0
  "Adjust-TCL"                                 0.0  0.0  1.0  2.6
WORKING GOALS
  "600&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    25900
CURRENT ACTIVITIES
  "wait"                                       0.0  0.0  0.0  0.0
  "TrackPitchGuide"                            5.4  0.0  4.6  0.0
  "anticipate 500 ft"                          0.0  0.0  0.0  0.0
  "Adjust-TCL"                                 0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Airspeed"
  "pitch&airspeed@600"
  "500&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    27200
CURRENT ACTIVITIES
  "Adjust Airspeed"                            0.0  0.0  1.0  2.6
  "TrackPitchGuide"                            5.4  0.0  4.6  0.0
  "anticipate 500 ft"                          0.0  0.0  0.0  0.0
  "Adjust-TCL"                                 0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Airspeed"
  "pitch&airspeed@600"
  "500&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    27700
CURRENT ACTIVITIES
  "TrackPitchGuide"                            5.4  0.0  4.6  0.0
  "anticipate 500 ft"                          0.0  0.0  0.0  0.0
  "Adjust-TCL"                                 0.0  0.0  1.0  2.6
WORKING GOALS
  "pitch&airspeed@600"
  "500&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"
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```
Time (millisecs):    28900
CURRENT ACTIVITIES
  "wait"                                    0.0  0.0  0.0  0.0
  "TrackLatGuide"                           5.4  0.0  4.6  0.0
  "anticipate 500 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "600-500 ft."
  "500&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    29100
CURRENT ACTIVITIES
  "Adjust Heading"                          0.0  0.0  1.0  2.6
  "TrackLatGuide"                           5.4  0.0  4.6  0.0
  "anticipate 500 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "600-500 ft."
  "500&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    29600
CURRENT ACTIVITIES
  "wait"                                    0.0  0.0  0.0  0.0
  "TrackLatGuide"                           5.4  0.0  4.6  0.0
  "anticipate 500 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "600-500 ft."
  "500&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    29900
CURRENT ACTIVITIES
  "Adjust Attitude"                         0.0  0.0  1.0  2.6
  "TrackLatGuide"                           5.4  0.0  4.6  0.0
  "anticipate 500 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "600-500 ft."
  "500&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"
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Time (millisecs):    30400
CURRENT ACTIVITIES
  "Verify-sink-rate"                          5.9  0.0  4.6  0.0
  "anticipate 500 ft"                         0.0  0.0  0.0  0.0
  "Adjust-TCL"                                0.0  0.0  1.0  2.6
WORKING GOALS
  "600-500 ft."
  "500&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    32400
CURRENT ACTIVITIES
  "anticipate 500 ft"                         0.0  0.0  0.0  0.0
  "Adjust-TCL"                                0.0  0.0  1.0  2.6
WORKING GOALS
  "500&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    32900
CURRENT ACTIVITIES
  "wait"                                      0.0  0.0  0.0  0.0
  "TrackPitchGuide"                           5.4  0.0  4.6  0.0
  "anticipate 400 ft"                         0.0  0.0  0.0  0.0
  "Adjust-TCL"                                0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Airspeed"
  "pitch&airspeed@500"
  "400&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    33500
CURRENT ACTIVITIES
  "500 ft Callout"                            0.0  4.9  1.0  0.0
  "wait"                                      0.0  0.0  0.0  0.0
  "TrackPitchGuide"                           5.4  0.0  4.6  0.0
  "anticipate 400 ft"                         0.0  0.0  0.0  0.0
  "Adjust-TCL"                                0.0  0.0  1.0  2.6
WORKING GOALS
  "Hear500Ft"
  "Adjust-Airspeed"
  "pitch&airspeed@500"
  "400&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"
```

```
Time (millisecs):    34200
CURRENT ACTIVITIES
  "500 ft Callout"                                0.0  4.9  1.0  0.0
  "TrackPitchGuide"                               5.4  0.0  4.6  0.0
  "anticipate 400 ft"                             0.0  0.0  0.0  0.0
  "Adjust-TCL"                                    0.0  0.0  1.0  2.6
WORKING GOALS
  "Hear500Ft"
  "Adjust-Airspeed"
  "pitch&airspeed@500"
  "400&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"
POSTPONED ACTIVITIES
  "Adjust Airspeed"

Time (millisecs):    35500
CURRENT ACTIVITIES
  "Adjust Airspeed"                               0.0  0.0  1.0  2.6
  "TrackPitchGuide"                               5.4  0.0  4.6  0.0
  "anticipate 400 ft"                             0.0  0.0  0.0  0.0
  "Adjust-TCL"                                    0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Airspeed"
  "pitch&airspeed@500"
  "400&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    36000
CURRENT ACTIVITIES
  "wait"                                          0.0  0.0  0.0  0.0
  "TrackLatGuide"                                 5.4  0.0  4.6  0.0
  "anticipate 400 ft"                             0.0  0.0  0.0  0.0
  "Adjust-TCL"                                    0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "500-400 ft."
  "400&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    36200
CURRENT ACTIVITIES
  "Adjust Heading"                                0.0  0.0  1.0  2.6
  "TrackLatGuide"                                 5.4  0.0  4.6  0.0
  "anticipate 400 ft"                             0.0  0.0  0.0  0.0
  "Adjust-TCL"                                    0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "500-400 ft."
  "400&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"
```

```
Time (millisecs):    36700
CURRENT ACTIVITIES
  "wait"                                    0.0  0.0  0.0  0.0
  "TrackLatGuide"                           5.4  0.0  4.6  0.0
  "anticipate 400 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "500-400 ft."
  "400&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    37000
CURRENT ACTIVITIES
  "Adjust Attitude"                         0.0  0.0  1.0  2.6
  "anticipate 400 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "500-400 ft."
  "400&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    37500
CURRENT ACTIVITIES
  "Scan"                                    7.0  0.0  3.7  0.0
  "anticipate 400 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "500-400 ft."
  "400&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    39500
CURRENT ACTIVITIES
  "anticipate 400 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "400&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    39900
CURRENT ACTIVITIES
  "wait"                                    0.0  0.0  0.0  0.0
  "TrackPitchGuide"                         5.4  0.0  4.6  0.0
  "anticipate 300 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Airspeed"
  "pitch&airspeed@400"
  "300&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"
```

```
Time (millisecs):    41200
CURRENT ACTIVITIES
  "Adjust Airspeed"                              0.0  0.0  1.0  2.6
  "TrackPitchGuide"                              5.4  0.0  4.6  0.0
  "anticipate 300 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Airspeed"
  "pitch&airspeed@400"
  "300&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    41700
CURRENT ACTIVITIES
  "TrackPitchGuide"                              5.4  0.0  4.6  0.0
  "anticipate 300 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "pitch&airspeed@400"
  "300&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    42900
CURRENT ACTIVITIES
  "wait"                                         0.0  0.0  0.0  0.0
  "TrackLatGuide"                                5.4  0.0  4.6  0.0
  "anticipate 300 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "400-300 ft."
  "300&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    43100
CURRENT ACTIVITIES
  "Adjust Heading"                               0.0  0.0  1.0  2.6
  "TrackLatGuide"                                5.4  0.0  4.6  0.0
  "anticipate 300 ft"                            0.0  0.0  0.0  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "400-300 ft."
  "300&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"
```

```
Time (millisecs):    43600
CURRENT ACTIVITIES
  "wait"                                    0.0  0.0  0.0  0.0
  "TrackLatGuide"                           5.4  0.0  4.6  0.0
  "anticipate 300 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "400-300 ft."
  "300&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    43900
CURRENT ACTIVITIES
  "Adjust Attitude"                         0.0  0.0  1.0  2.6
  "TrackLatGuide"                           5.4  0.0  4.6  0.0
  "anticipate 300 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Heading&Attitude"
  "lateral&heading-att"
  "400-300 ft."
  "300&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    44400
CURRENT ACTIVITIES
  "Scan"                                    7.0  0.0  3.7  0.0
  "anticipate 300 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "400-300 ft."
  "300&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    46400
CURRENT ACTIVITIES
  "anticipate 300 ft"                       0.0  0.0  0.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "300&above acts"
  "Glide-Slope-Intercept"
  "Control-TCL"
```

```
Time (millisecs):    46900
CURRENT ACTIVITIES
  "wait"                                    0.0  0.0  0.0  0.0
  "TrackPitchGuide@300"                     5.4  0.0  4.6  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Adjust-Airspeed"
  "300-200 ft."
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    48000
CURRENT ACTIVITIES
  "300 ft Callout"                          0.0  4.9  1.0  0.0
  "wait"                                    0.0  0.0  0.0  0.0
  "TrackPitchGuide@300"                     5.4  0.0  4.6  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Hear300Ft"
  "Adjust-Airspeed"
  "300-200 ft."
  "Glide-Slope-Intercept"
  "Control-TCL"

Time (millisecs):    48200
CURRENT ACTIVITIES
  "300 ft Callout"                          0.0  4.9  1.0  0.0
  "TrackPitchGuide@300"                     5.4  0.0  4.6  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Hear300Ft"
  "Adjust-Airspeed"
  "300-200 ft."
  "Glide-Slope-Intercept"
  "Control-TCL"
POSTPONED ACTIVITIES
  "Adjust Airspeed"

Time (millisecs):    49900
CURRENT ACTIVITIES
  "Adjust Airspeed"                         0.0  0.0  1.0  2.6
  "300 ft Callout"                          0.0  4.9  1.0  0.0
  "Adjust-TCL"                              0.0  0.0  1.0  2.6
WORKING GOALS
  "Hear300Ft"
  "Adjust-Airspeed"
  "Glide-Slope-Intercept"
  "Control-TCL"
```

```
Time (millisecs):    50000
CURRENT ACTIVITIES
  "MonitorState"                                0.0  0.0  0.0  0.0
  "PrepareToCheckEngTorque"                     0.0  0.0  0.0  0.0
  "PrepareToPullUp"                             0.0  0.0  0.0  0.0
  "Hear-Emergency-Go-Around"                    0.0  4.9  5.3  0.0
  ACTIVITY-SPACE:REMEMBER-ACTIVITY              0.0  0.0  0.0  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "Trim-aircraft-and-push-TO-GO-button"
  "verify-conditions"
  "Incr&Maintain-TCL"
  "Hear-GA-Messages"
  "Glide-Slope-Intercept"
  "Control-TCL"
SUSPENDED ACTIVITIES
  "Adjust-Airspeed"

Time (millisecs):    50200
CURRENT ACTIVITIES
  "PrepareToCheckEngTorque"                     0.0  0.0  0.0  0.0
  "PrepareToPullUp"                             0.0  0.0  0.0  0.0
  "Hear-Emergency-Go-Around"                    0.0  4.9  5.3  0.0
  ACTIVITY-SPACE:REMEMBER-ACTIVITY              0.0  0.0  0.0  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "Trim-aircraft-and-push-TO-GO-button"
  "verify-conditions"
  "Incr&Maintain-TCL"
  "Hear-GA-Messages"
  "Glide-Slope-Intercept"
  "Control-TCL"
SUSPENDED ACTIVITIES
  "Adjust-Airspeed"
POSTPONED ACTIVITIES
  "Adjust Airspeed"
  "AdjustAttitude"

Time (millisecs):    51000
CURRENT ACTIVITIES
  "Adjust Airspeed"                             0.0  0.0  1.0  2.6
  "PrepareToCheckEngTorque"                     0.0  0.0  0.0  0.0
  "PrepareToPullUp"                             0.0  0.0  0.0  0.0
  "Hear-Emergency-Go-Around"                    0.0  4.9  5.3  0.0
WORKING GOALS
  "Adjust-Airspeed"
  "Trim-aircraft-and-push-TO-GO-button"
  "verify-conditions"
  "Incr&Maintain-TCL"
  "Hear-GA-Messages"
  "Glide-Slope-Intercept"
POSTPONED ACTIVITIES
  "AdjustAttitude"
```

```
Time (millisecs):    51500
CURRENT ACTIVITIES
  "AdjustAttitude"                              0.0  0.0  1.0  2.6
  "Wait"                                        0.0  0.0  0.0  0.0
  "Increase-TCL"                                4.0  0.0  3.7  2.6
  "Hear-Climb-Right-to-180"                     0.0  4.9  1.0  0.0
  "PrepareToCheckEngTorque"                     0.0  0.0  0.0  0.0
WORKING GOALS
  "Adjust-Airspeed&Heading"
  "Trim-aircraft-and-push-TO-GO-button"
  "verify-conditions"
  "Incr&Maintain-TCL"
  "Hear-GA-Messages"
  "Glide-Slope-Intercept"

Time (millisecs):    51700
CURRENT ACTIVITIES
  "AdjustAttitude"                              0.0  0.0  1.0  2.6
  "Increase-TCL"                                4.0  0.0  3.7  2.6
  "Hear-Climb-Right-to-180"                     0.0  4.9  1.0  0.0
  "PrepareToCheckEngTorque"                     0.0  0.0  0.0  0.0
WORKING GOALS
  "Adjust-Airspeed&Heading"
  "Trim-aircraft-and-push-TO-GO-button"
  "verify-conditions"
  "Incr&Maintain-TCL"
  "Hear-GA-Messages"
  "Glide-Slope-Intercept"
POSTPONED ACTIVITIES
  "Adjust Heading"

Time (millisecs):    52000
CURRENT ACTIVITIES
  "Adjust Heading"                              0.0  0.0  1.0  2.6
  "Wait"                                        0.0  0.0  0.0  0.0
  "Increase-TCL"                                4.0  0.0  3.7  2.6
  "Hear-Climb-Right-to-180"                     0.0  4.9  1.0  0.0
  "PrepareToCheckEngTorque"                     0.0  0.0  0.0  0.0
WORKING GOALS
  "Adjust-Airspeed&Heading"
  "Trim-aircraft-and-push-TO-GO-button"
  "verify-conditions"
  "Incr&Maintain-TCL"
  "Hear-GA-Messages"
  "Glide-Slope-Intercept"

Time (millisecs):    52500
CURRENT ACTIVITIES
  "Wait"                                        0.0  0.0  0.0  0.0
  "Increase-TCL"                                4.0  0.0  3.7  2.6
  "Hear-Climb-Right-to-180"                     0.0  4.9  1.0  0.0
  "PrepareToCheckEngTorque"                     0.0  0.0  0.0  0.0
WORKING GOALS
  "Trim-aircraft-and-push-TO-GO-button"
  "verify-conditions"
  "Incr&Maintain-TCL"
  "Hear-GA-Messages"
```

```
Time (millisecs):    53000
CURRENT ACTIVITIES
  "Maintain-TCL"                                0.0  0.0  1.2  2.6
  "CheckEngineTorque"                           5.9  0.0  3.7  0.0
  "Wait"                                        0.0  0.0  0.0  0.0
WORKING GOALS
  "Trim-aircraft-and-push-TO-GO-button"
  "verify-conditions"
  "Incr&Maintain-TCL"

Time (millisecs):    54000
CURRENT ACTIVITIES
  "CheckAirspeed"                               5.9  0.0  3.7  0.0
  "Maintain-TCL"                                0.0  0.0  1.2  2.6
  "Wait"                                        0.0  0.0  0.0  0.0
WORKING GOALS
  "Trim-aircraft-and-push-TO-GO-button"
  "verify-conditions"
  "Incr&Maintain-TCL"

Time (millisecs):    55800
CURRENT ACTIVITIES
  "CheckEngineTorque"                           5.9  0.0  3.7  0.0
  "Maintain-TCL"                                0.0  0.0  1.2  2.6
  "Wait"                                        0.0  0.0  0.0  0.0
WORKING GOALS
  "Trim-aircraft-and-push-TO-GO-button"
  "verify-conditions"
  "Incr&Maintain-TCL"

Time (millisecs):    56800
CURRENT ACTIVITIES
  "MonitorRateofClimb"                          5.4  0.0  4.6  0.0
  "Maintain-TCL"                                0.0  0.0  1.2  2.6
  "Wait"                                        0.0  0.0  0.0  0.0
WORKING GOALS
  "Trim-aircraft-and-push-TO-GO-button"
  "verify-conditions"
  "Incr&Maintain-TCL"

Time (millisecs):    57200
CURRENT ACTIVITIES
  "Adjust Airspeed"                             0.0  0.0  1.0  2.6
  "MonitorRateofClimb"                          5.4  0.0  4.6  0.0
  "Maintain-TCL"                                0.0  0.0  1.2  2.6
WORKING GOALS
  "Trim-Aircraft"
  "Trim-aircraft-and-push-TO-GO-button"
  "verify-conditions"
  "Incr&Maintain-TCL"
```

```
Time (millisecs):    57700
CURRENT ACTIVITIES
  "Adjust Heading"                              0.0  0.0  1.0  2.6
  "MonitorRateofClimb"                          5.4  0.0  4.6  0.0
  "Maintain-TCL"                                0.0  0.0  1.2  2.6
WORKING GOALS
  "Trim-Aircraft"
  "Trim-aircraft-and-push-TO-GO-button"
  "verify-conditions"
  "Incr&Maintain-TCL"

Time (millisecs):    58200
CURRENT ACTIVITIES
  "Adjust Attitude"                             0.0  0.0  1.0  2.6
  "MonitorRateofClimb"                          5.4  0.0  4.6  0.0
  "Maintain-TCL"                                0.0  0.0  1.2  2.6
WORKING GOALS
  "Trim-Aircraft"
  "Trim-aircraft-and-push-TO-GO-button"
  "verify-conditions"
  "Incr&Maintain-TCL"

Time (millisecs):    58700
CURRENT ACTIVITIES
  "PrepareToPressTO-GA"                         0.0  0.0  0.1  0.0
  "MonitorRateofClimb"                          5.4  0.0  4.6  0.0
  "Maintain-TCL"                                0.0  0.0  1.2  2.6
WORKING GOALS
  "Trim-aircraft-and-push-TO-GO-button"
  "verify-conditions"
  "Incr&Maintain-TCL"

Time (millisecs):    59600
CURRENT ACTIVITIES
  "CheckHeading"                                4.0  0.0  3.7  0.0
  "PrepareToPressTO-GA"                         0.0  0.0  0.1  0.0
  "Maintain-TCL"                                0.0  0.0  1.2  2.6
WORKING GOALS
  "Trim-aircraft-and-push-TO-GO-button"
  "verify-conditions"
  "Incr&Maintain-TCL"

Time (millisecs):    60100
CURRENT ACTIVITIES
  "PressTO-GA"                                  0.0  0.0  1.0  2.6
  "CheckHeading"                                4.0  0.0  3.7  0.0
  "Maintain-TCL"                                0.0  0.0  1.2  2.6
WORKING GOALS
  "Trim-aircraft-and-push-TO-GO-button"
  "verify-conditions"
  "Incr&Maintain-TCL"

Time (millisecs):    61100
CURRENT ACTIVITIES
  "Maintain-TCL"                                0.0  0.0  1.2  2.6
WORKING GOALS
  "Incr&Maintain-TCL"
```

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Time (millisecs):    61200
CURRENT ACTIVITIES
  "Adj-Nac-Thumbwheel"                          4.0  0.0  4.6  5.8
  "Prepare-for-Callout"                         0.0  0.0  0.0  0.0
WORKING GOALS
  "CvtNacMan80to75Deg"
  "Gear-and-Flaps-Comms"
  "Emergency-Go-Around"
POSTPONED ACTIVITIES
  "Adjust-TCL"

Time (millisecs):    63200
CURRENT ACTIVITIES
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
  "AdjustPitchAtt"                              0.0  0.0  1.1  2.6
  "MonitorPitchAtt"                             3.7  0.0  4.6  0.0
  "Prepare-for-Callout"                         0.0  0.0  0.0  0.0
WORKING GOALS
  "StartCvtNacellesManual"
  "Adj&MonitorPitch"
  "CvtNacMan80to75Deg"
  "Gear-and-Flaps-Comms"
  "Emergency-Go-Around"

Time (millisecs):    65200
CURRENT ACTIVITIES
  "Adjust Airspeed"                             0.0  0.0  1.0  2.6
  "Call-out-GearUP"                             0.0  4.9  5.3  2.2
  ACTIVITY-SPACE:REMEMBER-ACTIVITY              0.0  0.0  0.0  0.0
WORKING GOALS
  "Trim-AC"
  "CvtNacMan80to75Deg"
  "Gear-and-Flaps-Comms"
  "Emergency-Go-Around"
SUSPENDED ACTIVITIES
  "Adjust-TCL"
POSTPONED ACTIVITIES
  "CheckNacellePos"

Time (millisecs):    65700
CURRENT ACTIVITIES
  "Adjust Heading"                              0.0  0.0  1.0  2.6
  "Call-out-GearUP"                             0.0  4.9  5.3  2.2
  ACTIVITY-SPACE:REMEMBER-ACTIVITY              0.0  0.0  0.0  0.0
WORKING GOALS
  "Trim-AC"
  "CvtNacMan80to75Deg"
  "Gear-and-Flaps-Comms"
  "Emergency-Go-Around"
SUSPENDED ACTIVITIES
  "Adjust-TCL"
POSTPONED ACTIVITIES
  "Adjust-TCL"
  "CheckNacellePos"
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```
Time (millisecs):    66200
CURRENT ACTIVITIES
  "Adjust Attitude"                            0.0  0.0  1.0  2.6
  "Call-out-GearUP"                            0.0  4.9  5.3  2.2
  ACTIVITY-SPACE:REMEMBER-ACTIVITY             0.0  0.0  0.0  0.0
WORKING GOALS
  "Trim-AC"
  "CvtNacMan80to75Deg"
  "Gear-and-Flaps-Comms"
  "Emergency-Go-Around"
SUSPENDED ACTIVITIES
  "Adjust-TCL"
POSTPONED ACTIVITIES
  "Adjust-TCL"
  "CheckNacellePos"

Time (millisecs):    66700
CURRENT ACTIVITIES
  "Adjust-TCL"                                 0.0  0.0  1.0  2.6
  "CheckNacellePos"                            5.4  0.0  4.6  0.0
  "ExpectGearUpConfirm"                        0.0  0.0  0.0  0.0
WORKING GOALS
  "StartCvtNacellesManual"
  "TrimAC&CheckNac"
  "CvtNacMan80to75Deg"
  "Gear-and-Flaps-Comms"
  "Emergency-Go-Around"

Time (millisecs):    68700
CURRENT ACTIVITIES
  "Adj-Nac-Thumbwheel"                         4.0  0.0  4.6  5.8
  ACTIVITY-SPACE:REMEMBER-ACTIVITY             0.0  0.0  0.0  0.0
  "ExpectGearUpConfirm"                        0.0  0.0  0.0  0.0
WORKING GOALS
  "CvtNacMan80to75Deg"
  "Gear-and-Flaps-Comms"
  "Emergency-Go-Around"
SUSPENDED ACTIVITIES
  "Adjust-TCL"

Time (millisecs):    70200
CURRENT ACTIVITIES
  "Adjust-TCL"                                 0.0  0.0  1.0  2.6
  "AdjustPitchAtt"                             0.0  0.0  1.1  2.6
  "MonitorPitchAtt"                            3.7  0.0  4.6  0.0
  "ExpectGearUpConfirm"                        0.0  0.0  0.0  0.0
WORKING GOALS
  "StartCvtNacellesManual"
  "Adj&MonitorPitch"
  "CvtNacMan80to75Deg"
  "Gear-and-Flaps-Comms"
  "Emergency-Go-Around"
```

```
Time (millisecs):    71700
CURRENT ACTIVITIES
  "Hear-GearUP-Flaps-X-degrees"                0.0  4.3  1.2  0.0
  ACTIVITY-SPACE:REMEMBER-ACTIVITY             0.0  0.0  0.0  0.0
  "AdjustPitchAtt"                             0.0  0.0  1.1  2.6
  "MonitorPitchAtt"                            3.7  0.0  4.6  0.0
WORKING GOALS
  "Adj&MonitorPitch"
  "CvtNacMan80to75Deg"
  "Gear-and-Flaps-Comms"
  "Emergency-Go-Around"
SUSPENDED ACTIVITIES
  "Adjust-TCL"

Time (millisecs):    72200
CURRENT ACTIVITIES
  "CheckNacellePos"                            5.4  0.0  4.6  0.0
  "Adjust Airspeed"                            0.0  0.0  1.0  2.6
  "Hear-GearUP-Flaps-X-degrees"                0.0  4.3  1.2  0.0
  ACTIVITY-SPACE:REMEMBER-ACTIVITY             0.0  0.0  0.0  0.0
WORKING GOALS
  "Trim-AC"
  "CvtNacMan80to75Deg"
  "Gear-and-Flaps-Comms"
  "Emergency-Go-Around"
SUSPENDED ACTIVITIES
  "Adjust-TCL"
POSTPONED ACTIVITIES
  "Adjust-TCL"

Time (millisecs):    72700
CURRENT ACTIVITIES
  "Adjust Heading"                             0.0  0.0  1.0  2.6
  "CheckNacellePos"                            5.4  0.0  4.6  0.0
  "Hear-GearUP-Flaps-X-degrees"                0.0  4.3  1.2  0.0
  ACTIVITY-SPACE:REMEMBER-ACTIVITY             0.0  0.0  0.0  0.0
WORKING GOALS
  "Trim-AC"
  "CvtNacMan80to75Deg"
  "Gear-and-Flaps-Comms"
  "Emergency-Go-Around"
SUSPENDED ACTIVITIES
  "Adjust-TCL"
POSTPONED ACTIVITIES
  "Adjust-TCL"
```

```
Time (millisecs):    73200
CURRENT ACTIVITIES
  "Adjust Attitude"                              0.0  0.0  1.0  2.6
  "CheckNacellePos"                              5.4  0.0  4.6  0.0
  "Hear-GearUP-Flaps-X-degrees"                  0.0  4.3  1.2  0.0
  ACTIVITY-SPACE:REMEMBER-ACTIVITY               0.0  0.0  0.0  0.0
WORKING GOALS
  "Trim-AC"
  "CvtNacMan80to75Deg"
  "Gear-and-Flaps-Comms"
  "Emergency-Go-Around"
SUSPENDED ACTIVITIES
  "Adjust-TCL"
POSTPONED ACTIVITIES
  "Adjust-TCL"

Time (millisecs):    73700
CURRENT ACTIVITIES
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
  "CheckNacellePos"                              5.4  0.0  4.6  0.0
  "Hear-GearUP-Flaps-X-degrees"                  0.0  4.3  1.2  0.0
WORKING GOALS
  "StartCvtNacellesManual"
  "TrimAC&CheckNac"
  "CvtNacMan80to75Deg"
  "Gear-and-Flaps-Comms"
  "Emergency-Go-Around"

Time (millisecs):    75200
CURRENT ACTIVITIES
  "Adjust-Lat-Cyclic-into-turn"                  4.0  0.0  4.6  4.6
  "Adjust-TCL-into-turn"                         0.0  0.0  1.0  2.2
WORKING GOALS
  "Start-climb-right-turn"
  "Emergency-Go-Around"

Time (millisecs):    76200
CURRENT ACTIVITIES
  "Check-Heading-and-Climb-Rate"                 5.4  0.0  3.7  0.0
  "Cont-Adjust-Lat-Cyclic"                       0.0  0.0  1.0  2.6
  "Cont-Adjust-TCL"                              0.0  0.0  1.1  2.6
WORKING GOALS
  "Maintain-turn"
  "Start-Climb"
  "Emergency-Go-Around"

Time (millisecs):    79200
CURRENT ACTIVITIES
  "Check-Airspeed"                               5.9  0.0  3.7  0.0
  "Adjust-Lat-Cyclic-out-of-turn"                0.0  0.0  1.0  2.6
  "Adjust-TCL-rollout-of-turn"                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Rollout-of-turn"
  "Start-Climb"
  "Emergency-Go-Around"
```

```
Time (millisecs):    81200
CURRENT ACTIVITIES
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
  "Adjust Airspeed"                             0.0  0.0  1.0  2.6
WORKING GOALS
  "Trim-Aircraft"
  "Start-Climb"
  "Emergency-Go-Around"

Time (millisecs):    81700
CURRENT ACTIVITIES
  "wait"                                        0.0  0.0  0.0  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "Trim-Aircraft"
  "Start-Climb"
  "Emergency-Go-Around"

Time (millisecs):    82200
CURRENT ACTIVITIES
  "Adjust Heading"                              0.0  0.0  1.0  2.6
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "Trim-Aircraft"
  "Start-Climb"
  "Emergency-Go-Around"

Time (millisecs):    82700
CURRENT ACTIVITIES
  "wait"                                        0.0  0.0  0.0  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "Trim-Aircraft"
  "Start-Climb"
  "Emergency-Go-Around"

Time (millisecs):    83200
CURRENT ACTIVITIES
  "Adjust Attitude"                             0.0  0.0  1.0  2.6
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "Trim-Aircraft"
  "Start-Climb"
  "Emergency-Go-Around"

Time (millisecs):    83700
CURRENT ACTIVITIES
  "Adj-Nac-Thumbwheel"                          4.0  0.0  4.6  5.8
WORKING GOALS
  "Cvt-Nac75To60-Man&Control-AC"
  "Emergency-Go-Around"
POSTPONED ACTIVITIES
  "Adjust-TCL"
```

```
Time (millisecs):    85200
CURRENT ACTIVITIES
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
  "AdjustPitchAtt"                              0.0  0.0  1.1  2.6
  "MonitorPitchAtt"                             5.9  0.0  3.7  0.0
WORKING GOALS
  "ContCvtNacellesManual"
  "Adj&MonitorPitch"
  "Cvt-Nac75To60-Man&Control-AC"
  "Emergency-Go-Around"

Time (millisecs):    87200
CURRENT ACTIVITIES
  "CheckNacellePos"                             5.9  0.0  3.7  0.0
  "Adjust Airspeed"                             0.0  0.0  1.0  2.6
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "Trim-AC"
  "ContCvtNacellesManual"
  "Cvt-Nac75To60-Man&Control-AC"
  "Emergency-Go-Around"

Time (millisecs):    87700
CURRENT ACTIVITIES
  "wait"                                        0.0  0.0  0.0  0.0
  "CheckNacellePos"                             5.9  0.0  3.7  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "Trim-AC"
  "ContCvtNacellesManual"
  "Cvt-Nac75To60-Man&Control-AC"
  "Emergency-Go-Around"

Time (millisecs):    88100
CURRENT ACTIVITIES
  "Adjust Heading"                              0.0  0.0  1.0  2.6
  "CheckNacellePos"                             5.9  0.0  3.7  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "Trim-AC"
  "ContCvtNacellesManual"
  "Cvt-Nac75To60-Man&Control-AC"
  "Emergency-Go-Around"

Time (millisecs):    88600
CURRENT ACTIVITIES
  "wait"                                        0.0  0.0  0.0  0.0
  "CheckNacellePos"                             5.9  0.0  3.7  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "Trim-AC"
  "ContCvtNacellesManual"
  "Cvt-Nac75To60-Man&Control-AC"
  "Emergency-Go-Around"
```

```
Time (millisecs):    89100
CURRENT ACTIVITIES
  "Adjust Attitude"                              0.0  0.0  1.0  2.6
  "CheckNacellePos"                              5.9  0.0  3.7  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Trim-AC"
  "ContCvtNacellesManual"
  "Cvt-Nac75To60-Man&Control-AC"
  "Emergency-Go-Around"

Time (millisecs):    89600
CURRENT ACTIVITIES
  "Adj-Nac-Thumbwheel"                           4.0  0.0  4.6  5.8
  ACTIVITY-SPACE:REMEMBER-ACTIVITY               0.0  0.0  0.0  0.0
WORKING GOALS
  "Cvt-Nac75To60-Man&Control-AC"
  "Emergency-Go-Around"
SUSPENDED ACTIVITIES
  "Adjust-TCL"

Time (millisecs):    91400
CURRENT ACTIVITIES
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
  "AdjustPitchAtt"                               0.0  0.0  1.1  2.6
  "MonitorPitchAtt"                              5.9  0.0  3.7  0.0
WORKING GOALS
  "ContCvtNacellesManual"
  "Adj&MonitorPitch"
  "Cvt-Nac75To60-Man&Control-AC"
  "Emergency-Go-Around"

Time (millisecs):    93400
CURRENT ACTIVITIES
  "CheckNacellePos"                              5.9  0.0  3.7  0.0
  "Adjust Airspeed"                              0.0  0.0  1.0  2.6
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Trim-AC"
  "ContCvtNacellesManual"
  "Cvt-Nac75To60-Man&Control-AC"
  "Emergency-Go-Around"

Time (millisecs):    93900
CURRENT ACTIVITIES
  "wait"                                         0.0  0.0  0.0  0.0
  "CheckNacellePos"                              5.9  0.0  3.7  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Trim-AC"
  "ContCvtNacellesManual"
  "Cvt-Nac75To60-Man&Control-AC"
  "Emergency-Go-Around"
```

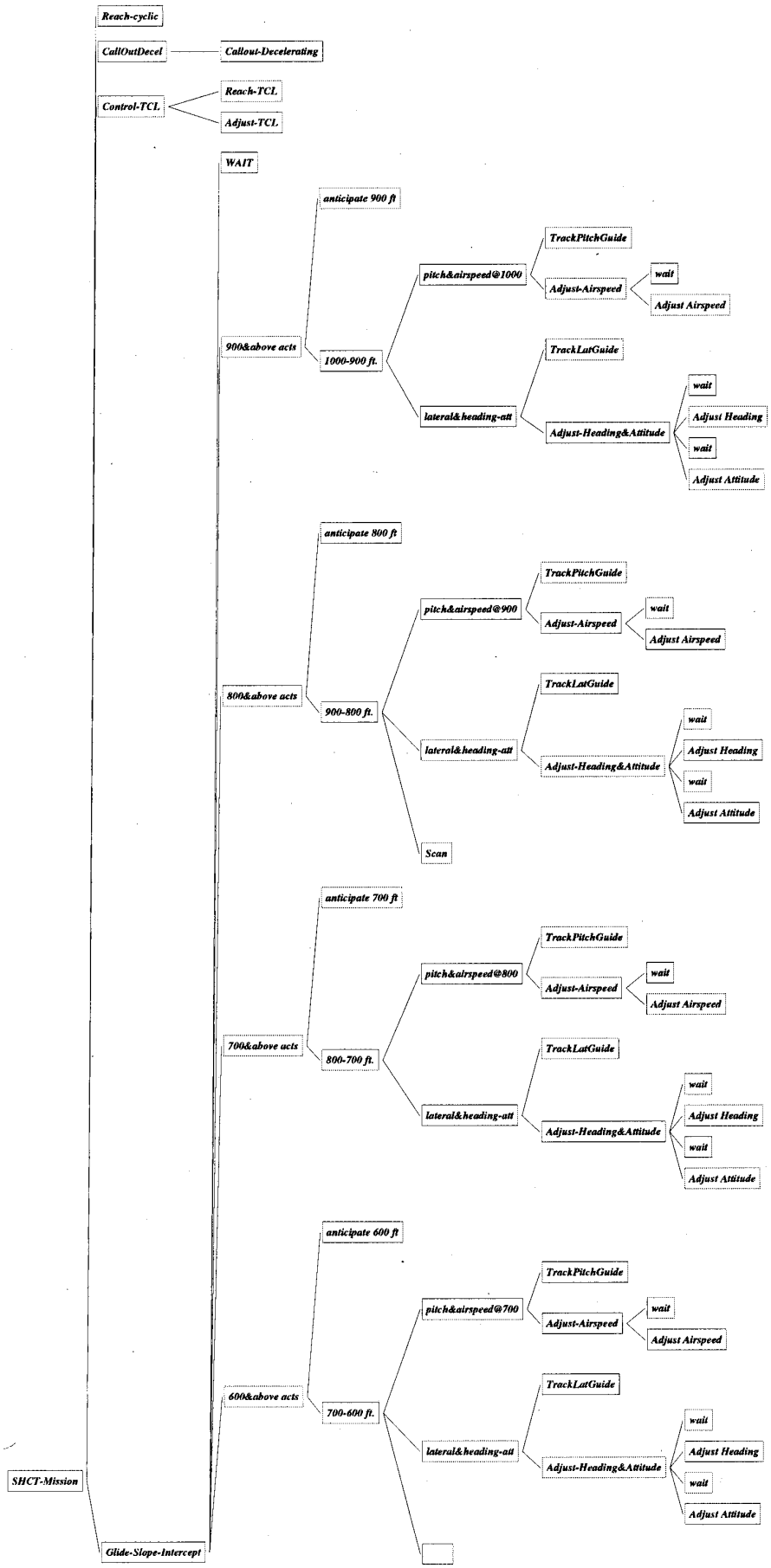
```
Time (millisecs):    94100
CURRENT ACTIVITIES
  "Adjust Heading"                                0.0  0.0  1.0  2.6
  "CheckNacellePos"                               5.9  0.0  3.7  0.0
  "Adjust-TCL"                                    0.0  0.0  1.0  2.6
WORKING GOALS
  "Trim-AC"
  "ContCvtNacellesManual"
  "Cvt-Nac75To60-Man&Control-AC"
  "Emergency-Go-Around"

Time (millisecs):    94600
CURRENT ACTIVITIES
  "wait"                                          0.0  0.0  0.0  0.0
  "CheckNacellePos"                               5.9  0.0  3.7  0.0
  "Adjust-TCL"                                    0.0  0.0  1.0  2.6
WORKING GOALS
  "Trim-AC"
  "ContCvtNacellesManual"
  "Cvt-Nac75To60-Man&Control-AC"
  "Emergency-Go-Around"

Time (millisecs):    94800
CURRENT ACTIVITIES
  "Adjust Attitude"                               0.0  0.0  1.0  2.6
  "CheckNacellePos"                               5.9  0.0  3.7  0.0
  "Adjust-TCL"                                    0.0  0.0  1.0  2.6
WORKING GOALS
  "Trim-AC"
  "ContCvtNacellesManual"
  "Cvt-Nac75To60-Man&Control-AC"
  "Emergency-Go-Around"

Time (millisecs):    95300
CURRENT ACTIVITIES
  "CheckNacellePos"                               5.9  0.0  3.7  0.0
  "Adjust-TCL"                                    0.0  0.0  1.0  2.6
WORKING GOALS
  "TrimAC&CheckNac"
  "ContCvtNacellesManual"
  "Cvt-Nac75To60-Man&Control-AC"
  "Emergency-Go-Around"

Time (millisecs):    95400
CURRENT ACTIVITIES
  "Adj-Nac-Thumbwheel"                            4.0  0.0  4.6  5.8
  ACTIVITY-SPACE:REMEMBER-ACTIVITY                0.0  0.0  0.0  0.0
WORKING GOALS
  "Cvt-Nac75To60-Man&Control-AC"
  "Emergency-Go-Around"
SUSPENDED ACTIVITIES
  "Adjust-TCL"
```

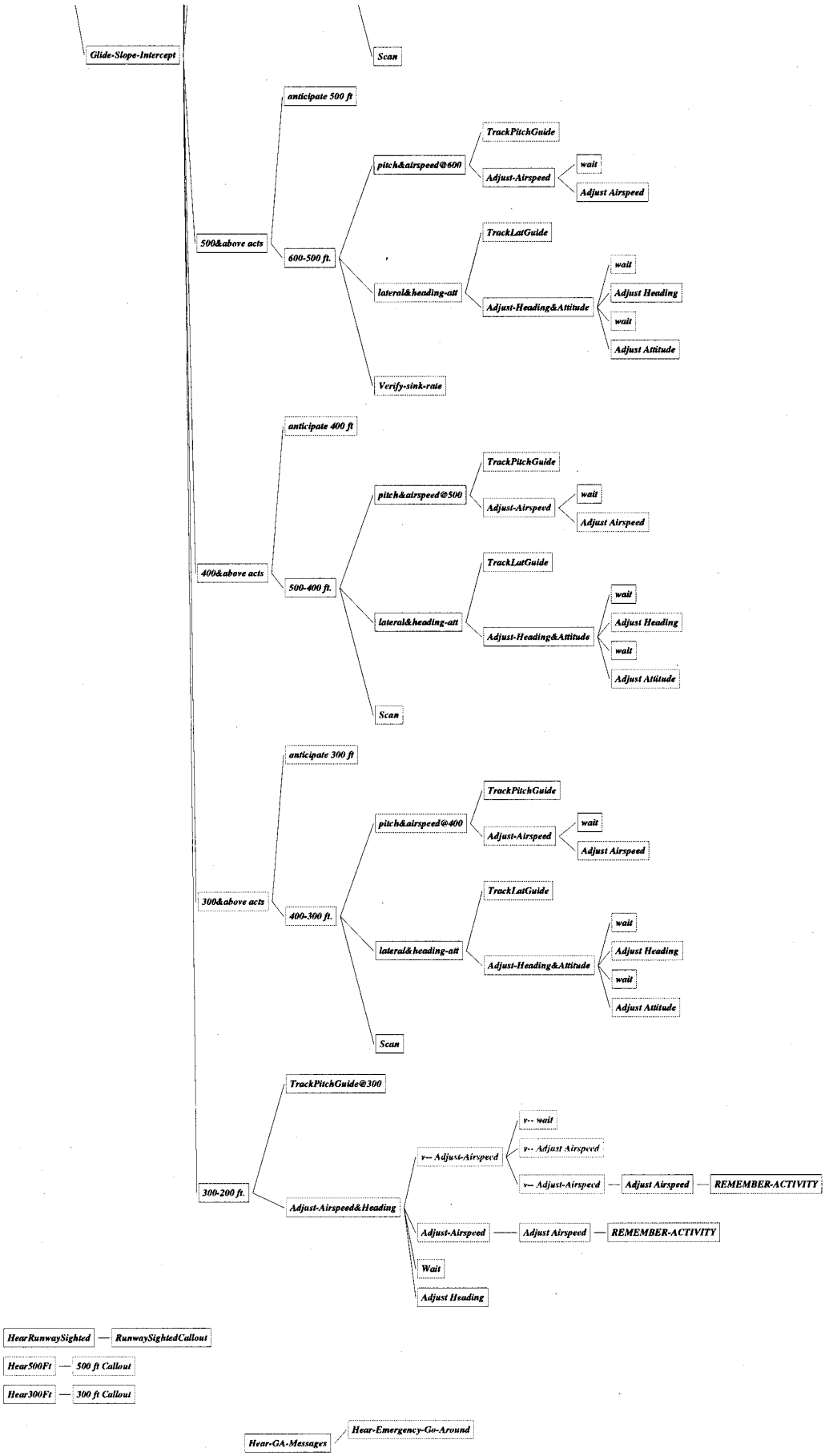
```
Time (millisecs):    97900
CURRENT ACTIVITIES
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
  "AdjustPitchAtt"                              0.0  0.0  1.1  2.6
  "MonitorPitchAtt"                             5.0  0.0  3.7  0.0
WORKING GOALS
  "ContCvtNacellesManual"
  "Adj&MonitorPitch"
  "Cvt-Nac75To60-Man&Control-AC"
  "Emergency-Go-Around"

Time (millisecs):    99900
CURRENT ACTIVITIES
  "CheckNacellePos"                             5.9  0.0  3.7  0.0
  "Adjust Airspeed"                             0.0  0.0  1.0  2.6
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "Trim-AC"
  "ContCvtNacellesManual"
  "Cvt-Nac75To60-Man&Control-AC"
  "Emergency-Go-Around"

Time (millisecs):   100400
CURRENT ACTIVITIES
  "wait"                                        0.0  0.0  0.0  0.0
  "CheckNacellePos"                             5.9  0.0  3.7  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "Trim-AC"
  "ContCvtNacellesManual"
  "Cvt-Nac75To60-Man&Control-AC"
  "Emergency-Go-Around"

Time (millisecs):   100600
CURRENT ACTIVITIES
  "Adjust Heading"                              0.0  0.0  1.0  2.6
  "CheckNacellePos"                             5.9  0.0  3.7  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "Trim-AC"
  "ContCvtNacellesManual"
  "Cvt-Nac75To60-Man&Control-AC"
  "Emergency-Go-Around"

Time (millisecs):   101100
CURRENT ACTIVITIES
  "wait"                                        0.0  0.0  0.0  0.0
  "CheckNacellePos"                             5.9  0.0  3.7  0.0
  "Adjust-TCL"                                  0.0  0.0  1.0  2.6
WORKING GOALS
  "Trim-AC"
  "ContCvtNacellesManual"
  "Cvt-Nac75To60-Man&Control-AC"
  "Emergency-Go-Around"
```

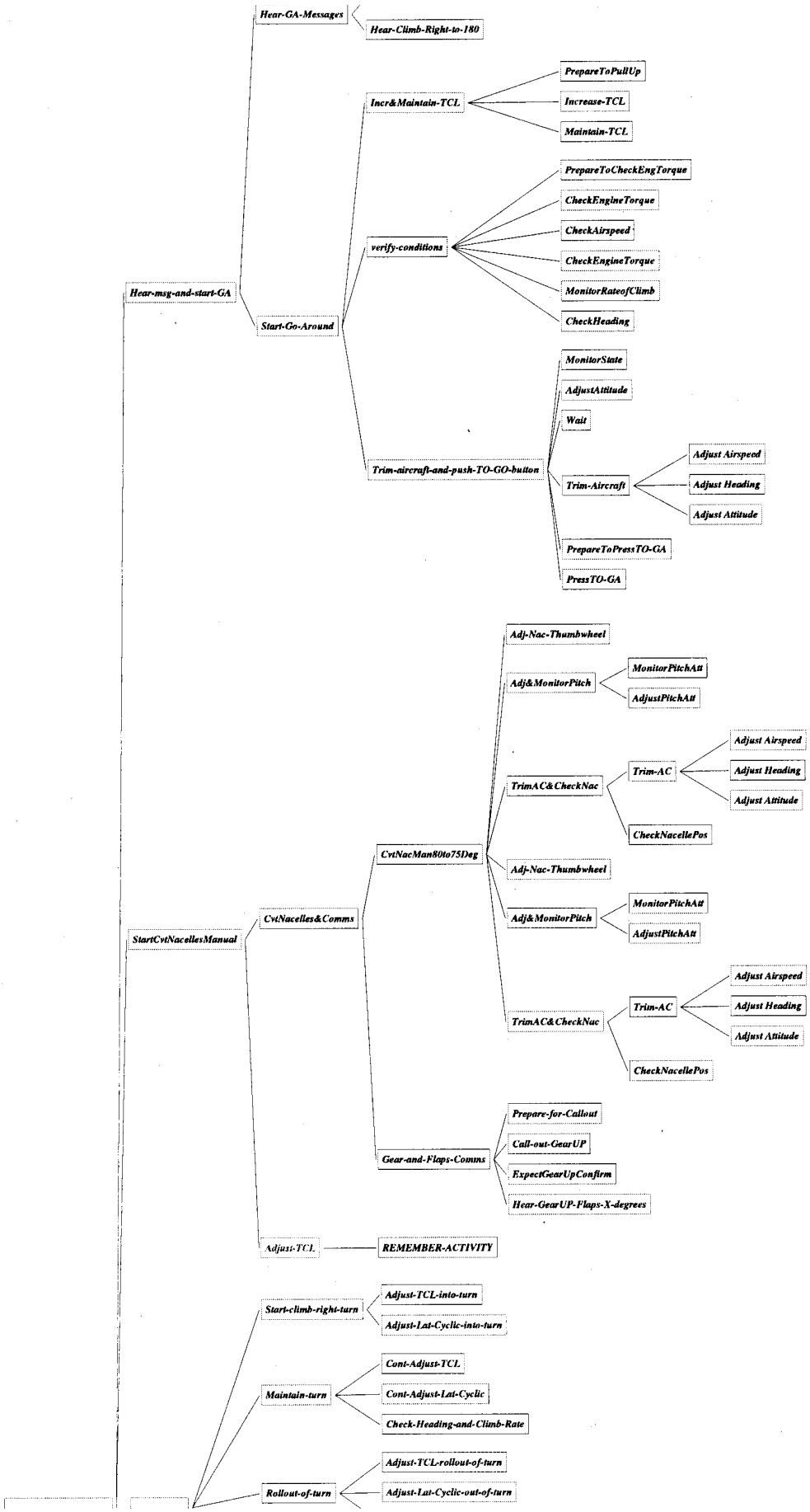
```
Time (millisecs):   101300
CURRENT ACTIVITIES
  "Adjust Attitude"                              0.0  0.0  1.0  2.6
  "CheckNacellePos"                              5.9  0.0  3.7  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "Trim-AC"
  "ContCvtNacellesManual"
  "Cvt-Nac75To60-Man&Control-AC"
  "Emergency-Go-Around"

Time (millisecs):   101800
CURRENT ACTIVITIES
  "CheckNacellePos"                              5.9  0.0  3.7  0.0
  "Adjust-TCL"                                   0.0  0.0  1.0  2.6
WORKING GOALS
  "TrimAC&CheckNac"
  "ContCvtNacellesManual"
  "Cvt-Nac75To60-Man&Control-AC"
  "Emergency-Go-Around"

Time (millisecs):   101900
CURRENT ACTIVITIES
  "Monitor-Controls"                             0.0  0.0  1.0  2.6
  "CallOut-60-deg-nacelles"                      0.0  4.3  5.3  2.2
WORKING GOALS
  "Change-Heading"
  "CallOut-60Deg-Nacelles&EnterHdg"
  "Emergency-Go-Around"

Time (millisecs):   104900
CURRENT ACTIVITIES
  "Reach-Hdg-Ctl-Panel"                          0.0  0.0  1.0  2.2
  "Fixate-Heading-Control-Panel"                 5.9  0.0  3.7  0.0
  "Monitor-Controls"                             0.0  0.0  1.0  2.6
WORKING GOALS
  "AcquireHdgSelSw"
  "Change-Heading"
  "CallOut-60Deg-Nacelles&EnterHdg"
  "Emergency-Go-Around"

Time (millisecs):   105600
CURRENT ACTIVITIES
  "Push-Hdg-Sel-Switch"                          3.7  0.0  1.2  2.2
  "Monitor-Controls"                             0.0  0.0  1.0  2.6
WORKING GOALS
  "Change-&-Verify-Heading"
  "Enter-New-Heading"
  "Change-Heading"
  "CallOut-60Deg-Nacelles&EnterHdg"
  "Emergency-Go-Around"
```

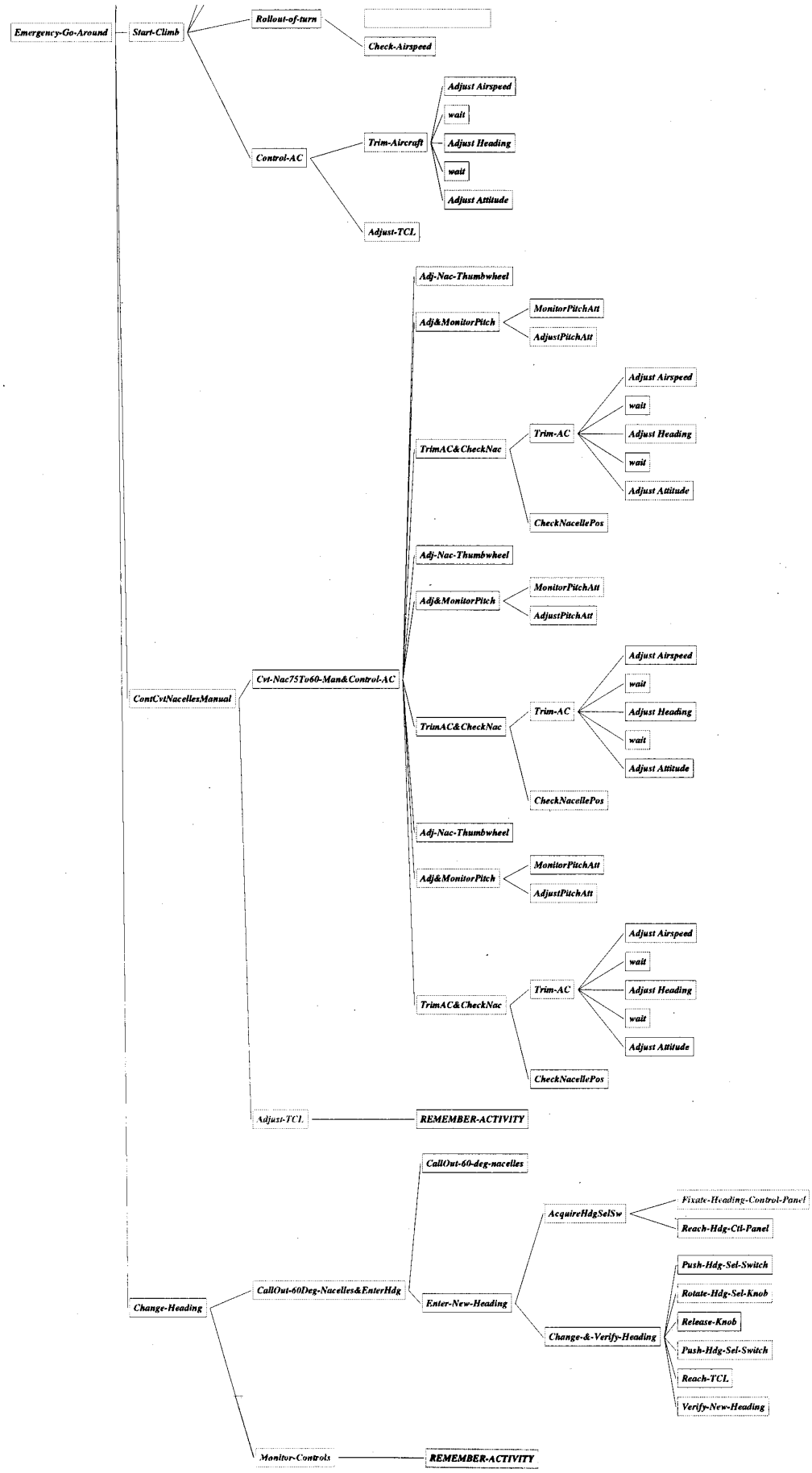
```
Time (millisecs):   107100
CURRENT ACTIVITIES
  "Rotate-Hdg-Sel-Knob"                        5.0  0.0  4.6  5.8
  ACTIVITY-SPACE:REMEMBER-ACTIVITY             0.0  0.0  0.0  0.0
WORKING GOALS
  "Change-&-Verify-Heading"
  "Enter-New-Heading"
  "CallOut-60Deg-Nacelles&EnterHdg"
  "Emergency-Go-Around"
SUSPENDED ACTIVITIES
  "Monitor-Controls"

Time (millisecs):   109100
CURRENT ACTIVITIES
  "Monitor-Controls"                           0.0  0.0  1.0  2.6
  "Release-Knob"                               1.0  0.0  1.2  2.2
WORKING GOALS
  "Change-Heading"
  "Change-&-Verify-Heading"
  "Enter-New-Heading"
  "CallOut-60Deg-Nacelles&EnterHdg"
  "Emergency-Go-Around"

Time (millisecs):   110100
CURRENT ACTIVITIES
  "Push-Hdg-Sel-Switch"                        3.7  0.0  1.2  2.2
  "Monitor-Controls"                           0.0  0.0  1.0  2.6
WORKING GOALS
  "Change-Heading"
  "Change-&-Verify-Heading"
  "Enter-New-Heading"
  "CallOut-60Deg-Nacelles&EnterHdg"
  "Emergency-Go-Around"

Time (millisecs):   111100
CURRENT ACTIVITIES
  "Reach-TCL"                                  0.0  0.0  1.0  4.2
  "Monitor-Controls"                           0.0  0.0  1.0  2.6
WORKING GOALS
  "Change-Heading"
  "Change-&-Verify-Heading"
  "Enter-New-Heading"
  "CallOut-60Deg-Nacelles&EnterHdg"
  "Emergency-Go-Around"

Time (millisecs):   111700
CURRENT ACTIVITIES
  "Verify-New-Heading"                         5.9  0.0  4.6  0.0
  "Monitor-Controls"                           0.0  0.0  1.0  2.6
WORKING GOALS
  "Change-Heading"
  "Change-&-Verify-Heading"
  "Enter-New-Heading"
  "CallOut-60Deg-Nacelles&EnterHdg"
  "Emergency-Go-Around"

Time (millisecs):   114700
```

CURRENT ACTIVITIES
WORKING GOALS


Reach-cyclic
CallOutDecel
Callout-Decelerating
Control-TCL
Reach-TCL
Adjust-TCL
WAIT
anticipate 900 ft
900&above acts
1000-900 ft.
pitch&airspeed@1000
TrackPitchGuide
Adjust-Airspeed
wait
Adjust Airspeed
TrackLatGuide
lateral&heading-att
Adjust-Heading&Attitude
wait
Adjust Heading
wait
Adjust Attitude
anticipate 800 ft
800&above acts
900-800 ft.
pitch&airspeed@900
TrackPitchGuide
Adjust-Airspeed
wait
Adjust Airspeed
TrackLatGuide
lateral&heading-att
Adjust-Heading&Attitude
wait
Adjust Heading
wait
Adjust Attitude
Scan
anticipate 700 ft
700&above acts
800-700 ft.
pitch&airspeed@800
TrackPitchGuide
Adjust-Airspeed
wait
Adjust Airspeed
TrackLatGuide
lateral&heading-att
Adjust-Heading&Attitude
wait
Adjust Heading
wait
Adjust Attitude
anticipate 600 ft
600&above acts
700-600 ft.
pitch&airspeed@700
TrackPitchGuide
Adjust-Airspeed
wait
Adjust Airspeed
TrackLatGuide
lateral&heading-att
Adjust-Heading&Attitude
wait
Adjust Heading
wait
Adjust Attitude
SHCT-Mission
Glide-Slope-Intercept


Glide-Slope-Intercept
Scan
500&above acts
anticipate 500 ft
600-500 ft.
pitch&airspeed@600
TrackPitchGuide
Adjust-Airspeed
wait
Adjust Airspeed
lateral&heading-att
TrackLatGuide
Adjust-Heading&Attitude
wait
Adjust Heading
wait
Adjust Attitude
Verify-sink-rate
400&above acts
anticipate 400 ft
500-400 ft.
pitch&airspeed@500
TrackPitchGuide
Adjust-Airspeed
wait
Adjust Airspeed
lateral&heading-att
TrackLatGuide
Adjust-Heading&Attitude
wait
Adjust Heading
wait
Adjust Attitude
Scan
300&above acts
anticipate 300 ft
400-300 ft.
pitch&airspeed@400
TrackPitchGuide
Adjust-Airspeed
wait
Adjust Airspeed
lateral&heading-att
TrackLatGuide
Adjust-Heading&Attitude
wait
Adjust Heading
wait
Adjust Attitude
Scan
300-200 ft.
TrackPitchGuide@300
Adjust-Airspeed&Heading
v-- Adjust-Airspeed
v-- wait
v-- Adjust Airspeed
v-- Adjust-Airspeed
Adjust Airspeed
REMEMBER-ACTIVITY
Adjust-Airspeed
Adjust Airspeed
REMEMBER-ACTIVITY
Wait
Adjust Heading
HearRunwaySighted
RunwaySightedCallout
Hear500Ft
500 ft Callout
Hear300Ft
300 ft Callout
Hear-GA-Messages
Hear-Emergency-Go-Around


Hear-GA-Messages
Hear-Climb-Right-to-180
Incr&Maintain-TCL
PrepareToPullUp
Increase-TCL
Maintain-TCL
verify-conditions
PrepareToCheckEngTorque
CheckEngineTorque
CheckAirspeed
CheckEngineTorque
MonitorRateofClimb
CheckHeading
Hear-msg-and-start-GA
Start-Go-Around
Trim-aircraft-and-push-TO-GO-button
MonitorState
AdjustAttitude
Wait
Trim-Aircraft
Adjust Airspeed
Adjust Heading
Adjust Attitude
PrepareToPressTO-GA
PressTO-GA
Adj-Nac-Thumbwheel
Adj&MonitorPitch
MonitorPitchAtt
AdjustPitchAtt
TrimAC&CheckNac
Trim-AC
Adjust Airspeed
Adjust Heading
Adjust Attitude
CheckNacellePos
CvtNacMan80to75Deg
Adj-Nac-Thumbwheel
Adj&MonitorPitch
MonitorPitchAtt
AdjustPitchAtt
TrimAC&CheckNac
Trim-AC
Adjust Airspeed
Adjust Heading
Adjust Attitude
CheckNacellePos
StartCvtNacellesManual
CvtNacelles&Comms
Prepare-for-Callout
Call-out-GearUP
ExpectGearUpConfirm
Hear-GearUP-Flaps-X-degrees
Gear-and-Flaps-Comms
Adjust-TCL
REMEMBER-ACTIVITY
Start-climb-right-turn
Adjust-TCL-into-turn
Adjust-Lat-Cyclic-into-turn
Maintain-turn
Cont-Adjust-TCL
Cont-Adjust-Lat-Cyclic
Check-Heading-and-Climb-Rate
Rollout-of-turn
Adjust-TCL-rollout-of-turn
Adjust-Lat-Cyclic-out-of-turn


Emergency-Go-Around
Start-Climb
Rollout-of-turn
Check-Airspeed
Control-AC
Trim-Aircraft
Adjust Airspeed
wait
Adjust Heading
wait
Adjust Attitude
Adjust-TCL
ContCvtNacellesManual
Cvt-Nac75To60-Man&Control-AC
Adj-Nac-Thumbwheel
Adj&MonitorPitch
MonitorPitchAtt
AdjustPitchAtt
TrimAC&CheckNac
Trim-AC
Adjust Airspeed
wait
Adjust Heading
wait
Adjust Attitude
CheckNacellePos
Adj-Nac-Thumbwheel
Adj&MonitorPitch
MonitorPitchAtt
AdjustPitchAtt
TrimAC&CheckNac
Trim-AC
Adjust Airspeed
wait
Adjust Heading
wait
Adjust Attitude
CheckNacellePos
Adj-Nac-Thumbwheel
Adj&MonitorPitch
MonitorPitchAtt
AdjustPitchAtt
TrimAC&CheckNac
Trim-AC
Adjust Airspeed
wait
Adjust Heading
wait
Adjust Attitude
CheckNacellePos
Adjust-TCL
REMEMBER-ACTIVITY
Change-Heading
CallOut-60Deg-Nacelles&EnterHdg
CallOut-60-deg-nacelles
Enter-New-Heading
AcquireHdgSelSw
Fixate-Heading-Control-Panel
Reach-Hdg-Ctl-Panel
Change-&-Verify-Heading
Push-Hdg-Sel-Switch
Rotate-Hdg-Sel-Knob
Release-Knob
Push-Hdg-Sel-Switch
Reach-TCL
Verify-New-Heading
Monitor-Controls
REMEMBER-ACTIVITY

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13. ABSTRACT *(Maximum 200 words)*

Tiltrotor aircraft combine the speed and range of a turboprop with the ability to take off and land in a vertical mode like a helicopter. These aircraft will transport passengers from city center to city center and from satellite airports to major hub airports to make connections to long range travel. The Short Haul Civil Tiltrotor (SH(CT)) being studied by NASA is a concept 40 passenger civil tiltrotor (CTR) transport. The Man-machine Integration Design and Analysis System (MIDAS) was used to evaluate human performance in terms of crew procedures and pilot workload for a simulated 40 passenger Civil Tiltrotor Transport on a steep approach to a vertiport. The scenario for the simulation was a normal approach to the vertiport that is interrupted by a commanded go-around at the landing decision point. The simulation contrasted an automated discrete nacelle mode control with a fully manual nacelle control mode for the go-around. The MIDAS simulation showed that the pilot task loading during approach and for the commanded go-around is high and that pilot workload is near capacity throughout. The go-around in manual nacelle mode was most demanding, resulting in additional time requirements to complete necessary tasks.

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Man-machine integration design and analysis system, Civil tiltrotor, Human factors research

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