

Validating a Cognitive Model of Approach based on the ACT-R Architecture

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General Introduction

This phase of the project focused on further developing the model that we presented at the March 2003 workshop along two principal lines. That model consisted of two parts. The first part is an ACT-R model that represents the cognitive, perceptual and motor processing of the people at the control of the aircraft. The second part is an IMPRINT model that represents the state of the aircraft, including its controls and indicators (both conventional and the Synthetic Vision System (SVS)) and the state of the world at large, including communications from the air traffic controllers.

In this phase of the project, we attempted to increase the generality of each model, both as a way of improving their range of applicability and of bringing more constraints to bear on the verification and validation of the models. The most straightforward generalization was the IMPRINT model. We needed to add the other scenarios to the original one to create the full set of conditions encountered in the human data collection.

We then needed to generalize the ACT-R model to handle the new conditions arising in the other scenarios than the one for which it had been defined. This generalization proceeded along two distinct paths, one which extended the model by developing a general method for attending to sources of information based on their learned utility (described in this section), and one which extended the model by incorporating a deeper task analysis based on human performance data collected for this task (described in the validation section).

Generalizing the ACT-R approach model through learned utility of information sources

We needed to handle the choice between the primary instrument panel and the Synthetic Vision System, both of which offer similar information about the world, in a more principled manner. The motivation for a more principled treatment was two-fold. The first goal was to examine more closely the benefits offered by the synthetic vision system. The second goal was to explain some of the data analyses performed in the first phase, especially the result showing that some crews learned to rely almost exclusively on the SVS while other crews mostly stuck with the traditional instrument panel. Both crews primarily focused their attention on either panel while occasionally glancing at the other one.

The first model had been written, its knowledge engineered in the form of production rules and chunks of declarative knowledge, to perform a particular scenario in the default aircraft configuration. We could have extended the same model to the new conditions encountered in the other scenarios. Production system models can usually be generalized quite easily by simply adding more production rules and/or knowledge chunks to handle

new conditions without disrupting their existing functionality.¹ However, this wouldn't have served either of our goals outlined previously: it wouldn't have brought new constraints to bear on the model and its validation, and it wouldn't have explained the dichotomy of reliance on either source of information regarding the world and the aircraft.

Therefore, we decided to generalize the ACT-R model through learning rather than exclusively through knowledge engineering. Learning in cognitive architectures such as ACT-R and Soar provides two principal advantages. First, it brings more constraints to bear on the model because the learning processes contain many fewer degrees of freedom than a knowledge engineering process performed by a human modeler. Second, learning allows the modeling of the fundamental human processes of encountering a new situation and adapting to it. That is certainly what the crews encountered when they were asked to perform their usual tasks in an environment in which a crucial new piece of equipment had been added, specifically the SVS system. More precisely, learning would allow us to explain why some crews came to rely primarily on the new system and why others mostly chose to ignore it. This modeling approach provides the added practical benefit not only of supporting the design of the new system but its real-world adoption as well.

Learning at multiple levels of decomposed tasks

The original ACT-R model had been designed as a two-level goal decomposition process. At the top level was the goal to decide which control to monitor next. This level was implemented as a round-robin loop that tested the previous control and scheduled the next one. At the lower level was the goal to gather needed information, decide the desired state of the control, and if necessary activate the change. Which source to gather the information from (instrument panel or SVS) was also pre-specified.

To enable learning to proceed, the hardwired symbolic constraints at both levels was removed to allow the architectural learning processes to take their place in tuning subsymbolic parameters to perform the decision instead in an adaptive manner. Specifically, the hardwired monitoring loop at the top level was removed to instead allow it to learn which controls to monitor. Each production specifying a different control to monitor can now compete with all others in the conflict resolution process that determines which rule is selected to fire. Similarly, at the lower level two productions rules are created for each goal to gather information about a specific instrument: one production rule will gather than information from the traditional instrument panel while the other will obtain it from the SVS display.

How are the competing productions selected and how is learning reflected in the conflict resolution process? The process of selecting which production to fire at each cycle, known as conflict resolution, is determined by subsymbolic quantities called utility that

¹ At least theoretically. As a practical matter, the new knowledge sometimes interferes with the existing one and can lead to difficult debugging and re-validation cycles.

are associated with each production. The utility, or expected gain, E of a production is defined as:

$$E = P \cdot G \square C$$

Expected Gain Equation

where G is the value of the goal to which the production applies, and P and C are estimates of the goal's probability of being successfully completed and the expected cost in time until that completion, respectively, after this production fires. Conflict resolution is a stochastic process through the injection of noise in each production's utility, leading to a probability of selecting a production i given by:

$$p(i) = \frac{e^{\frac{E_i}{t}}}{\sum_j e^{\frac{E_j}{t}}}$$

Conflict Resolution Equation

where $t = 6/\square$. A production's probability of success and cost are learned to reflect the past history of use of that production, specifically the past number of times that that production lead to success or failure of the goal to which it applied, and the subsequent cost that resulted, as specified by:

$$P = \frac{\text{Successes}}{\text{Successes} + \text{Failures}}$$

Probability Learning Equation

$$C = \frac{\square \text{ Costs}}{\text{Successes} + \text{Failures}}$$

Cost Learning Equation

Costs are defined in terms of the time to lead to a resolution of the current goal. Thus the more/less successful a production is in leading to a solution to the goal and the more/less efficient that solution is, the more/less likely that production is to be selected in the future. Those terms, *costs*, *successes* and *failures* will decay over time according to a power law process. Thus a recent experience will initially have more weight in the sums and ratios of the learning equations than an older one, but that weight will gradually decrease as time passes.

The learning process for production utilities at both levels thus depend fundamentally upon the defining of successes and failures at the end of each goal and the accumulations of costs (in terms of time spent) to reach the end of the goal. At the top level, a goal to choose the next control to monitor (and set a subgoal to accomplish that task) is deemed successful if the monitoring resulting in some action being taken. Otherwise, the monitoring of that particular control was deemed in vain and the goal resulted in failure since it wasted time and perhaps the opportunity to monitor some more pressing control. At that level, the learning will accomplish a similar but more flexible version of the initial round-robin selection. When a control task is selected and results in an adjustment, its utility goes up because its estimate of success is also increased. It is then likely to be

selected again shortly because of that high utility, but then will likely result in failure because the underlying situation hasn't changed enough to justify a new adjustment to that control. The utility of that production is then downgraded because of the failure, meaning that it won't be selected again until the failure has decayed and the productions associated with the other tasks have also incurred their own failures, at which point the cycle repeats. This process is quite similar to the hardwired round robin, but considerably more flexible. Since utility is stochastic, conflict resolution is probabilistic, leading to the constant exploration of new combinations. More fundamentally, the learning process will be sensitive through successes and failures to the frequency at which the underlying situation affecting a given control changes. This will result in productions associated with controls that require more frequent adjustments having higher utilities than others, and thus being selected more frequently. However, if that frequency changes over time, the conflict resolution process will again adapt through the time decay of the learning terms and change its frequency of selection to reflect the new situation.

At the lower level, we assume that a goal to capture information about underlying state variables, decide what to do with the given control and (optionally) perform the action is always successful. What varies is the cost in terms of time spent of performing these actions, in particular the capture of information from display panels. Our basic assumption (see section below for elaborations) is that it takes much less time to capture information from the same source (traditional instrument panel or SVS system) once one's visual attention is already there. Therefore given a low-level production that decides (and acts upon) which source to capture information from the cost of that production will primarily reflect where a shift of attention between display panels is required, or whether a much more minor and faster shift of attention between displays on the same panel is all that is needed. Note that that information is not represented symbolically at the production level, i.e. productions to capture information simply specify a source, and not whether it involves switching between panels or not. It is simply used to learn the productions utilities. What results is a gradual convergence to either display panel. Initially, productions have similar utilities and given their stochastic selection the model will cull information from either display with equal likelihood. But as one source starts being preferred through sheer randomness, the utilities for productions associated with that source will decrease while those associated with the other source will increase, leading to a winner-take-all process that will result in the model preferring one source over the other consistently, except for occasional glances to the other driven by conflict resolution stochasticity. This pattern reproduces the analysis of human data that we set out to emulate at the outset, not from our engineering the result into the model, but instead by turning on the architectural learning mechanisms, driven by environmental constraints.

One rather remarkable fact of this learning process is that while it takes the form of a single mechanism operating uniformly across two goal levels, it results in fundamentally opposite patterns at each level. At the top level, a round robin selection process emerges that makes sure all controls are attended to at some regular intervals. At the bottom level, a winner-take-all process emerges that gradually chooses to rely upon either of the two

main sources of information at the almost complete exclusion of the other. However, to achieve these two very different outcomes from the same process, we had to make one minor change to the ACT-R architecture. We partially reversed a change from ACT-R 4.0 to ACT-R 5.0 and made the utility learning process a goal-specific process again rather than a global process. This change was necessary to prevent catastrophic interference between the learning at the two levels. For instance, a lengthier search for information at the lower level should penalize the selection of a control that needed to be updated. That architectural change is still compatible with the ACT-R 5.0 architecture but indicates that some of the power of the ACT-R 4.0 mechanism was indeed essential.

Further investigations suggested by learned utility of information sources

In this model we have assumed that extracting information from the SVS system was a process neither more nor less efficient than from the conventional instrument panel. If an assumption was made based upon finer distinctions of the cost of harvesting information from the respective displays that one panel was more efficient than the others, this model would make predictions about the probability of adoption of the more efficient display over the other. Nothing in the model would need to be changed other than the costs of the various perceptual operations in each display. As new technologies emerge, their efficiency and rate of adoption could be easily studied by simply representing their costs rather than their entire operation.

Another process that can be studied in detail is the speed at which trained pilots adapt from one category of display to another. The process is basically one of overcoming well-trained productions with new ones with presumably higher utilities. The speed at which the skill at using the new displays will lead to the replacement of the skills associated with the established ones can also be studied under various assumptions of efficiency and errors. This can lead to the design of training procedures designed to maximize speed of adoption and reduce errors associated with the training phase during which skills conflict and might result in incorrect decisions and actions.

IMPRINT Simulation Description

For the NASA human performance modeling project, an IMPRINT task network model was created to simulate an aircraft landing on a runway. At a broad level, the purpose of the IMPRINT model is to mimic the simulation that real pilots used during this project with sufficient fidelity to expose the cognitive issues that arise from pilot/plane interface interactions. Thus, the IMPRINT model simulates the external environment (the outside world, atmosphere, landing field, etc.) and the cockpit controls through abstractions that allow a cognitive model to access the information a pilot would have access to in a simulator.

The IMPRINT model is a representation of an aircraft's controls, displays and the environment the aircraft operates in. The IMPRINT model is designed to communicate with the Act-R cognitive modeling software. When these two models execute in parallel, Act-R will model the pilot inside the aircraft. The IMPRINT task network model is constructed of a series of subnetworks representing the different areas of the simulation (see Figure 1). When the simulation is started, the model begins execution in the Start\End Landing network (2). In this subnetwork, IMPRINT connects to Act-R (via LIA) and the Act-R model is initialized. This initialization includes communicating to Act-R the current state of the aircraft and its environment. After the Start\End Landing subnetwork has completed, the following subnetworks begin execution: the Act-R Thought subnetwork (6), the Aircraft Environment subnetwork (1) and the Communication subnetwork (5). The Aircraft Displays subnetwork (3) and the Aircraft Controls subnetwork (4) are executed based upon what control or display Act-R utilizes (this information is communicated between IMPRINT and Act-R).

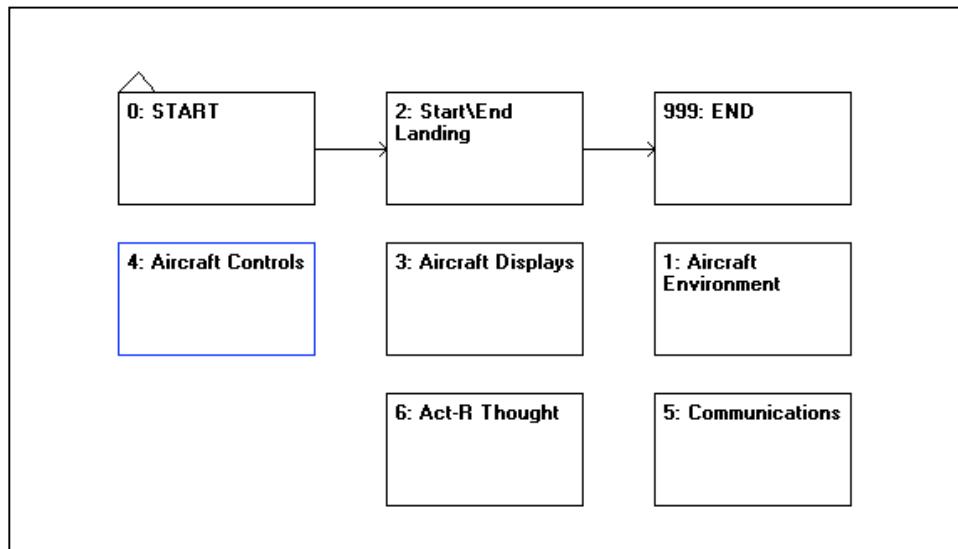


Figure 1: Main IMPRINT Network

When the Communications subnetwork begins, IMPRINT will schedule random communication tasks between the pilot (modeled by Act-R) and general air traffic chatter

(modeled by IMPRINT). Along with these random communication events, regularly scheduled communication between the pilot and air traffic control (ATC) will occur.

The Aircraft Environment subnetwork reflects a basic implementation of the physics of the aircraft and the external environment. The aircraft physics modeled include the aircraft's location in time and space, the aircraft's airspeed and altitude, and all of the aircraft's displays and controls. As the simulation executes, the pilot will set the various controls of the aircraft. These changes will affect the aircraft and are updated in this subnetwork. For example, if the pilot reduces the airspeed, the airspeed will slowly decrease to its new setting and the time it takes for the aircraft to travel to a certain waypoint will increase. As an aircraft's location changes, the external environment is updated. This includes what is visible to the pilot out the window and the distance the aircraft is from the runway. It is the environmental updates that dictate what decisions the pilot will make when landing the aircraft. Both the aircraft and its external environment update every tenth of a second.

The Aircraft Controls subnetwork and the Aircraft Displays subnetwork represent the various controls and displays of the aircraft respectively. In the Aircraft Displays subnetwork (Figure 2), the displays are broken down into the primary flight display, the navigational display, and the out the window display. It is important to note that while there is no true aircraft display for out the window, the pilot has the ability to look out the window to see if the ground is in sight or what the current flap settings are. Inside each Aircraft Displays subnetwork (Figure 2), individual displays are represented by tasks in the IMPRINT model (Figure 3). The Aircraft Controls subnetwork is constructed in a similar manner (Figure 4 and Figure 5). The tasks representing the controls and displays (Figure 3 and Figure 5) are executed when information on a control or display is requested. For example, if Act-R requests from IMPRINT the value of the Altitude Indicator display, IMPRINT will execute the Altitude Indicator task (see Figure 3). When the Altitude Indicator task is executed, the current Altitude (Above Ground Level) of the aircraft is retrieved and communicated to Act-R. This approach is used any time Act-R requires the value of a display or wants to change the setting of a control. This approach also allows IMPRINT to accept any new technologies that are in development and need to be tested.

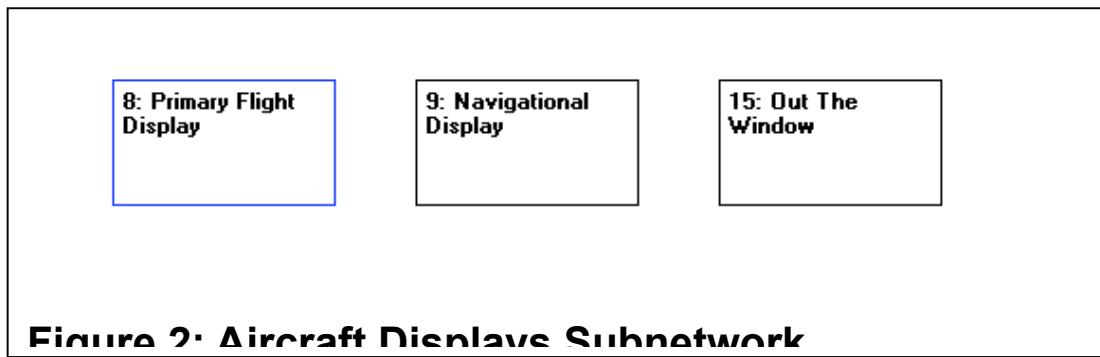


Figure 2: Aircraft Displays Subnetwork

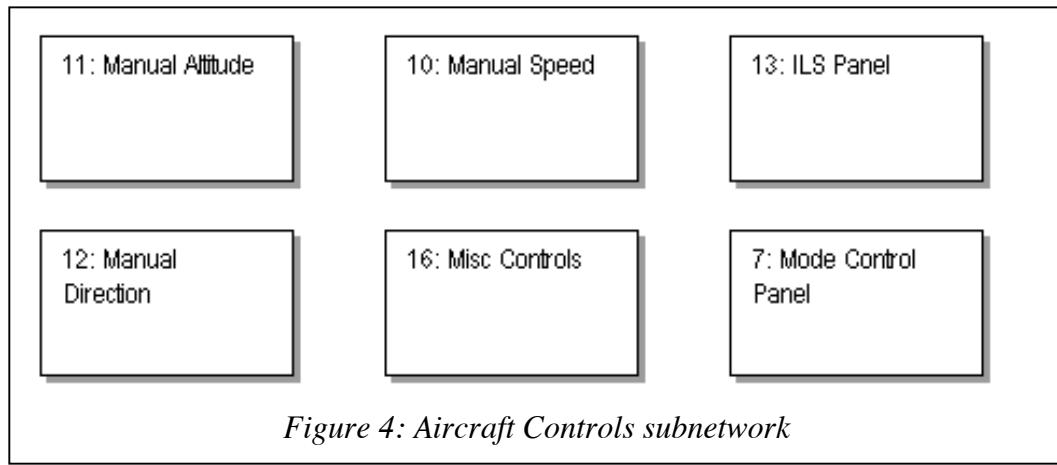
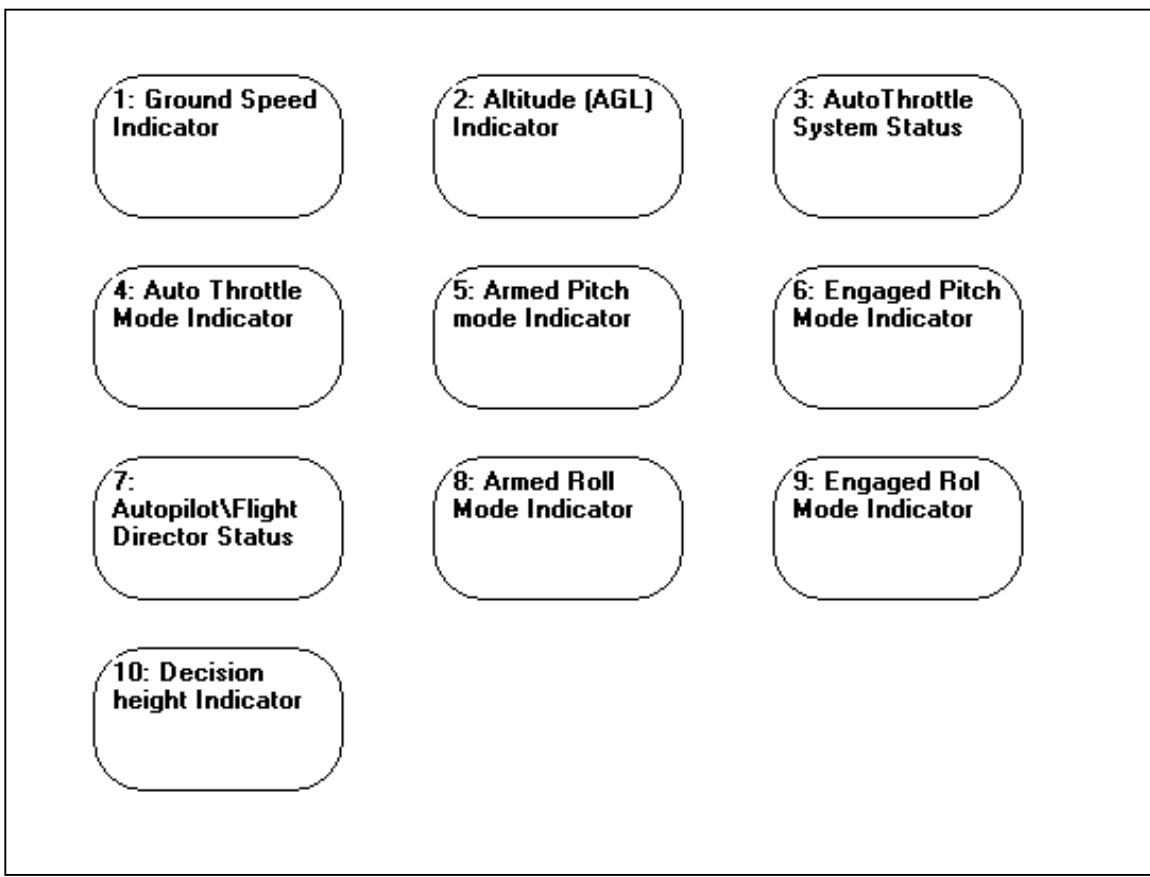
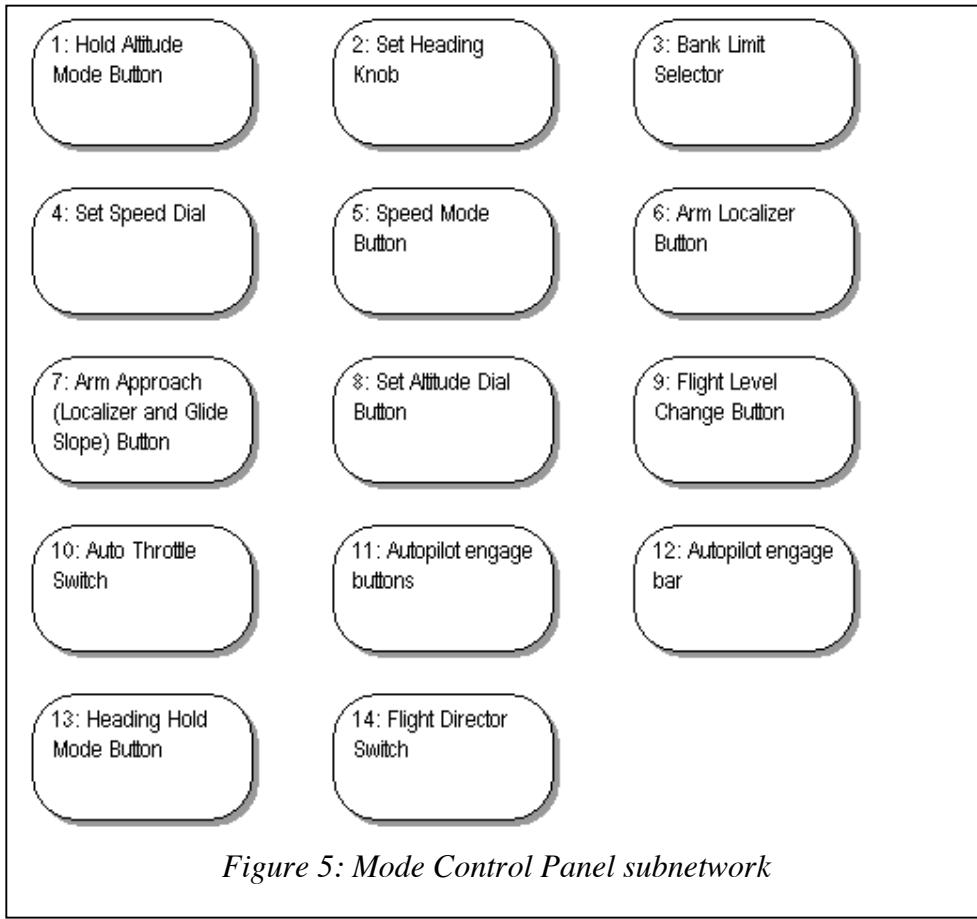


Figure 4: Aircraft Controls subnetwork



The main information transfer between Act-R and IMPRINT takes place inside the Act-R Thought subnetwork. During simulation execution, Act-R will request from IMPRINT what display value it needs or what control to use. IMPRINT will execute the task associated with the appropriate control or display and either return the display's current value to Act-R or set the specified control. As the simulation executes, Act-R will continually updates its memory and control the aircraft until the scenario ends. The scenario ends with either the aircraft landing or Act-R deciding the aircraft needs to go around and attempt the landing again.

The IMPRINT model is designed to simulate ten different scenarios. These scenarios are VMC vectored approach, VMC late reassignment, VMC missed approach, IMC vectored approach, IMC missed approach, IMC terrain mismatch, SVS vectored approach, SVS late reassignment, SVS missed approach, and SVS terrain mismatch. The following chart describes what is different by scenario:

<u>Scenario</u>	<u>ATC Communications</u>	<u>Visibility</u>
VMC Vectored Approach	Normal	Runway visible - 800 feet AGL
VMC Late Reassignment	Late reassignment request -1000 feet AGL	Runway visible - 800 feet AGL
VMC Missed Approach	Normal	Runway visible - 800 feet AGL (traffic on runway)
IMC Vectored Approach	Normal	Runway visible - 650 feet AGL
IMC Missed Approach	Normal	Runway never visible
IMC Terrain Mismatch	Normal	Runway visible - 650 feet AGL (runway 200' misaligned)
SVS IMC Vectored Approach	Normal	Runway visible - 650 feet AGL
SVS IMC Late Reassignment	Late reassignment request -1000 feet AGL	Runway visible - 650 feet AGL
SVS IMC Missed Approach	Normal	Runway never visible
SVS IMC Terrain Mismatch	Normal	Runway visible - 650 feet AGL (runway 200' misaligned)

Selection of the various scenarios will change the aircraft's environment and which displays are available for the pilot to use. The environmental changes include the altitude where the runway can be seen, the condition of the runway (i.e. misaligned or full of traffic) and what ATC communications take place. If the scenario uses the SVS technology, the SVS display will be available for the pilot to take advantage of. Since the IMPRINT model is packaged as source code, a user is able to run any scenario available and add is also able to add new technologies to the aircraft for future testing. In addition, existing controls can be extended to improve their fidelity, modify their function, or otherwise alter them to better suit the simulation goals.

Model Validation

Model validation is an extremely complicated subject – for a model to be completely validated, it would have to reproduce exactly the performance of the human subjects. Given the variable nature of human performance, this task is nearly impossible unless a task is so constrained as to make the model nearly meaningless. For any task of reasonable complexity, a broad range of human behavior can be expected, and the task of validation is to ensure that the model performance falls within the bounds as determined by the human performance.

The ACT-R theory provides some validation by only supporting processes that have been empirically determined to fall within the realm of human capability. That is, architecturally, ACT-R prohibits many actions that an unconstrained computer program (such as one written in C#) could accomplish. In this sense, there is a level of validity obtained simply by using ACT-R since the operations completed by the model are in principle operations that could be accomplished by a human performer of the task. However, these architectural limitations do not ensure that the operations undertaken by the model are the same operations undertaken by the human performer. Validating an ACT-R model of task performance requires that the constraints imposed by human performance on the task be used to inform the actual operations undertaken by the model to produce a validated model.

Validation of the ACT-R/Imprint model against human performance will be examined here at three distinct levels, from broad to fine grain. The first level involves achieving the criterion of successful task completion (to the extent that human performers succeed). The second level involves finer-grained validation of the individual actions taken by the model to determine if they correspond to the individual actions taken by human performers, and is largely qualitative (i.e., establishing that the model's actions have face validity). The third, and final, level involves examining behavioral data at an extremely fine grain and attempting to establish close quantitative correspondence between data captured from an instrumented model and data captured from human performance.

Validation level 1: Successful task completion

The first level, the most basic level of model validation, is a demonstration that the model can in fact accomplish the task. If the model cannot complete the task and human performers can, there is no need to proceed further along the validation path. Our model is a model of the pilot flying (PF) during runway approach. We have abstracted the pilot not flying (PNF, who is in the case of the experimental data a confederate) since all the PNF does is operate controls and our primary interest is in the cognitive operations of the PF. In the case of this approach model, the model achieves the same outcome as human pilots flying the scenarios in the simulator in each case. These scenarios and the identical outcomes (scenario conclusions) reached by both human pilots and the model are detailed in the table below:

Scenario Number	Description	Outcome
1	Baseline VMC	Disengage autopilot and prepare to land
2	Baseline VMC	Late reassignment (land on parallel runway)
3	Baseline VMC	Terrain mismatch (traffic on runway)
4	Baseline IMC	Nominal landing (land on parallel runway)
5	Baseline IMC	Missed approach (go around)
6	Baseline IMC	Terrain mismatch (go around)
7	SVS IMC	Disengage autopilot and prepare to land
8	SVS IMC	Late reassignment
9	SVS IMC	Missed approach (go around)
10	SVS IMC	Terrain mismatch (go around)

It is not a given that the model would successfully complete the task. The simulation environment requires that the model approach the runway at the proper altitude (through controlling the simulation) and see the runway where it is expected to be. There are several ways things can go wrong. If the simulation results in the plane being above the altitude where the runway can be seen, the result is that the plane would overfly the runway. On the other hand, if decision height is reached prematurely and the runway was not in sight, the model would choose to go around. Correct performance is predicated upon arriving at the decision height at the appropriate distance from the airfield, and therefore critically upon controlling rate of descent, speed of forward motion, and configuration of the airplane to allow a landing to occur. The outcomes above, achieved by both the pilots that participated in the data collection and the ACT-R model, represent the fundamental validation on which more extensive validation depends: the cognitive model successfully completes the task in exact agreement with the human participants.

Validation level 2: Assessing subtask correspondence

Given the first level of validation, we will proceed to the second level of validation, a qualitative assessment of the correspondence between model actions and human performer actions. This aspect of validation can be approached rigorously by encoding the actions taken by the human performer and lining it up with a model trace. This approach is based on the techniques of protocol analysis as described by Ericsson and Simon (1993). In addition, the correspondence between the model's use of the SVS display and actual pilot's use of the display was addressed in earlier development of this model as discussed above, and is incorporated within the version reported here (as well as being briefly addressed below).

Following this approach, the video taped scenarios were transcribed by recording those events that were audible and recording the corresponding time stamp present on the video (the full transcriptions for subject 5 for all tasks are presented in Appendix A).

Aggregating these performances and performing a protocol analysis resulted in the emergence of a general task decomposition that was common among the scenarios.

The ACT-R traces require a brief explanation before proceeding. ACT-R actions that execute subtasks within a task are coded as "PROCEDURAL" in the model runs below. The ACT-R model traces also produce actions that are coded as "VISUAL", indicating

looking at something in particular, “MANUAL”, indicating a physical action performed, “AURAL”, indicating something listened to, and “VOCAL”, indicating a speech act. The ACT-R model, because we have access to its inner workings, can thus provide much more fine-grained data on the operations it is performing at any time. This is a general truth of cognitive models, making the validation task more difficult since we only have access to sparser information about the detailed cognitive processes the human participants are involved in (the model must do much more than the human pilot says they are doing just as the human pilot must do much more than they say they are doing to complete the task). An ACT-R trace for each scenario is presented in its entirety in Appendix B.

(Note: Actions of the human pilot are coded similarly in the excerpts below to aid the reader in aligning pilot actions to model actions. The coding adopted in the appendix, and the coding used for the protocol analysis is different from this, though there is a one to one mapping between the two.)

The performance of approach tasks can be broken down into the following main tasks and subtasks (these tasks do not necessarily correspond to other previous categorizations of approach tasks and focus instead on the cognitive phases as demonstrated by human performance in the simulation environment as demonstrated on the videotaped scenario runs):

1. Simulation initiation
 - a. Encode and respond to ATC instructions for approach
 - b. Set aircraft configuration for approach
 - i. Set speed brakes
 - ii. Set LNAV/VNAV
 - iii. Set autopilots on
 - iv. Set flaps to 1 or 4
 - v. Check altitude
2. Descent from 3000 feet
 - a. Check/Adjust speed
 - b. Check/Adjust flaps
 - c. Check/Adjust altitude dial
 - d. Check/Adjust map scale
 - e. Check altitude
 - f. Check/Adjust decision altitude
 - g. Check distance to next waypoint
 - h. Check/Adjust airbrakes
3. Landing Checklist
 - a. Set gear down
 - b. Set flaps 15
 - c. Set speed brakes armed
 - d. Set speed 135

- e. Notify cabin of landing
- 4. Final Approach (nearing decision altitude)
 - a. Check/Adjust flaps (set full flaps on)
 - b. Make landing decision at decision height
 - i. Check altitude
 - ii. Check runway (out the window)
 - iii. Decide to land or go around

The main tasks can be separated into two distinct categories: 1) schematic scripts (simulation initiation, and landing checklist), and 2) reactive monitoring tasks (descent from 3000 feet, and final approach). The tasks above occur in the order presented. The schematic tasks are characterized by rapid performance of the subtasks while the monitoring tasks take up the time between the schematic tasks.

This sequence of tasks is worth examining in further detail. Upon simulation initiation (within 30 seconds of simulation start), regardless of the scenario, the pilot flying (PF) rapidly performs the subtasks listed above under the main task “simulation initiation” in a scripted fashion (the pilot sets LNAV/VNAV, sets autopilots to engaged, sets flaps to setting 1, etc.). This is followed by a period of roughly seven minutes of monitoring the descent, occasionally gradually adjusting controls. At this point the pilot flying calls out the landing checklist, again a scripted set of actions including lowering the landing gear, arming the speed brakes, etc., which ensures that the aircraft is configured for landing (typically read off of a card though sometimes read from memory). The landing checklist only takes on the order of ten seconds to complete. This is followed by a period of roughly three minutes while the final approach is monitored, during which flaps are set to their final setting, and the pilot monitors their altitude relative to the decision altitude while looking for the runway out the window. These tasks form the macro-structure of all scenario performances, and are therefore shared by all of the individual task models (in fact, one ACT-R model performs all of the scenarios; this model is not parameterized for any scenario and is not provided with the current scenario beyond the presence/absence of the SVS). These tasks also directly form the macro-structure of the ACT-R model itself, which is both an aid in development and validation (the model maps directly onto the cognitive constructs; it is presented in Appendix C).

The performance of actions during these phases (for the baseline IMC non-SVS condition) is demonstrated by protocol excerpts from several scenarios for Subject #5, Tape 1 (Baseline-IMC-normal landing) and the corresponding model trace. Excerpts were selected from scenario runs that provided the most detailed information for validation (the situations described had corresponding episodes in each of the scenario runs; the most complete verbal/visual protocols available were used).

Validating Task 1 – Simulation Initiation:

The human performance protocol during this phase is as follows:

OPERATOR-TYPE	TIME	OPERANDS
PROCEDURAL	40:03	Preparing for approach: setting LNAV
PROCEDURAL	40:04	Preparing for approach: Speedbrakes Full
PROCEDURAL	40:05	Autopilots engaged
PROCEDURAL	40:06	Preparing for approach: Set Flaps 1

This section involves setting the flaps, autopilot, LNAV and VNAV just after simulation initiation (from 2.4 seconds into the simulation to 8.9 seconds into the simulation).

```

PROCEDURAL 2.363 Preparing for approach: setting Flaps 1
MANUAL    2.363 flaps set 1
PROCEDURAL 3.435 Preparing for approach: setting VNAV
VISUAL    3.435 waypoint Value 1
PROCEDURAL 6.476 Preparing for approach: engaging Speed-brakes full
MANUAL    6.476 airbrakes on/off 0
PROCEDURAL 7.649 Preparing for approach: setting LNAV
VISUAL    7.649 distance-next Value 1
PROCEDURAL 8.899 Preparing for approach: engaging Autopilot
VISUAL    8.899 autopilots Value up

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Note that the actions do not occur in the same order. This is typical of human performance during simulation initiation, where the same set of actions occur, but the order is not specified. The model produces the same stochastic effect where different runs will produce a different ordering of the subtasks involved in initiating the simulation. Also note that this particular process does not have an explicit checklist (like landing does), and the pilot has NOT in this case ensured that the VNAV was set (though this pilot explicitly does so in almost every other scenario). In contrast, our model is using an explicit checklist at this point and does not miss the item.

Validating Task 2 – Descent from 3000 Feet:

The human protocol during the descent from 3000 feet is somewhat sparser than the model protocol (the model reports everything it is looking at while the pilot reports only changes to controls being made). The following explicit actions take place (though there is also constant monitoring of various controls and displays as evidenced by the eye-tracking data):

OPERATOR-TYPE	TIME	OPERANDS
PROCEDURAL	43:40	retract Speedbrakes
MANUAL	43:42	set Speedbrakes retracted
PROCEDURAL	46:30	lower gear
MANUAL	46:31	set gear down
PROCEDURAL	46:32	Flaps 25
MANUAL	46:33	set flaps 25

The following segment is a section of the trace that illustrates actions during the descent from 3000 feet (only a portion is included here; for a full trace, see the appendix). This segment of the trace involves monitoring the status of various systems. The pilot first checks the status of the autopilot and looks out the window at 47 seconds. The pilot then checks the status of the speed brakes at 51 seconds and, now that the plane speed has

decreased, chooses to disengage them. The pilot then checks that the decision altitude is set at 54 seconds (which it already is). At 57 seconds, the pilot checks the value of the speed dial, which is 160 knots, and decreases it to 140 knots. The pilot then looks at the altitude and notes that the current altitude is 2500 feet. This is followed by lowering the landing gear at 65 seconds, and adjusting the flaps from 15 to 25 at 69 seconds.

```

PROCEDURAL 47.436 SubGoal checking Autopilot
VISUAL 48.498 otw_runway Value out-of-sight
VISUAL 49.650 autopilots Value up
VISUAL 50.626 altitude Value 2500
**Goal37 8.341
  isa SET-AUTOPILOT
  visibility Out-Of-Sight
  peek 2500
  decision EngagedGOAL37 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 51.327 SubGoal checking Speed Brakes
VISUAL 52.596 speed Value 170
VISUAL 53.478 airbrakes Value off
**Goal41 8.261
  isa SPEED-BRAKES
  speed 170
  decision OffGOAL41 DIAL DIAL T Decide-Speed-Brakes
PROCEDURAL 54.078 SubGoal checking Decision Altitude
VISUAL 55.277 waypoint Value 2
VISUAL 56.261 distance-next Value 2
RETRIEVAL 56.361 Waypoint 2 Next 2 Distance 13
**Goal44 5.025
  isa SET-DECISION-ALTITUDE
  waypoint 2
  distance-next 2
  distance 13
  old 600
  decision 600GOAL44 DIAL DIAL T Ignore-Decision-Altitude
PROCEDURAL 57.017 SubGoal checking Speed
VISUAL 57.906 waypoint Value 2
VISUAL 58.834 distance-next Value 1
RETRIEVAL 58.934 Waypoint 2 Next 1 Distance 12
RETRIEVAL 59.034 Speed
VISUAL 60.278 dial-speed Value 160
MANUAL 63.031 dial-speed set 140
**Goal47 5.210
  isa SET-SPEED
  waypoint 2
  distance-next 1
  distance 12
  speed 140GOAL47 DIAL DIAL T Dial-Speed
PROCEDURAL 63.641 SubGoal checking Altitude
VISUAL 64.715 altitude Value 2500
**Goal52 4.935
  isa CHECK-ALTITUDE
  altitude 2500
  previous 2500GOAL52 DIAL DIAL T Ignore-Altitude
PROCEDURAL 65.372 SubGoal checking Landing Gear
VISUAL 66.437 waypoint Value 2
VISUAL 67.335 distance-next Value 1

```

```

RETRIEVAL 67.436 Waypoint 2 Next 1 Distance 12
VISUAL 68.252 landing-gear Value down
**Goal54 8.342
isa MOVE-GEAR
waypoint 2
distance-next 1
distance 12
decision DownGOAL54 DIAL DIAL T Decide-Gear
PROCEDURAL 68.852 SubGoal checking Flaps
VISUAL 69.918 speed Value 159
RETRIEVAL 70.068 Flaps 25
VISUAL 71.025 flaps Value 15
MANUAL 73.940 flaps set 25
**Goal58 5.046
isa SET-FLAP
speed 159
flap 25GOAL58 DIAL DIAL T Set-Flaps

```

Again, the trace indicates many of the same actions are completed, though the order is not specified. This captures the variability of the human data as well, where this segment of flight is characterized by monitoring of various systems. Much of the trace from this segment (a complete listing is presented in the appendix) shows the pilot alternately checking controls that already have the desired value. The segment selected above shows a period of transition where several control values actually are altered, as they are in the human protocol.

Validating Task 3 – Landing Checklist:

The landing checklist is completed by notifying the cabin to prepare for landing, lowering the landing gear, setting the speed to 135 knots, arming the speed brakes, and setting the flaps to their final setting (40). These actions take approximately ten seconds to complete for pilots and roughly the same for the model (from 140 seconds to 153 seconds in this case). In this case, the excerpted human protocol (subject 5, scenario #9, SVS, IMC, missed approach) and the model protocol are extremely similar (exactly as we would expect for the more highly scripted sections of performance).

Once the pilot in the simulator announces it is time to perform the landing checklist, in rapid succession (8 seconds in this case) the pilot and copilot check that the gear are down, set the flaps to 15, arm the speed brakes for automatic deployment on landing, and set the speed dial to 135 knots.

OPERATOR-TYPE	TIME	OPERANDS
PROCEDURAL	3:05:02	landing checklist
PROCEDURAL	3:05:03	gear down
VISUAL	3:05:04	gear Value down
PROCEDURAL	3:05:05	flaps 15
MANUAL	3:05:06	set flaps 15
PROCEDURAL	3:05:07	speed brakes armed
MANUAL	3:05:08	set speed brakes armed
PROCEDURAL	3:05:09	speed 135
MANUAL	3:05:10	set speed 135

Similarly, upon deciding to execute the landing checklist, the ACT-R model quickly announces to the cabin to prepare for landing (this step was skipped by the pilot in the simulator in this run but was included by this pilot in other runs), checks that the gear are down, sets the speed to 135, sets the speed brakes to armed, and sets the flaps to 15.

```

PROCEDURAL 139.975 SubGoal completing landing checklist
PROCEDURAL 142.313 Landing checklist: preparing cabin for approach
VOCAL 142.313 nothing communication 2007
PROCEDURAL 145.058 Landing checklist: setting Gear down 1
MANUAL 145.058 landing-gear up/down 0
PROCEDURAL 147.611 Landing checklist: setting Speed to 135
MANUAL 147.611 speed set 135
VISUAL 147.611 speed Value 142
PROCEDURAL 151.038 Landing checklist: setting Speed-brakes to armed
MANUAL 151.038 airbrakes on/off 0
PROCEDURAL 153.097 Landing checklist: setting Flaps 15
MANUAL 153.097 flaps set 15
VOCAL 153.147 Landing Checklist Complete

```

Validating Task 4 – Final Approach:

The final approach is relatively simple, though critical. As this task is initiated, flaps are set to the final setting (40) and the pilot enters a cycle of monitoring the altitude relative to the decision altitude, and looking for the runway. If a clear runway is visually identified by the decision point, the pilot decides to land. Otherwise, the pilot calls a missed approach and goes around. The following sequence (from subject 5, Baseline IMC missed approach) shows the operations performed by the pilot just prior to landing:

OPERATOR-TYPE	TIME	OPERANDS
PROCEDURAL	1:33:24	full flaps
MANUAL	1:33:25	set flaps 40
PROCEDURAL	1:35:16	check altitude
VISUAL	1:35:17	altitude value 1000
PROCEDURAL	1:35:37	check altitude
VISUAL	1:35:38	altitude value 650 -- approaching decision
PROCEDURAL	1:35:42	check altitude
VISUAL	1:35:43	altitude value 600 -- decision height
PROCEDURAL	1:35:44	check out the window
VISUAL	1:35:45	field not in sight
PROCEDURAL	1:35:47	missed approach - go around

Similarly, the ACT-R model supports the range of cues and decisions available to a pilot. In this case, for the vectored approach scenario, the ACT-R model checks the altitude and decides to land based on a visible, clear, aligned runway:

```

PROCEDURAL 287.970 SubGoal checking Altitude
VISUAL 288.797 altitude Value 623
**Goal278 4.872
    isa CHECK-ALTITUDE
    altitude 623
    previous 713GOAL278 DIAL DIAL T Ignore-Altitude

```

```

PROCEDURAL 289.455 SubGoal checking Autopilot
VISUAL 290.566 otw_runway Value in-sight
VISUAL 291.751 autopilots Value up
PROCEDURAL 291.801 Disengage Autopilot and land
MANUAL 294.559 autopilots up/down 0
**Goal280 10.012
    isa SET-AUTOPILOT
    visibility In-Sight
    peek nil
    decision DisengagedGOAL280 DIAL DIAL T Disengage-Autopilot

```

Several possible actions are possible at the conclusion of the final approach. These actions as taken by the model and by the human pilots are presented above in the section on Task 1. Only the outcome is different for both different model runs and different pilot runs in the simulator, and these outcomes are in perfect 1:1 correspondence.

Validation of learning the utility of sources of information

The previous modeling effort on this project focused on the learning aspects of progress monitoring during the descent from 3000 feet and the final approach by guiding where to look for information based on the learned utility of looking during online task performance. A result of using this utility model that has previously been demonstrated, and a result that is confirmed in the human data, is that the model will adapt to either use the synthetic vision system or rely on the out-the-window view, but will prefer not to alternate between the views. The current extension of the previous model incorporates these utility learning mechanisms with the standard schematic behavior of quickly performing both the simulation initiation and the landing checklist.

This learning model provides a principled description of monitoring activity that occurs in the absence of a strongly schematic approach to task completion. This task, in particular, is extremely interesting because it depends on both highly-scripted task performance, and on loose and adaptive reactive monitoring between the scripted episodes. The model presented here provides a model of this task, and also a model of how reactive and highly goal-directed behaviors can co-exist within the same architecture.

Validation level 3: Quantitative correspondence of behavioral data with model performance

The third level of validation, a quantitative assessment of correspondence between behavioral data exhibited by human task performance and data produced by the model, depends on a rich body of data on both sides to align. For this project, eye-tracking data was provided for the simulator runs. To establish correspondence with ACT-R model performance, the ACT-R model was instrumented to record the amount of time spent in various subtasks, with the assumption that the task performer would look at what they were doing. We do, however, expect one systematic variation of the model from the human data: since the PNF operates controls during the human performance but the

ACT-R model operates these directly during model runs, the ACT-R model should spend a correspondingly larger amount of time viewing the controls.

Quantitative assessment typically depends on having a large enough sample of subject data that any findings can be truly expected to generalize. In the case of this project, we have data for only three pilots completing the task, all running only one trial per scenario. Given these limitations of the data, we have decided to use this as an opportunity to explore data validation methods. However, any findings in this section will be subject to the caveat that the data set used is very limited, and the findings are therefore suggestive.

The experimental data included eye fixation data for the pilots as they performed the tasks. Much of this data was at too fine a level of detail for incorporation into the models we developed here. However, the individual pilot x task data also included summary tables of eye dwells in various areas of interest, where the tables included both mean dwell time and the total number of dwells for each particular area. This allows the derivation of an exact percentage of fixation time for each area of interest during task performance. For subject 5, across all scenarios, summarizing in this way results in the following table:

Subject 5 Dwell Time in Area of Interest as Percentage of Total Time							
Scenario	MCP	NAV	PFD	SVS	CONTROLS	OTW	off
1	0.04	0.36	0.40	0.00	0.02	0.09	0.05
2	0.02	0.49	0.28	0.00	0.05	0.09	0.04
3	0.04	0.41	0.30	0.00	0.00	0.10	0.13
4	0.00	0.49	0.35	0.00	0.05	0.03	0.05
5	0.03	0.47	0.40	0.00	0.07	0.01	0.01
6	0.06	0.45	0.40	0.00	0.03	0.02	0.04
7	0.03	0.30	0.35	0.20	0.05	0.04	0.02
8	0.03	0.36	0.29	0.23	0.04	0.02	0.02
9	0.05	0.34	0.31	0.23	0.04	0.00	0.02
10	0.01	0.28	0.37	0.25	0.02	0.00	0.06
Avg	0.03	0.40	0.35	0.09	0.04	0.04	0.04

There are several points worth mentioning in this table. First, the pilot spends an extremely small amount of the total time actually looking at the controls. The primary explanation for this is that, as part of this experiment, a confederate of the experiment played the role of the pilot-not-flying (PNF) and performed most of the control manipulations. The pilot requested that the PNF set the values, but had little need to look at the controls themselves. The synthetic vision system (SVS) was depended on by this pilot a fair amount when available (22% of all dwell time when available). In the VMC conditions, the pilot also spent 9% of the time looking out the window. During IMC conditions, however, the pilot relied primarily on the navigational display (NAV) and the primary flight display (PFD), though they still sampled from the out the window (OTW) view occasionally. However, the low percentage of time the pilot sampled OTW during IMC conditions suggests that peripheral vision played a large role in determining whether or not to look there.

A priori, we expected the ACT-R model of the task discussed here to depart from these values systematically in several ways. First, we chose not to model the whole simulated run, which included substantial amounts of time where nothing was happening, but instead focused on the second half of the approach period, especially final approach, resulting in runs of approximately 280 seconds (vs. approximately 600 seconds for the pilot runs). This means the ACT-R model should spend more time looking out the window relative to the total (i.e., the OTW display is most useful during this phase, so the OTW numbers for the ACT-R model should be inflated relative to subject 5). Further, lacking peripheral vision, the ACT-R model cannot know there is nothing to see out the window unless it actually looks there. That is, the ACT-R model does not represent the well-known covert shifts of attention that allow a person to attend to an area without shifting gaze (and the results from the IMC conditions above indicate strongly that this is occurring). Second, since the ACT-R model does not have a copilot, it actually looks at the controls as it sets them. Thus the ACT-R model should have a substantially higher percentage of dwell time associated with the controls. The dwell percentages as predicted by the ACT-R model are presented below:

Model Dwell Time in Area of Interest as Percentage of Total Time							
Scenario	MCP	NAV	PFD	SVS	CONTROLS	OTW	Off
1	0.25	0.17	0.19	0.00	0.16	0.19	0.04
2	0.22	0.15	0.17	0.00	0.19	0.23	0.04
3	0.24	0.17	0.19	0.00	0.15	0.20	0.04
4	0.22	0.17	0.20	0.00	0.17	0.19	0.04
5	0.24	0.17	0.21	0.00	0.16	0.18	0.05
6	0.24	0.17	0.21	0.00	0.15	0.19	0.04
7	0.20	0.03	0.22	0.09	0.16	0.25	0.05
8	0.21	0.08	0.21	0.05	0.17	0.23	0.05
9	0.18	0.05	0.21	0.09	0.21	0.19	0.07
10	0.20	0.06	0.20	0.08	0.17	0.24	0.04
Avg	0.22	0.12	0.20	0.03	0.17	0.21	0.05

As expected, the ACT-R approach model spends a good deal more time checking out the window (OTW). In addition, the ACT-R approach model focuses substantially more on the controls. The major unexpected discrepancy between the model dwell times and the human performance is the over-reliance of the model on the Mode Control Panel for information relative to the human pilot.

The issue this is highlighting has to do with the way the ACT-R model chooses to monitor different informational displays. In this case, the ACT-R model looks at three controls in particular: the speed dial, the altitude dial, and the autopilot engagement switch. Because these three informational displays often present new information, the system is rewarded for looking at these displays more than others, and learns to pay attention to them as they are frequently changing. This suggests that either the way novelty is assigned in this model should be adjusted, or that there is an extra feature (such as knowledge of a display's importance) driving the selection of displays to focus on.

The second major discrepancy from the pilot dwell times is in regards to the navigation display (NAV). The navigation display, or LNAV, provides a map view of the area in which the aircraft is headed. For this modeling effort, we did not deal with directional aspects of the flight, and as a result, there is little new information available on the LNAV display to draw or require the attention of the model. In this case, what is needed is an extension of the IMPRINT model of the simulator to expand the capabilities of the LNAV to drive the ACT-R model to use it more.

Discussion

The modeling approach chosen here, that of separately modeling the cognitive agent and the simulation environment, has promise for producing validated models that can generalize to other domains and tasks. This is a result of keeping the model free of many of the entanglements that either embedding a cognitive model within an application, or embedding a simulation within a cognitive modeling environment results in.

We have explored model validation along two separate paths. One of these paths involved exploring the use of architecturally supported learning mechanisms to determine selection of information sources based on the sources that are most often useful (i.e., provide novel information). Besides freeing a production system architect from having to carefully hand-craft arbitration rules for choosing between competing knowledge, this mechanism has the added benefit of making it possible to expose shortcomings in a simulation environment. In this case, the mechanism learned to look at the displays that changed the most often. This is a situation that is true of the IMPRINT simulation environment we constructed, but that is not true of either the simulator the pilots used or the real airplane. (In both of these the navigational display is constantly updated.)

This modeling effort has also pressed on the issue of the contrast between scripted tasks and actions and reactive tasks and actions. The overall task analysis that resulted from protocol analysis of pilot performance called for a high-level structure that consisted of two scripted sets of actions (one explicitly so, the landing checklist, the other implicitly so, placing the simulator in the pilot's desired configuration during the simulation initiation) and two reactive sets of actions (monitoring flight performance and monitoring the final approach). Our initial model of scripted actions used in this approach model is simple and not prone to errors, though we have experience with more complex models of scripted actions within the ACT-R framework that are subject to intrusions and step skipping. These more complex models do suggest that more practice is not the answer (though it will help), but rather use of explicit physical checklists and controlling interruptions during the execution of those checklists may help reduce errors.

This contrast between scripted and reactive behaviors is also related to the errors coded during transcription of pilot protocols. Although it is common practice to use an actual printed landing checklist, the pilots in the scenarios did not use one, but rather recalled the items from memory. As an example of the kind of error that results from this, subject 5 in scenario 6 neither notifies the cabin nor arms the speed brakes. The first is an oversight, and understandable given that the pilots know there is no cabin to notify in the simulation. Despite being a standard item on landing checklists, this item was actually skipped fairly often. The second, however, is potentially more important. This omission occurred immediately after a communication from the tower interrupted the execution of the landing checklist. This suggests that one safety procedure might be to restart a landing checklist from scratch if it is interrupted in any way. In practice, the pilots in these scenarios appeared to compensate by issuing multiple exemplars of the critical commands in the landing checklist. In particular, pilots often lowered the landing gear and set the flaps to 15 as a preamble to the landing checklist, where within five seconds

they would then issue the command to lower the landing gear and set the flaps to 15. This redundancy indicates that the pilots may have accumulated some experience that encouraged them to rely on some extra insurance.

Despite strategies such as this, mistakes still creep in. Subject 5, in scenario 10, after lowering the gear and setting the flaps to 15 (starting at offset of 7:01), starts to execute the landing checklist immediately afterwards (offset 7:03, just seconds later). The first item executed, however, is “speed brakes full”, rather than “speed brakes armed”. This confusion persists until, several minutes later and approaching 1000 feet, the copilot asks if “speed brakes full” is really what the pilot wants. The pilot then recovers and corrects the mistake, retracting the speed brakes and arming them for automatic deployment on landing. It may be that the simulation environment lacks the audible and tactile feedback that a real plane provides, and perhaps this mistake might never occur in real flight, but it is suggestive of the impact that confusing similar terms can have in an environment where many things are happening at the same time.

Appendix A: Protocols of Pilots Performing Approach Tasks

1-Baseline VMC vectored			
Action	delta time	actual time	
start	0:00:00	0:30:43	
engage autopilot	0:00:07	0:30:50	
LNAV	0:00:12	0:30:55	
tower comm	0:00:19	0:31:02	
ack	0:00:22	0:31:05	
set MCP altitude 3000	0:00:30	0:31:13	
VNAV	0:00:42	0:31:25	
speed brakes full	0:01:11	0:31:54	
set flaps 4	0:02:53	0:33:36	
set MCP altitude 100	0:03:55	0:34:38	
retract speed brakes	0:04:22	0:35:05	
check altitude - 3400	0:04:29	0:35:12	
check altitude - 3000	0:04:50	0:35:33	
map scale 5	0:06:53	0:37:36	
set flaps 15	0:07:03	0:37:46	
gear down	0:07:04	0:37:47	
landing checklist	0:07:05	0:37:48	
tower comm - clear to land	0:07:12	0:37:55	
ack	0:07:17	0:38:00	
gear down	0:07:22	0:38:05	
speed brakes armed	0:07:24	0:38:07	
set flaps 15	0:07:25	0:38:08	
notify cabin	0:07:26	0:38:09	
set speed 135	0:07:27	0:38:10	
check altitude - 1800	0:08:02	0:38:45	
set flaps 25	0:08:12	0:38:55	
field in sight	0:08:27	0:39:10	
set flaps 40	0:08:35	0:39:18	
check altitude - 1000	0:10:12	0:40:55	
terrain lined up	0:10:25	0:41:08	
approaching DA	0:10:29	0:41:12	
DA	0:10:40	0:41:23	
manual control - landing	0:10:43	0:41:26	

2-Baseline VMC late reassign			
Action	delta time	actual time	
start	0:00:00	1:03:00	
tower comm	0:00:20	1:03:20	
engage autopilot	0:00:30	1:03:30	
LNAV	0:00:31	1:03:31	
VNAV	0:00:32	1:03:32	
set 3000 MCP	0:00:33	1:03:33	
set speed brakes full on	0:01:06	1:04:06	
set flaps 4	0:02:08	1:05:08	
set MCP altitude 100	0:02:35	1:05:35	
set flaps 15	0:03:58	1:06:58	
retract speed brakes	0:04:42	1:07:42	
check altitude - 3300	0:04:45	1:07:45	
check altitude - 3000	0:05:15	1:08:15	
set map range 5	0:06:33	1:09:33	
gear down	0:07:28	1:10:28	
set flaps 25	0:07:28	1:10:28	
landing checklist	0:07:28	1:10:28	
tower comm	0:07:39	1:10:39	
check altitude - 2000	0:08:01	1:11:01	
check altitude - 1800	0:08:29	1:11:29	
set flaps 40	0:08:51	1:11:51	
field in sight	0:09:04	1:12:04	
tower comm sidestep	0:10:34	1:13:34	
ack	0:10:38	1:13:38	
manual control	0:10:52	1:13:52	

3-Baseline VMC missed				
Action	delta time	actual time		
start	0:00:00	0:00:00	1:16:10	
engage autopilot	0:00:05	0:00:05	1:16:15	
LNAV	0:00:06	0:00:06	1:16:16	
tower comm	0:00:19	0:00:19	1:16:29	
ack	0:00:22	0:00:22	1:16:32	
set MCP altitude 3000	0:00:30	0:00:30	1:16:40	
VNAV	0:00:40	0:00:40	1:16:50	
set flaps 4	0:01:20	0:01:20	1:17:30	
speed brakes 50%	0:02:10	0:02:10	1:18:20	only time for this!
set MCP altitude 1800	0:03:15	0:03:15	1:19:25	this is new too
retract speed brakes	0:03:52	0:03:52	1:20:02	
check altitude - 4500	0:04:26	0:04:26	1:20:36	
check altitude - 3800	0:04:52	0:04:52	1:21:02	
set MCP altitude 100	0:05:21	0:05:21	1:21:31	
map scale 5	0:06:40	0:06:40	1:22:50	
set flaps 15	0:07:06	0:07:06	1:23:16	
gear down	0:07:07	0:07:07	1:23:17	
landing checklist	0:07:08	0:07:08	1:23:18	
tower comm - clear to land	0:07:13	0:07:13	1:23:23	
ack	0:07:15	0:07:15	1:23:25	
set flaps 15	0:07:15	0:07:15	1:23:25	
gear down	0:07:17	0:07:17	1:23:27	
speed brakes armed	0:07:19	0:07:19	1:23:29	
set speed 135	0:07:21	0:07:21	1:23:31	
check altitude - 2000	0:07:25	0:07:25	1:23:35	
go live 1800	0:08:03	0:08:03	1:24:13	
VNAV annunciated	0:08:07	0:08:07	1:24:17	
field in sight	0:08:18	0:08:18	1:24:28	
set flaps 25	0:08:25	0:08:25	1:24:35	
set flaps 40	0:09:05	0:09:05	1:25:15	
check altitude - 1000	0:10:12	0:10:12	1:26:22	
approaching DA	0:10:31	0:10:31	1:26:41	
DA	0:10:40	0:10:40	1:26:50	
manual control - traffic on runway, going around	0:10:43	0:10:43	1:26:53	

4-Baseline IMC vectored			
Action	delta time	actual time	
start	0:00:00	0:40:00	
set LNAV	0:00:11	0:40:11	
set speed brakes full	0:00:12	0:40:12	
set autopilots on	0:00:13	0:40:13	
set flaps 1	0:00:14	0:40:14	
check altitude	0:00:15	0:40:15	
set flaps 15	0:02:00	0:42:00	
retract speed brakes	0:03:40	0:43:40	
set map scale 5	0:06:20	0:46:20	
gear down	0:06:30	0:46:30	
set flaps 25	0:06:30	0:46:30	
landing checklist	0:06:45	0:46:45	
tower clearance	0:06:50	0:46:50	
set flaps 40	0:08:00	0:48:00	
check altitude - 1000	0:09:40	0:49:40	
tower clear to land	0:09:45	0:49:45	
approaching DA	0:10:00	0:50:00	
field in sight	0:10:05	0:50:05	
DA	0:10:10	0:50:10	
taking over manual	0:10:10	0:50:10	

5-Baseline IMC missed			
Action	delta time	actual time	
start	0:00:00	1:25:00	
engage autopilot	0:00:04	1:25:04	
LNAV	0:00:05	1:25:05	
VNAV	0:00:06	1:25:06	
tower comm	0:00:20	1:25:20	
check altitude - 3000	0:00:33	1:25:33	
speed brakes full	0:00:40	1:25:40	
set flaps 4	0:02:58	1:27:58	
set MCP altitude 100	0:03:33	1:28:33	
set flaps 15	0:04:07	1:29:07	
retract speed brakes	0:04:10	1:29:10	
check altitude - 3200	0:04:55	1:29:55	
map scale 5	0:06:03	1:31:03	
gear down	0:07:12	1:32:12	
set flaps 25	0:07:13	1:32:13	
landing checklist	0:07:14	1:32:14	
tower comm clear to land	0:07:20	1:32:20	
check altitude - 1800	0:08:04	1:33:04	
VNAV path annunciated	0:08:06	1:33:06	
set flaps 40	0:08:24	1:33:24	
check altitude - 1000	0:10:17	1:35:17	
approaching DA	0:10:38	1:35:38	
DA	0:10:43	1:35:43	
field not in sight	0:10:46	1:35:46	
manual control - going around	0:10:49	1:35:49	

6-Baseline IMC mismatch			
Action	delta time	actual time	
start	0:00:00	0:30:43	
engage autopilot	0:00:07	0:30:50	
LNAV	0:00:12	0:30:55	
tower comm	0:00:19	0:31:02	
ack	0:00:22	0:31:05	
set MCP altitude 3000	0:00:30	0:31:13	
VNAV	0:00:42	0:31:25	
speed brakes full	0:01:11	0:31:54	
retract speed brakes	0:02:53	0:33:36	
set flaps 4	0:03:55	0:34:38	
set MCP altitude 100	0:04:22	0:35:05	
check altitude - 3900	0:04:29	0:35:12	
check altitude - 3500	0:04:50	0:35:33	
map scale 5	0:06:53	0:37:36	
set flaps 15	0:07:03	0:37:46	
gear down	0:07:04	0:37:47	
landing checklist	0:07:05	0:37:48	
tower comm - clear to land	0:07:12	0:37:55	
ack	0:07:17	0:38:00	
gear down	0:07:22	0:38:05	
set flaps 15	0:07:24	0:38:07	speed brakes not armed!
set speed 135	0:07:25	0:38:08	
check altitude - 1800	0:07:26	0:38:09	cabin not notified!
VNAV path annunciated	0:07:27	0:38:10	
set flaps 25	0:08:02	0:38:45	
set flaps 40	0:08:12	0:38:55	
check altitude - 1000	0:08:27	0:39:10	
approaching DA	0:08:35	0:39:18	
DA	0:10:12	0:40:55	
runway not lined up	0:10:25	0:41:08	
manual control - going around	0:10:29	0:41:12	

7-SVS IMC vectored			
Action	delta time	actual time	
start	0:00:00	3:27:12	
engage autopilot	0:00:03	3:27:15	
LNAV	0:00:05	3:27:17	
tower comm	0:00:13	3:27:25	
ack	0:00:18	3:27:30	
set MCP altitude 3000	0:00:24	3:27:36	
VNAV	0:00:28	3:27:40	
speed brakes full	0:00:48	3:28:00	
check altitude	0:02:26	3:29:38	
set flaps 4	0:02:28	3:29:40	
set MCP altitude 100	0:03:28	3:30:40	
retract speed brakes	0:04:20	3:31:32	
map scale 5	0:06:15	3:33:27	
set flaps 15	0:06:37	3:33:49	
gear down	0:07:00	3:34:12	
landing checklist	0:07:01	3:34:13	
gear down	0:07:02	3:34:14	
set flaps 15	0:07:04	3:34:16	
speed brakes armed	0:07:06	3:34:18	
set speed 135	0:07:08	3:34:20	
notify cabin	0:07:10	3:34:22	
tower comm - clear to land	0:07:13	3:34:25	
ack	0:07:16	3:34:28	
check altitude - 2000	0:07:18	3:34:30	
set flaps 25	0:07:42	3:34:54	
check altitude - 1800 (go live)	0:08:01	3:35:13	
set flaps 40	0:08:22	3:35:34	
check altitude - 1000	0:10:13	3:37:25	
terrain lined up	0:10:23	3:37:35	
approaching DA	0:10:28	3:37:40	
airport in sight	0:11:30	3:38:42	
runway in sight	0:11:36	3:38:48	
manual control - landing	0:11:38	3:38:50	

8-SVS IMC late reassign			
Action	delta time	actual time	
start	0:00:00	4:06:28	
engage autopilot	0:00:11	4:06:39	
LNAV	0:00:12	4:06:40	
tower comm	0:00:17	4:06:45	
ack	0:00:19	4:06:47	
set MCP altitude 3000	0:00:34	4:07:02	
VNAV	0:00:40	4:07:08	
speed brakes full	0:01:05	4:07:33	
set MCP altitude 100	0:03:43	4:10:11	
set flaps 4	0:04:03	4:10:31	
retract speed brakes	0:04:20	4:10:48	
check altitude - 3400	0:04:26	4:10:54	
check altitude - 3000	0:04:51	4:11:19	
map scale 5	0:06:24	4:12:52	
gear down	0:07:06	4:13:34	
set flaps 15	0:07:07	4:13:35	
landing checklist	0:07:08	4:13:36	
speed brakes armed	0:07:10	4:13:38	
notify cabin	0:07:12	4:13:40	
tower comm - clear to land	0:07:20	4:13:48	
ack	0:07:22	4:13:50	
set flaps 25	0:07:52	4:14:20	
set flaps 40	0:08:25	4:14:53	
check altitude - 1000	0:10:14	4:16:42	
tower comm - traffic on runway, sidestep?	0:10:15	4:16:43	
ack	0:10:21	4:16:49	
runway in sight	0:10:31	4:16:59	
manual control - landing	0:10:32	4:17:00	

9-SVS IMC missed			
Action	delta time	actual time	
start	0:00:00	2:57:35	
engage autopilot	0:00:13	2:57:48	
LNAV	0:00:14	2:57:49	
tower comm	0:00:25	2:58:00	
set MCP altitude 3000	0:00:32	2:58:07	
VNAV	0:00:35	2:58:10	
speed brakes full	0:00:50	2:58:25	
set flaps 4	0:02:30	3:00:05	
set MCP altitude 100	0:03:32	3:01:07	
retract speed brakes	0:04:12	3:01:47	
check altitude - 3500	0:04:30	3:02:05	
check altitude - 3000	0:04:55	3:02:30	
set flaps 15	0:06:27	3:04:02	
map scale 5	0:06:47	3:04:22	
tower comm clear to land	0:07:17	3:04:52	
ack	0:07:20	3:04:55	
gear down	0:07:25	3:05:00	
landing checklist	0:07:27	3:05:02	
gear down	0:07:28	3:05:03	
set flaps 15	0:07:30	3:05:05	
speed brakes armed	0:07:32	3:05:07	
set speed 135	0:07:34	3:05:09	
set flaps 25	0:07:42	3:05:17	
check altitude - 1800 (go live)	0:08:05	3:05:40	
VNAV path annunciated	0:08:07	3:05:42	
set flaps 40	0:08:19	3:05:54	
check altitude 1000	0:10:14	3:07:49	
check terrain - lined up	0:10:28	3:08:03	
approaching DA	0:10:37	3:08:12	
DA	0:10:41	3:08:16	
not in sight	0:10:43	3:08:18	
manual control - going around	0:10:44	3:08:19	

10-SVS IMC mismatch			
Action	delta time	actual time	
start	0:00:00	0:08:49	
engage autopilot	0:00:08	0:08:57	
LNAV	0:00:09	0:08:58	
tower comm	0:00:18	0:09:07	
ack	0:00:21	0:09:10	
set MCP altitude 3000	0:00:32	0:09:21	
VNAV	0:00:42	0:09:31	
speed brakes full	0:01:19	0:10:08	
set flaps 4	0:03:00	0:11:49	
set MCP altitude 100	0:04:01	0:12:50	
map scale 5	0:06:47	0:15:36	
set flaps 15	0:07:01	0:15:50	
gear down	0:07:02	0:15:51	
landing checklist	0:07:03	0:15:52	
speed brakes full	0:07:12	0:16:01	mistake!
notify cabin	0:07:21	0:16:10	
tower comm - clear to land	0:07:31	0:16:20	
ack	0:07:32	0:16:21	
check altitude - 2000	0:07:33	0:16:22	
check altitude - 1800	0:08:02	0:16:51	
VNAV annunciated	0:08:09	0:16:58	
set flaps 25	0:08:16	0:17:05	
set flaps 40	0:08:34	0:17:23	
check speedbrakes	0:08:47	0:17:36	copilot notices speedbrakes full and asks pilot
retract speedbrakes	0:08:48	0:17:37	
speed brakes armed	0:08:59	0:17:48	
check altitude - 1000	0:10:11	0:19:00	
approaching DA	0:10:30	0:19:19	
DA	0:10:34	0:19:23	
runway not aligned	0:10:35	0:19:24	
manual control - going around	0:10:36	0:19:25	

Appendix B: Model Traces

1-Baseline VMC Vectored approach

dribbling to file "Baseline-VMC-vectored.drb"

```
Factory Started
CL-USER(1): (register-server)
Registered Server EMC_NASAHPM.EMCReceiveCOMMessages
NIL
CL-USER(2):
Subject 0 Trial 0 Run 1
Initializing control

Control      5.136
  isa CONTROL
  speed 200.0d0
  altitude 2500.0d0
  waypoint nil
  distance nil
  flaps 5
  decision-altitude 600
  landing-gear Up
  airbrakes Off
  autopilots Engaged
  task nil
  last-task nil
  status Active
  landing-checklist nil
VISUAL      0.000 flaps Value 5
CHUNK NIL IS UNDEFINED.
CHUNK NIL IS UNDEFINED.
PROCEDURAL   0.989 Preparing for approach: setting VNAV
VISUAL      0.989 waypoint Value 1
PROCEDURAL   3.343 Preparing for approach: setting Flaps 1
MANUAL      3.343 flaps set 1
PROCEDURAL   6.194 Preparing for approach: engaging Speed-brakes full
MANUAL      6.194 airbrakes on/off 0
PROCEDURAL   7.102 Preparing for approach: engaging Autopilot
VISUAL      7.102 autopilots Value up
PROCEDURAL   7.951 Preparing for approach: setting LNAV
VISUAL      7.951 distance-next Value 0
PROCEDURAL   8.107 SubGoal checking Speed
VISUAL      9.055 waypoint Value 1
VISUAL      10.032 distance-next Value 0
RETRIEVAL    10.132 Waypoint 1 Next 0 Distance 15
RETRIEVAL    10.283 Speed
VISUAL      11.114 dial-speed Value 200
MANUAL      13.353 dial-speed set 160
**Goal16    5.354
  isa SET-SPEED
  waypoint 1
  distance-next 0
  distance 15
```

```

    speed 160GOAL6 DIAL DIAL T Dial-Speed
PROCEDURAL 13.962 SubGoal checking Speed Brakes
VISUAL 14.882 speed Value 199
VISUAL 16.167 airbrakes Value on
PROCEDURAL 16.217 Setting Speed Brakes
MANUAL 18.643 airbrakes on/off 0
**Goal11 8.423
    isa SPEED-BRAKES
    speed 199
    decision OffGOAL11 DIAL DIAL T Set-Speed-Brakes
PROCEDURAL 19.244 SubGoal checking Decision Altitude
VISUAL 20.053 waypoint Value 2
VISUAL 21.127 distance-next Value 4
RETRIEVAL 21.227 Waypoint 2 Next 4 Distance 15
**Goal15 5.106
    isa SET-DECISION-ALTITUDE
    waypoint 2
    distance-next 4
    distance 15
    old 600
    decision 600GOAL15 DIAL DIAL T Ignore-Decision-Altitude
PROCEDURAL 21.885 SubGoal setting Dial Altitude
VISUAL 23.027 waypoint Value 2
RETRIEVAL 23.227 Altitude 1800
VISUAL 24.025 dial-altitude Value 2500
MANUAL 26.373 dial-altitude set 1800
**Goal18 4.952
    isa DIAL-ALTITUDE
    waypoint 2
    altitude 1800GOAL18 DIAL DIAL T Dial-Altitude
PROCEDURAL 26.980 SubGoal checking Landing Gear
VISUAL 27.928 waypoint Value 2
VISUAL 29.108 distance-next Value 3
RETRIEVAL 29.208 Waypoint 2 Next 3 Distance 14
VISUAL 30.212 landing-gear Value up
PROCEDURAL 30.262 Lowering Gear
MANUAL 32.737 landing-gear up/down 0
**Goal122 8.950
    isa MOVE-GEAR
    waypoint 2
    distance-next 3
    distance 14
    decision DownGOAL22 DIAL DIAL T Move-Gear
PROCEDURAL 33.345 SubGoal checking Flaps
VISUAL 34.585 speed Value 183
RETRIEVAL 34.735 Flaps 5
VISUAL 35.933 flaps Value 1
MANUAL 38.324 flaps set 5
**Goal127 4.983
    isa SET-FLAP
    speed 183
    flap 5GOAL27 DIAL DIAL T Set-Flaps
PROCEDURAL 38.931 SubGoal checking Autopilot
VISUAL 39.780 otw_runway Value out-of-sight
VISUAL 40.902 autopilots Value up
VISUAL 42.160 altitude Value 2500
**Goal131 8.971

```

```

isa SET-AUTOPILOT
visibility Out-Of-Sight
peek 2500
decision Engaged
decision-altitude 600GOAL31 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 42.861 SubGoal checking Altitude
VISUAL 43.930 altitude Value 2500
**Goal35 4.992
isa CHECK-ALTITUDE
altitude 2500
previous 2500.0d0GOAL35 DIAL DIAL T Ignore-Altitude
PROCEDURAL 44.588 SubGoal checking Speed
VISUAL 45.505 waypoint Value 2
VISUAL 46.448 distance-next Value 2
RETRIEVAL 46.548 Waypoint 2 Next 2 Distance 13
RETRIEVAL 46.648 Speed
VISUAL 47.859 dial-speed Value 160
MANUAL 50.262 dial-speed set 165
**Goal37 4.731
isa SET-SPEED
waypoint 2
distance-next 2
distance 13
speed 165GOAL37 DIAL DIAL T Dial-Speed
PROCEDURAL 50.867 SubGoal checking Decision Altitude
VISUAL 51.914 waypoint Value 2
VISUAL 53.042 distance-next Value 2
RETRIEVAL 53.142 Waypoint 2 Next 2 Distance 13
**Goal42 5.367
isa SET-DECISION-ALTITUDE
waypoint 2
distance-next 2
distance 13
old 600
decision 600GOAL42 DIAL DIAL T Ignore-Decision-Altitude
PROCEDURAL 53.798 SubGoal checking Speed Brakes
VISUAL 54.990 speed Value 167
VISUAL 55.842 airbrakes Value off
**Goal45 8.550
isa SPEED-BRAKES
speed 167
decision OffGOAL45 DIAL DIAL T Decide-Speed-Brakes
PROCEDURAL 56.442 SubGoal setting Dial Altitude
VISUAL 57.501 waypoint Value 2
RETRIEVAL 57.651 Altitude 1800
VISUAL 58.463 dial-altitude Value 1800
PROCEDURAL 58.513 Confirm Altitude already set to 1800
**Goal48 5.130
isa DIAL-ALTITUDE
waypoint 2
altitude 1800GOAL48 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 59.119 SubGoal checking Landing Gear
VISUAL 60.044 waypoint Value 2
VISUAL 60.915 distance-next Value 1
RETRIEVAL 61.015 Waypoint 2 Next 1 Distance 12
VISUAL 61.871 landing-gear Value down
**Goal51 8.549

```

```

isa MOVE-GEAR
waypoint 2
distance-next 1
distance 12
decision DownGOAL51 DIAL DIAL T Decide-Gear
PROCEDURAL 62.471 SubGoal checking Altitude
VISUAL 63.498 altitude Value 2500
**Goal55 4.775
isa CHECK-ALTITUDE
altitude 2500
previous 2500GOAL55 DIAL DIAL T Ignore-Altitude
PROCEDURAL 64.154 SubGoal checking Flaps
VISUAL 65.099 speed Value 165
RETRIEVAL 65.249 Flaps 25
VISUAL 66.280 flaps Value 5
MANUAL 68.928 flaps set 25
**Goal57 4.956
isa SET-FLAP
speed 165
flap 25GOAL57 DIAL DIAL T Set-Flaps
PROCEDURAL 69.537 SubGoal checking Autopilot
VISUAL 70.638 otw_runway Value out-of-sight
VISUAL 71.675 autopilots Value up
VISUAL 72.765 altitude Value 2500
**Goal61 8.610
isa SET-AUTOPILOT
visibility Out-Of-Sight
peek 2500
decision Engaged
decision-altitude 600GOAL61 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 73.466 SubGoal checking Speed Brakes
VISUAL 74.430 speed Value 165
VISUAL 75.388 airbrakes Value off
**Goal65 8.252
isa SPEED-BRAKES
speed 165
decision OffGOAL65 DIAL DIAL T Decide-Speed-Brakes
PROCEDURAL 75.988 SubGoal checking Decision Altitude
VISUAL 77.216 waypoint Value 2
VISUAL 78.558 distance-next Value 0
RETRIEVAL 78.658 Waypoint 2 Next 0 Distance 11
**Goal68 4.940
isa SET-DECISION-ALTITUDE
waypoint 2
distance-next 0
distance 11
old 600
decision 600GOAL68 DIAL DIAL T Ignore-Decision-Altitude
PROCEDURAL 79.316 SubGoal checking Altitude
VISUAL 80.224 atc Value random-no-listen
VISUAL 80.224 altitude Value 2500
**Goal71 5.293
isa CHECK-ALTITUDE
altitude 2500
previous 2500GOAL71 DIAL DIAL T Ignore-Altitude
PROCEDURAL 80.884 SubGoal setting Dial Altitude
VISUAL 81.959 waypoint Value 2

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```

RETRIEVAL 82.109 Altitude 1800
VISUAL 83.349 dial-altitude Value 1800
PROCEDURAL 83.399 Confirm Altitude already set to 1800
**Goal73 5.559
    isa DIAL-ALTITUDE
    waypoint 2
    altitude 1800GOAL73 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 84.004 SubGoal checking Speed
VISUAL 85.154 waypoint Value 2
VISUAL 86.340 distance-next Value 0
RETRIEVAL 86.440 Waypoint 2 Next 0 Distance 11
RETRIEVAL 86.540 Speed
VISUAL 87.600 atc Value ten-miles-out
VISUAL 87.600 dial-speed Value 165
MANUAL 90.144 dial-speed set 140
**Goal76 4.727
    isa SET-SPEED
    waypoint 2
    distance-next 0
    distance 11
    speed 140GOAL76 DIAL DIAL T Dial-Speed
PROCEDURAL 90.751 SubGoal checking Altitude
VISUAL 91.862 altitude Value 2413
**Goal81 5.020
    isa CHECK-ALTITUDE
    altitude 2413
    previous 2500GOAL81 DIAL DIAL T Ignore-Altitude
PROCEDURAL 92.519 SubGoal checking Landing Gear
VISUAL 93.743 waypoint Value 3
VISUAL 94.922 distance-next Value 2
RETRIEVAL 95.022 Waypoint 3 Next 2 Distance 11
VISUAL 96.073 landing-gear Value down
**Goal83 7.669
    isa MOVE-GEAR
    waypoint 3
    distance-next 2
    distance 11
    decision DownGOAL83 DIAL DIAL T Decide-Gear
PROCEDURAL 96.673 SubGoal checking Autopilot
VISUAL 97.900 otw_runway Value out-of-sight
VISUAL 98.843 autopilots Value up
VISUAL 99.681 altitude Value 2273
**Goal87 8.853
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 2273
    decision Engaged
    decision-altitude 600GOAL87 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 100.382 SubGoal checking Flaps
VISUAL 101.285 speed Value 159
RETRIEVAL 101.436 Flaps 25
VISUAL 102.645 flaps Value 25
PROCEDURAL 102.695 Confirm Flaps already set to 25
**Goal91 5.051
    isa SET-FLAP
    speed 159
    flap 25GOAL91 DIAL DIAL T Flaps-Already-Set

```

```

PROCEDURAL 103.302 SubGoal checking Speed Brakes
VISUAL 104.352 speed Value 158
VISUAL 105.308 airbrakes Value off
**Goal94 8.306
    isa SPEED-BRAKES
    speed 158
    decision OffGOAL94 DIAL DIAL T Decide-Speed-Brakes
PROCEDURAL 105.908 SubGoal checking Altitude
VISUAL 106.795 altitude Value 2147
**Goal97 4.862
    isa CHECK-ALTITUDE
    altitude 2147
    previous 2413GOAL97 DIAL DIAL T Read-Altitude
PROCEDURAL 107.454 SubGoal checking Decision Altitude
VISUAL 108.494 waypoint Value 3
VISUAL 109.780 distance-next Value 1
RETRIEVAL 109.880 Waypoint 3 Next 1 Distance 10
**Goal99 5.014
    isa SET-DECISION-ALTITUDE
    waypoint 3
    distance-next 1
    distance 10
    old 600
    decision 600GOAL99 DIAL DIAL T Ignore-Decision-Altitude
PROCEDURAL 110.536 SubGoal setting Dial Altitude
VISUAL 111.502 waypoint Value 3
RETRIEVAL 111.652 Altitude 1000
VISUAL 112.893 dial-altitude Value 1800
MANUAL 115.437 dial-altitude set 1000
**Goal102 5.021
    isa DIAL-ALTITUDE
    waypoint 3
    altitude 1000GOAL102 DIAL DIAL T Dial-Altitude
PROCEDURAL 116.045 SubGoal checking Autopilot
VISUAL 116.885 otw_runway Value out-of-sight
VISUAL 118.081 autopilots Value up
VISUAL 119.098 altitude Value 1932
**Goal106 8.594
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1932
    decision Engaged
    decision-altitude 600GOAL106 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 119.799 SubGoal checking Speed Brakes
VISUAL 120.756 speed Value 155
VISUAL 121.680 airbrakes Value off
**Goal110 8.172
    isa SPEED-BRAKES
    speed 155
    decision OffGOAL110 DIAL DIAL T Decide-Speed-Brakes
PROCEDURAL 122.280 SubGoal checking Landing Gear
VISUAL 123.278 waypoint Value 3
VISUAL 124.257 distance-next Value 0
RETRIEVAL 124.357 Waypoint 3 Next 0 Distance 9
VISUAL 125.385 landing-gear Value down
**Goal113 8.691
    isa MOVE-GEAR

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```

waypoint 3
distance-next 0
distance 9
decision DownGOAL113 DIAL DIAL T Decide-Gear
PROCEDURAL 125.985 SubGoal checking Altitude
VISUAL 127.239 altitude Value 1797
**Goal117 5.138
  isa CHECK-ALTITUDE
  altitude 1797
  previous 2147GOAL117 DIAL DIAL T Read-Altitude
PROCEDURAL 127.896 SubGoal checking Autopilot
VISUAL 129.089 otw_runway Value out-of-sight
VISUAL 130.351 autopilots Value up
VISUAL 131.430 altitude Value 1770
**Goal119 8.542
  isa SET-AUTOPILOT
  visibility Out-Of-Sight
  peek 1770
  decision Engaged
  decision-altitude 600GOAL119 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 132.131 SubGoal checking Altitude
VISUAL 133.303 altitude Value 1758
**Goal123 5.475
  isa CHECK-ALTITUDE
  altitude 1758
  previous 1797GOAL123 DIAL DIAL T Ignore-Altitude
PROCEDURAL 133.959 SubGoal checking Autopilot
VISUAL 135.188 otw_runway Value out-of-sight
VISUAL 136.267 autopilots Value up
VISUAL 137.516 altitude Value 1731
**Goal125 8.360
  isa SET-AUTOPILOT
  visibility Out-Of-Sight
  peek 1731
  decision Engaged
  decision-altitude 600GOAL125 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 138.217 SubGoal setting Dial Altitude
VISUAL 139.387 waypoint Value 4
RETRIEVAL 139.537 Altitude 700
VISUAL 140.634 dial-altitude Value 1000
MANUAL 142.713 dial-altitude set 700
**Goal129 4.952
  isa DIAL-ALTITUDE
  waypoint 4
  altitude 700GOAL129 DIAL DIAL T Dial-Altitude
PROCEDURAL 143.320 SubGoal completing landing checklist
PROCEDURAL 145.498 Landing checklist: setting Speed to 135
MANUAL 145.498 speed set 135
VISUAL 145.498 speed Value 149
CHUNK NIL IS UNDEFINED.
CHUNK NIL IS UNDEFINED.
PROCEDURAL 147.849 Landing checklist: setting Flaps 15
MANUAL 147.849 flaps set 15
PROCEDURAL 150.612 Landing checklist: preparing cabin for landing
VOCAL 150.612 nothing communication 2007
PROCEDURAL 153.007 Landing checklist: setting Gear down 1
MANUAL 153.007 landing-gear up/down 0

```

```

PROCEDURAL 156.602 Landing checklist: setting Speed-brakes to armed
MANUAL 156.602 airbrakes on/off 0
VOCAL 156.652 Landing Checklist Complete
PROCEDURAL 156.808 SubGoal checking Altitude
VISUAL 157.729 altitude Value 1603
**Goal140 5.111
    isa CHECK-ALTITUDE
    altitude 1603
    previous 1758GOAL140 DIAL DIAL T Read-Altitude
PROCEDURAL 158.386 SubGoal checking Autopilot
VISUAL 159.563 atc Value random-listen
VISUAL 159.563 otw_runway Value out-of-sight
VISUAL 160.799 autopilots Value up
VISUAL 161.753 altitude Value 1577
**Goal142 7.831
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1577
    decision Engaged
    decision-altitude 600GOAL142 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 162.454 SubGoal checking Altitude
VISUAL 163.478 altitude Value 1567
**Goal146 5.008
    isa CHECK-ALTITUDE
    altitude 1567
    previous 1603GOAL146 DIAL DIAL T Ignore-Altitude
PROCEDURAL 164.136 SubGoal setting Dial Altitude
VISUAL 165.265 waypoint Value 4
RETRIEVAL 165.415 Altitude 700
VISUAL 166.388 dial-altitude Value 700
PROCEDURAL 166.438 Confirm Altitude already set to 700
**Goal148 4.912
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL148 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 167.046 SubGoal checking Altitude
VISUAL 168.210 altitude Value 1538
**Goal151 5.036
    isa CHECK-ALTITUDE
    altitude 1538
    previous 1567GOAL151 DIAL DIAL T Ignore-Altitude
PROCEDURAL 168.868 SubGoal setting Dial Altitude
VISUAL 170.044 waypoint Value 4
RETRIEVAL 170.194 Altitude 700
VISUAL 171.276 dial-altitude Value 700
PROCEDURAL 171.326 Confirm Altitude already set to 700
**Goal153 4.864
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL153 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 171.932 SubGoal checking Altitude
VISUAL 172.971 altitude Value 1508
**Goal156 5.295
    isa CHECK-ALTITUDE
    altitude 1508
    previous 1538GOAL156 DIAL DIAL T Ignore-Altitude
PROCEDURAL 173.627 SubGoal checking Autopilot

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VISUAL 174.566 otw_runway Value out-of-sight
VISUAL 175.703 autopilots Value up
VISUAL 176.733 altitude Value 1485
**Goal158 8.079
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1485
    decision Engaged
    decision-altitude 600GOAL158 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 177.434 SubGoal checking Altitude
VISUAL 178.581 altitude Value 1474
**Goal162 4.969
    isa CHECK-ALTITUDE
    altitude 1474
    previous 1508GOAL162 DIAL DIAL T Ignore-Altitude
PROCEDURAL 179.237 SubGoal setting Dial Altitude
VISUAL 180.212 waypoint Value 4
RETRIEVAL 180.362 Altitude 700
VISUAL 181.299 dial-altitude Value 700
PROCEDURAL 181.349 Confirm Altitude already set to 700
**Goal164 5.146
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL164 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 181.955 SubGoal checking Altitude
VISUAL 182.810 altitude Value 1448
**Goal167 5.289
    isa CHECK-ALTITUDE
    altitude 1448
    previous 1474GOAL167 DIAL DIAL T Ignore-Altitude
PROCEDURAL 183.467 SubGoal checking Autopilot
VISUAL 184.310 otw_runway Value out-of-sight
VISUAL 185.480 autopilots Value up
VISUAL 186.384 altitude Value 1427
**Goal169 7.639
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1427
    decision Engaged
    decision-altitude 600GOAL169 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 187.085 SubGoal checking Altitude
VISUAL 188.176 altitude Value 1416
**Goal173 5.022
    isa CHECK-ALTITUDE
    altitude 1416
    previous 1448GOAL173 DIAL DIAL T Ignore-Altitude
PROCEDURAL 188.831 SubGoal setting Dial Altitude
VISUAL 189.867 waypoint Value 4
RETRIEVAL 190.017 Altitude 700
VISUAL 191.213 dial-altitude Value 700
PROCEDURAL 191.263 Confirm Altitude already set to 700
**Goal175 4.793
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL175 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 191.871 SubGoal checking Altitude
VISUAL 192.920 altitude Value 1388

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**Goal178      4.907
  isa CHECK-ALTITUDE
  altitude 1388
  previous 1416GOAL178 DIAL DIAL T Ignore-Altitude
PROCEDURAL 193.577 SubGoal checking Autopilot
VISUAL 194.800 otw_runway Value out-of-sight
VISUAL 195.645 autopilots Value up
VISUAL 196.679 altitude Value 1365
**Goal180      7.786
  isa SET-AUTOPILOT
  visibility Out-Of-Sight
  peek 1365
  decision Engaged
  decision-altitude 600GOAL180 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 197.381 SubGoal checking Altitude
VISUAL 198.319 altitude Value 1355
**Goal184      4.927
  isa CHECK-ALTITUDE
  altitude 1355
  previous 1388GOAL184 DIAL DIAL T Ignore-Altitude
PROCEDURAL 198.974 SubGoal setting Dial Altitude
VISUAL 200.127 waypoint Value 4
RETRIEVAL 200.277 Altitude 700
VISUAL 201.253 dial-altitude Value 700
PROCEDURAL 201.303 Confirm Altitude already set to 700
**Goal186      5.124
  isa DIAL-ALTITUDE
  waypoint 4
  altitude 700GOAL186 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 201.909 SubGoal checking Altitude
VISUAL 202.738 altitude Value 1329
**Goal189      5.123
  isa CHECK-ALTITUDE
  altitude 1329
  previous 1355GOAL189 DIAL DIAL T Ignore-Altitude
PROCEDURAL 203.396 SubGoal setting Dial Altitude
VISUAL 204.345 waypoint Value 4
RETRIEVAL 204.495 Altitude 700
VISUAL 205.407 dial-altitude Value 700
PROCEDURAL 205.457 Confirm Altitude already set to 700
**Goal191      4.860
  isa DIAL-ALTITUDE
  waypoint 4
  altitude 700GOAL191 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 206.066 SubGoal checking Altitude
VISUAL 207.175 altitude Value 1302
**Goal194      5.069
  isa CHECK-ALTITUDE
  altitude 1302
  previous 1329GOAL194 DIAL DIAL T Ignore-Altitude
PROCEDURAL 207.831 SubGoal setting Dial Altitude
VISUAL 209.095 waypoint Value 4
RETRIEVAL 209.295 Altitude 700
VISUAL 210.211 dial-altitude Value 700
PROCEDURAL 210.261 Confirm Altitude already set to 700
**Goal196      4.999
  isa DIAL-ALTITUDE

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waypoint 4
    altitude 700GOAL196 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 210.868 SubGoal checking Altitude
VISUAL 212.112 altitude Value 1273
**Goal199 4.822
    isa CHECK-ALTITUDE
    altitude 1273
    previous 1302GOAL199 DIAL DIAL T Ignore-Altitude
PROCEDURAL 212.768 SubGoal setting Dial Altitude
VISUAL 213.934 waypoint Value 4
RETRIEVAL 214.084 Altitude 700
VISUAL 215.116 dial-altitude Value 700
PROCEDURAL 215.166 Confirm Altitude already set to 700
**Goal201 4.874
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL201 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 215.773 SubGoal checking Altitude
VISUAL 217.060 altitude Value 1243
**Goal204 5.023
    isa CHECK-ALTITUDE
    altitude 1243
    previous 1273GOAL204 DIAL DIAL T Ignore-Altitude
PROCEDURAL 217.715 SubGoal setting Dial Altitude
VISUAL 218.570 waypoint Value 4
RETRIEVAL 218.720 Altitude 700
VISUAL 219.481 dial-altitude Value 700
PROCEDURAL 219.531 Confirm Altitude already set to 700
**Goal206 5.403
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL206 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 220.138 SubGoal checking Altitude
VISUAL 221.024 altitude Value 1220
**Goal209 4.853
    isa CHECK-ALTITUDE
    altitude 1220
    previous 1243GOAL209 DIAL DIAL T Ignore-Altitude
PROCEDURAL 221.679 SubGoal checking Autopilot
VISUAL 222.700 otw_runway Value out-of-sight
VISUAL 223.913 autopilots Value up
VISUAL 225.022 altitude Value 1196
**Goal211 8.102
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1196
    decision Engaged
    decision-altitude 600GOAL211 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 225.723 SubGoal checking Altitude
VISUAL 226.740 altitude Value 1186
**Goal215 5.075
    isa CHECK-ALTITUDE
    altitude 1186
    previous 1220GOAL215 DIAL DIAL T Ignore-Altitude
PROCEDURAL 227.396 SubGoal setting Dial Altitude
VISUAL 228.597 waypoint Value 4
RETRIEVAL 228.747 Altitude 700

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VISUAL 229.685 dial-altitude Value 700
PROCEDURAL 229.735 Confirm Altitude already set to 700
**Goal217 5.003
  isa DIAL-ALTITUDE
  waypoint 4
  altitude 700GOAL217 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 230.340 SubGoal checking Altitude
VISUAL 231.536 altitude Value 1157
**Goal220 4.823
  isa CHECK-ALTITUDE
  altitude 1157
  previous 1186GOAL220 DIAL DIAL T Ignore-Altitude
PROCEDURAL 232.192 SubGoal setting Dial Altitude
VISUAL 233.306 waypoint Value 4
RETRIEVAL 233.456 Altitude 700
VISUAL 234.476 dial-altitude Value 700
PROCEDURAL 234.526 Confirm Altitude already set to 700
**Goal222 4.978
  isa DIAL-ALTITUDE
  waypoint 4
  altitude 700GOAL222 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 235.132 SubGoal checking Altitude
VISUAL 235.935 altitude Value 1131
**Goal225 5.142
  isa CHECK-ALTITUDE
  altitude 1131
  previous 1157GOAL225 DIAL DIAL T Ignore-Altitude
PROCEDURAL 236.591 SubGoal checking Autopilot
VISUAL 237.585 atc Value random-no-listen
VISUAL 237.585 otw_runway Value out-of-sight
VISUAL 238.707 autopilots Value up
VISUAL 239.596 altitude Value 1109
**Goal227 7.800
  isa SET-AUTOPILOT
  visibility Out-Of-Sight
  peek 1109
  decision Engaged
  decision-altitude 600GOAL227 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 240.297 SubGoal checking Altitude
VISUAL 241.233 altitude Value 1099
**Goal231 5.066
  isa CHECK-ALTITUDE
  altitude 1099
  previous 1131GOAL231 DIAL DIAL T Ignore-Altitude
PROCEDURAL 241.893 SubGoal checking Autopilot
VISUAL 242.853 otw_runway Value out-of-sight
VISUAL 244.038 autopilots Value up
VISUAL 245.121 altitude Value 1076
**Goal233 7.763
  isa SET-AUTOPILOT
  visibility Out-Of-Sight
  peek 1076
  decision Engaged
  decision-altitude 600GOAL233 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 245.823 SubGoal checking Altitude
VISUAL 246.650 altitude Value 1066
**Goal237 5.316

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isa CHECK-ALTITUDE
altitude 1066
previous 1099GOAL237 DIAL DIAL T Ignore-Altitude
PROCEDURAL 247.309 SubGoal setting Dial Altitude
VISUAL 248.200 waypoint Value 4
RETRIEVAL 248.350 Altitude 700
VISUAL 249.597 dial-altitude Value 700
PROCEDURAL 249.647 Confirm Altitude already set to 700
**Goal1239 4.942
isa DIAL-ALTITUDE
waypoint 4
altitude 700GOAL239 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 250.254 SubGoal checking Altitude
VISUAL 251.214 altitude Value 1039
**Goal1242 5.088
isa CHECK-ALTITUDE
altitude 1039
previous 1066GOAL242 DIAL DIAL T Ignore-Altitude
PROCEDURAL 251.869 SubGoal setting Dial Altitude
VISUAL 252.824 waypoint Value 4
RETRIEVAL 252.974 Altitude 700
VISUAL 254.194 dial-altitude Value 700
PROCEDURAL 254.244 Confirm Altitude already set to 700
**Goal1244 4.984
isa DIAL-ALTITUDE
waypoint 4
altitude 700GOAL244 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 254.852 SubGoal checking Altitude
VISUAL 255.853 altitude Value 1011
**Goal1247 4.798
isa CHECK-ALTITUDE
altitude 1011
previous 1039GOAL247 DIAL DIAL T Ignore-Altitude
PROCEDURAL 256.510 SubGoal setting Dial Altitude
VISUAL 257.362 waypoint Value 4
RETRIEVAL 257.512 Altitude 700
VISUAL 258.594 dial-altitude Value 700
PROCEDURAL 258.644 Confirm Altitude already set to 700
**Goal1249 4.914
isa DIAL-ALTITUDE
waypoint 4
altitude 700GOAL249 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 259.251 SubGoal checking Altitude
VISUAL 260.501 altitude Value 963
**Goal1252 4.933
isa CHECK-ALTITUDE
altitude 963
previous 1011GOAL252 DIAL DIAL T Ignore-Altitude
PROCEDURAL 261.157 SubGoal setting Dial Altitude
VISUAL 262.365 waypoint Value 5
RETRIEVAL 262.515 Altitude 500
VISUAL 263.710 dial-altitude Value 700
MANUAL 266.794 dial-altitude set 500
**Goal1254 5.327
isa DIAL-ALTITUDE
waypoint 5
altitude 500GOAL254 DIAL DIAL T Dial-Altitude

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PROCEDURAL 267.400 SubGoal checking Altitude
VISUAL 268.343 altitude Value 859
**Goal258 4.898
    isa CHECK-ALTITUDE
    altitude 859
    previous 963GOAL258 DIAL DIAL T Ignore-Altitude
PROCEDURAL 269.000 SubGoal setting Dial Altitude
VISUAL 269.927 waypoint Value 5
RETRIEVAL 270.077 Altitude 500
VISUAL 271.261 dial-altitude Value 500
PROCEDURAL 271.311 Confirm Altitude already set to 500
**Goal260 5.166
    isa DIAL-ALTITUDE
    waypoint 5
    altitude 500GOAL260 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 271.918 SubGoal checking Altitude
VISUAL 272.827 altitude Value 798
**Goal263 4.772
    isa CHECK-ALTITUDE
    altitude 798
    previous 859GOAL263 DIAL DIAL T Ignore-Altitude
PROCEDURAL 273.480 SubGoal setting Dial Altitude
VISUAL 274.351 waypoint Value 5
RETRIEVAL 274.501 Altitude 500
VISUAL 275.740 dial-altitude Value 500
PROCEDURAL 275.790 Confirm Altitude already set to 500
**Goal265 5.198
    isa DIAL-ALTITUDE
    waypoint 5
    altitude 500GOAL265 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 276.397 SubGoal checking Autopilot
VISUAL 277.602 otw_runway Value in-sight
VISUAL 278.677 autopilots Value up
PROCEDURAL 278.727 Disengage Autopilot and land
MANUAL 281.186 autopilots up/down 0
**Goal268 9.657
    isa SET-AUTOPILOT
    visibility In-Sight
    peek nil
    decision Disengaged
    decision-altitude 600GOAL268 DIAL DIAL T Disengage-Autopilot

```

*** Finis ***

*** Setting ModelDone to 1***

```

MCP NAV PFD SVS CONTROLS OTW off Total-time
69.14676 48.713253 53.1717 0 44.248768 54.78721 11.675201 281.7429
EMC End:T 281.7429

```

Look 1.0 Action 2.5 Listen 0.5 Ans 0.1

; ; Factory is idle.

2-Baseline VMC Late reassignment (land on parallel runway)

dribbling to file "Baseline-VMC-late.drb"

```
Factory Started
CL-USER(1): (register-server)
Resistered Server EMC_NASAHPM.EMCReceiveCOMMessages
NIL
CL-USER(2):
Subject 0 Trial 0 Run 1
Initializing control

Control      4.576
  isa CONTROL
  speed 200.0d0
  altitude 2500.0d0
  waypoint nil
  distance nil
  flaps 5
  decision-altitude 600
  landing-gear Up
  airbrakes Off
  autopilots Engaged
  task nil
  last-task nil
  status Active
  landing-checklist nil
VISUAL      0.000 flaps Value 5
CHUNK NIL IS UNDEFINED.
CHUNK NIL IS UNDEFINED.
PROCEDURAL   0.893 Preparing for approach: setting VNAV
VISUAL      0.893 waypoint Value 1
PROCEDURAL   2.004 Preparing for approach: engaging Autopilot
VISUAL      2.004 autopilots Value up
PROCEDURAL   5.236 Preparing for approach: engaging Speed-brakes full
MANUAL      5.236 airbrakes on/off 0
PROCEDURAL   8.373 Preparing for approach: setting Flaps 1
MANUAL      8.373 flaps set 1
PROCEDURAL   9.276 Preparing for approach: setting LNAV
VISUAL      9.276 distance-next Value 0
PROCEDURAL   9.433 SubGoal checking Speed
VISUAL      10.472 waypoint Value 1
VISUAL      11.330 distance-next Value 0
RETRIEVAL    11.430 Waypoint 1 Next 0 Distance 15
RETRIEVAL    11.680 Speed
VISUAL      12.687 dial-speed Value 200
MANUAL      15.608 dial-speed set 160
**Goal6     5.076
  isa SET-SPEED
  waypoint 1
  distance-next 0
  distance 15
  speed 160GOAL6 DIAL DIAL T Dial-Speed
PROCEDURAL   16.213 SubGoal checking Altitude
VISUAL      17.129 altitude Value 2500
**Goal11    5.270
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isa CHECK-ALTITUDE
altitude 2500
previous 2500.0d0GOAL11 DIAL DIAL T Ignore-Altitude
PROCEDURAL 17.788 SubGoal setting Dial Altitude
VISUAL 19.012 waypoint Value 2
RETRIEVAL 19.162 Altitude 1800
VISUAL 20.040 dial-altitude Value 2500
MANUAL 22.222 dial-altitude set 1800
**Goal13 5.145
isa DIAL-ALTITUDE
waypoint 2
altitude 1800GOAL13 DIAL DIAL T Dial-Altitude
PROCEDURAL 22.829 SubGoal checking Speed Brakes
VISUAL 23.700 speed Value 194
VISUAL 24.618 airbrakes Value on
PROCEDURAL 24.668 Setting Speed Brakes
MANUAL 27.141 airbrakes on/off 0
**Goal17 8.597
isa SPEED-BRAKES
speed 194
decision OffGOAL17 DIAL DIAL T Set-Speed-Brakes
PROCEDURAL 27.741 SubGoal checking Decision Altitude
VISUAL 28.627 waypoint Value 2
VISUAL 29.495 distance-next Value 3
RETRIEVAL 29.595 Waypoint 2 Next 3 Distance 14
**Goal21 5.031
isa SET-DECISION-ALTITUDE
waypoint 2
distance-next 3
distance 14
old 600
decision 600GOAL21 DIAL DIAL T Ignore-Decision-Altitude
PROCEDURAL 30.252 SubGoal checking Flaps
VISUAL 31.517 speed Value 187
RETRIEVAL 31.717 Flaps 25
VISUAL 32.741 flaps Value 1
MANUAL 34.774 flaps set 25
**Goal24 5.052
isa SET-FLAP
speed 187
flap 25GOAL24 DIAL DIAL T Set-Flaps
PROCEDURAL 35.382 SubGoal checking Landing Gear
VISUAL 36.253 waypoint Value 2
VISUAL 37.369 distance-next Value 3
RETRIEVAL 37.469 Waypoint 2 Next 3 Distance 14
VISUAL 38.720 landing-gear Value up
PROCEDURAL 38.770 Lowering Gear
MANUAL 41.762 landing-gear up/down 0
**Goal28 9.102
isa MOVE-GEAR
waypoint 2
distance-next 3
distance 14
decision DownGOAL28 DIAL DIAL T Move-Gear
PROCEDURAL 42.370 SubGoal checking Autopilot
VISUAL 43.345 otw_runway Value out-of-sight
VISUAL 44.497 autopilots Value up

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VISUAL 45.415 altitude Value 2500
**Goal33 8.510
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 2500
    decision Engaged
    decision-altitude 600GOAL33 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 46.116 SubGoal checking Altitude
VISUAL 47.276 altitude Value 2500
**Goal37 5.052
    isa CHECK-ALTITUDE
    altitude 2500
    previous 2500GOAL37 DIAL DIAL T Ignore-Altitude
PROCEDURAL 47.933 SubGoal checking Speed
VISUAL 48.925 waypoint Value 2
VISUAL 50.074 distance-next Value 2
RETRIEVAL 50.174 Waypoint 2 Next 2 Distance 13
RETRIEVAL 50.274 Speed
VISUAL 51.351 dial-speed Value 160
MANUAL 53.698 dial-speed set 165
**Goal39 4.936
    isa SET-SPEED
    waypoint 2
    distance-next 2
    distance 13
    speed 165GOAL39 DIAL DIAL T Dial-Speed
PROCEDURAL 54.304 SubGoal setting Dial Altitude
VISUAL 55.341 waypoint Value 2
RETRIEVAL 55.491 Altitude 1800
VISUAL 56.495 dial-altitude Value 1800
PROCEDURAL 56.545 Confirm Altitude already set to 1800
**Goal44 5.146
    isa DIAL-ALTITUDE
    waypoint 2
    altitude 1800GOAL44 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 57.150 SubGoal checking Decision Altitude
VISUAL 58.311 waypoint Value 2
VISUAL 59.298 distance-next Value 1
RETRIEVAL 59.398 Waypoint 2 Next 1 Distance 12
**Goal47 5.102
    isa SET-DECISION-ALTITUDE
    waypoint 2
    distance-next 1
    distance 12
    old 600
    decision 600GOAL47 DIAL DIAL T Ignore-Decision-Altitude
PROCEDURAL 60.056 SubGoal checking Speed Brakes
VISUAL 61.239 speed Value 165
VISUAL 62.259 airbrakes Value off
**Goal50 8.774
    isa SPEED-BRAKES
    speed 165
    decision OffGOAL50 DIAL DIAL T Decide-Speed-Brakes
PROCEDURAL 62.859 SubGoal checking Flaps
VISUAL 64.000 speed Value 165
RETRIEVAL 64.150 Flaps 25
VISUAL 65.237 flaps Value 25

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PROCEDURAL 65.287 Confirm Flaps already set to 25
**Goal53 5.108
  isa SET-FLAP
  speed 165
  flap 25GOAL53 DIAL DIAL T Flaps-Already-Set
PROCEDURAL 65.895 SubGoal checking Autopilot
VISUAL 66.999 otw_runway Value out-of-sight
VISUAL 68.027 autopilots Value up
VISUAL 69.190 altitude Value 2500
**Goal56 8.409
  isa SET-AUTOPILOT
  visibility Out-Of-Sight
  peek 2500
  decision Engaged
  decision-altitude 600GOAL56 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 69.891 SubGoal checking Landing Gear
VISUAL 70.912 waypoint Value 2
VISUAL 71.965 distance-next Value 1
RETRIEVAL 72.065 Waypoint 2 Next 1 Distance 12
VISUAL 72.924 landing-gear Value down
**Goal60 8.608
  isa MOVE-GEAR
  waypoint 2
  distance-next 1
  distance 12
  decision DownGOAL60 DIAL DIAL T Decide-Gear
PROCEDURAL 73.524 SubGoal checking Altitude
VISUAL 74.411 altitude Value 2500
**Goal64 5.041
  isa CHECK-ALTITUDE
  altitude 2500
  previous 2500GOAL64 DIAL DIAL T Ignore-Altitude
PROCEDURAL 75.068 SubGoal setting Dial Altitude
VISUAL 76.181 waypoint Value 2
RETRIEVAL 76.331 Altitude 1800
VISUAL 77.447 dial-altitude Value 1800
PROCEDURAL 77.497 Confirm Altitude already set to 1800
**Goal66 5.258
  isa DIAL-ALTITUDE
  waypoint 2
  altitude 1800GOAL66 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 78.102 SubGoal checking Decision Altitude
VISUAL 79.329 waypoint Value 2
VISUAL 80.503 atc Value random-listen
VISUAL 80.503 distance-next Value 0
RETRIEVAL 80.603 Waypoint 2 Next 0 Distance 11
**Goal69 4.977
  isa SET-DECISION-ALTITUDE
  waypoint 2
  distance-next 0
  distance 11
  old 600
  decision 600GOAL69 DIAL DIAL T Ignore-Decision-Altitude
PROCEDURAL 81.261 SubGoal checking Altitude
VISUAL 82.362 altitude Value 2500
**Goal72 5.200
  isa CHECK-ALTITUDE

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    altitude 2500
    previous 2500GOAL72 DIAL DIAL T Ignore-Altitude
PROCEDURAL 83.019 SubGoal checking Speed Brakes
VISUAL 84.001 speed Value 165
VISUAL 85.286 airbrakes Value off
**Goal74 8.423
    isa SPEED-BRAKES
    speed 165
    decision OffGOAL74 DIAL DIAL T Decide-Speed-Brakes
PROCEDURAL 85.886 SubGoal checking Flaps
VISUAL 86.983 atc Value ten-miles-out
VISUAL 86.983 speed Value 165
RETRIEVAL 87.133 Flaps 15
VISUAL 88.378 flaps Value 25
MANUAL 90.311 flaps set 15
**Goal77 5.216
    isa SET-FLAP
    speed 165
    flap 15GOAL77 DIAL DIAL T Set-Flaps
PROCEDURAL 90.916 SubGoal checking Autopilot
VISUAL 91.848 otw_runway Value out-of-sight
VISUAL 92.803 autopilots Value up
VISUAL 93.726 altitude Value 2369
**Goal81 8.487
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 2369
    decision Engaged
    decision-altitude 600GOAL81 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 94.427 SubGoal checking Landing Gear
VISUAL 95.323 waypoint Value 3
VISUAL 96.617 distance-next Value 1
RETRIEVAL 96.717 Waypoint 3 Next 1 Distance 10
VISUAL 97.542 landing-gear Value down
**Goal85 8.552
    isa MOVE-GEAR
    waypoint 3
    distance-next 1
    distance 10
    decision DownGOAL85 DIAL DIAL T Decide-Gear
PROCEDURAL 98.142 SubGoal checking Speed
VISUAL 99.004 waypoint Value 3
VISUAL 99.900 distance-next Value 1
RETRIEVAL 100.000 Waypoint 3 Next 1 Distance 10
RETRIEVAL 100.100 Speed
VISUAL 101.342 dial-speed Value 165
PROCEDURAL 101.392 Confirm Speed already set to 165
**Goal89 4.957
    isa SET-SPEED
    waypoint 3
    distance-next 1
    distance 10
    speed 165GOAL89 DIAL DIAL T Speed-Already-Dialed
PROCEDURAL 102.000 SubGoal checking Altitude
VISUAL 103.002 altitude Value 2199
**Goal93 4.829
    isa CHECK-ALTITUDE

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    altitude 2199
    previous 2500GOAL93 DIAL DIAL T Read-Altitude
PROCEDURAL 103.659 SubGoal setting Dial Altitude
VISUAL 104.831 waypoint Value 3
RETRIEVAL 104.981 Altitude 1000
VISUAL 106.024 dial-altitude Value 1800
MANUAL 108.200 dial-altitude set 1000
**Goal95 4.890
    isa DIAL-ALTITUDE
    waypoint 3
    altitude 1000GOAL95 DIAL DIAL T Dial-Altitude
PROCEDURAL 108.808 SubGoal checking Decision Altitude
VISUAL 109.788 waypoint Value 3
VISUAL 110.882 distance-next Value 1
RETRIEVAL 110.982 Waypoint 3 Next 1 Distance 10
**Goal99 5.077
    isa SET-DECISION-ALTITUDE
    waypoint 3
    distance-next 1
    distance 10
    old 600
    decision 600GOAL99 DIAL DIAL T Ignore-Decision-Altitude
PROCEDURAL 111.639 SubGoal checking Altitude
VISUAL 112.835 altitude Value 2016
**Goal102 5.255
    isa CHECK-ALTITUDE
    altitude 2016
    previous 2199GOAL102 DIAL DIAL T Read-Altitude
PROCEDURAL 113.492 SubGoal checking Speed Brakes
VISUAL 114.550 speed Value 165
VISUAL 115.602 airbrakes Value off
**Goal104 8.027
    isa SPEED-BRAKES
    speed 165
    decision OffGOAL104 DIAL DIAL T Decide-Speed-Brakes
PROCEDURAL 116.202 SubGoal checking Autopilot
VISUAL 117.213 otw_runway Value out-of-sight
VISUAL 118.198 autopilots Value up
VISUAL 119.101 altitude Value 1902
**Goal107 8.295
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1902
    decision Engaged
    decision-altitude 600GOAL107 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 119.802 SubGoal checking Landing Gear
VISUAL 120.791 waypoint Value 3
VISUAL 122.009 distance-next Value 0
RETRIEVAL 122.109 Waypoint 3 Next 0 Distance 9
VISUAL 122.951 landing-gear Value down
**Goal111 8.082
    isa MOVE-GEAR
    waypoint 3
    distance-next 0
    distance 9
    decision DownGOAL111 DIAL DIAL T Decide-Gear
PROCEDURAL 123.551 SubGoal checking Flaps

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VISUAL 124.580 speed Value 165
RETRIEVAL 124.730 Flaps 25
VISUAL 125.972 flaps Value 15
MANUAL 128.097 flaps set 25
**Goal115 5.106
    isa SET-FLAP
    speed 165
    flap 25GOAL115 DIAL DIAL T Set-Flaps
PROCEDURAL 128.702 SubGoal checking Speed
VISUAL 129.913 waypoint Value 4
VISUAL 130.803 distance-next Value 6
RETRIEVAL 130.903 Waypoint 4 Next 6 Distance 9
RETRIEVAL 131.004 Speed
VISUAL 131.931 dial-speed Value 165
PROCEDURAL 131.981 Confirm Speed already set to 165
**Goal119 4.934
    isa SET-SPEED
    waypoint 4
    distance-next 6
    distance 9
    speed 165GOAL119 DIAL DIAL T Speed-Already-Dialed
PROCEDURAL 132.588 SubGoal checking Altitude
VISUAL 133.406 altitude Value 1739
**Goal123 5.035
    isa CHECK-ALTITUDE
    altitude 1739
    previous 2016GOAL123 DIAL DIAL T Read-Altitude
PROCEDURAL 134.064 SubGoal setting Dial Altitude
VISUAL 134.958 waypoint Value 4
RETRIEVAL 135.108 Altitude 500
VISUAL 136.063 dial-altitude Value 1000
MANUAL 138.425 dial-altitude set 500
**Goal125 4.959
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 500GOAL125 DIAL DIAL T Dial-Altitude
PROCEDURAL 139.031 SubGoal completing landing checklist
PROCEDURAL 141.922 Landing checklist: setting Gear down 1
MANUAL 141.922 landing-gear up/down 0
PROCEDURAL 144.703 Landing checklist: preparing cabin for landing
VOCAL 144.703 nothing communication 2007
PROCEDURAL 147.863 Landing checklist: setting Flaps 15
MANUAL 147.863 flaps set 15
PROCEDURAL 151.551 Landing checklist: setting Speed-brakes to armed
MANUAL 151.551 airbrakes on/off 0
PROCEDURAL 154.565 Landing checklist: setting Speed to 135
MANUAL 154.565 speed set 135
VISUAL 154.565 speed Value 165
VOCAL 154.615 Landing Checklist Complete
PROCEDURAL 154.771 SubGoal checking Altitude
VISUAL 156.040 altitude Value 1579
**Goal136 4.922
    isa CHECK-ALTITUDE
    altitude 1579
    previous 1739GOAL136 DIAL DIAL T Read-Altitude
PROCEDURAL 156.697 SubGoal checking Autopilot
VISUAL 157.868 atc Value random-listen

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VISUAL 157.868 otw_runway Value out-of-sight
VISUAL 159.161 autopilots Value up
VISUAL 160.237 altitude Value 1549
**Goal138 8.487
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1549
    decision Engaged
    decision-altitude 600GOAL138 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 160.938 SubGoal checking Altitude
VISUAL 161.882 altitude Value 1538
**Goal142 4.811
    isa CHECK-ALTITUDE
    altitude 1538
    previous 1579GOAL142 DIAL DIAL T Ignore-Altitude
PROCEDURAL 162.538 SubGoal checking Autopilot
VISUAL 163.718 otw_runway Value out-of-sight
VISUAL 164.673 autopilots Value up
VISUAL 165.946 altitude Value 1509
**Goal144 7.910
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1509
    decision Engaged
    decision-altitude 600GOAL144 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 166.648 SubGoal checking Altitude
VISUAL 167.453 altitude Value 1499
**Goal148 5.021
    isa CHECK-ALTITUDE
    altitude 1499
    previous 1538GOAL148 DIAL DIAL T Ignore-Altitude
PROCEDURAL 168.108 SubGoal setting Dial Altitude
VISUAL 169.369 waypoint Value 4
RETRIEVAL 169.519 Altitude 500
VISUAL 170.426 dial-altitude Value 500
PROCEDURAL 170.476 Confirm Altitude already set to 500
**Goal150 4.942
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 500GOAL150 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 171.083 SubGoal checking Altitude
VISUAL 172.273 altitude Value 1465
**Goal153 5.016
    isa CHECK-ALTITUDE
    altitude 1465
    previous 1499GOAL153 DIAL DIAL T Ignore-Altitude
PROCEDURAL 172.929 SubGoal checking Autopilot
VISUAL 173.947 otw_runway Value out-of-sight
VISUAL 175.180 autopilots Value up
VISUAL 176.268 altitude Value 1437
**Goal155 8.233
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1437
    decision Engaged
    decision-altitude 600GOAL155 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 176.969 SubGoal checking Altitude

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VISUAL 178.237 altitude Value 1423
**Goal159 5.070
    isa CHECK-ALTITUDE
    altitude 1423
    previous 1465GOAL159 DIAL DIAL T Ignore-Altitude
PROCEDURAL 178.893 SubGoal setting Dial Altitude
VISUAL 179.724 waypoint Value 4
RETRIEVAL 179.874 Altitude 700
VISUAL 180.726 dial-altitude Value 500
MANUAL 183.668 dial-altitude set 700
**Goal161 4.895
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL161 DIAL DIAL T Dial-Altitude
PROCEDURAL 184.274 SubGoal checking Altitude
VISUAL 185.270 altitude Value 1373
**Goal165 5.172
    isa CHECK-ALTITUDE
    altitude 1373
    previous 1423GOAL165 DIAL DIAL T Ignore-Altitude
PROCEDURAL 185.926 SubGoal setting Dial Altitude
VISUAL 186.846 waypoint Value 4
RETRIEVAL 186.996 Altitude 500
VISUAL 188.156 dial-altitude Value 700
MANUAL 190.431 dial-altitude set 500
**Goal167 5.035
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 500GOAL167 DIAL DIAL T Dial-Altitude
PROCEDURAL 191.037 SubGoal checking Altitude
VISUAL 192.054 altitude Value 1326
**Goal171 4.834
    isa CHECK-ALTITUDE
    altitude 1326
    previous 1373GOAL171 DIAL DIAL T Ignore-Altitude
PROCEDURAL 192.712 SubGoal checking Autopilot
VISUAL 193.777 otw_runway Value out-of-sight
VISUAL 194.650 autopilots Value up
VISUAL 195.873 altitude Value 1299
**Goal173 8.032
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1299
    decision Engaged
    decision-altitude 600GOAL173 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 196.574 SubGoal checking Altitude
VISUAL 197.482 altitude Value 1288
**Goal177 4.850
    isa CHECK-ALTITUDE
    altitude 1288
    previous 1326GOAL177 DIAL DIAL T Ignore-Altitude
PROCEDURAL 198.139 SubGoal setting Dial Altitude
VISUAL 199.280 waypoint Value 4
RETRIEVAL 199.430 Altitude 700
VISUAL 200.603 dial-altitude Value 500
MANUAL 202.966 dial-altitude set 700
**Goal179 5.172

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isa DIAL-ALTITUDE
waypoint 4
altitude 700GOAL179 DIAL DIAL T Dial-Altitude
PROCEDURAL 203.571 SubGoal checking Altitude
VISUAL 204.517 altitude Value 1238
**Goal183 5.087
isa CHECK-ALTITUDE
altitude 1238
previous 1288GOAL183 DIAL DIAL T Ignore-Altitude
PROCEDURAL 205.175 SubGoal checking Autopilot
VISUAL 206.458 otw_runway Value out-of-sight
VISUAL 207.454 autopilots Value up
VISUAL 208.668 altitude Value 1209
**Goal185 7.829
isa SET-AUTOPILOT
visibility Out-Of-Sight
peek 1209
decision Engaged
decision-altitude 600GOAL185 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 209.369 SubGoal checking Altitude
VISUAL 210.381 altitude Value 1197
**Goal189 4.877
isa CHECK-ALTITUDE
altitude 1197
previous 1238GOAL189 DIAL DIAL T Ignore-Altitude
PROCEDURAL 211.038 SubGoal checking Autopilot
VISUAL 212.289 otw_runway Value out-of-sight
VISUAL 213.185 autopilots Value up
VISUAL 214.464 altitude Value 1168
**Goal191 7.994
isa SET-AUTOPILOT
visibility Out-Of-Sight
peek 1168
decision Engaged
decision-altitude 600GOAL191 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 215.165 SubGoal checking Altitude
VISUAL 216.008 altitude Value 1157
**Goal195 4.681
isa CHECK-ALTITUDE
altitude 1157
previous 1197GOAL195 DIAL DIAL T Ignore-Altitude
PROCEDURAL 216.668 SubGoal checking Autopilot
VISUAL 217.665 otw_runway Value out-of-sight
VISUAL 218.531 autopilots Value up
VISUAL 219.435 altitude Value 1133
**Goal197 7.951
isa SET-AUTOPILOT
visibility Out-Of-Sight
peek 1133
decision Engaged
decision-altitude 600GOAL197 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 220.136 SubGoal checking Altitude
VISUAL 221.375 altitude Value 1119
**Goal201 4.927
isa CHECK-ALTITUDE
altitude 1119
previous 1157GOAL201 DIAL DIAL T Ignore-Altitude

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PROCEDURAL 222.030 SubGoal checking Autopilot
VISUAL 223.152 otw_runway Value out-of-sight
VISUAL 224.428 autopilots Value up
VISUAL 225.702 altitude Value 1089
**Goal203 7.976
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1089
    decision Engaged
    decision-altitude 600GOAL203 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 226.404 SubGoal checking Altitude
VISUAL 227.415 altitude Value 1077
**Goal207 5.207
    isa CHECK-ALTITUDE
    altitude 1077
    previous 1119GOAL207 DIAL DIAL T Ignore-Altitude
PROCEDURAL 228.073 SubGoal checking Autopilot
VISUAL 229.345 otw_runway Value out-of-sight
VISUAL 230.456 autopilots Value up
VISUAL 231.667 altitude Value 1047
**Goal209 7.561
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1047
    decision Engaged
    decision-altitude 600GOAL209 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 232.368 SubGoal checking Altitude
VISUAL 233.625 altitude Value 1034
**Goal213 5.133
    isa CHECK-ALTITUDE
    altitude 1034
    previous 1077GOAL213 DIAL DIAL T Ignore-Altitude
PROCEDURAL 234.280 SubGoal setting Dial Altitude
VISUAL 235.271 waypoint Value 4
RETRIEVAL 235.421 Altitude 700
VISUAL 236.213 dial-altitude Value 700
PROCEDURAL 236.263 Confirm Altitude already set to 700
**Goal215 5.030
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL215 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 236.873 SubGoal checking Altitude
VISUAL 237.964 altitude Value 1003
**Goal218 5.006
    isa CHECK-ALTITUDE
    altitude 1003
    previous 1034GOAL218 DIAL DIAL T Ignore-Altitude
PROCEDURAL 238.622 SubGoal setting Dial Altitude
VISUAL 239.541 atc Value late-reassignment
VISUAL 239.541 atc Value random-listen
VISUAL 239.541 waypoint Value 5
RETRIEVAL 239.691 Altitude 500
VISUAL 240.725 dial-altitude Value 700
MANUAL 243.037 dial-altitude set 500
**Goal220 5.177
    isa DIAL-ALTITUDE
    waypoint 5

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        altitude 500GOAL220 DIAL DIAL T Dial-Altitude
PROCEDURAL 243.643 SubGoal checking Altitude
VISUAL 244.640 altitude Value 901
**Goal224 4.985
    isa CHECK-ALTITUDE
    altitude 901
    previous 1003GOAL224 DIAL DIAL T Ignore-Altitude
PROCEDURAL 245.296 SubGoal checking Autopilot
VISUAL 246.528 otw_runway Value out-of-sight
VISUAL 247.550 autopilots Value up
VISUAL 248.776 altitude Value 835
**Goal226 7.763
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 835
    decision Engaged
    decision-altitude 600GOAL226 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 249.477 SubGoal checking Altitude
VISUAL 250.659 altitude Value 805
**Goal230 5.130
    isa CHECK-ALTITUDE
    altitude 805
    previous 901GOAL230 DIAL DIAL T Ignore-Altitude
PROCEDURAL 251.314 SubGoal setting Dial Altitude
VISUAL 252.389 waypoint Value 5
RETRIEVAL 252.539 Altitude 500
VISUAL 253.673 dial-altitude Value 500
PROCEDURAL 253.723 Confirm Altitude already set to 500
**Goal232 5.092
    isa DIAL-ALTITUDE
    waypoint 5
    altitude 500GOAL232 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 254.330 SubGoal checking Altitude
VISUAL 255.423 altitude Value 730
**Goal235 5.142
    isa CHECK-ALTITUDE
    altitude 730
    previous 805GOAL235 DIAL DIAL T Ignore-Altitude
PROCEDURAL 256.078 SubGoal checking Autopilot
VISUAL 256.919 otw_runway Value in-sight
VISUAL 258.038 autopilots Value up
PROCEDURAL 258.088 Disengage Autopilot and land
MANUAL 260.106 autopilots up/down 0
**Goal237 9.947
    isa SET-AUTOPILOT
    visibility In-Sight
    peek nil
    decision Disengaged
    decision-altitude 600GOAL237 DIAL DIAL T Disengage-Autopilot

```

*** Finis ***

*** Setting ModelDone to 1***

MCP NAV PFD SVS CONTROLS OTW off Total-time

58.521206 39.112114 44.09481 0 49.761616 58.878254 10.293945 260.66193
EMC End:T 260.66193

Look 1.0 Action 2.5 Listen 0.5 Ans 0.1

; ; Factory is idle.

3-Baseline VMC Terrain mismatch (traffic on runway)

dribbling to file "Baseline-VMC-mismatch.drb"

```
Factory Started
CL-USER(1): (register-server)
Resistered Server EMC_NASAHPM.EMCReceiveCOMMessages
NIL
CL-USER(2):
Subject 0 Trial 0 Run 1
Initializing control

Control      5.136
  isa CONTROL
  speed 200.0d0
  altitude 2500.0d0
  waypoint nil
  distance nil
  flaps 5
  decision-altitude 600
  landing-gear Up
  airbrakes Off
  autopilots Engaged
  task nil
  last-task nil
  status Active
  landing-checklist nil
VISUAL      0.000 flaps Value 5
CHUNK NIL IS UNDEFINED.
CHUNK NIL IS UNDEFINED.
PROCEDURAL   0.989 Preparing for approach: setting VNAV
VISUAL      0.989 waypoint Value 1
PROCEDURAL   3.343 Preparing for approach: setting Flaps 1
MANUAL      3.343 flaps set 1
PROCEDURAL   6.194 Preparing for approach: engaging Speed-brakes full
MANUAL      6.194 airbrakes on/off 0
PROCEDURAL   7.102 Preparing for approach: engaging Autopilot
VISUAL      7.102 autopilots Value up
PROCEDURAL   7.951 Preparing for approach: setting LNAV
VISUAL      7.951 distance-next Value 0
PROCEDURAL   8.107 SubGoal checking Speed
VISUAL      9.055 waypoint Value 1
VISUAL      10.032 distance-next Value 0
RETRIEVAL    10.132 Waypoint 1 Next 0 Distance 15
RETRIEVAL    10.283 Speed
VISUAL      11.114 dial-speed Value 200
MANUAL      13.353 dial-speed set 160
**Goal6     5.354
  isa SET-SPEED
  waypoint 1
  distance-next 0
  distance 15
  speed 160GOAL6 DIAL DIAL T Dial-Speed
PROCEDURAL   13.962 SubGoal checking Speed Brakes
VISUAL      14.882 speed Value 199
VISUAL      16.167 airbrakes Value on
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PROCEDURAL 16.217 Setting Speed Brakes
MANUAL 18.643 airbrakes on/off 0
**Goal11 8.423
  isa SPEED-BRAKES
  speed 199
  decision OffGOAL11 DIAL DIAL T Set-Speed-Brakes
PROCEDURAL 19.244 SubGoal checking Decision Altitude
VISUAL 20.053 waypoint Value 2
VISUAL 21.127 distance-next Value 4
RETRIEVAL 21.227 Waypoint 2 Next 4 Distance 15
**Goal15 5.106
  isa SET-DECISION-ALTITUDE
  waypoint 2
  distance-next 4
  distance 15
  old 600
  decision 600GOAL15 DIAL DIAL T Ignore-Decision-Altitude
PROCEDURAL 21.885 SubGoal setting Dial Altitude
VISUAL 23.027 waypoint Value 2
RETRIEVAL 23.227 Altitude 1800
VISUAL 24.025 dial-altitude Value 2500
MANUAL 26.373 dial-altitude set 1800
**Goal18 4.952
  isa DIAL-ALTITUDE
  waypoint 2
  altitude 1800GOAL18 DIAL DIAL T Dial-Altitude
PROCEDURAL 26.980 SubGoal checking Landing Gear
VISUAL 27.928 waypoint Value 2
VISUAL 29.108 distance-next Value 3
RETRIEVAL 29.208 Waypoint 2 Next 3 Distance 14
VISUAL 30.212 landing-gear Value up
PROCEDURAL 30.262 Lowering Gear
MANUAL 32.737 landing-gear up/down 0
**Goal22 8.950
  isa MOVE-GEAR
  waypoint 2
  distance-next 3
  distance 14
  decision DownGOAL22 DIAL DIAL T Move-Gear
PROCEDURAL 33.345 SubGoal checking Flaps
VISUAL 34.585 speed Value 183
RETRIEVAL 34.735 Flaps 5
VISUAL 35.933 flaps Value 1
MANUAL 38.324 flaps set 5
**Goal27 4.983
  isa SET-FLAP
  speed 183
  flap 5GOAL27 DIAL DIAL T Set-Flaps
PROCEDURAL 38.931 SubGoal checking Autopilot
VISUAL 39.780 otw_runway Value out-of-sight
VISUAL 40.902 autopilots Value up
VISUAL 42.160 altitude Value 2500
**Goal31 8.971
  isa SET-AUTOPILOT
  visibility Out-Of-Sight
  peek 2500
  decision Engaged

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    decision-altitude 600GOAL31 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 42.861 SubGoal checking Altitude
VISUAL 43.930 altitude Value 2500
**Goal35 4.992
    isa CHECK-ALTITUDE
    altitude 2500
    previous 2500.0d0GOAL35 DIAL DIAL T Ignore-Altitude
PROCEDURAL 44.588 SubGoal checking Speed
VISUAL 45.505 waypoint Value 2
VISUAL 46.448 distance-next Value 2
RETRIEVAL 46.548 Waypoint 2 Next 2 Distance 13
RETRIEVAL 46.648 Speed
VISUAL 47.859 dial-speed Value 160
MANUAL 50.262 dial-speed set 165
**Goal37 4.731
    isa SET-SPEED
    waypoint 2
    distance-next 2
    distance 13
    speed 165GOAL37 DIAL DIAL T Dial-Speed
PROCEDURAL 50.867 SubGoal checking Decision Altitude
VISUAL 51.914 waypoint Value 2
VISUAL 53.042 distance-next Value 2
RETRIEVAL 53.142 Waypoint 2 Next 2 Distance 13
**Goal42 5.367
    isa SET-DECISION-ALTITUDE
    waypoint 2
    distance-next 2
    distance 13
    old 600
    decision 600GOAL42 DIAL DIAL T Ignore-Decision-Altitude
PROCEDURAL 53.798 SubGoal checking Speed Brakes
VISUAL 54.990 speed Value 167
VISUAL 55.842 airbrakes Value off
**Goal45 8.550
    isa SPEED-BRAKES
    speed 167
    decision OffGOAL45 DIAL DIAL T Decide-Speed-Brakes
PROCEDURAL 56.442 SubGoal setting Dial Altitude
VISUAL 57.501 waypoint Value 2
RETRIEVAL 57.651 Altitude 1800
VISUAL 58.463 dial-altitude Value 1800
PROCEDURAL 58.513 Confirm Altitude already set to 1800
**Goal48 5.130
    isa DIAL-ALTITUDE
    waypoint 2
    altitude 1800GOAL48 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 59.119 SubGoal checking Landing Gear
VISUAL 60.044 waypoint Value 2
VISUAL 60.915 distance-next Value 1
RETRIEVAL 61.015 Waypoint 2 Next 1 Distance 12
VISUAL 61.871 landing-gear Value down
**Goal51 8.549
    isa MOVE-GEAR
    waypoint 2
    distance-next 1
    distance 12

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    decision DownGOAL51 DIAL DIAL T Decide-Gear
PROCEDURAL 62.471 SubGoal checking Altitude
VISUAL 63.498 altitude Value 2500
**Goal55 4.775
    isa CHECK-ALTITUDE
    altitude 2500
    previous 2500GOAL55 DIAL DIAL T Ignore-Altitude
PROCEDURAL 64.154 SubGoal checking Flaps
VISUAL 65.099 speed Value 165
RETRIEVAL 65.249 Flaps 25
VISUAL 66.280 flaps Value 5
MANUAL 68.928 flaps set 25
**Goal57 4.956
    isa SET-FLAP
    speed 165
    flap 25GOAL57 DIAL DIAL T Set-Flaps
PROCEDURAL 69.537 SubGoal checking Autopilot
VISUAL 70.638 otw_runway Value out-of-sight
VISUAL 71.675 autopilots Value up
VISUAL 72.765 altitude Value 2500
**Goal61 8.610
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 2500
    decision Engaged
    decision-altitude 600GOAL61 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 73.466 SubGoal checking Speed Brakes
VISUAL 74.430 speed Value 165
VISUAL 75.388 airbrakes Value off
**Goal65 8.252
    isa SPEED-BRAKES
    speed 165
    decision OffGOAL65 DIAL DIAL T Decide-Speed-Brakes
PROCEDURAL 75.988 SubGoal checking Decision Altitude
VISUAL 77.216 waypoint Value 2
VISUAL 78.558 distance-next Value 0
RETRIEVAL 78.658 Waypoint 2 Next 0 Distance 11
**Goal68 4.940
    isa SET-DECISION-ALTITUDE
    waypoint 2
    distance-next 0
    distance 11
    old 600
    decision 600GOAL68 DIAL DIAL T Ignore-Decision-Altitude
PROCEDURAL 79.316 SubGoal checking Altitude
VISUAL 80.224 atc Value random-no-listen
VISUAL 80.224 altitude Value 2500
**Goal71 5.293
    isa CHECK-ALTITUDE
    altitude 2500
    previous 2500GOAL71 DIAL DIAL T Ignore-Altitude
PROCEDURAL 80.884 SubGoal setting Dial Altitude
VISUAL 81.959 waypoint Value 2
RETRIEVAL 82.109 Altitude 1800
VISUAL 83.349 dial-altitude Value 1800
PROCEDURAL 83.399 Confirm Altitude already set to 1800
**Goal73 5.559

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isa DIAL-ALTITUDE
waypoint 2
altitude 1800GOAL73 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 84.004 SubGoal checking Speed
VISUAL 85.154 waypoint Value 2
VISUAL 86.340 distance-next Value 0
RETRIEVAL 86.440 Waypoint 2 Next 0 Distance 11
RETRIEVAL 86.540 Speed
VISUAL 87.600 atc Value ten-miles-out
VISUAL 87.600 dial-speed Value 165
MANUAL 90.144 dial-speed set 140
**Goal76 4.727
isa SET-SPEED
waypoint 2
distance-next 0
distance 11
speed 140GOAL76 DIAL DIAL T Dial-Speed
PROCEDURAL 90.751 SubGoal checking Altitude
VISUAL 91.862 altitude Value 2413
**Goal81 5.020
isa CHECK-ALTITUDE
altitude 2413
previous 2500GOAL81 DIAL DIAL T Ignore-Altitude
PROCEDURAL 92.519 SubGoal checking Landing Gear
VISUAL 93.743 waypoint Value 3
VISUAL 94.922 distance-next Value 2
RETRIEVAL 95.022 Waypoint 3 Next 2 Distance 11
VISUAL 96.073 landing-gear Value down
**Goal83 7.669
isa MOVE-GEAR
waypoint 3
distance-next 2
distance 11
decision DownGOAL83 DIAL DIAL T Decide-Gear
PROCEDURAL 96.673 SubGoal checking Autopilot
VISUAL 97.900 otw_runway Value out-of-sight
VISUAL 98.843 autopilots Value up
VISUAL 99.681 altitude Value 2273
**Goal87 8.853
isa SET-AUTOPILOT
visibility Out-Of-Sight
peek 2273
decision Engaged
decision-altitude 600GOAL87 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 100.382 SubGoal checking Flaps
VISUAL 101.285 speed Value 159
RETRIEVAL 101.436 Flaps 25
VISUAL 102.645 flaps Value 25
PROCEDURAL 102.695 Confirm Flaps already set to 25
**Goal91 5.051
isa SET-FLAP
speed 159
flap 25GOAL91 DIAL DIAL T Flaps-Already-Set
PROCEDURAL 103.302 SubGoal checking Speed Brakes
VISUAL 104.352 speed Value 158
VISUAL 105.308 airbrakes Value off
**Goal94 8.306

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isa SPEED-BRAKES
speed 158
decision OffGOAL94 DIAL DIAL T Decide-Speed-Brakes
PROCEDURAL 105.908 SubGoal checking Altitude
VISUAL 106.795 altitude Value 2147
**Goal97 4.862
isa CHECK-ALTITUDE
altitude 2147
previous 2413GOAL97 DIAL DIAL T Read-Altitude
PROCEDURAL 107.454 SubGoal checking Decision Altitude
VISUAL 108.494 waypoint Value 3
VISUAL 109.780 distance-next Value 1
RETRIEVAL 109.880 Waypoint 3 Next 1 Distance 10
**Goal99 5.014
isa SET-DECISION-ALTITUDE
waypoint 3
distance-next 1
distance 10
old 600
decision 600GOAL99 DIAL DIAL T Ignore-Decision-Altitude
PROCEDURAL 110.536 SubGoal setting Dial Altitude
VISUAL 111.502 waypoint Value 3
RETRIEVAL 111.652 Altitude 1000
VISUAL 112.893 dial-altitude Value 1800
MANUAL 115.437 dial-altitude set 1000
**Goal102 5.021
isa DIAL-ALTITUDE
waypoint 3
altitude 1000GOAL102 DIAL DIAL T Dial-Altitude
PROCEDURAL 116.045 SubGoal checking Autopilot
VISUAL 116.885 otw_runway Value out-of-sight
VISUAL 118.081 autopilots Value up
VISUAL 119.098 altitude Value 1932
**Goal106 8.594
isa SET-AUTOPILOT
visibility Out-Of-Sight
peek 1932
decision Engaged
decision-altitude 600GOAL106 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 119.799 SubGoal checking Speed Brakes
VISUAL 120.756 speed Value 155
VISUAL 121.680 airbrakes Value off
**Goal110 8.172
isa SPEED-BRAKES
speed 155
decision OffGOAL110 DIAL DIAL T Decide-Speed-Brakes
PROCEDURAL 122.280 SubGoal checking Landing Gear
VISUAL 123.278 waypoint Value 3
VISUAL 124.257 distance-next Value 0
RETRIEVAL 124.357 Waypoint 3 Next 0 Distance 9
VISUAL 125.385 landing-gear Value down
**Goal113 8.691
isa MOVE-GEAR
waypoint 3
distance-next 0
distance 9
decision DownGOAL113 DIAL DIAL T Decide-Gear

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PROCEDURAL 125.985 SubGoal checking Altitude
VISUAL 127.239 altitude Value 1797
**Goal117 5.138
    isa CHECK-ALTITUDE
    altitude 1797
    previous 2147GOAL117 DIAL DIAL T Read-Altitude
PROCEDURAL 127.896 SubGoal checking Autopilot
VISUAL 129.089 otw_runway Value out-of-sight
VISUAL 130.351 autopilots Value up
VISUAL 131.430 altitude Value 1770
**Goal119 8.542
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1770
    decision Engaged
    decision-altitude 600GOAL119 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 132.131 SubGoal checking Altitude
VISUAL 133.303 altitude Value 1758
**Goal123 5.475
    isa CHECK-ALTITUDE
    altitude 1758
    previous 1797GOAL123 DIAL DIAL T Ignore-Altitude
PROCEDURAL 133.959 SubGoal checking Autopilot
VISUAL 135.188 otw_runway Value out-of-sight
VISUAL 136.267 autopilots Value up
VISUAL 137.516 altitude Value 1731
**Goal125 8.360
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1731
    decision Engaged
    decision-altitude 600GOAL125 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 138.217 SubGoal setting Dial Altitude
VISUAL 139.387 waypoint Value 4
RETRIEVAL 139.537 Altitude 700
VISUAL 140.634 dial-altitude Value 1000
MANUAL 142.713 dial-altitude set 700
**Goal129 4.952
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL129 DIAL DIAL T Dial-Altitude
PROCEDURAL 143.320 SubGoal completing landing checklist
PROCEDURAL 145.498 Landing checklist: setting Speed to 135
MANUAL 145.498 speed set 135
VISUAL 145.498 speed Value 149
CHUNK NIL IS UNDEFINED.
CHUNK NIL IS UNDEFINED.
PROCEDURAL 147.849 Landing checklist: setting Flaps 15
MANUAL 147.849 flaps set 15
PROCEDURAL 150.612 Landing checklist: preparing cabin for landing
VOCAL 150.612 nothing communication 2007
PROCEDURAL 153.007 Landing checklist: setting Gear down 1
MANUAL 153.007 landing-gear up/down 0
PROCEDURAL 156.602 Landing checklist: setting Speed-brakes to armed
MANUAL 156.602 airbrakes on/off 0
VOCAL 156.652 Landing Checklist Complete
PROCEDURAL 156.808 SubGoal checking Altitude

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VISUAL 157.729 altitude Value 1603
**Goal140 5.111
    isa CHECK-ALTITUDE
    altitude 1603
    previous 1758GOAL140 DIAL DIAL T Read-Altitude
PROCEDURAL 158.386 SubGoal checking Autopilot
VISUAL 159.563 atc Value random-listen
VISUAL 159.563 otw_runway Value out-of-sight
VISUAL 160.799 autopilots Value up
VISUAL 161.753 altitude Value 1577
**Goal142 7.831
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1577
    decision Engaged
    decision-altitude 600GOAL142 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 162.454 SubGoal checking Altitude
VISUAL 163.478 altitude Value 1567
**Goal146 5.008
    isa CHECK-ALTITUDE
    altitude 1567
    previous 1603GOAL146 DIAL DIAL T Ignore-Altitude
PROCEDURAL 164.136 SubGoal setting Dial Altitude
VISUAL 165.265 waypoint Value 4
RETRIEVAL 165.415 Altitude 700
VISUAL 166.388 dial-altitude Value 700
PROCEDURAL 166.438 Confirm Altitude already set to 700
**Goal148 4.912
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL148 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 167.046 SubGoal checking Altitude
VISUAL 168.210 altitude Value 1538
**Goal151 5.036
    isa CHECK-ALTITUDE
    altitude 1538
    previous 1567GOAL151 DIAL DIAL T Ignore-Altitude
PROCEDURAL 168.868 SubGoal setting Dial Altitude
VISUAL 170.044 waypoint Value 4
RETRIEVAL 170.194 Altitude 700
VISUAL 171.276 dial-altitude Value 700
PROCEDURAL 171.326 Confirm Altitude already set to 700
**Goal153 4.864
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL153 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 171.932 SubGoal checking Altitude
VISUAL 172.971 altitude Value 1508
**Goal156 5.295
    isa CHECK-ALTITUDE
    altitude 1508
    previous 1538GOAL156 DIAL DIAL T Ignore-Altitude
PROCEDURAL 173.627 SubGoal checking Autopilot
VISUAL 174.566 otw_runway Value out-of-sight
VISUAL 175.703 autopilots Value up
VISUAL 176.733 altitude Value 1485
**Goal158 8.079

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isa SET-AUTOPILOT
visibility Out-Of-Sight
peek 1485
decision Engaged
decision-altitude 600GOAL158 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 177.434 SubGoal checking Altitude
VISUAL 178.581 altitude Value 1474
**Goal162 4.969
  isa CHECK-ALTITUDE
  altitude 1474
  previous 1508GOAL162 DIAL DIAL T Ignore-Altitude
PROCEDURAL 179.237 SubGoal setting Dial Altitude
VISUAL 180.212 waypoint Value 4
RETRIEVAL 180.362 Altitude 700
VISUAL 181.299 dial-altitude Value 700
PROCEDURAL 181.349 Confirm Altitude already set to 700
**Goal164 5.146
  isa DIAL-ALTITUDE
  waypoint 4
  altitude 700GOAL164 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 181.955 SubGoal checking Altitude
VISUAL 182.810 altitude Value 1448
**Goal167 5.289
  isa CHECK-ALTITUDE
  altitude 1448
  previous 1474GOAL167 DIAL DIAL T Ignore-Altitude
PROCEDURAL 183.467 SubGoal checking Autopilot
VISUAL 184.310 otw_runway Value out-of-sight
VISUAL 185.480 autopilots Value up
VISUAL 186.384 altitude Value 1427
**Goal169 7.639
  isa SET-AUTOPILOT
  visibility Out-Of-Sight
  peek 1427
  decision Engaged
  decision-altitude 600GOAL169 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 187.085 SubGoal checking Altitude
VISUAL 188.176 altitude Value 1416
**Goal173 5.022
  isa CHECK-ALTITUDE
  altitude 1416
  previous 1448GOAL173 DIAL DIAL T Ignore-Altitude
PROCEDURAL 188.831 SubGoal setting Dial Altitude
VISUAL 189.867 waypoint Value 4
RETRIEVAL 190.017 Altitude 700
VISUAL 191.213 dial-altitude Value 700
PROCEDURAL 191.263 Confirm Altitude already set to 700
**Goal175 4.793
  isa DIAL-ALTITUDE
  waypoint 4
  altitude 700GOAL175 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 191.871 SubGoal checking Altitude
VISUAL 192.920 altitude Value 1388
**Goal178 4.907
  isa CHECK-ALTITUDE
  altitude 1388
  previous 1416GOAL178 DIAL DIAL T Ignore-Altitude

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PROCEDURAL 193.577 SubGoal checking Autopilot
VISUAL 194.800 otw_runway Value out-of-sight
VISUAL 195.645 autopilots Value up
VISUAL 196.679 altitude Value 1365
**Goal180 7.786
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1365
    decision Engaged
    decision-altitude 600GOAL180 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 197.381 SubGoal checking Altitude
VISUAL 198.319 altitude Value 1355
**Goal184 4.927
    isa CHECK-ALTITUDE
    altitude 1355
    previous 1388GOAL184 DIAL DIAL T Ignore-Altitude
PROCEDURAL 198.974 SubGoal setting Dial Altitude
VISUAL 200.127 waypoint Value 4
RETRIEVAL 200.277 Altitude 700
VISUAL 201.253 dial-altitude Value 700
PROCEDURAL 201.303 Confirm Altitude already set to 700
**Goal186 5.124
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL186 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 201.909 SubGoal checking Altitude
VISUAL 202.738 altitude Value 1329
**Goal189 5.123
    isa CHECK-ALTITUDE
    altitude 1329
    previous 1355GOAL189 DIAL DIAL T Ignore-Altitude
PROCEDURAL 203.396 SubGoal setting Dial Altitude
VISUAL 204.345 waypoint Value 4
RETRIEVAL 204.495 Altitude 700
VISUAL 205.407 dial-altitude Value 700
PROCEDURAL 205.457 Confirm Altitude already set to 700
**Goal191 4.860
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL191 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 206.066 SubGoal checking Altitude
VISUAL 207.175 altitude Value 1302
**Goal194 5.069
    isa CHECK-ALTITUDE
    altitude 1302
    previous 1329GOAL194 DIAL DIAL T Ignore-Altitude
PROCEDURAL 207.831 SubGoal setting Dial Altitude
VISUAL 209.095 waypoint Value 4
RETRIEVAL 209.295 Altitude 700
VISUAL 210.211 dial-altitude Value 700
PROCEDURAL 210.261 Confirm Altitude already set to 700
**Goal196 4.999
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL196 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 210.868 SubGoal checking Altitude
VISUAL 212.112 altitude Value 1273

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**Goal199      4.822
  isa CHECK-ALTITUDE
  altitude 1273
  previous 1302GOAL199 DIAL DIAL T Ignore-Altitude
PROCEDURAL 212.768 SubGoal setting Dial Altitude
VISUAL 213.934 waypoint Value 4
RETRIEVAL 214.084 Altitude 700
VISUAL 215.116 dial-altitude Value 700
PROCEDURAL 215.166 Confirm Altitude already set to 700
**Goal201      4.874
  isa DIAL-ALTITUDE
  waypoint 4
  altitude 700GOAL201 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 215.773 SubGoal checking Altitude
VISUAL 217.060 altitude Value 1243
**Goal204      5.023
  isa CHECK-ALTITUDE
  altitude 1243
  previous 1273GOAL204 DIAL DIAL T Ignore-Altitude
PROCEDURAL 217.715 SubGoal setting Dial Altitude
VISUAL 218.570 waypoint Value 4
RETRIEVAL 218.720 Altitude 700
VISUAL 219.481 dial-altitude Value 700
PROCEDURAL 219.531 Confirm Altitude already set to 700
**Goal206      5.403
  isa DIAL-ALTITUDE
  waypoint 4
  altitude 700GOAL206 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 220.138 SubGoal checking Altitude
VISUAL 221.024 altitude Value 1220
**Goal209      4.853
  isa CHECK-ALTITUDE
  altitude 1220
  previous 1243GOAL209 DIAL DIAL T Ignore-Altitude
PROCEDURAL 221.679 SubGoal checking Autopilot
VISUAL 222.700 otw_runway Value out-of-sight
VISUAL 223.913 autopilots Value up
VISUAL 225.022 altitude Value 1196
**Goal211      8.102
  isa SET-AUTOPILOT
  visibility Out-Of-Sight
  peek 1196
  decision Engaged
  decision-altitude 600GOAL211 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 225.723 SubGoal checking Altitude
VISUAL 226.740 altitude Value 1186
**Goal215      5.075
  isa CHECK-ALTITUDE
  altitude 1186
  previous 1220GOAL215 DIAL DIAL T Ignore-Altitude
PROCEDURAL 227.396 SubGoal setting Dial Altitude
VISUAL 228.597 waypoint Value 4
RETRIEVAL 228.747 Altitude 700
VISUAL 229.685 dial-altitude Value 700
PROCEDURAL 229.735 Confirm Altitude already set to 700
**Goal217      5.003
  isa DIAL-ALTITUDE

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waypoint 4
    altitude 700GOAL217 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 230.340 SubGoal checking Altitude
VISUAL 231.536 altitude Value 1157
**Goal220 4.823
    isa CHECK-ALTITUDE
    altitude 1157
    previous 1186GOAL220 DIAL DIAL T Ignore-Altitude
PROCEDURAL 232.192 SubGoal setting Dial Altitude
VISUAL 233.306 waypoint Value 4
RETRIEVAL 233.456 Altitude 700
VISUAL 234.476 dial-altitude Value 700
PROCEDURAL 234.526 Confirm Altitude already set to 700
**Goal222 4.978
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL222 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 235.132 SubGoal checking Altitude
VISUAL 235.935 altitude Value 1131
**Goal225 5.142
    isa CHECK-ALTITUDE
    altitude 1131
    previous 1157GOAL225 DIAL DIAL T Ignore-Altitude
PROCEDURAL 236.591 SubGoal checking Autopilot
VISUAL 237.585 atc Value random-no-listen
VISUAL 237.585 otw_runway Value out-of-sight
VISUAL 238.707 autopilots Value up
VISUAL 239.596 altitude Value 1109
**Goal227 7.800
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1109
    decision Engaged
    decision-altitude 600GOAL227 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 240.297 SubGoal checking Altitude
VISUAL 241.233 altitude Value 1099
**Goal231 5.066
    isa CHECK-ALTITUDE
    altitude 1099
    previous 1131GOAL231 DIAL DIAL T Ignore-Altitude
PROCEDURAL 241.893 SubGoal checking Autopilot
VISUAL 242.853 otw_runway Value out-of-sight
VISUAL 244.038 autopilots Value up
VISUAL 245.121 altitude Value 1076
**Goal233 7.763
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1076
    decision Engaged
    decision-altitude 600GOAL233 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 245.823 SubGoal checking Altitude
VISUAL 246.650 altitude Value 1066
**Goal237 5.316
    isa CHECK-ALTITUDE
    altitude 1066
    previous 1099GOAL237 DIAL DIAL T Ignore-Altitude
PROCEDURAL 247.309 SubGoal setting Dial Altitude

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VISUAL 248.200 waypoint Value 4
RETRIEVAL 248.350 Altitude 700
VISUAL 249.597 dial-altitude Value 700
PROCEDURAL 249.647 Confirm Altitude already set to 700
**Goal1239 4.942
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL239 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 250.254 SubGoal checking Altitude
VISUAL 251.214 altitude Value 1039
**Goal1242 5.088
    isa CHECK-ALTITUDE
    altitude 1039
    previous 1066GOAL242 DIAL DIAL T Ignore-Altitude
PROCEDURAL 251.869 SubGoal setting Dial Altitude
VISUAL 252.824 waypoint Value 4
RETRIEVAL 252.974 Altitude 700
VISUAL 254.194 dial-altitude Value 700
PROCEDURAL 254.244 Confirm Altitude already set to 700
**Goal1244 4.984
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL244 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 254.852 SubGoal checking Altitude
VISUAL 255.853 altitude Value 1011
**Goal1247 4.798
    isa CHECK-ALTITUDE
    altitude 1011
    previous 1039GOAL247 DIAL DIAL T Ignore-Altitude
PROCEDURAL 256.510 SubGoal setting Dial Altitude
VISUAL 257.362 waypoint Value 4
RETRIEVAL 257.512 Altitude 700
VISUAL 258.594 dial-altitude Value 700
PROCEDURAL 258.644 Confirm Altitude already set to 700
**Goal1249 4.914
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL249 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 259.251 SubGoal checking Altitude
VISUAL 260.501 altitude Value 963
**Goal1252 4.933
    isa CHECK-ALTITUDE
    altitude 963
    previous 1011GOAL252 DIAL DIAL T Ignore-Altitude
PROCEDURAL 261.157 SubGoal setting Dial Altitude
VISUAL 262.365 waypoint Value 5
RETRIEVAL 262.515 Altitude 500
VISUAL 263.710 dial-altitude Value 700
MANUAL 266.794 dial-altitude set 500
**Goal1254 5.327
    isa DIAL-ALTITUDE
    waypoint 5
    altitude 500GOAL254 DIAL DIAL T Dial-Altitude
PROCEDURAL 267.400 SubGoal checking Altitude
VISUAL 268.343 altitude Value 859
**Goal1258 4.898
    isa CHECK-ALTITUDE

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    altitude 859
    previous 963GOAL258 DIAL DIAL T Ignore-Altitude
PROCEDURAL 269.000 SubGoal setting Dial Altitude
VISUAL 269.927 waypoint Value 5
RETRIEVAL 270.077 Altitude 500
VISUAL 271.261 dial-altitude Value 500
PROCEDURAL 271.311 Confirm Altitude already set to 500
**Goal260 5.166
    isa DIAL-ALTITUDE
    waypoint 5
    altitude 500GOAL260 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 271.918 SubGoal checking Altitude
VISUAL 272.827 altitude Value 798
**Goal263 4.772
    isa CHECK-ALTITUDE
    altitude 798
    previous 859GOAL263 DIAL DIAL T Ignore-Altitude
PROCEDURAL 273.480 SubGoal setting Dial Altitude
VISUAL 274.351 waypoint Value 5
RETRIEVAL 274.501 Altitude 500
VISUAL 275.740 dial-altitude Value 500
PROCEDURAL 275.790 Confirm Altitude already set to 500
**Goal265 5.198
    isa DIAL-ALTITUDE
    waypoint 5
    altitude 500GOAL265 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 276.397 SubGoal checking Autopilot
VISUAL 277.602 otw_runway Value out-of-sight
VISUAL 278.677 autopilots Value up
VISUAL 279.711 altitude Value 706
**Goal268 7.751
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 706
    decision Engaged
    decision-altitude 600GOAL268 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 280.412 SubGoal checking Altitude
VISUAL 281.550 altitude Value 665
**Goal272 4.872
    isa CHECK-ALTITUDE
    altitude 665
    previous 798GOAL272 DIAL DIAL T Ignore-Altitude
PROCEDURAL 282.207 SubGoal setting Dial Altitude
VISUAL 283.282 waypoint Value 6
RETRIEVAL 283.432 Altitude 500
VISUAL 284.661 dial-altitude Value 500
PROCEDURAL 284.711 Confirm Altitude already set to 500
**Goal274 4.883
    isa DIAL-ALTITUDE
    waypoint 6
    altitude 500GOAL274 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 285.318 SubGoal checking Altitude
VISUAL 286.270 altitude Value 580
**Goal277 5.019
    isa CHECK-ALTITUDE
    altitude 580
    previous 665GOAL277 DIAL DIAL T Ignore-Altitude

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PROCEDURAL 286.926 SubGoal checking Autopilot
VISUAL 288.059 otw_runway Value runway-traffic
VISUAL 289.182 autopilots Value up
PROCEDURAL 289.232 Traffic on runway -- going around
MANUAL 291.328 autopilots up/down 0
VISUAL 292.602 altitude Value 723
**Goal279 9.766
    isa SET-AUTOPILOT
    visibility Runway-Traffic
    peek Looking
    decision Disengaged
    decision-altitude 600GOAL279 DIAL DIAL T Peek

*** Finis ***

*** Setting ModelDone to 1***

MCP NAV PFD SVS CONTROLS OTW off Total-time
71.03262 49.838284 56.374763 0 44.248768 59.58216 12.075104 293.1517
EMC End:T 293.1517

Look 1.0 Action 2.5 Listen 0.5 Ans 0.1

;; Factory is idle.
```

4-Baseline IMC Nominal landing (land on parallel runway)

dribbling to file "Baseline-IMC-vectored.drb"

```
Factory Started
CL-USER(1): (register-server)
Registered Server EMC_NASAHPM.EMCReceiveCOMMessages
NIL
CL-USER(2):
Subject 0 Trial 0 Run 1
Initializing control

Control      4.555
  isa CONTROL
  speed 200.0d0
  altitude 2500.0d0
  waypoint nil
  distance nil
  flaps 5
  decision-altitude 600
  landing-gear Up
  airbrakes Off
  autopilots Engaged
  task nil
  last-task nil
  status Active
  landing-checklist nil
VISUAL      0.000 flaps Value 5
CHUNK NIL IS UNDEFINED.
CHUNK NIL IS UNDEFINED.
PROCEDURAL   1.271 Preparing for approach: engaging Autopilot
VISUAL      1.271 autopilots Value up
PROCEDURAL   3.516 Preparing for approach: setting Flaps 1
MANUAL      3.516 flaps set 1
PROCEDURAL   4.690 Preparing for approach: setting LNAV
VISUAL      4.690 distance-next Value 1
PROCEDURAL   8.378 Preparing for approach: engaging Speed-brakes full
MANUAL      8.378 airbrakes on/off 0
PROCEDURAL   9.289 Preparing for approach: setting VNAV
VISUAL      9.289 waypoint Value 1
PROCEDURAL   9.446 SubGoal checking Landing Gear
VISUAL      10.300 waypoint Value 1
VISUAL      11.593 distance-next Value 0
RETRIEVAL    11.693 Waypoint 1 Next 0 Distance 15
VISUAL      12.879 landing-gear Value up
PROCEDURAL   12.929 Lowering Gear
MANUAL      14.912 landing-gear up/down 0
**Goal6     8.871
  isa MOVE-GEAR
  waypoint 1
  distance-next 0
  distance 15
  decision DownGOAL6 DIAL DIAL T Move-Gear
PROCEDURAL   15.516 SubGoal checking Autopilot
VISUAL      16.667 otw_runway Value out-of-sight
VISUAL      17.956 autopilots Value up
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VISUAL 19.155 altitude Value 2500
**Goal11 8.635
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 2500
    decision Engaged
    decision-altitude 600GOAL11 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 19.856 SubGoal checking Decision Altitude
VISUAL 20.705 waypoint Value 2
VISUAL 21.966 distance-next Value 4
RETRIEVAL 22.066 Waypoint 2 Next 4 Distance 15
**Goal15 4.718
    isa SET-DECISION-ALTITUDE
    waypoint 2
    distance-next 4
    distance 15
    old 600
    decision 600GOAL15 DIAL DIAL T Ignore-Decision-Altitude
PROCEDURAL 22.722 SubGoal checking Speed
VISUAL 23.799 waypoint Value 2
VISUAL 24.843 distance-next Value 3
RETRIEVAL 24.943 Waypoint 2 Next 3 Distance 14
RETRIEVAL 25.043 Speed
VISUAL 25.887 dial-speed Value 200
MANUAL 28.483 dial-speed set 165
**Goal18 5.165
    isa SET-SPEED
    waypoint 2
    distance-next 3
    distance 14
    speed 165GOAL18 DIAL DIAL T Dial-Speed
PROCEDURAL 29.089 SubGoal checking Speed Brakes
VISUAL 29.907 speed Value 199
VISUAL 30.816 airbrakes Value on
PROCEDURAL 30.866 Setting Speed Brakes
MANUAL 33.026 airbrakes on/off 0
**Goal23 8.451
    isa SPEED-BRAKES
    speed 199
    decision OffGOAL23 DIAL DIAL T Set-Speed-Brakes
PROCEDURAL 33.626 SubGoal checking Flaps
VISUAL 34.441 speed Value 195
RETRIEVAL 34.641 Flaps 20
VISUAL 35.558 flaps Value 1
MANUAL 38.480 flaps set 20
**Goal27 4.811
    isa SET-FLAP
    speed 195
    flap 20GOAL27 DIAL DIAL T Set-Flaps
PROCEDURAL 39.087 SubGoal setting Dial Altitude
VISUAL 40.184 waypoint Value 2
RETRIEVAL 40.334 Altitude 1800
VISUAL 41.157 dial-altitude Value 2500
MANUAL 43.259 dial-altitude set 1800
**Goal31 4.668
    isa DIAL-ALTITUDE
    waypoint 2

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```

    altitude 1800GOAL31 DIAL DIAL T Dial-Altitude
PROCEDURAL 43.865 SubGoal checking Altitude
VISUAL 45.043 altitude Value 2500
**Goal35 5.033
    isa CHECK-ALTITUDE
    altitude 2500
    previous 2500.0d0GOAL35 DIAL DIAL T Ignore-Altitude
PROCEDURAL 45.702 SubGoal checking Decision Altitude
VISUAL 46.721 waypoint Value 2
VISUAL 47.623 distance-next Value 2
RETRIEVAL 47.723 Waypoint 2 Next 2 Distance 13
**Goal37 5.217
    isa SET-DECISION-ALTITUDE
    waypoint 2
    distance-next 2
    distance 13
    old 600
    decision 600GOAL37 DIAL DIAL T Ignore-Decision-Altitude
PROCEDURAL 48.383 SubGoal checking Landing Gear
VISUAL 49.631 waypoint Value 2
VISUAL 50.778 distance-next Value 2
RETRIEVAL 50.878 Waypoint 2 Next 2 Distance 13
VISUAL 52.059 landing-gear Value down
**Goal40 8.526
    isa MOVE-GEAR
    waypoint 2
    distance-next 2
    distance 13
    decision DownGOAL40 DIAL DIAL T Decide-Gear
PROCEDURAL 52.659 SubGoal checking Autopilot
VISUAL 53.900 otw_runway Value out-of-sight
VISUAL 55.110 autopilots Value up
VISUAL 56.370 altitude Value 2500
**Goal44 8.450
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 2500
    decision Engaged
    decision-altitude 600GOAL44 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 57.071 SubGoal checking Speed
VISUAL 58.181 waypoint Value 2
VISUAL 59.487 distance-next Value 1
RETRIEVAL 59.587 Waypoint 2 Next 1 Distance 12
RETRIEVAL 59.687 Speed
VISUAL 60.761 dial-speed Value 165
MANUAL 62.954 dial-speed set 140
**Goal48 4.711
    isa SET-SPEED
    waypoint 2
    distance-next 1
    distance 12
    speed 140GOAL48 DIAL DIAL T Dial-Speed
PROCEDURAL 63.564 SubGoal checking Speed Brakes
VISUAL 64.679 speed Value 171
VISUAL 65.779 airbrakes Value off
**Goal53 8.476
    isa SPEED-BRAKES

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speed 171
decision OffGOAL53 DIAL DIAL T Decide-Speed-Brakes
PROCEDURAL 66.379 SubGoal checking Altitude
VISUAL 67.599 altitude Value 2500
**Goal56 4.986
isa CHECK-ALTITUDE
altitude 2500
previous 2500GOAL56 DIAL DIAL T Ignore-Altitude
PROCEDURAL 68.255 SubGoal checking Flaps
VISUAL 69.202 speed Value 167
RETRIEVAL 69.352 Flaps 25
VISUAL 70.246 flaps Value 20
MANUAL 72.971 flaps set 25
**Goal58 5.223
isa SET-FLAP
speed 167
flap 25GOAL58 DIAL DIAL T Set-Flaps
PROCEDURAL 73.577 SubGoal setting Dial Altitude
VISUAL 74.605 waypoint Value 2
RETRIEVAL 74.805 Altitude 1800
VISUAL 75.568 dial-altitude Value 1800
PROCEDURAL 75.618 Confirm Altitude already set to 1800
**Goal62 5.309
isa DIAL-ALTITUDE
waypoint 2
altitude 1800GOAL62 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 76.225 SubGoal checking Decision Altitude
VISUAL 77.291 waypoint Value 2
VISUAL 78.575 distance-next Value 0
RETRIEVAL 78.675 Waypoint 2 Next 0 Distance 11
**Goal65 4.696
isa SET-DECISION-ALTITUDE
waypoint 2
distance-next 0
distance 11
old 600
decision 600GOAL65 DIAL DIAL T Ignore-Decision-Altitude
PROCEDURAL 79.333 SubGoal checking Autopilot
VISUAL 80.388 atc Value random-listen
VISUAL 80.388 otw_runway Value out-of-sight
VISUAL 81.645 autopilots Value up
VISUAL 82.768 altitude Value 2500
**Goal68 8.259
isa SET-AUTOPILOT
visibility Out-Of-Sight
peek 2500
decision Engaged
decision-altitude 600GOAL68 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 83.469 SubGoal checking Altitude
VISUAL 84.513 atc Value ten-miles-out
VISUAL 84.513 altitude Value 2496
**Goal72 5.059
isa CHECK-ALTITUDE
altitude 2496
previous 2500GOAL72 DIAL DIAL T Ignore-Altitude
PROCEDURAL 85.171 SubGoal checking Speed Brakes
VISUAL 86.221 speed Value 158

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VISUAL 87.555 airbrakes Value off
**Goal74 8.300
  isa SPEED-BRAKES
  speed 158
  decision OffGOAL74 DIAL DIAL T Decide-Speed-Brakes
PROCEDURAL 88.155 SubGoal checking Landing Gear
VISUAL 88.978 waypoint Value 3
VISUAL 89.869 distance-next Value 2
RETRIEVAL 89.969 Waypoint 3 Next 2 Distance 11
VISUAL 91.033 landing-gear Value down
**Goal77 8.397
  isa MOVE-GEAR
  waypoint 3
  distance-next 2
  distance 11
  decision DownGOAL77 DIAL DIAL T Decide-Gear
PROCEDURAL 91.633 SubGoal setting Dial Altitude
VISUAL 92.912 waypoint Value 3
RETRIEVAL 93.062 Altitude 1000
VISUAL 93.867 dial-altitude Value 1800
MANUAL 96.086 dial-altitude set 1000
**Goal81 4.693
  isa DIAL-ALTITUDE
  waypoint 3
  altitude 1000GOAL81 DIAL DIAL T Dial-Altitude
PROCEDURAL 96.694 SubGoal checking Decision Altitude
VISUAL 97.875 waypoint Value 3
VISUAL 99.054 distance-next Value 1
RETRIEVAL 99.155 Waypoint 3 Next 1 Distance 10
**Goal85 5.022
  isa SET-DECISION-ALTITUDE
  waypoint 3
  distance-next 1
  distance 10
  old 600
  decision 600GOAL85 DIAL DIAL T Ignore-Decision-Altitude
PROCEDURAL 99.811 SubGoal checking Speed
VISUAL 101.078 waypoint Value 3
VISUAL 102.207 distance-next Value 1
RETRIEVAL 102.307 Waypoint 3 Next 1 Distance 10
RETRIEVAL 102.407 Speed
VISUAL 103.466 dial-speed Value 140
PROCEDURAL 103.516 Confirm Speed already set to 140
**Goal88 4.903
  isa SET-SPEED
  waypoint 3
  distance-next 1
  distance 10
  speed 140GOAL88 DIAL DIAL T Speed-Already-Dialed
PROCEDURAL 104.122 SubGoal checking Altitude
VISUAL 104.967 altitude Value 2138
**Goal92 4.653
  isa CHECK-ALTITUDE
  altitude 2138
  previous 2496GOAL92 DIAL DIAL T Read-Altitude
PROCEDURAL 105.623 SubGoal checking Flaps
VISUAL 106.915 speed Value 154

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RETRIEVAL 107.065 Flaps 20
VISUAL 108.012 flaps Value 25
MANUAL 110.340 flaps set 20
**Goal94 5.124
    isa SET-FLAP
    speed 154
    flap 20GOAL94 DIAL DIAL T Set-Flaps
PROCEDURAL 110.948 SubGoal checking Altitude
VISUAL 111.836 altitude Value 2019
**Goal98 5.043
    isa CHECK-ALTITUDE
    altitude 2019
    previous 2138GOAL98 DIAL DIAL T Ignore-Altitude
PROCEDURAL 112.494 SubGoal checking Landing Gear
VISUAL 113.443 waypoint Value 3
VISUAL 114.668 distance-next Value 0
RETRIEVAL 114.768 Waypoint 3 Next 0 Distance 9
VISUAL 115.978 landing-gear Value down
**Goal100 8.009
    isa MOVE-GEAR
    waypoint 3
    distance-next 0
    distance 9
    decision DownGOAL100 DIAL DIAL T Decide-Gear
PROCEDURAL 116.578 SubGoal checking Speed Brakes
VISUAL 117.383 speed Value 151
VISUAL 118.512 airbrakes Value off
**Goal104 7.915
    isa SPEED-BRAKES
    speed 151
    decision OffGOAL104 DIAL DIAL T Decide-Speed-Brakes
PROCEDURAL 119.112 SubGoal checking Altitude
VISUAL 120.172 altitude Value 1878
**Goal107 4.984
    isa CHECK-ALTITUDE
    altitude 1878
    previous 2019GOAL107 DIAL DIAL T Ignore-Altitude
PROCEDURAL 120.835 SubGoal checking Autopilot
VISUAL 121.789 otw_runway Value out-of-sight
VISUAL 122.635 autopilots Value up
VISUAL 123.630 altitude Value 1820
**Goal109 8.670
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1820
    decision Engaged
    decision-altitude 600GOAL109 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 124.331 SubGoal setting Dial Altitude
VISUAL 125.567 waypoint Value 4
RETRIEVAL 125.717 Altitude 700
VISUAL 126.906 dial-altitude Value 1000
MANUAL 129.938 dial-altitude set 700
**Goal113 4.968
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL113 DIAL DIAL T Dial-Altitude
PROCEDURAL 130.545 SubGoal completing landing checklist

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PROCEDURAL 133.277 Landing checklist: preparing cabin for landing
 VOCAL 133.277 nothing communication 2007
 PROCEDURAL 135.653 Landing checklist: setting Gear down 1
 MANUAL 135.653 landing-gear up/down 0
 PROCEDURAL 138.044 Landing checklist: setting Speed to 135
 MANUAL 138.044 speed set 135
 VISUAL 138.044 speed Value 147
 CHUNK NIL IS UNDEFINED.
 CHUNK NIL IS UNDEFINED.
 PROCEDURAL 140.657 Landing checklist: setting Flaps 15
 MANUAL 140.657 flaps set 15
 PROCEDURAL 144.734 Landing checklist: setting Speed-brakes to armed
 MANUAL 144.734 airbrakes on/off 0
 VOCAL 144.784 Landing Checklist Complete
 PROCEDURAL 144.942 SubGoal checking Altitude
 VISUAL 145.997 altitude Value 1668
 **Goal124 5.034
 isa CHECK-ALTITUDE
 altitude 1668
 previous 1878GOAL124 DIAL DIAL T Read-Altitude
 PROCEDURAL 146.653 SubGoal checking Autopilot
 VISUAL 147.624 otw_runway Value out-of-sight
 VISUAL 148.761 autopilots Value up
 VISUAL 150.056 altitude Value 1642
 **Goal126 8.501
 isa SET-AUTOPILOT
 visibility Out-Of-Sight
 peek 1642
 decision Engaged
 decision-altitude 600GOAL126 DIAL DIAL T Ignore-Autopilot
 PROCEDURAL 150.757 SubGoal checking Altitude
 VISUAL 151.826 altitude Value 1632
 **Goal130 4.737
 isa CHECK-ALTITUDE
 altitude 1632
 previous 1668GOAL130 DIAL DIAL T Ignore-Altitude
 PROCEDURAL 152.485 SubGoal setting Dial Altitude
 VISUAL 153.358 waypoint Value 4
 RETRIEVAL 153.508 Altitude 700
 VISUAL 154.444 dial-altitude Value 700
 PROCEDURAL 154.494 Confirm Altitude already set to 700
 **Goal132 5.117
 isa DIAL-ALTITUDE
 waypoint 4
 altitude 700GOAL132 DIAL DIAL T Dial-Altitude-Already-Dialed
 PROCEDURAL 155.100 SubGoal checking Altitude
 VISUAL 156.364 altitude Value 1603
 **Goal135 4.838
 isa CHECK-ALTITUDE
 altitude 1603
 previous 1632GOAL135 DIAL DIAL T Ignore-Altitude
 PROCEDURAL 157.019 SubGoal checking Autopilot
 VISUAL 157.862 atc Value random-listen
 VISUAL 157.862 otw_runway Value out-of-sight
 VISUAL 159.139 autopilots Value up
 VISUAL 160.340 altitude Value 1579
 **Goal137 8.267

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isa SET-AUTOPILOT
visibility Out-Of-Sight
peek 1579
decision Engaged
decision-altitude 600GOAL137 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 161.041 SubGoal checking Altitude
VISUAL 162.040 altitude Value 1569
**Goal141 4.991
  isa CHECK-ALTITUDE
  altitude 1569
  previous 1603GOAL141 DIAL DIAL T Ignore-Altitude
PROCEDURAL 162.696 SubGoal setting Dial Altitude
VISUAL 163.630 waypoint Value 4
RETRIEVAL 163.830 Altitude 700
VISUAL 164.995 dial-altitude Value 700
PROCEDURAL 165.045 Confirm Altitude already set to 700
**Goal143 4.965
  isa DIAL-ALTITUDE
  waypoint 4
  altitude 700GOAL143 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 165.652 SubGoal checking Altitude
VISUAL 166.901 altitude Value 1540
**Goal146 4.699
  isa CHECK-ALTITUDE
  altitude 1540
  previous 1569GOAL146 DIAL DIAL T Ignore-Altitude
PROCEDURAL 167.556 SubGoal checking Autopilot
VISUAL 168.589 otw_runway Value out-of-sight
VISUAL 169.597 autopilots Value up
VISUAL 170.459 altitude Value 1518
**Goal148 8.374
  isa SET-AUTOPILOT
  visibility Out-Of-Sight
  peek 1518
  decision Engaged
  decision-altitude 600GOAL148 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 171.160 SubGoal checking Altitude
VISUAL 172.025 altitude Value 1509
**Goal152 4.923
  isa CHECK-ALTITUDE
  altitude 1509
  previous 1540GOAL152 DIAL DIAL T Ignore-Altitude
PROCEDURAL 172.683 SubGoal setting Dial Altitude
VISUAL 173.750 waypoint Value 4
RETRIEVAL 173.900 Altitude 700
VISUAL 174.830 dial-altitude Value 700
PROCEDURAL 174.880 Confirm Altitude already set to 700
**Goal154 4.955
  isa DIAL-ALTITUDE
  waypoint 4
  altitude 700GOAL154 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 175.487 SubGoal checking Altitude
VISUAL 176.771 altitude Value 1480
**Goal157 4.887
  isa CHECK-ALTITUDE
  altitude 1480
  previous 1509GOAL157 DIAL DIAL T Ignore-Altitude

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PROCEDURAL 177.429 SubGoal checking Autopilot
VISUAL 178.327 otw_runway Value out-of-sight
VISUAL 179.551 autopilots Value up
VISUAL 180.580 altitude Value 1458
**Goal159 8.248
  isa SET-AUTOPILOT
  visibility Out-Of-Sight
  peek 1458
  decision Engaged
  decision-altitude 600GOAL159 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 181.281 SubGoal checking Altitude
VISUAL 182.427 altitude Value 1447
**Goal163 5.111
  isa CHECK-ALTITUDE
  altitude 1447
  previous 1480GOAL163 DIAL DIAL T Ignore-Altitude
PROCEDURAL 183.082 SubGoal setting Dial Altitude
VISUAL 184.164 waypoint Value 4
RETRIEVAL 184.314 Altitude 700
VISUAL 185.435 dial-altitude Value 700
PROCEDURAL 185.485 Confirm Altitude already set to 700
**Goal165 5.605
  isa DIAL-ALTITUDE
  waypoint 4
  altitude 700GOAL165 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 186.093 SubGoal checking Altitude
VISUAL 187.101 altitude Value 1419
**Goal168 4.909
  isa CHECK-ALTITUDE
  altitude 1419
  previous 1447GOAL168 DIAL DIAL T Ignore-Altitude
PROCEDURAL 187.760 SubGoal setting Dial Altitude
VISUAL 188.786 waypoint Value 4
RETRIEVAL 188.936 Altitude 700
VISUAL 189.969 dial-altitude Value 700
PROCEDURAL 190.019 Confirm Altitude already set to 700
**Goal170 4.953
  isa DIAL-ALTITUDE
  waypoint 4
  altitude 700GOAL170 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 190.627 SubGoal checking Altitude
VISUAL 191.448 altitude Value 1393
**Goal173 4.778
  isa CHECK-ALTITUDE
  altitude 1393
  previous 1419GOAL173 DIAL DIAL T Ignore-Altitude
PROCEDURAL 192.102 SubGoal setting Dial Altitude
VISUAL 193.161 waypoint Value 4
RETRIEVAL 193.311 Altitude 700
VISUAL 194.093 dial-altitude Value 700
PROCEDURAL 194.143 Confirm Altitude already set to 700
**Goal175 5.009
  isa DIAL-ALTITUDE
  waypoint 4
  altitude 700GOAL175 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 194.750 SubGoal checking Altitude
VISUAL 195.674 altitude Value 1367

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**Goal178      4.992
  isa CHECK-ALTITUDE
  altitude 1367
  previous 1393GOAL178 DIAL DIAL T Ignore-Altitude
PROCEDURAL 196.329 SubGoal setting Dial Altitude
VISUAL 197.219 waypoint Value 4
RETRIEVAL 197.369 Altitude 700
VISUAL 198.607 dial-altitude Value 700
PROCEDURAL 198.657 Confirm Altitude already set to 700
**Goal180      4.578
  isa DIAL-ALTITUDE
  waypoint 4
  altitude 700GOAL180 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 199.267 SubGoal checking Altitude
VISUAL 200.431 altitude Value 1339
**Goal183      4.997
  isa CHECK-ALTITUDE
  altitude 1339
  previous 1367GOAL183 DIAL DIAL T Ignore-Altitude
PROCEDURAL 201.088 SubGoal checking Autopilot
VISUAL 202.306 otw_runway Value out-of-sight
VISUAL 203.352 autopilots Value up
VISUAL 204.572 altitude Value 1314
**Goal185      8.104
  isa SET-AUTOPILOT
  visibility Out-Of-Sight
  peek 1314
  decision Engaged
  decision-altitude 600GOAL185 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 205.273 SubGoal checking Altitude
VISUAL 206.438 altitude Value 1304
**Goal189      4.793
  isa CHECK-ALTITUDE
  altitude 1304
  previous 1339GOAL189 DIAL DIAL T Ignore-Altitude
PROCEDURAL 207.095 SubGoal setting Dial Altitude
VISUAL 208.174 waypoint Value 4
RETRIEVAL 208.324 Altitude 700
VISUAL 209.481 dial-altitude Value 700
PROCEDURAL 209.531 Confirm Altitude already set to 700
**Goal191      5.040
  isa DIAL-ALTITUDE
  waypoint 4
  altitude 700GOAL191 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 210.140 SubGoal checking Altitude
VISUAL 211.241 altitude Value 1275
**Goal194      4.826
  isa CHECK-ALTITUDE
  altitude 1275
  previous 1304GOAL194 DIAL DIAL T Ignore-Altitude
PROCEDURAL 211.898 SubGoal checking Autopilot
VISUAL 213.178 otw_runway Value out-of-sight
VISUAL 213.983 autopilots Value up
VISUAL 215.242 altitude Value 1251
**Goal196      8.091
  isa SET-AUTOPILOT
  visibility Out-Of-Sight

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peek 1251
decision Engaged
decision-altitude 600GOAL196 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 215.944 SubGoal checking Altitude
VISUAL 216.968 altitude Value 1240
**Goal200 4.979
    isa CHECK-ALTITUDE
    altitude 1240
    previous 1275GOAL200 DIAL DIAL T Ignore-Altitude
PROCEDURAL 217.627 SubGoal setting Dial Altitude
VISUAL 218.765 waypoint Value 4
RETRIEVAL 218.915 Altitude 700
VISUAL 220.161 dial-altitude Value 700
PROCEDURAL 220.211 Confirm Altitude already set to 700
**Goal202 5.205
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL202 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 220.818 SubGoal checking Altitude
VISUAL 221.865 altitude Value 1211
**Goal205 4.911
    isa CHECK-ALTITUDE
    altitude 1211
    previous 1240GOAL205 DIAL DIAL T Ignore-Altitude
PROCEDURAL 222.522 SubGoal setting Dial Altitude
VISUAL 223.793 waypoint Value 4
RETRIEVAL 223.943 Altitude 700
VISUAL 225.104 dial-altitude Value 700
PROCEDURAL 225.154 Confirm Altitude already set to 700
**Goal207 5.249
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL207 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 225.761 SubGoal checking Altitude
VISUAL 226.670 altitude Value 1182
**Goal210 5.139
    isa CHECK-ALTITUDE
    altitude 1182
    previous 1211GOAL210 DIAL DIAL T Ignore-Altitude
PROCEDURAL 227.326 SubGoal setting Dial Altitude
VISUAL 228.203 waypoint Value 4
RETRIEVAL 228.353 Altitude 700
VISUAL 229.138 dial-altitude Value 700
PROCEDURAL 229.188 Confirm Altitude already set to 700
**Goal212 4.987
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL212 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 229.794 SubGoal checking Altitude
VISUAL 230.688 altitude Value 1158
**Goal215 5.149
    isa CHECK-ALTITUDE
    altitude 1158
    previous 1182GOAL215 DIAL DIAL T Ignore-Altitude
PROCEDURAL 231.345 SubGoal setting Dial Altitude
VISUAL 232.249 waypoint Value 4
RETRIEVAL 232.399 Altitude 700

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VISUAL 233.232 dial-altitude Value 700
PROCEDURAL 233.282 Confirm Altitude already set to 700
**Goal217 4.868
  isa DIAL-ALTITUDE
  waypoint 4
  altitude 700GOAL217 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 233.888 SubGoal checking Altitude
VISUAL 234.768 altitude Value 1134
**Goal220 4.896
  isa CHECK-ALTITUDE
  altitude 1134
  previous 1158GOAL220 DIAL DIAL T Ignore-Altitude
PROCEDURAL 235.424 SubGoal checking Autopilot
VISUAL 236.562 otw_runway Value out-of-sight
VISUAL 237.841 autopilots Value up
VISUAL 238.731 altitude Value 1111
**Goal222 7.992
  isa SET-AUTOPILOT
  visibility Out-Of-Sight
  peek 1111
  decision Engaged
  decision-altitude 600GOAL222 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 239.433 SubGoal checking Altitude
VISUAL 240.383 atc Value random-listen
VISUAL 240.383 altitude Value 1100
**Goal226 4.954
  isa CHECK-ALTITUDE
  altitude 1100
  previous 1134GOAL226 DIAL DIAL T Ignore-Altitude
PROCEDURAL 241.040 SubGoal setting Dial Altitude
VISUAL 241.862 waypoint Value 4
RETRIEVAL 242.012 Altitude 700
VISUAL 242.805 dial-altitude Value 700
PROCEDURAL 242.855 Confirm Altitude already set to 700
**Goal228 5.178
  isa DIAL-ALTITUDE
  waypoint 4
  altitude 700GOAL228 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 243.462 SubGoal checking Altitude
VISUAL 244.555 altitude Value 1075
**Goal231 4.916
  isa CHECK-ALTITUDE
  altitude 1075
  previous 1100GOAL231 DIAL DIAL T Ignore-Altitude
PROCEDURAL 245.211 SubGoal setting Dial Altitude
VISUAL 246.317 waypoint Value 4
RETRIEVAL 246.467 Altitude 700
VISUAL 247.646 dial-altitude Value 700
PROCEDURAL 247.696 Confirm Altitude already set to 700
**Goal233 4.883
  isa DIAL-ALTITUDE
  waypoint 4
  altitude 700GOAL233 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 248.301 SubGoal checking Altitude
VISUAL 249.374 altitude Value 1047
**Goal236 4.861
  isa CHECK-ALTITUDE

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    altitude 1047
    previous 1075GOAL236 DIAL DIAL T Ignore-Altitude
PROCEDURAL 250.031 SubGoal setting Dial Altitude
VISUAL 251.197 waypoint Value 4
RETRIEVAL 251.347 Altitude 700
VISUAL 252.339 dial-altitude Value 700
PROCEDURAL 252.389 Confirm Altitude already set to 700
**Goal238 4.611
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL238 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 252.999 SubGoal checking Altitude
VISUAL 254.076 altitude Value 1019
**Goal241 4.925
    isa CHECK-ALTITUDE
    altitude 1019
    previous 1047GOAL241 DIAL DIAL T Ignore-Altitude
PROCEDURAL 254.733 SubGoal setting Dial Altitude
VISUAL 255.954 waypoint Value 4
RETRIEVAL 256.104 Altitude 700
VISUAL 256.947 dial-altitude Value 700
PROCEDURAL 256.997 Confirm Altitude already set to 700
**Goal243 4.911
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL243 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 257.602 SubGoal checking Altitude
VISUAL 258.898 altitude Value 977
**Goal246 4.878
    isa CHECK-ALTITUDE
    altitude 977
    previous 1019GOAL246 DIAL DIAL T Ignore-Altitude
PROCEDURAL 259.558 SubGoal checking Autopilot
VISUAL 260.581 otw_runway Value out-of-sight
VISUAL 261.750 autopilots Value up
VISUAL 262.565 altitude Value 928
**Goal248 7.966
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 928
    decision Engaged
    decision-altitude 600GOAL248 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 263.266 SubGoal checking Altitude
VISUAL 264.270 altitude Value 905
**Goal252 5.071
    isa CHECK-ALTITUDE
    altitude 905
    previous 977GOAL252 DIAL DIAL T Ignore-Altitude
PROCEDURAL 264.926 SubGoal setting Dial Altitude
VISUAL 265.778 waypoint Value 5
RETRIEVAL 265.928 Altitude 500
VISUAL 266.697 dial-altitude Value 700
MANUAL 268.979 dial-altitude set 500
**Goal254 5.073
    isa DIAL-ALTITUDE
    waypoint 5
    altitude 500GOAL254 DIAL DIAL T Dial-Altitude

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PROCEDURAL 269.586 SubGoal checking Altitude
VISUAL 270.824 altitude Value 818
**Goal258 4.619
  isa CHECK-ALTITUDE
  altitude 818
  previous 905GOAL258 DIAL DIAL T Ignore-Altitude
PROCEDURAL 271.479 SubGoal checking Autopilot
VISUAL 272.407 otw_runway Value in-sight
VISUAL 273.661 autopilots Value up
PROCEDURAL 273.711 Disengage Autopilot and land
MANUAL 276.804 autopilots up/down 0
**Goal260 9.677
  isa SET-AUTOPILOT
  visibility In-Sight
  peek nil
  decision Disengaged
  decision-altitude 600GOAL260 DIAL DIAL T Disengage-Autopilot
```

*** Finis ***

*** Setting ModelDone to 1***

```
MCP NAV PFD SVS CONTROLS OTW off Total-time
61.97901 48.263695 55.97228 0 47.154587 52.54387 11.446228 277.35968
EMC End:T 277.35968
```

Look 1.0 Action 2.5 Listen 0.5 Ans 0.1

; ; Factory is idle.

5-Baseline IMC Missed approach (go around)

dribbling to file "Baseline-IMC-missed.drb"

```
Factory Started
CL-USER(1): (register-server)
Registered Server EMC_NASAHPM.EMCReceiveCOMMessages
NIL
CL-USER(2):
Subject 0 Trial 0 Run 1
Initializing control

Control      5.116
  isa CONTROL
  speed 200.0d0
  altitude 2500.0d0
  waypoint nil
  distance nil
  flaps 5
  decision-altitude 600
  landing-gear Up
  airbrakes Off
  autopilots Engaged
  task nil
  last-task nil
  status Active
  landing-checklist nil
VISUAL      0.000 flaps Value 5
CHUNK NIL IS UNDEFINED.
CHUNK NIL IS UNDEFINED.
PROCEDURAL   1.074 Preparing for approach: setting VNAV
VISUAL      1.074 waypoint Value 1
PROCEDURAL   1.948 Preparing for approach: engaging Autopilot
VISUAL      1.948 autopilots Value up
PROCEDURAL   5.059 Preparing for approach: setting Flaps 1
MANUAL      5.059 flaps set 1
PROCEDURAL   8.122 Preparing for approach: engaging Speed-brakes full
MANUAL      8.122 airbrakes on/off 0
PROCEDURAL   9.115 Preparing for approach: setting LNAV
VISUAL      9.115 distance-next Value 0
PROCEDURAL   9.270 SubGoal setting Dial Altitude
VISUAL      10.359 waypoint Value 1
RETRIEVAL    10.559 Altitude 2500
VISUAL      11.702 dial-altitude Value 2500
PROCEDURAL   11.752 Confirm Altitude already set to 2500
**Goal6     4.871
  isa DIAL-ALTITUDE
  waypoint 1
  altitude 2500GOAL6 DIAL NIL NIL Dial-Altitude-Already-Dialed
PROCEDURAL   13.360 SubGoal checking Speed
VISUAL      14.325 waypoint Value 1
VISUAL      15.240 distance-next Value 0
RETRIEVAL    15.340 Waypoint 1 Next 0 Distance 15
RETRIEVAL    15.490 Speed
VISUAL      16.375 dial-speed Value 200
MANUAL      19.368 dial-speed set 160
```

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**Goal9      5.217
  isa SET-SPEED
  waypoint 1
  distance-next 0
  distance 15
  speed 160GOAL9 DIAL DIAL T Dial-Speed
PROCEDURAL  19.975 SubGoal checking Flaps
VISUAL    20.780 speed Value 199
RETRIEVAL   20.930 Flaps 1
VISUAL    21.842 flaps Value 1
PROCEDURAL  21.892 Confirm Flaps already set to 1
**Goal14     4.946
  isa SET-FLAP
  speed 199
  flap 1GOAL14 DIAL DIAL T Flaps-Already-Set
PROCEDURAL  22.500 SubGoal checking Speed Brakes
VISUAL    23.469 speed Value 197
VISUAL    24.770 airbrakes Value on
PROCEDURAL  24.820 Setting Speed Brakes
MANUAL    27.021 airbrakes on/off 0
**Goal17     8.995
  isa SPEED-BRAKES
  speed 197
  decision OffGOAL17 DIAL DIAL T Set-Speed-Brakes
PROCEDURAL  27.621 SubGoal checking Decision Altitude
VISUAL    28.638 waypoint Value 2
VISUAL    29.663 distance-next Value 3
RETRIEVAL   29.763 Waypoint 2 Next 3 Distance 14
**Goal21     5.201
  isa SET-DECISION-ALTITUDE
  waypoint 2
  distance-next 3
  distance 14
  old 600
  decision 600GOAL21 DIAL DIAL T Ignore-Decision-Altitude
PROCEDURAL  30.421 SubGoal checking Autopilot
VISUAL    31.698 otw_runway Value out-of-sight
VISUAL    32.877 autopilots Value up
VISUAL    34.154 altitude Value 2500
**Goal24     8.638
  isa SET-AUTOPILOT
  visibility Out-Of-Sight
  peek 2500
  decision Engaged
  decision-altitude 600GOAL24 DIAL DIAL T Ignore-Autopilot
PROCEDURAL  34.855 SubGoal checking Altitude
VISUAL    35.809 altitude Value 2500
**Goal28     4.910
  isa CHECK-ALTITUDE
  altitude 2500
  previous 2500.0d0GOAL28 DIAL DIAL T Ignore-Altitude
PROCEDURAL  36.466 SubGoal checking Landing Gear
VISUAL    37.374 waypoint Value 2
VISUAL    38.549 distance-next Value 3
RETRIEVAL   38.649 Waypoint 2 Next 3 Distance 14
VISUAL    39.948 landing-gear Value up
PROCEDURAL  39.998 Lowering Gear

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MANUAL    42.094 landing-gear up/down 0
**Goal30   9.271
  isa MOVE-GEAR
  waypoint 2
  distance-next 3
  distance 14
  decision DownGOAL30 DIAL DIAL T Move-Gear
PROCEDURAL 42.701 SubGoal checking Flaps
VISUAL    43.632 speed Value 181
RETRIEVAL  43.782 Flaps 5
VISUAL    44.585 flaps Value 1
MANUAL    47.051 flaps set 5
**Goal35   5.120
  isa SET-FLAP
  speed 181
  flap 5GOAL35 DIAL DIAL T Set-Flaps
PROCEDURAL 47.657 SubGoal setting Dial Altitude
VISUAL    48.639 waypoint Value 2
RETRIEVAL  48.789 Altitude 1800
VISUAL    49.581 dial-altitude Value 2500
MANUAL    51.528 dial-altitude set 1800
**Goal39   5.165
  isa DIAL-ALTITUDE
  waypoint 2
  altitude 1800GOAL39 DIAL DIAL T Dial-Altitude
PROCEDURAL 52.135 SubGoal checking Decision Altitude
VISUAL    53.323 waypoint Value 2
VISUAL    54.589 distance-next Value 2
RETRIEVAL  54.689 Waypoint 2 Next 2 Distance 13
**Goal43   5.001
  isa SET-DECISION-ALTITUDE
  waypoint 2
  distance-next 2
  distance 13
  old 600
  decision 600GOAL43 DIAL DIAL T Ignore-Decision-Altitude
PROCEDURAL 55.344 SubGoal checking Altitude
VISUAL    56.564 altitude Value 2500
**Goal46   4.939
  isa CHECK-ALTITUDE
  altitude 2500
  previous 2500GOAL46 DIAL DIAL T Ignore-Altitude
PROCEDURAL 57.220 SubGoal checking Speed
VISUAL    58.164 waypoint Value 2
VISUAL    59.164 distance-next Value 1
RETRIEVAL  59.264 Waypoint 2 Next 1 Distance 12
RETRIEVAL  59.364 Speed
VISUAL    60.574 dial-speed Value 160
MANUAL    63.052 dial-speed set 140
**Goal48   4.863
  isa SET-SPEED
  waypoint 2
  distance-next 1
  distance 12
  speed 140GOAL48 DIAL DIAL T Dial-Speed
PROCEDURAL 63.659 SubGoal checking Autopilot
VISUAL    64.926 otw_runway Value out-of-sight

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VISUAL    65.956 autopilots Value up
VISUAL    67.062 altitude Value 2500
**Goal53    8.392
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 2500
    decision Engaged
    decision-altitude 600GOAL53 DIAL DIAL T Ignore-Autopilot
PROCEDURAL    67.764 SubGoal checking Speed Brakes
VISUAL    68.796 speed Value 160
VISUAL    70.005 airbrakes Value off
**Goal57    8.525
    isa SPEED-BRAKES
    speed 160
    decision OffGOAL57 DIAL DIAL T Decide-Speed-Brakes
PROCEDURAL    70.605 SubGoal checking Landing Gear
VISUAL    71.495 waypoint Value 2
VISUAL    72.740 distance-next Value 1
RETRIEVAL    72.840 Waypoint 2 Next 1 Distance 12
VISUAL    73.966 landing-gear Value down
**Goal60    8.689
    isa MOVE-GEAR
    waypoint 2
    distance-next 1
    distance 12
    decision DownGOAL60 DIAL DIAL T Decide-Gear
PROCEDURAL    74.566 SubGoal checking Flaps
VISUAL    75.424 speed Value 159
RETRIEVAL    75.574 Flaps 15
VISUAL    76.676 flaps Value 5
MANUAL    79.093 flaps set 15
**Goal64    4.789
    isa SET-FLAP
    speed 159
    flap 15GOAL64 DIAL DIAL T Set-Flaps
PROCEDURAL    79.699 SubGoal checking Altitude
VISUAL    80.788 atc Value random-listen
VISUAL    80.788 altitude Value 2500
**Goal68    5.052
    isa CHECK-ALTITUDE
    altitude 2500
    previous 2500GOAL68 DIAL DIAL T Ignore-Altitude
PROCEDURAL    81.446 SubGoal checking Decision Altitude
VISUAL    82.721 waypoint Value 2
VISUAL    83.906 distance-next Value 0
RETRIEVAL    84.006 Waypoint 2 Next 0 Distance 11
**Goal70    5.069
    isa SET-DECISION-ALTITUDE
    waypoint 2
    distance-next 0
    distance 11
    old 600
    decision 600GOAL70 DIAL DIAL T Ignore-Decision-Altitude
PROCEDURAL    84.666 SubGoal setting Dial Altitude
VISUAL    85.924 waypoint Value 2
RETRIEVAL    86.074 Altitude 1800
VISUAL    87.050 atc Value ten-miles-out

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VISUAL 87.050 dial-altitude Value 1800
PROCEDURAL 87.100 Confirm Altitude already set to 1800
**Goal73 4.858
  isa DIAL-ALTITUDE
  waypoint 2
  altitude 1800GOAL73 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 87.705 SubGoal checking Autopilot
VISUAL 88.600 otw_runway Value out-of-sight
VISUAL 89.808 autopilots Value up
VISUAL 90.683 altitude Value 2430
**Goal76 8.438
  isa SET-AUTOPILOT
  visibility Out-Of-Sight
  peek 2430
  decision Engaged
  decision-altitude 600GOAL76 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 91.384 SubGoal checking Speed Brakes
VISUAL 92.580 speed Value 155
VISUAL 93.480 airbrakes Value off
**Goal80 8.170
  isa SPEED-BRAKES
  speed 155
  decision OffGOAL80 DIAL DIAL T Decide-Speed-Brakes
PROCEDURAL 94.080 SubGoal checking Altitude
VISUAL 95.220 altitude Value 2351
**Goal83 4.933
  isa CHECK-ALTITUDE
  altitude 2351
  previous 2500GOAL83 DIAL DIAL T Ignore-Altitude
PROCEDURAL 95.878 SubGoal checking Speed
VISUAL 96.708 waypoint Value 3
VISUAL 97.739 distance-next Value 1
RETRIEVAL 97.839 Waypoint 3 Next 1 Distance 10
RETRIEVAL 97.989 Speed
VISUAL 98.772 dial-speed Value 140
PROCEDURAL 98.822 Confirm Speed already set to 140
**Goal85 5.039
  isa SET-SPEED
  waypoint 3
  distance-next 1
  distance 10
  speed 140GOAL85 DIAL DIAL T Speed-Already-Dialed
PROCEDURAL 99.428 SubGoal setting Dial Altitude
VISUAL 100.693 waypoint Value 3
RETRIEVAL 100.893 Altitude 1000
VISUAL 101.649 dial-altitude Value 1800
MANUAL 104.021 dial-altitude set 1000
**Goal89 4.801
  isa DIAL-ALTITUDE
  waypoint 3
  altitude 1000GOAL89 DIAL DIAL T Dial-Altitude
PROCEDURAL 104.627 SubGoal checking Landing Gear
VISUAL 105.890 waypoint Value 3
VISUAL 107.078 distance-next Value 1
RETRIEVAL 107.178 Waypoint 3 Next 1 Distance 10
VISUAL 108.010 landing-gear Value down
**Goal93 8.731

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isa MOVE-GEAR
waypoint 3
distance-next 1
distance 10
decision DownGOAL93 DIAL DIAL T Decide-Gear
PROCEDURAL 108.610 SubGoal checking Altitude
VISUAL 109.713 altitude Value 2105
**Goal97 5.162
isa CHECK-ALTITUDE
altitude 2105
previous 2351GOAL97 DIAL DIAL T Read-Altitude
PROCEDURAL 110.370 SubGoal checking Decision Altitude
VISUAL 111.233 waypoint Value 3
VISUAL 112.346 distance-next Value 1
RETRIEVAL 112.447 Waypoint 3 Next 1 Distance 10
**Goal99 5.149
isa SET-DECISION-ALTITUDE
waypoint 3
distance-next 1
distance 10
old 600
decision 600GOAL99 DIAL DIAL T Ignore-Decision-Altitude
PROCEDURAL 113.103 SubGoal checking Flaps
VISUAL 113.960 speed Value 150
RETRIEVAL 114.211 Flaps 25
VISUAL 115.174 flaps Value 15
MANUAL 117.592 flaps set 25
**Goal102 4.878
isa SET-FLAP
speed 150
flap 25GOAL102 DIAL DIAL T Set-Flaps
PROCEDURAL 118.197 SubGoal checking Speed Brakes
VISUAL 119.017 speed Value 149
VISUAL 120.126 airbrakes Value off
**Goal106 8.229
isa SPEED-BRAKES
speed 149
decision OffGOAL106 DIAL DIAL T Decide-Speed-Brakes
PROCEDURAL 120.726 SubGoal checking Autopilot
VISUAL 121.811 otw_runway Value out-of-sight
VISUAL 122.712 autopilots Value up
VISUAL 123.921 altitude Value 1868
**Goal109 8.683
isa SET-AUTOPILOT
visibility Out-Of-Sight
peek 1868
decision Engaged
decision-altitude 600GOAL109 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 124.622 SubGoal checking Altitude
VISUAL 125.488 altitude Value 1842
**Goal113 4.640
isa CHECK-ALTITUDE
altitude 1842
previous 2105GOAL113 DIAL DIAL T Read-Altitude
PROCEDURAL 126.144 SubGoal setting Dial Altitude
VISUAL 126.980 waypoint Value 3
RETRIEVAL 127.130 Altitude 1000

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VISUAL 128.125 dial-altitude Value 1000
PROCEDURAL 128.175 Confirm Altitude already set to 1000
**Goal115 4.992
    isa DIAL-ALTITUDE
    waypoint 3
    altitude 1000GOAL115 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 128.781 SubGoal checking Altitude
VISUAL 129.892 altitude Value 1788
**Goal118 5.139
    isa CHECK-ALTITUDE
    altitude 1788
    previous 1842GOAL118 DIAL DIAL T Ignore-Altitude
PROCEDURAL 130.548 SubGoal checking Autopilot
VISUAL 131.693 otw_runway Value out-of-sight
VISUAL 132.826 autopilots Value up
VISUAL 134.040 altitude Value 1762
**Goal120 8.222
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1762
    decision Engaged
    decision-altitude 600GOAL120 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 134.742 SubGoal checking Altitude
VISUAL 135.947 altitude Value 1750
**Goal124 4.708
    isa CHECK-ALTITUDE
    altitude 1750
    previous 1788GOAL124 DIAL DIAL T Ignore-Altitude
PROCEDURAL 136.602 SubGoal setting Dial Altitude
VISUAL 137.811 waypoint Value 4
RETRIEVAL 137.961 Altitude 700
VISUAL 139.067 dial-altitude Value 1000
MANUAL 141.825 dial-altitude set 700
**Goal126 5.069
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL126 DIAL DIAL T Dial-Altitude
PROCEDURAL 142.434 SubGoal completing landing checklist
PROCEDURAL 144.661 Landing checklist: setting Flaps 15
MANUAL 144.661 flaps set 15
PROCEDURAL 146.972 Landing checklist: setting Gear down 1
MANUAL 146.972 landing-gear up/down 0
PROCEDURAL 149.928 Landing checklist: setting Speed to 135
MANUAL 149.928 speed set 135
VISUAL 149.928 speed Value 143
CHUNK NIL IS UNDEFINED.
CHUNK NIL IS UNDEFINED.
PROCEDURAL 152.761 Landing checklist: preparing cabin for landing
VOCAL 152.761 nothing communication 2007
PROCEDURAL 157.119 Landing checklist: setting Speed-brakes to armed
MANUAL 157.119 airbrakes on/off 0
VOCAL 157.169 Landing Checklist Complete
PROCEDURAL 157.327 SubGoal checking Altitude
VISUAL 158.542 atc Value random-listen
VISUAL 158.542 altitude Value 1612
**Goal137 5.024
    isa CHECK-ALTITUDE

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    altitude 1612
    previous 1750GOAL137 DIAL DIAL T Ignore-Altitude
PROCEDURAL 159.201 SubGoal checking Autopilot
VISUAL 160.351 otw_runway Value out-of-sight
VISUAL 161.636 autopilots Value up
VISUAL 162.888 altitude Value 1586
**Goal139 8.038
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1586
    decision Engaged
    decision-altitude 600GOAL139 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 163.589 SubGoal checking Altitude
VISUAL 164.635 altitude Value 1576
**Goal143 4.812
    isa CHECK-ALTITUDE
    altitude 1576
    previous 1612GOAL143 DIAL DIAL T Ignore-Altitude
PROCEDURAL 165.290 SubGoal setting Dial Altitude
VISUAL 166.505 waypoint Value 4
RETRIEVAL 166.655 Altitude 700
VISUAL 167.782 dial-altitude Value 700
PROCEDURAL 167.832 Confirm Altitude already set to 700
**Goal145 5.005
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL145 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 168.437 SubGoal checking Altitude
VISUAL 169.417 altitude Value 1548
**Goal148 4.888
    isa CHECK-ALTITUDE
    altitude 1548
    previous 1576GOAL148 DIAL DIAL T Ignore-Altitude
PROCEDURAL 170.074 SubGoal setting Dial Altitude
VISUAL 171.219 waypoint Value 4
RETRIEVAL 171.369 Altitude 700
VISUAL 172.449 dial-altitude Value 700
PROCEDURAL 172.499 Confirm Altitude already set to 700
**Goal150 5.299
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL150 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 173.108 SubGoal checking Altitude
VISUAL 174.114 altitude Value 1519
**Goal153 5.153
    isa CHECK-ALTITUDE
    altitude 1519
    previous 1548GOAL153 DIAL DIAL T Ignore-Altitude
PROCEDURAL 174.773 SubGoal setting Dial Altitude
VISUAL 175.706 waypoint Value 4
RETRIEVAL 175.856 Altitude 700
VISUAL 176.817 dial-altitude Value 700
PROCEDURAL 176.867 Confirm Altitude already set to 700
**Goal155 4.854
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL155 DIAL DIAL T Dial-Altitude-Already-Dialed

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PROCEDURAL 177.474 SubGoal checking Altitude
VISUAL 178.305 altitude Value 1494
**Goal158 5.605
    isa CHECK-ALTITUDE
    altitude 1494
    previous 1519GOAL158 DIAL DIAL T Ignore-Altitude
PROCEDURAL 178.963 SubGoal checking Autopilot
VISUAL 180.187 otw_runway Value out-of-sight
VISUAL 181.394 autopilots Value up
VISUAL 182.502 altitude Value 1469
**Goal160 8.286
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1469
    decision Engaged
    decision-altitude 600GOAL160 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 183.203 SubGoal checking Altitude
VISUAL 184.286 altitude Value 1459
**Goal164 4.885
    isa CHECK-ALTITUDE
    altitude 1459
    previous 1494GOAL164 DIAL DIAL T Ignore-Altitude
PROCEDURAL 184.943 SubGoal setting Dial Altitude
VISUAL 185.863 waypoint Value 4
RETRIEVAL 186.013 Altitude 700
VISUAL 186.979 dial-altitude Value 700
PROCEDURAL 187.029 Confirm Altitude already set to 700
**Goal166 4.970
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL166 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 187.635 SubGoal checking Altitude
VISUAL 188.466 altitude Value 1434
**Goal169 4.925
    isa CHECK-ALTITUDE
    altitude 1434
    previous 1459GOAL169 DIAL DIAL T Ignore-Altitude
PROCEDURAL 189.124 SubGoal setting Dial Altitude
VISUAL 189.966 waypoint Value 4
RETRIEVAL 190.116 Altitude 700
VISUAL 191.366 dial-altitude Value 700
PROCEDURAL 191.416 Confirm Altitude already set to 700
**Goal171 4.977
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL171 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 192.020 SubGoal checking Altitude
VISUAL 193.308 altitude Value 1405
**Goal174 4.515
    isa CHECK-ALTITUDE
    altitude 1405
    previous 1434GOAL174 DIAL DIAL T Ignore-Altitude
PROCEDURAL 193.965 SubGoal checking Autopilot
VISUAL 195.151 otw_runway Value out-of-sight
VISUAL 196.254 autopilots Value up
VISUAL 197.415 altitude Value 1380
**Goal176 7.996

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isa SET-AUTOPILOT
visibility Out-Of-Sight
peek 1380
decision Engaged
decision-altitude 600GOAL176 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 198.116 SubGoal checking Altitude
VISUAL 199.036 altitude Value 1371
**Goal180 4.986
    isa CHECK-ALTITUDE
    altitude 1371
    previous 1405GOAL180 DIAL DIAL T Ignore-Altitude
PROCEDURAL 199.692 SubGoal setting Dial Altitude
VISUAL 200.961 waypoint Value 4
RETRIEVAL 201.111 Altitude 700
VISUAL 202.242 dial-altitude Value 700
PROCEDURAL 202.292 Confirm Altitude already set to 700
**Goal182 5.368
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL182 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 202.903 SubGoal checking Altitude
VISUAL 204.110 altitude Value 1340
**Goal185 5.144
    isa CHECK-ALTITUDE
    altitude 1340
    previous 1371GOAL185 DIAL DIAL T Ignore-Altitude
PROCEDURAL 204.766 SubGoal setting Dial Altitude
VISUAL 205.675 waypoint Value 4
RETRIEVAL 205.825 Altitude 700
VISUAL 206.591 dial-altitude Value 700
PROCEDURAL 206.641 Confirm Altitude already set to 700
**Goal187 5.026
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL187 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 207.250 SubGoal checking Altitude
VISUAL 208.446 altitude Value 1314
**Goal190 5.101
    isa CHECK-ALTITUDE
    altitude 1314
    previous 1340GOAL190 DIAL DIAL T Ignore-Altitude
PROCEDURAL 209.103 SubGoal setting Dial Altitude
VISUAL 210.014 waypoint Value 4
RETRIEVAL 210.164 Altitude 700
VISUAL 211.136 dial-altitude Value 700
PROCEDURAL 211.186 Confirm Altitude already set to 700
**Goal192 4.927
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL192 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 211.793 SubGoal checking Altitude
VISUAL 213.067 altitude Value 1287
**Goal195 5.205
    isa CHECK-ALTITUDE
    altitude 1287
    previous 1314GOAL195 DIAL DIAL T Ignore-Altitude
PROCEDURAL 213.723 SubGoal setting Dial Altitude

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VISUAL 214.865 waypoint Value 4
 RETRIEVAL 215.015 Altitude 700
 VISUAL 216.009 dial-altitude Value 700
 PROCEDURAL 216.059 Confirm Altitude already set to 700
 **Goal197 4.840
 isa DIAL-ALTITUDE
 waypoint 4
 altitude 700GOAL197 DIAL DIAL T Dial-Altitude-Already-Dialed
 PROCEDURAL 216.665 SubGoal checking Altitude
 VISUAL 217.781 altitude Value 1259
 **Goal200 5.249
 isa CHECK-ALTITUDE
 altitude 1259
 previous 1287GOAL200 DIAL DIAL T Ignore-Altitude
 PROCEDURAL 218.440 SubGoal checking Autopilot
 VISUAL 219.713 otw_runway Value out-of-sight
 VISUAL 220.996 autopilots Value up
 VISUAL 221.901 altitude Value 1234
 **Goal202 8.165
 isa SET-AUTOPILOT
 visibility Out-Of-Sight
 peek 1234
 decision Engaged
 decision-altitude 600GOAL202 DIAL DIAL T Ignore-Autopilot
 PROCEDURAL 222.603 SubGoal checking Altitude
 VISUAL 223.438 altitude Value 1225
 **Goal206 5.151
 isa CHECK-ALTITUDE
 altitude 1225
 previous 1259GOAL206 DIAL DIAL T Ignore-Altitude
 PROCEDURAL 224.095 SubGoal setting Dial Altitude
 VISUAL 225.059 waypoint Value 4
 RETRIEVAL 225.209 Altitude 700
 VISUAL 226.018 dial-altitude Value 700
 PROCEDURAL 226.068 Confirm Altitude already set to 700
 **Goal208 5.214
 isa DIAL-ALTITUDE
 waypoint 4
 altitude 700GOAL208 DIAL DIAL T Dial-Altitude-Already-Dialed
 PROCEDURAL 226.674 SubGoal checking Altitude
 VISUAL 227.558 altitude Value 1200
 **Goal211 5.160
 isa CHECK-ALTITUDE
 altitude 1200
 previous 1225GOAL211 DIAL DIAL T Ignore-Altitude
 PROCEDURAL 228.214 SubGoal setting Dial Altitude
 VISUAL 229.464 waypoint Value 4
 RETRIEVAL 229.614 Altitude 700
 VISUAL 230.557 dial-altitude Value 700
 PROCEDURAL 230.607 Confirm Altitude already set to 700
 **Goal213 4.815
 isa DIAL-ALTITUDE
 waypoint 4
 altitude 700GOAL213 DIAL DIAL T Dial-Altitude-Already-Dialed
 PROCEDURAL 231.213 SubGoal checking Altitude
 VISUAL 232.191 altitude Value 1173
 **Goal216 5.023

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isa CHECK-ALTITUDE
altitude 1173
previous 1200GOAL216 DIAL DIAL T Ignore-Altitude
PROCEDURAL 232.850 SubGoal checking Autopilot
VISUAL 234.056 otw_runway Value out-of-sight
VISUAL 234.915 autopilots Value up
VISUAL 235.748 altitude Value 1151
**Goal218 7.960
isa SET-AUTOPILOT
visibility Out-Of-Sight
peek 1151
decision Engaged
decision-altitude 600GOAL218 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 236.449 SubGoal checking Altitude
VISUAL 237.292 altitude Value 1142
**Goal222 4.610
isa CHECK-ALTITUDE
altitude 1142
previous 1173GOAL222 DIAL DIAL T Ignore-Altitude
PROCEDURAL 237.950 SubGoal setting Dial Altitude
VISUAL 239.077 waypoint Value 4
RETRIEVAL 239.227 Altitude 700
VISUAL 240.437 atc Value random-listen
VISUAL 240.437 dial-altitude Value 700
PROCEDURAL 240.487 Confirm Altitude already set to 700
**Goal224 4.815
isa DIAL-ALTITUDE
waypoint 4
altitude 700GOAL224 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 241.096 SubGoal checking Altitude
VISUAL 242.325 altitude Value 1112
**Goal227 5.017
isa CHECK-ALTITUDE
altitude 1112
previous 1142GOAL227 DIAL DIAL T Ignore-Altitude
PROCEDURAL 242.980 SubGoal checking Autopilot
VISUAL 244.043 otw_runway Value out-of-sight
VISUAL 244.987 autopilots Value up
VISUAL 246.273 altitude Value 1088
**Goal229 7.907
isa SET-AUTOPILOT
visibility Out-Of-Sight
peek 1088
decision Engaged
decision-altitude 600GOAL229 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 246.975 SubGoal checking Altitude
VISUAL 248.036 altitude Value 1078
**Goal233 5.229
isa CHECK-ALTITUDE
altitude 1078
previous 1112GOAL233 DIAL DIAL T Ignore-Altitude
PROCEDURAL 248.692 SubGoal setting Dial Altitude
VISUAL 249.827 waypoint Value 4
RETRIEVAL 250.027 Altitude 700
VISUAL 251.056 dial-altitude Value 700
PROCEDURAL 251.106 Confirm Altitude already set to 700
**Goal235 4.946

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isa DIAL-ALTITUDE
waypoint 4
altitude 700GOAL235 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 251.711 SubGoal checking Altitude
VISUAL 252.609 altitude Value 1051
**Goal1238 4.981
isa CHECK-ALTITUDE
altitude 1051
previous 1078GOAL238 DIAL DIAL T Ignore-Altitude
PROCEDURAL 253.267 SubGoal checking Autopilot
VISUAL 254.091 otw_runway Value out-of-sight
VISUAL 255.356 autopilots Value up
VISUAL 256.399 altitude Value 1028
**Goal1240 7.792
isa SET-AUTOPILOT
visibility Out-Of-Sight
peek 1028
decision Engaged
decision-altitude 600GOAL240 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 257.100 SubGoal checking Altitude
VISUAL 258.173 altitude Value 1017
**Goal1244 5.025
isa CHECK-ALTITUDE
altitude 1017
previous 1051GOAL244 DIAL DIAL T Ignore-Altitude
PROCEDURAL 258.828 SubGoal setting Dial Altitude
VISUAL 260.031 waypoint Value 4
RETRIEVAL 260.181 Altitude 700
VISUAL 261.180 dial-altitude Value 700
PROCEDURAL 261.230 Confirm Altitude already set to 700
**Goal1246 5.327
isa DIAL-ALTITUDE
waypoint 4
altitude 700GOAL246 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 261.837 SubGoal checking Altitude
VISUAL 262.779 altitude Value 977
**Goal1249 4.898
isa CHECK-ALTITUDE
altitude 977
previous 1017GOAL249 DIAL DIAL T Ignore-Altitude
PROCEDURAL 263.436 SubGoal setting Dial Altitude
VISUAL 264.363 waypoint Value 5
RETRIEVAL 264.513 Altitude 500
VISUAL 265.697 dial-altitude Value 700
MANUAL 268.584 dial-altitude set 500
**Goal1251 5.142
isa DIAL-ALTITUDE
waypoint 5
altitude 500GOAL251 DIAL DIAL T Dial-Altitude
PROCEDURAL 269.190 SubGoal checking Altitude
VISUAL 270.090 altitude Value 879
**Goal1255 4.707
isa CHECK-ALTITUDE
altitude 879
previous 977GOAL255 DIAL DIAL T Ignore-Altitude
PROCEDURAL 270.747 SubGoal setting Dial Altitude
VISUAL 271.787 waypoint Value 5

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RETRIEVAL 271.937 Altitude 500
VISUAL 272.965 dial-altitude Value 500
PROCEDURAL 273.015 Confirm Altitude already set to 500
**Goal257 5.035
    isa DIAL-ALTITUDE
    waypoint 5
    altitude 500GOAL257 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 273.620 SubGoal checking Altitude
VISUAL 274.839 altitude Value 816
**Goal260 4.864
    isa CHECK-ALTITUDE
    altitude 816
    previous 879GOAL260 DIAL DIAL T Ignore-Altitude
PROCEDURAL 275.499 SubGoal setting Dial Altitude
VISUAL 276.431 waypoint Value 5
RETRIEVAL 276.581 Altitude 500
VISUAL 277.801 dial-altitude Value 500
PROCEDURAL 277.851 Confirm Altitude already set to 500
**Goal262 4.488
    isa DIAL-ALTITUDE
    waypoint 5
    altitude 500GOAL262 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 278.458 SubGoal checking Altitude
VISUAL 279.308 altitude Value 756
**Goal265 4.989
    isa CHECK-ALTITUDE
    altitude 756
    previous 816GOAL265 DIAL DIAL T Ignore-Altitude
PROCEDURAL 279.965 SubGoal checking Autopilot
VISUAL 281.105 otw_runway Value out-of-sight
VISUAL 282.381 autopilots Value up
VISUAL 283.272 altitude Value 702
**Goal267 7.927
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 702
    decision Engaged
    decision-altitude 600GOAL267 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 283.973 SubGoal checking Altitude
VISUAL 285.272 altitude Value 654
**Goal271 4.879
    isa CHECK-ALTITUDE
    altitude 654
    previous 756GOAL271 DIAL DIAL T Ignore-Altitude
PROCEDURAL 285.930 SubGoal setting Dial Altitude
VISUAL 286.750 waypoint Value 6
RETRIEVAL 286.900 Altitude 500
VISUAL 287.853 dial-altitude Value 500
PROCEDURAL 287.903 Confirm Altitude already set to 500
**Goal273 4.995
    isa DIAL-ALTITUDE
    waypoint 6
    altitude 500GOAL273 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 288.510 SubGoal checking Altitude
VISUAL 289.314 altitude Value 584
**Goal276 4.992
    isa CHECK-ALTITUDE

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```
    altitude 584
    previous 654GOAL276 DIAL DIAL T Ignore-Altitude
    PROCEDURAL 292.567 Missed Approach (Altitude below decision
altitude!)
*** Setting ModelDone to 3***

MCP NAV PFD SVS CONTROLS OTW off Total-time
70.13239 48.80538 60.28575 0 47.164062 51.384296 14.79541 292.5673
EMC End:T 292.5673

Look 1.0 Action 2.5 Listen 0.5 Ans 0.1

;; Factory is idle.
```

6-Baseline IMC Terrain mismatch

dribbling to file "Baseline-IMC-mismatch.drb"

```
Factory Started
CL-USER(1): (register-server)
Registered Server EMC_NASAHPM.EMCReceiveCOMMessages
NIL
CL-USER(2):
Subject 0 Trial 0 Run 1
Initializing control

Control      5.103
  isa CONTROL
  speed 200.0d0
  altitude 2500.0d0
  waypoint nil
  distance nil
  flaps 5
  decision-altitude 600
  landing-gear Up
  airbrakes Off
  autopilots Engaged
  task nil
  last-task nil
  status Active
  landing-checklist nil
VISUAL      0.000 flaps Value 5
CHUNK NIL IS UNDEFINED.
CHUNK NIL IS UNDEFINED.
PROCEDURAL   2.363 Preparing for approach: setting Flaps 1
MANUAL      2.363 flaps set 1
PROCEDURAL   3.435 Preparing for approach: setting VNAV
VISUAL      3.435 waypoint Value 1
PROCEDURAL   6.476 Preparing for approach: engaging Speed-brakes full
MANUAL      6.476 airbrakes on/off 0
PROCEDURAL   7.649 Preparing for approach: setting LNAV
VISUAL      7.649 distance-next Value 1
PROCEDURAL   8.899 Preparing for approach: engaging Autopilot
VISUAL      8.899 autopilots Value up
PROCEDURAL   9.055 SubGoal checking Speed
VISUAL      10.347 waypoint Value 1
VISUAL      11.486 distance-next Value 0
RETRIEVAL    11.586 Waypoint 1 Next 0 Distance 15
RETRIEVAL    11.686 Speed
VISUAL      12.724 dial-speed Value 200
MANUAL      14.681 dial-speed set 160
**Goal6     4.779
  isa SET-SPEED
  waypoint 1
  distance-next 0
  distance 15
  speed 160GOAL6 DIAL DIAL T Dial-Speed
PROCEDURAL   15.288 SubGoal checking Autopilot
VISUAL      16.280 otw_runway Value out-of-sight
VISUAL      17.329 autopilots Value up
```

```

VISUAL 18.540 altitude Value 2500
**Goal11 8.699
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 2500
    decision Engaged
    decision-altitude 600GOAL11 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 19.241 SubGoal checking Speed Brakes
VISUAL 20.302 speed Value 196
VISUAL 21.264 airbrakes Value on
PROCEDURAL 21.314 Setting Speed Brakes
MANUAL 24.194 airbrakes on/off 0
**Goal15 8.247
    isa SPEED-BRAKES
    speed 196
    decision OffGOAL15 DIAL DIAL T Set-Speed-Brakes
PROCEDURAL 24.794 SubGoal checking Decision Altitude
VISUAL 25.861 waypoint Value 2
VISUAL 26.840 distance-next Value 3
RETRIEVAL 26.940 Waypoint 2 Next 3 Distance 14
**Goal19 5.047
    isa SET-DECISION-ALTITUDE
    waypoint 2
    distance-next 3
    distance 14
    old 600
    decision 600GOAL19 DIAL DIAL T Ignore-Decision-Altitude
PROCEDURAL 27.596 SubGoal checking Flaps
VISUAL 28.705 speed Value 189
RETRIEVAL 28.956 Flaps 25
VISUAL 30.176 flaps Value 1
MANUAL 32.749 flaps set 25
**Goal22 4.859
    isa SET-FLAP
    speed 189
    flap 25GOAL22 DIAL DIAL T Set-Flaps
PROCEDURAL 33.357 SubGoal checking Landing Gear
VISUAL 34.298 waypoint Value 2
VISUAL 35.307 distance-next Value 3
RETRIEVAL 35.407 Waypoint 2 Next 3 Distance 14
VISUAL 36.248 landing-gear Value up
PROCEDURAL 36.298 Lowering Gear
MANUAL 39.259 landing-gear up/down 0
**Goal26 8.985
    isa MOVE-GEAR
    waypoint 2
    distance-next 3
    distance 14
    decision DownGOAL26 DIAL DIAL T Move-Gear
PROCEDURAL 39.862 SubGoal checking Altitude
VISUAL 40.741 altitude Value 2500
**Goal31 4.810
    isa CHECK-ALTITUDE
    altitude 2500
    previous 2500.0d0GOAL31 DIAL DIAL T Ignore-Altitude
PROCEDURAL 41.397 SubGoal setting Dial Altitude
VISUAL 42.235 waypoint Value 2

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RETRIEVAL 42.485 Altitude 1800
VISUAL 43.716 dial-altitude Value 2500
MANUAL 46.828 dial-altitude set 1800
**Goal33 4.945
    isa DIAL-ALTITUDE
    waypoint 2
    altitude 1800GOAL33 DIAL DIAL T Dial-Altitude
PROCEDURAL 47.436 SubGoal checking Autopilot
VISUAL 48.498 otw_runway Value out-of-sight
VISUAL 49.650 autopilots Value up
VISUAL 50.626 altitude Value 2500
**Goal37 8.341
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 2500
    decision Engaged
    decision-altitude 600GOAL37 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 51.327 SubGoal checking Speed Brakes
VISUAL 52.596 speed Value 170
VISUAL 53.478 airbrakes Value off
**Goal41 8.261
    isa SPEED-BRAKES
    speed 170
    decision OffGOAL41 DIAL DIAL T Decide-Speed-Brakes
PROCEDURAL 54.078 SubGoal checking Decision Altitude
VISUAL 55.277 waypoint Value 2
VISUAL 56.261 distance-next Value 2
RETRIEVAL 56.361 Waypoint 2 Next 2 Distance 13
**Goal44 5.025
    isa SET-DECISION-ALTITUDE
    waypoint 2
    distance-next 2
    distance 13
    old 600
    decision 600GOAL44 DIAL DIAL T Ignore-Decision-Altitude
PROCEDURAL 57.017 SubGoal checking Speed
VISUAL 57.906 waypoint Value 2
VISUAL 58.834 distance-next Value 1
RETRIEVAL 58.934 Waypoint 2 Next 1 Distance 12
RETRIEVAL 59.034 Speed
VISUAL 60.278 dial-speed Value 160
MANUAL 63.031 dial-speed set 140
**Goal47 5.210
    isa SET-SPEED
    waypoint 2
    distance-next 1
    distance 12
    speed 140GOAL47 DIAL DIAL T Dial-Speed
PROCEDURAL 63.641 SubGoal checking Altitude
VISUAL 64.715 altitude Value 2500
**Goal52 4.935
    isa CHECK-ALTITUDE
    altitude 2500
    previous 2500GOAL52 DIAL DIAL T Ignore-Altitude
PROCEDURAL 65.372 SubGoal checking Landing Gear
VISUAL 66.437 waypoint Value 2
VISUAL 67.335 distance-next Value 1

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RETRIEVAL 67.436 Waypoint 2 Next 1 Distance 12
VISUAL 68.252 landing-gear Value down
**Goal54 8.342
  isa MOVE-GEAR
  waypoint 2
  distance-next 1
  distance 12
  decision DownGOAL54 DIAL DIAL T Decide-Gear
PROCEDURAL 68.852 SubGoal checking Flaps
VISUAL 69.918 speed Value 159
RETRIEVAL 70.068 Flaps 15
VISUAL 71.025 flaps Value 25
MANUAL 73.940 flaps set 15
**Goal58 5.046
  isa SET-FLAP
  speed 159
  flap 15GOAL58 DIAL DIAL T Set-Flaps
PROCEDURAL 74.545 SubGoal setting Dial Altitude
VISUAL 75.683 waypoint Value 2
RETRIEVAL 75.833 Altitude 1800
VISUAL 76.761 dial-altitude Value 1800
PROCEDURAL 76.811 Confirm Altitude already set to 1800
**Goal62 5.017
  isa DIAL-ALTITUDE
  waypoint 2
  altitude 1800GOAL62 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 77.418 SubGoal checking Decision Altitude
VISUAL 78.298 waypoint Value 2
VISUAL 79.445 distance-next Value 0
RETRIEVAL 79.545 Waypoint 2 Next 0 Distance 11
**Goal65 5.072
  isa SET-DECISION-ALTITUDE
  waypoint 2
  distance-next 0
  distance 11
  old 600
  decision 600GOAL65 DIAL DIAL T Ignore-Decision-Altitude
PROCEDURAL 80.202 SubGoal checking Altitude
VISUAL 81.412 atc Value random-listen
VISUAL 81.412 altitude Value 2500
**Goal68 5.055
  isa CHECK-ALTITUDE
  altitude 2500
  previous 2500GOAL68 DIAL DIAL T Ignore-Altitude
PROCEDURAL 82.070 SubGoal checking Autopilot
VISUAL 83.181 otw_runway Value out-of-sight
VISUAL 84.159 autopilots Value up
VISUAL 85.317 altitude Value 2500
**Goal70 8.494
  isa SET-AUTOPILOT
  visibility Out-Of-Sight
  peek 2500
  decision Engaged
  decision-altitude 600GOAL70 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 86.018 SubGoal checking Speed Brakes
VISUAL 87.127 speed Value 155
VISUAL 88.036 airbrakes Value off

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**Goal74      8.358
  isa SPEED-BRAKES
  speed 155
  decision OffGOAL74 DIAL DIAL T Decide-Speed-Brakes
PROCEDURAL   88.636 SubGoal checking Landing Gear
VISUAL     89.512 atc Value ten-miles-out
VISUAL     89.512 waypoint Value 3
VISUAL     90.635 distance-next Value 2
RETRIEVAL   90.735 Waypoint 3 Next 2 Distance 11
VISUAL     91.941 landing-gear Value down
**Goal77      8.264
  isa MOVE-GEAR
  waypoint 3
  distance-next 2
  distance 11
  decision DownGOAL77 DIAL DIAL T Decide-Gear
PROCEDURAL   92.541 SubGoal checking Decision Altitude
VISUAL     93.751 waypoint Value 3
VISUAL     94.998 distance-next Value 2
RETRIEVAL   95.098 Waypoint 3 Next 2 Distance 11
**Goal81      5.118
  isa SET-DECISION-ALTITUDE
  waypoint 3
  distance-next 2
  distance 11
  old 600
  decision 600GOAL81 DIAL DIAL T Ignore-Decision-Altitude
PROCEDURAL   95.756 SubGoal setting Dial Altitude
VISUAL     96.664 waypoint Value 3
RETRIEVAL   96.815 Altitude 1000
VISUAL     97.641 dial-altitude Value 1800
MANUAL     99.860 dial-altitude set 1000
**Goal84      4.997
  isa DIAL-ALTITUDE
  waypoint 3
  altitude 1000GOAL84 DIAL DIAL T Dial-Altitude
PROCEDURAL   100.465 SubGoal checking Altitude
VISUAL     101.543 altitude Value 2268
**Goal88      5.060
  isa CHECK-ALTITUDE
  altitude 2268
  previous 2500GOAL88 DIAL DIAL T Read-Altitude
PROCEDURAL   102.199 SubGoal checking Flaps
VISUAL     103.239 speed Value 151
RETRIEVAL   103.389 Flaps 20
VISUAL     104.496 flaps Value 15
MANUAL     106.961 flaps set 20
**Goal90      4.952
  isa SET-FLAP
  speed 151
  flap 20GOAL90 DIAL DIAL T Set-Flaps
PROCEDURAL   107.567 SubGoal checking Speed
VISUAL     108.775 waypoint Value 3
VISUAL     110.027 distance-next Value 1
RETRIEVAL   110.127 Waypoint 3 Next 1 Distance 10
RETRIEVAL   110.227 Speed
VISUAL     111.371 dial-speed Value 140

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PROCEDURAL 111.421 Confirm Speed already set to 140
**Goal94    5.082
  isa SET-SPEED
  waypoint 3
  distance-next 1
  distance 10
  speed 140GOAL94 DIAL DIAL T Speed-Already-Dialed
PROCEDURAL 112.027 SubGoal checking Speed Brakes
VISUAL 112.895 speed Value 149
VISUAL 113.978 airbrakes Value off
**Goal98    8.128
  isa SPEED-BRAKES
  speed 149
  decision OffGOAL98 DIAL DIAL T Decide-Speed-Brakes
PROCEDURAL 114.578 SubGoal checking Altitude
VISUAL 115.816 altitude Value 2030
**Goal101   4.686
  isa CHECK-ALTITUDE
  altitude 2030
  previous 2268GOAL101 DIAL DIAL T Read-Altitude
PROCEDURAL 116.474 SubGoal checking Autopilot
VISUAL 117.386 otw_runway Value out-of-sight
VISUAL 118.482 autopilots Value up
VISUAL 119.495 altitude Value 1968
**Goal103   8.681
  isa SET-AUTOPILOT
  visibility Out-Of-Sight
  peek 1968
  decision Engaged
  decision-altitude 600GOAL103 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 120.196 SubGoal checking Decision Altitude
VISUAL 121.207 waypoint Value 3
VISUAL 122.124 distance-next Value 0
RETRIEVAL 122.224 Waypoint 3 Next 0 Distance 9
**Goal107   5.068
  isa SET-DECISION-ALTITUDE
  waypoint 3
  distance-next 0
  distance 9
  old 600
  decision 600GOAL107 DIAL DIAL T Ignore-Decision-Altitude
PROCEDURAL 122.880 SubGoal checking Altitude
VISUAL 124.036 altitude Value 1892
**Goal110   4.948
  isa CHECK-ALTITUDE
  altitude 1892
  previous 2030GOAL110 DIAL DIAL T Ignore-Altitude
PROCEDURAL 124.693 SubGoal setting Dial Altitude
VISUAL 125.609 waypoint Value 3
RETRIEVAL 125.759 Altitude 1000
VISUAL 126.649 dial-altitude Value 1000
PROCEDURAL 126.699 Confirm Altitude already set to 1000
**Goal112   5.019
  isa DIAL-ALTITUDE
  waypoint 3
  altitude 1000GOAL112 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 127.306 SubGoal checking Altitude

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VISUAL 128.215 altitude Value 1825
**Goal115 4.978
    isa CHECK-ALTITUDE
    altitude 1825
    previous 1892GOAL115 DIAL DIAL T Ignore-Altitude
PROCEDURAL 128.872 SubGoal checking Autopilot
VISUAL 130.077 otw_runway Value out-of-sight
VISUAL 131.085 autopilots Value up
VISUAL 131.984 altitude Value 1786
**Goal117 8.443
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1786
    decision Engaged
    decision-altitude 600GOAL117 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 132.685 SubGoal checking Altitude
VISUAL 133.490 altitude Value 1777
**Goal121 5.154
    isa CHECK-ALTITUDE
    altitude 1777
    previous 1825GOAL121 DIAL DIAL T Ignore-Altitude
PROCEDURAL 134.147 SubGoal setting Dial Altitude
VISUAL 135.024 waypoint Value 4
RETRIEVAL 135.174 Altitude 700
VISUAL 136.208 dial-altitude Value 1000
MANUAL 139.369 dial-altitude set 700
**Goal123 5.033
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL123 DIAL DIAL T Dial-Altitude
PROCEDURAL 139.975 SubGoal completing landing checklist
PROCEDURAL 142.313 Landing checklist: preparing cabin for landing
VOCAL 142.313 nothing communication 2007
PROCEDURAL 145.058 Landing checklist: setting Gear down 1
MANUAL 145.058 landing-gear up/down 0
PROCEDURAL 147.611 Landing checklist: setting Speed to 135
MANUAL 147.611 speed set 135
VISUAL 147.611 speed Value 142
CHUNK NIL IS UNDEFINED.
CHUNK NIL IS UNDEFINED.
PROCEDURAL 151.038 Landing checklist: setting Speed-brakes to armed
MANUAL 151.038 airbrakes on/off 0
PROCEDURAL 153.097 Landing checklist: setting Flaps 15
MANUAL 153.097 flaps set 15
VOCAL 153.147 Landing Checklist Complete
PROCEDURAL 153.304 SubGoal checking Altitude
VISUAL 154.285 altitude Value 1650
**Goal134 4.980
    isa CHECK-ALTITUDE
    altitude 1650
    previous 1777GOAL134 DIAL DIAL T Ignore-Altitude
PROCEDURAL 154.943 SubGoal checking Autopilot
VISUAL 156.033 otw_runway Value out-of-sight
VISUAL 157.216 autopilots Value up
VISUAL 158.149 atc Value random-listen
VISUAL 158.149 altitude Value 1627
**Goal136 8.294

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isa SET-AUTOPILOT
visibility Out-Of-Sight
peek 1627
decision Engaged
decision-altitude 600GOAL136 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 158.851 SubGoal checking Altitude
VISUAL 159.843 altitude Value 1616
**Goal140 4.904
isa CHECK-ALTITUDE
altitude 1616
previous 1650GOAL140 DIAL DIAL T Ignore-Altitude
PROCEDURAL 160.499 SubGoal checking Autopilot
VISUAL 161.427 otw_runway Value out-of-sight
VISUAL 162.252 autopilots Value up
VISUAL 163.218 altitude Value 1597
**Goal142 8.168
isa SET-AUTOPILOT
visibility Out-Of-Sight
peek 1597
decision Engaged
decision-altitude 600GOAL142 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 163.920 SubGoal checking Altitude
VISUAL 165.161 altitude Value 1585
**Goal146 5.028
isa CHECK-ALTITUDE
altitude 1585
previous 1616GOAL146 DIAL DIAL T Ignore-Altitude
PROCEDURAL 165.818 SubGoal setting Dial Altitude
VISUAL 166.826 waypoint Value 4
RETRIEVAL 166.976 Altitude 700
VISUAL 167.932 dial-altitude Value 700
PROCEDURAL 167.982 Confirm Altitude already set to 700
**Goal148 4.869
isa DIAL-ALTITUDE
waypoint 4
altitude 700GOAL148 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 168.589 SubGoal checking Altitude
VISUAL 169.444 altitude Value 1559
**Goal151 4.862
isa CHECK-ALTITUDE
altitude 1559
previous 1585GOAL151 DIAL DIAL T Ignore-Altitude
PROCEDURAL 170.101 SubGoal setting Dial Altitude
VISUAL 171.226 waypoint Value 4
RETRIEVAL 171.376 Altitude 700
VISUAL 172.332 dial-altitude Value 700
PROCEDURAL 172.382 Confirm Altitude already set to 700
**Goal153 5.242
isa DIAL-ALTITUDE
waypoint 4
altitude 700GOAL153 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 172.989 SubGoal checking Altitude
VISUAL 173.875 altitude Value 1533
**Goal156 4.998
isa CHECK-ALTITUDE
altitude 1533
previous 1559GOAL156 DIAL DIAL T Ignore-Altitude

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PROCEDURAL 174.532 SubGoal checking Autopilot
VISUAL 175.526 otw_runway Value out-of-sight
VISUAL 176.805 autopilots Value up
VISUAL 177.717 altitude Value 1510
**Goal158 8.356
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1510
    decision Engaged
    decision-altitude 600GOAL158 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 178.419 SubGoal checking Altitude
VISUAL 179.285 altitude Value 1501
**Goal162 5.088
    isa CHECK-ALTITUDE
    altitude 1501
    previous 1533GOAL162 DIAL DIAL T Ignore-Altitude
PROCEDURAL 179.942 SubGoal checking Autopilot
VISUAL 180.742 otw_runway Value out-of-sight
VISUAL 181.902 autopilots Value up
VISUAL 183.004 altitude Value 1478
**Goal164 8.111
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1478
    decision Engaged
    decision-altitude 600GOAL164 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 183.705 SubGoal checking Altitude
VISUAL 184.977 altitude Value 1466
**Goal168 5.066
    isa CHECK-ALTITUDE
    altitude 1466
    previous 1501GOAL168 DIAL DIAL T Ignore-Altitude
PROCEDURAL 185.633 SubGoal setting Dial Altitude
VISUAL 186.792 waypoint Value 4
RETRIEVAL 186.942 Altitude 700
VISUAL 188.133 dial-altitude Value 700
PROCEDURAL 188.183 Confirm Altitude already set to 700
**Goal170 5.283
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL170 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 188.790 SubGoal checking Altitude
VISUAL 189.681 altitude Value 1438
**Goal173 5.118
    isa CHECK-ALTITUDE
    altitude 1438
    previous 1466GOAL173 DIAL DIAL T Ignore-Altitude
PROCEDURAL 190.338 SubGoal setting Dial Altitude
VISUAL 191.537 waypoint Value 4
RETRIEVAL 191.687 Altitude 700
VISUAL 192.754 dial-altitude Value 700
PROCEDURAL 192.804 Confirm Altitude already set to 700
**Goal175 4.968
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL175 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 193.411 SubGoal checking Altitude

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VISUAL 194.639 altitude Value 1409
**Goal178 5.000
  isa CHECK-ALTITUDE
  altitude 1409
  previous 1438GOAL178 DIAL DIAL T Ignore-Altitude
PROCEDURAL 195.297 SubGoal checking Autopilot
VISUAL 196.169 otw_runway Value out-of-sight
VISUAL 197.401 autopilots Value up
VISUAL 198.344 altitude Value 1386
**Goal180 7.917
  isa SET-AUTOPILOT
  visibility Out-Of-Sight
  peek 1386
  decision Engaged
  decision-altitude 600GOAL180 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 199.045 SubGoal checking Altitude
VISUAL 200.307 altitude Value 1375
**Goal184 5.051
  isa CHECK-ALTITUDE
  altitude 1375
  previous 1409GOAL184 DIAL DIAL T Ignore-Altitude
PROCEDURAL 200.962 SubGoal setting Dial Altitude
VISUAL 201.909 waypoint Value 4
RETRIEVAL 202.059 Altitude 700
VISUAL 202.912 dial-altitude Value 700
PROCEDURAL 202.962 Confirm Altitude already set to 700
**Goal186 4.844
  isa DIAL-ALTITUDE
  waypoint 4
  altitude 700GOAL186 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 203.569 SubGoal checking Altitude
VISUAL 204.773 altitude Value 1348
**Goal189 4.970
  isa CHECK-ALTITUDE
  altitude 1348
  previous 1375GOAL189 DIAL DIAL T Ignore-Altitude
PROCEDURAL 205.430 SubGoal setting Dial Altitude
VISUAL 206.591 waypoint Value 4
RETRIEVAL 206.741 Altitude 700
VISUAL 207.958 dial-altitude Value 700
PROCEDURAL 208.008 Confirm Altitude already set to 700
**Goal191 5.177
  isa DIAL-ALTITUDE
  waypoint 4
  altitude 700GOAL191 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 208.614 SubGoal checking Altitude
VISUAL 209.906 altitude Value 1318
**Goal194 4.939
  isa CHECK-ALTITUDE
  altitude 1318
  previous 1348GOAL194 DIAL DIAL T Ignore-Altitude
PROCEDURAL 210.563 SubGoal setting Dial Altitude
VISUAL 211.368 waypoint Value 4
RETRIEVAL 211.518 Altitude 700
VISUAL 212.351 dial-altitude Value 700
PROCEDURAL 212.401 Confirm Altitude already set to 700
**Goal196 5.079

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isa DIAL-ALTITUDE
waypoint 4
altitude 700GOAL196 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 213.008 SubGoal checking Altitude
VISUAL 214.239 altitude Value 1292
**Goal199 4.694
isa CHECK-ALTITUDE
altitude 1292
previous 1318GOAL199 DIAL DIAL T Ignore-Altitude
PROCEDURAL 214.896 SubGoal setting Dial Altitude
VISUAL 216.129 waypoint Value 4
RETRIEVAL 216.279 Altitude 700
VISUAL 217.377 dial-altitude Value 700
PROCEDURAL 217.427 Confirm Altitude already set to 700
**Goal201 5.235
isa DIAL-ALTITUDE
waypoint 4
altitude 700GOAL201 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 218.034 SubGoal checking Altitude
VISUAL 218.952 altitude Value 1263
**Goal204 5.129
isa CHECK-ALTITUDE
altitude 1263
previous 1292GOAL204 DIAL DIAL T Ignore-Altitude
PROCEDURAL 219.610 SubGoal setting Dial Altitude
VISUAL 220.617 waypoint Value 4
RETRIEVAL 220.767 Altitude 700
VISUAL 221.737 dial-altitude Value 700
PROCEDURAL 221.787 Confirm Altitude already set to 700
**Goal206 4.947
isa DIAL-ALTITUDE
waypoint 4
altitude 700GOAL206 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 222.392 SubGoal checking Altitude
VISUAL 223.505 altitude Value 1237
**Goal209 5.085
isa CHECK-ALTITUDE
altitude 1237
previous 1263GOAL209 DIAL DIAL T Ignore-Altitude
PROCEDURAL 224.161 SubGoal checking Autopilot
VISUAL 225.398 otw_runway Value out-of-sight
VISUAL 226.487 autopilots Value up
VISUAL 227.541 altitude Value 1213
**Goal211 7.968
isa SET-AUTOPILOT
visibility Out-Of-Sight
peek 1213
decision Engaged
decision-altitude 600GOAL211 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 228.243 SubGoal checking Altitude
VISUAL 229.334 altitude Value 1202
**Goal215 5.006
isa CHECK-ALTITUDE
altitude 1202
previous 1237GOAL215 DIAL DIAL T Ignore-Altitude
PROCEDURAL 229.992 SubGoal setting Dial Altitude
VISUAL 230.912 waypoint Value 4

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RETRIEVAL 231.062 Altitude 700
VISUAL 231.961 dial-altitude Value 700
PROCEDURAL 232.011 Confirm Altitude already set to 700
**Goal217 5.111
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL217 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 232.617 SubGoal checking Altitude
VISUAL 233.664 altitude Value 1176
**Goal220 4.922
    isa CHECK-ALTITUDE
    altitude 1176
    previous 1202GOAL220 DIAL DIAL T Ignore-Altitude
PROCEDURAL 234.321 SubGoal setting Dial Altitude
VISUAL 235.599 waypoint Value 4
RETRIEVAL 235.749 Altitude 700
VISUAL 236.502 dial-altitude Value 700
PROCEDURAL 236.552 Confirm Altitude already set to 700
**Goal222 5.321
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL222 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 237.159 SubGoal checking Altitude
VISUAL 238.188 altitude Value 1149
**Goal225 5.295
    isa CHECK-ALTITUDE
    altitude 1149
    previous 1176GOAL225 DIAL DIAL T Ignore-Altitude
PROCEDURAL 238.844 SubGoal setting Dial Altitude
VISUAL 239.787 atc Value random-listen
VISUAL 239.787 waypoint Value 4
RETRIEVAL 239.937 Altitude 700
VISUAL 241.051 dial-altitude Value 700
PROCEDURAL 241.101 Confirm Altitude already set to 700
**Goal227 5.020
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL227 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 241.709 SubGoal checking Altitude
VISUAL 242.913 altitude Value 1121
**Goal230 4.924
    isa CHECK-ALTITUDE
    altitude 1121
    previous 1149GOAL230 DIAL DIAL T Ignore-Altitude
PROCEDURAL 243.571 SubGoal checking Autopilot
VISUAL 244.690 otw_runway Value out-of-sight
VISUAL 245.547 autopilots Value up
VISUAL 246.458 altitude Value 1099
**Goal232 8.029
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1099
    decision Engaged
    decision-altitude 600GOAL232 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 247.160 SubGoal checking Altitude
VISUAL 248.234 altitude Value 1089
**Goal236 4.906

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isa CHECK-ALTITUDE
altitude 1089
previous 1121GOAL236 DIAL DIAL T Ignore-Altitude
PROCEDURAL 248.891 SubGoal checking Autopilot
VISUAL 249.736 otw_runway Value out-of-sight
VISUAL 250.695 autopilots Value up
VISUAL 251.852 altitude Value 1067
**Goal238 7.971
isa SET-AUTOPILOT
visibility Out-Of-Sight
peek 1067
decision Engaged
decision-altitude 600GOAL238 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 252.554 SubGoal checking Altitude
VISUAL 253.732 altitude Value 1056
**Goal242 4.924
isa CHECK-ALTITUDE
altitude 1056
previous 1089GOAL242 DIAL DIAL T Ignore-Altitude
PROCEDURAL 254.389 SubGoal setting Dial Altitude
VISUAL 255.595 waypoint Value 4
RETRIEVAL 255.745 Altitude 700
VISUAL 256.590 dial-altitude Value 700
PROCEDURAL 256.640 Confirm Altitude already set to 700
**Goal244 4.981
isa DIAL-ALTITUDE
waypoint 4
altitude 700GOAL244 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 257.246 SubGoal checking Altitude
VISUAL 258.365 altitude Value 1028
**Goal247 4.918
isa CHECK-ALTITUDE
altitude 1028
previous 1056GOAL247 DIAL DIAL T Ignore-Altitude
PROCEDURAL 259.021 SubGoal setting Dial Altitude
VISUAL 260.265 waypoint Value 4
RETRIEVAL 260.415 Altitude 700
VISUAL 261.437 dial-altitude Value 700
PROCEDURAL 261.487 Confirm Altitude already set to 700
**Goal249 4.972
isa DIAL-ALTITUDE
waypoint 4
altitude 700GOAL249 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 262.092 SubGoal checking Altitude
VISUAL 263.328 altitude Value 998
**Goal252 5.059
isa CHECK-ALTITUDE
altitude 998
previous 1028GOAL252 DIAL DIAL T Ignore-Altitude
PROCEDURAL 263.985 SubGoal setting Dial Altitude
VISUAL 265.053 waypoint Value 5
RETRIEVAL 265.203 Altitude 500
VISUAL 266.096 dial-altitude Value 700
MANUAL 268.891 dial-altitude set 500
**Goal254 5.000
isa DIAL-ALTITUDE
waypoint 5

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        altitude 500GOAL254 DIAL DIAL T Dial-Altitude
PROCEDURAL 269.497 SubGoal checking Altitude
VISUAL 270.479 altitude Value 901
**Goal258 5.340
    isa CHECK-ALTITUDE
    altitude 901
    previous 998GOAL258 DIAL DIAL T Ignore-Altitude
PROCEDURAL 271.136 SubGoal setting Dial Altitude
VISUAL 272.389 waypoint Value 5
RETRIEVAL 272.589 Altitude 500
VISUAL 273.465 dial-altitude Value 500
PROCEDURAL 273.515 Confirm Altitude already set to 500
**Goal260 5.351
    isa DIAL-ALTITUDE
    waypoint 5
    altitude 500GOAL260 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 274.122 SubGoal checking Altitude
VISUAL 275.042 altitude Value 841
**Goal263 4.794
    isa CHECK-ALTITUDE
    altitude 841
    previous 901GOAL263 DIAL DIAL T Ignore-Altitude
PROCEDURAL 275.699 SubGoal setting Dial Altitude
VISUAL 276.807 waypoint Value 5
RETRIEVAL 276.957 Altitude 500
VISUAL 278.099 dial-altitude Value 500
PROCEDURAL 278.149 Confirm Altitude already set to 500
**Goal265 4.873
    isa DIAL-ALTITUDE
    waypoint 5
    altitude 500GOAL265 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 278.756 SubGoal checking Altitude
VISUAL 280.013 altitude Value 773
**Goal268 4.933
    isa CHECK-ALTITUDE
    altitude 773
    previous 841GOAL268 DIAL DIAL T Ignore-Altitude
PROCEDURAL 280.669 SubGoal setting Dial Altitude
VISUAL 281.913 waypoint Value 5
RETRIEVAL 282.063 Altitude 500
VISUAL 282.919 dial-altitude Value 500
PROCEDURAL 282.969 Confirm Altitude already set to 500
**Goal270 5.111
    isa DIAL-ALTITUDE
    waypoint 5
    altitude 500GOAL270 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 283.579 SubGoal checking Altitude
VISUAL 284.486 altitude Value 713
**Goal273 5.036
    isa CHECK-ALTITUDE
    altitude 713
    previous 773GOAL273 DIAL DIAL T Ignore-Altitude
PROCEDURAL 285.142 SubGoal setting Dial Altitude
VISUAL 286.075 waypoint Value 6
RETRIEVAL 286.225 Altitude 500
VISUAL 287.315 dial-altitude Value 500
PROCEDURAL 287.365 Confirm Altitude already set to 500

```

```
**Goal275      5.305
  isa DIAL-ALTITUDE
  waypoint 6
  altitude 500GOAL275 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 287.970 SubGoal checking Altitude
VISUAL 288.797 altitude Value 623
**Goal278      4.872
  isa CHECK-ALTITUDE
  altitude 623
  previous 713GOAL278 DIAL DIAL T Ignore-Altitude
PROCEDURAL 289.455 SubGoal checking Autopilot
VISUAL 290.566 otw_runway Value runway-off-alignment
VISUAL 291.751 autopilots Value up
PROCEDURAL 291.801 Runway misaligned -- going around
MANUAL 294.559 autopilots up/down 0
VISUAL 295.814 altitude Value 551
**Goal280      10.262
  isa SET-AUTOPILOT
  visibility Runway-Off-Alignment
  peek Looking
  decision Disengaged
  decision-altitude 600GOAL280 DIAL DIAL T Peek
```

*** Finis ***

*** Setting ModelDone to 1***

```
MCP NAV PFD SVS CONTROLS OTW off Total-time
69.668495 51.08157 63.531006 0 45.285492 54.94635 11.850983 296.3639
EMC End:T 296.3639
```

Look 1.0 Action 2.5 Listen 0.5 Ans 0.1

; ; Factory is idle.

7-SVS IMC Vectored approach

dribbling to file "SVS-IMC-vectored.drb"

```
Factory Started
CL-USER(1): (register-server)
Registered Server EMC_NASAHPM.EMCReceiveCOMMessages
NIL
CL-USER(2):
Subject 0 Trial 0 Run 1
Initializing control

Control      4.867
  isa CONTROL
  speed 200.0d0
  altitude 2500.0d0
  waypoint nil
  distance nil
  flaps 5
  decision-altitude 600
  landing-gear Up
  airbrakes Off
  autopilots Engaged
  task nil
  last-task nil
  status Active
  landing-checklist nil
VISUAL      0.000 flaps Value 5
CHUNK NIL IS UNDEFINED.
CHUNK NIL IS UNDEFINED.
PROCEDURAL   1.298 Preparing for approach: setting LNAV
VISUAL      1.298 distance-next Value 1
PROCEDURAL   2.297 Preparing for approach: setting VNAV
VISUAL      2.297 waypoint Value 1
PROCEDURAL   6.345 Preparing for approach: engaging Speed-brakes full
MANUAL      6.345 airbrakes on/off 0
PROCEDURAL   7.309 Preparing for approach: engaging Autopilot
VISUAL      7.309 autopilots Value up
PROCEDURAL   9.693 Preparing for approach: setting Flaps 1
MANUAL      9.693 flaps set 1
PROCEDURAL   9.849 SubGoal checking Flaps
VISUAL      10.711 speed Value 200
RETRIEVAL    10.861 Flaps 1
VISUAL      11.949 flaps Value 1
PROCEDURAL   11.999 Confirm Flaps already set to 1
**Goal6     4.976
  isa SET-FLAP
  speed 200
  flap 1GOAL6 SVS NIL NIL Flaps-Already-Set
PROCEDURAL   13.606 SubGoal checking Autopilot
VISUAL      14.691 otw_runway Value out-of-sight
VISUAL      15.854 autopilots Value up
VISUAL      16.717 altitude Value 2500
**Goal9     8.297
  isa SET-AUTOPILOT
  visibility Out-Of-Sight
```

```

peek 2500
decision Engaged
decision-altitude 600GOAL9 SVS NIL NIL Ignore-Autopilot
PROCEDURAL 18.418 SubGoal setting Dial Altitude
VISUAL 19.664 waypoint Value 2
RETRIEVAL 20.014 Altitude 1800
VISUAL 20.929 dial-altitude Value 2500
MANUAL 24.099 dial-altitude set 1800
**Goal13 4.756
isa DIAL-ALTITUDE
waypoint 2
altitude 1800GOAL13 DIAL SVS NIL Dial-Altitude
PROCEDURAL 25.706 SubGoal checking Altitude
VISUAL 26.725 altitude Value 2500
**Goal17 4.946
isa CHECK-ALTITUDE
altitude 2500
previous 2500.0d0GOAL17 DIAL SVS NIL Ignore-Altitude
PROCEDURAL 28.380 SubGoal checking Speed Brakes
VISUAL 29.350 speed Value 200
VISUAL 30.650 airbrakes Value on
PROCEDURAL 30.700 Setting Speed Brakes
MANUAL 32.901 airbrakes on/off 0
**Goal19 9.014
isa SPEED-BRAKES
speed 200
decision OffGOAL19 DIAL DIAL T Set-Speed-Brakes
PROCEDURAL 33.501 SubGoal checking Decision Altitude
VISUAL 34.518 waypoint Value 2
VISUAL 35.544 distance-next Value 3
RETRIEVAL 35.644 Waypoint 2 Next 3 Distance 14
**Goal23 5.201
isa SET-DECISION-ALTITUDE
waypoint 2
distance-next 3
distance 14
old 600
decision 600GOAL23 SVS SVS T Ignore-Decision-Altitude
PROCEDURAL 36.302 SubGoal checking Speed
VISUAL 37.583 waypoint Value 2
VISUAL 38.846 distance-next Value 3
RETRIEVAL 38.946 Waypoint 2 Next 3 Distance 14
RETRIEVAL 39.046 Speed
VISUAL 39.920 dial-speed Value 200
MANUAL 41.968 dial-speed set 160
**Goal26 5.115
isa SET-SPEED
waypoint 2
distance-next 3
distance 14
speed 160GOAL26 DIAL SVS NIL Dial-Speed
PROCEDURAL 43.576 SubGoal checking Landing Gear
VISUAL 44.823 waypoint Value 2
VISUAL 45.835 distance-next Value 2
RETRIEVAL 45.935 Waypoint 2 Next 2 Distance 13
VISUAL 47.101 landing-gear Value up
PROCEDURAL 47.151 Lowering Gear

```

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MANUAL    49.321 landing-gear up/down 0
**Goal31   9.088
  isa MOVE-GEAR
  waypoint 2
  distance-next 2
  distance 13
  decision DownGOAL31 SVS SVS T Move-Gear
PROCEDURAL  49.931 SubGoal checking Flaps
VISUAL    51.097 speed Value 193
RETRIEVAL   51.247 Flaps 20
VISUAL    52.426 flaps Value 1
MANUAL    55.548 flaps set 20
**Goal36   4.731
  isa SET-FLAP
  speed 193
  flap 20GOAL36 SVS SVS T Set-Flaps
PROCEDURAL  56.155 SubGoal checking Altitude
VISUAL    57.316 altitude Value 2500
**Goal40   4.969
  isa CHECK-ALTITUDE
  altitude 2500
  previous 2500GOAL40 SVS SVS T Ignore-Altitude
PROCEDURAL  57.973 SubGoal checking Decision Altitude
VISUAL    59.121 waypoint Value 2
VISUAL    60.353 distance-next Value 1
RETRIEVAL   60.454 Waypoint 2 Next 1 Distance 12
**Goal42   4.936
  isa SET-DECISION-ALTITUDE
  waypoint 2
  distance-next 1
  distance 12
  old 600
  decision 600GOAL42 SVS DIAL NIL Ignore-Decision-Altitude
PROCEDURAL  62.110 SubGoal checking Autopilot
VISUAL    63.409 otw_runway Value out-of-sight
VISUAL    64.288 autopilots Value up
VISUAL    65.100 altitude Value 2500
**Goal45   8.592
  isa SET-AUTOPILOT
  visibility Out-Of-Sight
  peek 2500
  decision Engaged
  decision-altitude 600GOAL45 SVS DIAL NIL Ignore-Autopilot
PROCEDURAL  66.801 SubGoal checking Speed Brakes
VISUAL    67.786 speed Value 179
VISUAL    68.966 airbrakes Value off
**Goal49   8.946
  isa SPEED-BRAKES
  speed 179
  decision OffGOAL49 DIAL SVS NIL Decide-Speed-Brakes
PROCEDURAL  70.566 SubGoal setting Dial Altitude
VISUAL    71.822 waypoint Value 2
RETRIEVAL   71.972 Altitude 1800
VISUAL    72.847 dial-altitude Value 1800
PROCEDURAL  72.897 Confirm Altitude already set to 1800
**Goal52   4.680
  isa DIAL-ALTITUDE

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waypoint 2
    altitude 1800GOAL52 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 73.506 SubGoal checking Speed
VISUAL 74.637 waypoint Value 2
VISUAL 75.745 distance-next Value 0
RETRIEVAL 75.845 Waypoint 2 Next 0 Distance 11
RETRIEVAL 75.945 Speed
VISUAL 76.999 dial-speed Value 160
MANUAL 79.813 dial-speed set 140
VISUAL 79.813 atc Value random-listen
CHUNK NIL IS UNDEFINED.
CHUNK NIL IS UNDEFINED.
**Goal55 5.265
    isa SET-SPEED
    waypoint 2
    distance-next 0
    distance 11
    speed 140GOAL55 SVS DIAL NIL Dial-Speed
PROCEDURAL 81.420 SubGoal checking Landing Gear
VISUAL 82.485 atc Value ten-miles-out
VISUAL 82.485 waypoint Value 3
VISUAL 83.626 distance-next Value 2
RETRIEVAL 83.726 Waypoint 3 Next 2 Distance 11
VISUAL 84.805 landing-gear Value down
**Goal60 8.415
    isa MOVE-GEAR
    waypoint 3
    distance-next 2
    distance 11
    decision DownGOAL60 DIAL SVS NIL Decide-Gear
PROCEDURAL 86.405 SubGoal checking Altitude
VISUAL 87.402 altitude Value 2383
**Goal64 5.028
    isa CHECK-ALTITUDE
    altitude 2383
    previous 2500GOAL64 DIAL SVS NIL Ignore-Altitude
PROCEDURAL 89.059 SubGoal checking Decision Altitude
VISUAL 90.099 waypoint Value 3
VISUAL 91.131 distance-next Value 1
RETRIEVAL 91.231 Waypoint 3 Next 1 Distance 10
**Goal66 4.994
    isa SET-DECISION-ALTITUDE
    waypoint 3
    distance-next 1
    distance 10
    old 600
    decision 600GOAL66 DIAL SVS NIL Ignore-Decision-Altitude
PROCEDURAL 92.891 SubGoal checking Speed Brakes
VISUAL 93.908 speed Value 160
VISUAL 94.868 airbrakes Value off
**Goal69 8.305
    isa SPEED-BRAKES
    speed 160
    decision OffGOAL69 DIAL DIAL T Decide-Speed-Brakes
PROCEDURAL 95.468 SubGoal checking Autopilot
VISUAL 96.341 otw_runway Value out-of-sight
VISUAL 97.307 autopilots Value up

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VISUAL 98.340 altitude Value 2186
**Goal72 8.629
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 2186
    decision Engaged
    decision-altitude 600GOAL72 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 99.040 SubGoal setting Dial Altitude
VISUAL 99.955 waypoint Value 3
RETRIEVAL 100.105 Altitude 1000
VISUAL 101.254 dial-altitude Value 1800
MANUAL 103.440 dial-altitude set 1000
**Goal76 4.962
    isa DIAL-ALTITUDE
    waypoint 3
    altitude 1000GOAL76 SVS DIAL NIL Dial-Altitude
PROCEDURAL 105.047 SubGoal checking Flaps
VISUAL 105.891 speed Value 157
RETRIEVAL 106.041 Flaps 25
VISUAL 106.946 flaps Value 20
MANUAL 109.489 flaps set 25
**Goal80 4.794
    isa SET-FLAP
    speed 157
    flap 25GOAL80 DIAL SVS NIL Set-Flaps
PROCEDURAL 111.096 SubGoal checking Altitude
VISUAL 112.277 altitude Value 1943
**Goal84 5.045
    isa CHECK-ALTITUDE
    altitude 1943
    previous 2383GOAL84 DIAL SVS NIL Read-Altitude
PROCEDURAL 113.933 SubGoal checking Autopilot
VISUAL 115.014 otw_runway Value out-of-sight
VISUAL 116.142 autopilots Value up
VISUAL 117.196 altitude Value 1858
**Goal86 8.328
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1858
    decision Engaged
    decision-altitude 600GOAL86 DIAL SVS NIL Ignore-Autopilot
PROCEDURAL 118.897 SubGoal checking Altitude
VISUAL 119.860 altitude Value 1812
**Goal90 5.006
    isa CHECK-ALTITUDE
    altitude 1812
    previous 1943GOAL90 DIAL SVS NIL Ignore-Altitude
PROCEDURAL 121.517 SubGoal setting Dial Altitude
VISUAL 122.686 waypoint Value 4
RETRIEVAL 122.837 Altitude 700
VISUAL 124.030 dial-altitude Value 1000
MANUAL 126.787 dial-altitude set 700
**Goal92 4.946
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL92 DIAL DIAL T Dial-Altitude
PROCEDURAL 127.395 SubGoal completing landing checklist

```

PROCEDURAL 131.455 Landing checklist: setting Speed-brakes to armed
 MANUAL 131.455 airbrakes on/off 0
 PROCEDURAL 134.253 Landing checklist: setting Gear down 1
 MANUAL 134.253 landing-gear up/down 0
 PROCEDURAL 136.631 Landing checklist: setting Flaps 15
 MANUAL 136.631 flaps set 15
 PROCEDURAL 139.758 Landing checklist: setting Speed to 135
 MANUAL 139.758 speed set 135
 VISUAL 139.758 speed Value 149
 PROCEDURAL 142.595 Landing checklist: preparing cabin for landing
 VOCAL 142.595 nothing communication 2007
 VOCAL 142.645 Landing Checklist Complete
 PROCEDURAL 142.802 SubGoal checking Altitude
 VISUAL 143.773 altitude Value 1651
 **Goal103 5.154
 isa CHECK-ALTITUDE
 altitude 1651
 previous 1812GOAL103 DIAL DIAL T Read-Altitude
 PROCEDURAL 144.431 SubGoal checking Autopilot
 VISUAL 145.445 otw_runway Value out-of-sight
 VISUAL 146.729 autopilots Value up
 VISUAL 147.667 altitude Value 1626
 **Goal105 8.260
 isa SET-AUTOPILOT
 visibility Out-Of-Sight
 peek 1626
 decision Engaged
 decision-altitude 600GOAL105 DIAL DIAL T Ignore-Autopilot
 PROCEDURAL 148.368 SubGoal checking Altitude
 VISUAL 149.473 altitude Value 1615
 **Goal109 4.990
 isa CHECK-ALTITUDE
 altitude 1615
 previous 1651GOAL109 DIAL DIAL T Ignore-Altitude
 PROCEDURAL 150.130 SubGoal checking Autopilot
 VISUAL 151.242 otw_runway Value out-of-sight
 VISUAL 152.056 autopilots Value up
 VISUAL 152.885 altitude Value 1594
 **Goal111 8.099
 isa SET-AUTOPILOT
 visibility Out-Of-Sight
 peek 1594
 decision Engaged
 decision-altitude 600GOAL111 DIAL DIAL T Ignore-Autopilot
 PROCEDURAL 153.586 SubGoal checking Altitude
 VISUAL 154.832 altitude Value 1581
 **Goal115 5.039
 isa CHECK-ALTITUDE
 altitude 1581
 previous 1615GOAL115 DIAL DIAL T Ignore-Altitude
 PROCEDURAL 155.489 SubGoal setting Dial Altitude
 VISUAL 156.509 waypoint Value 4
 RETRIEVAL 156.659 Altitude 700
 VISUAL 157.719 dial-altitude Value 700
 PROCEDURAL 157.769 Confirm Altitude already set to 700
 **Goal117 5.051
 isa DIAL-ALTITUDE

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waypoint 4
    altitude 700GOAL117 SVS DIAL NIL Dial-Altitude-Already-Dialed
PROCEDURAL 159.377 SubGoal checking Altitude
VISUAL 160.567 atc Value random-no-listen
VISUAL 160.567 altitude Value 1546
**Goal120 5.076
    isa CHECK-ALTITUDE
    altitude 1546
    previous 1581GOAL120 SVS DIAL NIL Ignore-Altitude
PROCEDURAL 162.222 SubGoal checking Autopilot
VISUAL 163.184 otw_runway Value out-of-sight
VISUAL 164.039 autopilots Value up
VISUAL 165.323 altitude Value 1517
**Goal122 8.138
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1517
    decision Engaged
    decision-altitude 600GOAL122 SVS DIAL NIL Ignore-Autopilot
PROCEDURAL 167.025 SubGoal checking Altitude
VISUAL 168.006 altitude Value 1500
**Goal126 5.038
    isa CHECK-ALTITUDE
    altitude 1500
    previous 1546GOAL126 SVS DIAL NIL Ignore-Altitude
PROCEDURAL 169.662 SubGoal setting Dial Altitude
VISUAL 170.811 waypoint Value 4
RETRIEVAL 170.961 Altitude 700
VISUAL 172.058 dial-altitude Value 700
PROCEDURAL 172.108 Confirm Altitude already set to 700
**Goal128 5.063
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL128 SVS SVS T Dial-Altitude-Already-Dialed
PROCEDURAL 172.714 SubGoal checking Altitude
VISUAL 173.607 altitude Value 1466
**Goal131 5.157
    isa CHECK-ALTITUDE
    altitude 1466
    previous 1500GOAL131 SVS SVS T Ignore-Altitude
PROCEDURAL 174.264 SubGoal setting Dial Altitude
VISUAL 175.559 waypoint Value 4
RETRIEVAL 175.709 Altitude 700
VISUAL 176.911 dial-altitude Value 700
PROCEDURAL 176.961 Confirm Altitude already set to 700
**Goal133 4.805
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL133 SVS SVS T Dial-Altitude-Already-Dialed
PROCEDURAL 177.569 SubGoal checking Altitude
VISUAL 178.789 altitude Value 1434
**Goal136 5.066
    isa CHECK-ALTITUDE
    altitude 1434
    previous 1466GOAL136 SVS SVS T Ignore-Altitude
PROCEDURAL 179.446 SubGoal checking Autopilot
VISUAL 180.380 otw_runway Value out-of-sight

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VISUAL 181.354 autopilots Value up
VISUAL 182.561 altitude Value 1411
**Goal138 7.727
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1411
    decision Engaged
    decision-altitude 600GOAL138 SVS SVS T Ignore-Autopilot
PROCEDURAL 183.262 SubGoal checking Altitude
VISUAL 184.165 altitude Value 1402
**Goal142 5.006
    isa CHECK-ALTITUDE
    altitude 1402
    previous 1434GOAL142 SVS SVS T Ignore-Altitude
PROCEDURAL 184.822 SubGoal setting Dial Altitude
VISUAL 186.027 waypoint Value 4
RETRIEVAL 186.177 Altitude 700
VISUAL 187.336 dial-altitude Value 700
PROCEDURAL 187.386 Confirm Altitude already set to 700
**Goal144 5.087
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL144 SVS SVS T Dial-Altitude-Already-Dialed
PROCEDURAL 187.991 SubGoal checking Altitude
VISUAL 189.242 altitude Value 1371
**Goal147 4.784
    isa CHECK-ALTITUDE
    altitude 1371
    previous 1402GOAL147 SVS SVS T Ignore-Altitude
PROCEDURAL 189.897 SubGoal setting Dial Altitude
VISUAL 191.076 waypoint Value 4
RETRIEVAL 191.226 Altitude 700
VISUAL 192.374 dial-altitude Value 700
PROCEDURAL 192.424 Confirm Altitude already set to 700
**Goal149 4.720
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL149 SVS SVS T Dial-Altitude-Already-Dialed
PROCEDURAL 193.031 SubGoal checking Altitude
VISUAL 194.004 altitude Value 1343
**Goal152 4.925
    isa CHECK-ALTITUDE
    altitude 1343
    previous 1371GOAL152 SVS SVS T Ignore-Altitude
PROCEDURAL 194.661 SubGoal setting Dial Altitude
VISUAL 195.511 waypoint Value 4
RETRIEVAL 195.661 Altitude 700
VISUAL 196.466 dial-altitude Value 700
PROCEDURAL 196.516 Confirm Altitude already set to 700
**Goal154 5.472
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL154 SVS SVS T Dial-Altitude-Already-Dialed
PROCEDURAL 197.123 SubGoal checking Altitude
VISUAL 198.048 altitude Value 1319
**Goal157 5.083
    isa CHECK-ALTITUDE

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    altitude 1319
    previous 1343GOAL157 SVS SVS T Ignore-Altitude
PROCEDURAL 198.705 SubGoal setting Dial Altitude
VISUAL 199.511 waypoint Value 4
RETRIEVAL 199.661 Altitude 700
VISUAL 200.785 dial-altitude Value 700
PROCEDURAL 200.835 Confirm Altitude already set to 700
**Goal159 4.887
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL159 SVS SVS T Dial-Altitude-Already-Dialed
PROCEDURAL 201.443 SubGoal checking Altitude
VISUAL 202.407 altitude Value 1293
**Goal162 4.600
    isa CHECK-ALTITUDE
    altitude 1293
    previous 1319GOAL162 SVS SVS T Ignore-Altitude
PROCEDURAL 203.064 SubGoal checking Autopilot
VISUAL 204.013 otw_runway Value out-of-sight
VISUAL 204.978 autopilots Value up
VISUAL 205.897 altitude Value 1272
**Goal164 7.803
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1272
    decision Engaged
    decision-altitude 600GOAL164 SVS SVS T Ignore-Autopilot
PROCEDURAL 206.598 SubGoal checking Altitude
VISUAL 207.499 altitude Value 1262
**Goal168 5.154
    isa CHECK-ALTITUDE
    altitude 1262
    previous 1293GOAL168 SVS SVS T Ignore-Altitude
PROCEDURAL 208.155 SubGoal checking Autopilot
VISUAL 209.010 otw_runway Value out-of-sight
VISUAL 209.913 autopilots Value up
VISUAL 211.156 altitude Value 1240
**Goal170 7.810
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1240
    decision Engaged
    decision-altitude 600GOAL170 SVS SVS T Ignore-Autopilot
PROCEDURAL 211.858 SubGoal checking Altitude
VISUAL 212.758 altitude Value 1231
**Goal174 5.315
    isa CHECK-ALTITUDE
    altitude 1231
    previous 1262GOAL174 SVS SVS T Ignore-Altitude
PROCEDURAL 213.420 SubGoal setting Dial Altitude
VISUAL 214.359 waypoint Value 4
RETRIEVAL 214.509 Altitude 700
VISUAL 215.470 dial-altitude Value 700
PROCEDURAL 215.520 Confirm Altitude already set to 700
**Goal176 4.957
    isa DIAL-ALTITUDE
    waypoint 4

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    altitude 700GOAL176 SVS SVS T Dial-Altitude-Already-Dialed
PROCEDURAL 216.127 SubGoal checking Altitude
VISUAL 216.963 altitude Value 1206
**Goal179 5.111
    isa CHECK-ALTITUDE
    altitude 1206
    previous 1231GOAL179 SVS SVS T Ignore-Altitude
PROCEDURAL 217.620 SubGoal checking Autopilot
VISUAL 218.520 otw_runway Value out-of-sight
VISUAL 219.424 autopilots Value up
VISUAL 220.228 altitude Value 1187
**Goal181 7.409
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1187
    decision Engaged
    decision-altitude 600GOAL181 SVS SVS T Ignore-Autopilot
PROCEDURAL 220.930 SubGoal setting Dial Altitude
VISUAL 221.927 waypoint Value 4
RETRIEVAL 222.077 Altitude 700
VISUAL 222.967 dial-altitude Value 700
PROCEDURAL 223.017 Confirm Altitude already set to 700
**Goal185 5.000
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL185 SVS SVS T Dial-Altitude-Already-Dialed
PROCEDURAL 223.624 SubGoal checking Altitude
VISUAL 224.608 altitude Value 1160
**Goal188 4.888
    isa CHECK-ALTITUDE
    altitude 1160
    previous 1206GOAL188 SVS SVS T Ignore-Altitude
PROCEDURAL 225.267 SubGoal setting Dial Altitude
VISUAL 226.421 waypoint Value 4
RETRIEVAL 226.571 Altitude 700
VISUAL 227.751 dial-altitude Value 700
PROCEDURAL 227.801 Confirm Altitude already set to 700
**Goal190 5.115
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL190 SVS SVS T Dial-Altitude-Already-Dialed
PROCEDURAL 228.411 SubGoal checking Altitude
VISUAL 229.237 altitude Value 1133
**Goal193 5.315
    isa CHECK-ALTITUDE
    altitude 1133
    previous 1160GOAL193 SVS SVS T Ignore-Altitude
PROCEDURAL 229.895 SubGoal checking Autopilot
VISUAL 230.703 otw_runway Value out-of-sight
VISUAL 231.689 autopilots Value up
VISUAL 232.507 altitude Value 1113
**Goal195 7.695
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1113
    decision Engaged
    decision-altitude 600GOAL195 SVS SVS T Ignore-Autopilot

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PROCEDURAL 233.209 SubGoal checking Altitude
VISUAL 234.298 altitude Value 1102
**Goal199 4.867
    isa CHECK-ALTITUDE
    altitude 1102
    previous 1133GOAL199 SVS SVS T Ignore-Altitude
PROCEDURAL 234.956 SubGoal setting Dial Altitude
VISUAL 235.918 waypoint Value 4
RETRIEVAL 236.068 Altitude 700
VISUAL 236.855 dial-altitude Value 700
PROCEDURAL 236.905 Confirm Altitude already set to 700
**Goal201 4.770
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL201 SVS SVS T Dial-Altitude-Already-Dialed
PROCEDURAL 237.511 SubGoal checking Altitude
VISUAL 238.573 atc Value random-no-listen
VISUAL 238.573 altitude Value 1077
**Goal204 4.709
    isa CHECK-ALTITUDE
    altitude 1077
    previous 1102GOAL204 SVS SVS T Ignore-Altitude
PROCEDURAL 239.228 SubGoal checking Autopilot
VISUAL 240.075 otw_runway Value out-of-sight
VISUAL 241.364 autopilots Value up
VISUAL 242.199 altitude Value 1055
**Goal206 7.701
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1055
    decision Engaged
    decision-altitude 600GOAL206 SVS SVS T Ignore-Autopilot
PROCEDURAL 242.901 SubGoal checking Altitude
VISUAL 244.083 altitude Value 1044
**Goal210 4.847
    isa CHECK-ALTITUDE
    altitude 1044
    previous 1077GOAL210 SVS SVS T Ignore-Altitude
PROCEDURAL 244.740 SubGoal checking Autopilot
VISUAL 245.973 otw_runway Value out-of-sight
VISUAL 246.992 autopilots Value up
VISUAL 248.122 altitude Value 1020
**Goal212 7.598
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1020
    decision Engaged
    decision-altitude 600GOAL212 SVS SVS T Ignore-Autopilot
PROCEDURAL 248.823 SubGoal checking Altitude
VISUAL 249.764 altitude Value 1010
**Goal216 5.022
    isa CHECK-ALTITUDE
    altitude 1010
    previous 1044GOAL216 SVS SVS T Ignore-Altitude
PROCEDURAL 250.420 SubGoal setting Dial Altitude
VISUAL 251.542 waypoint Value 5
RETRIEVAL 251.692 Altitude 500

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VISUAL 252.599 dial-altitude Value 700
MANUAL 255.463 dial-altitude set 500
**Goal218 5.112
    isa DIAL-ALTITUDE
    waypoint 5
    altitude 500GOAL218 SVS SVS T Dial-Altitude
PROCEDURAL 256.069 SubGoal checking Altitude
VISUAL 257.332 altitude Value 921
**Goal222 4.952
    isa CHECK-ALTITUDE
    altitude 921
    previous 1010GOAL222 SVS SVS T Ignore-Altitude
PROCEDURAL 257.989 SubGoal setting Dial Altitude
VISUAL 259.258 waypoint Value 5
RETRIEVAL 259.408 Altitude 500
VISUAL 260.360 dial-altitude Value 500
PROCEDURAL 260.410 Confirm Altitude already set to 500
**Goal224 4.938
    isa DIAL-ALTITUDE
    waypoint 5
    altitude 500GOAL224 SVS SVS T Dial-Altitude-Already-Dialed
PROCEDURAL 261.016 SubGoal checking Altitude
VISUAL 261.841 altitude Value 861
**Goal227 5.266
    isa CHECK-ALTITUDE
    altitude 861
    previous 921GOAL227 SVS SVS T Ignore-Altitude
PROCEDURAL 262.498 SubGoal checking Autopilot
VISUAL 263.673 otw_runway Value out-of-sight
VISUAL 264.852 autopilots Value up
VISUAL 265.947 altitude Value 806
**Goal229 7.835
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 806
    decision Engaged
    decision-altitude 600GOAL229 SVS SVS T Ignore-Autopilot
PROCEDURAL 266.649 SubGoal checking Altitude
VISUAL 267.577 altitude Value 783
**Goal233 5.234
    isa CHECK-ALTITUDE
    altitude 783
    previous 861GOAL233 SVS SVS T Ignore-Altitude
PROCEDURAL 268.234 SubGoal checking Autopilot
VISUAL 269.398 otw_runway Value out-of-sight
VISUAL 270.613 autopilots Value up
VISUAL 271.654 altitude Value 729
**Goal235 7.611
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 729
    decision Engaged
    decision-altitude 600GOAL235 SVS SVS T Ignore-Autopilot
PROCEDURAL 272.355 SubGoal checking Altitude
VISUAL 273.481 altitude Value 704
**Goal239 4.897
    isa CHECK-ALTITUDE

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    altitude 704
    previous 783GOAL239 SVS SVS T Ignore-Altitude
PROCEDURAL 274.137 SubGoal checking Autopilot
VISUAL 274.968 otw_runway Value out-of-sight
VISUAL 275.993 autopilots Value up
VISUAL 276.824 altitude Value 629
**Goal241 7.659
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 629
    decision Engaged
    decision-altitude 600GOAL241 SVS SVS T Ignore-Autopilot
PROCEDURAL 277.525 SubGoal checking Altitude
VISUAL 278.455 altitude Value 601
**Goal245 5.126
    isa CHECK-ALTITUDE
    altitude 601
    previous 704GOAL245 SVS SVS T Ignore-Altitude
PROCEDURAL 279.110 SubGoal checking Autopilot
VISUAL 280.034 otw_runway Value in-sight
VISUAL 281.304 autopilots Value up
PROCEDURAL 281.354 Disengage Autopilot and land
MANUAL 283.776 autopilots up/down 0
**Goal247 9.659
    isa SET-AUTOPILOT
    visibility In-Sight
    peek nil
    decision Disengaged
    decision-altitude 600GOAL247 SVS SVS T Disengage-Autopilot

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*** Finis ***

*** Setting ModelDone to 1***

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MCP NAV PFD SVS CONTROLS OTW off Total-time
57.334217 9.238611 60.972866 26.718245 46.018257 70.80176 13.249908
284.33386
EMC End:T 284.33386

```

Look 1.0 Action 2.5 Listen 0.5 Ans 0.1

; ; Factory is idle.

8-SVS IMC Late reassignment

dribbling to file "SVS-IMC-late.drb"

```
; Fast loading
;      C:\Documents and Settings\bbest\My Documents\NASA HEM\NasaHEMv07-
Jul-2004c\nasav07\HPMv7\delivery\ole\client\autotool.fasl
;   Fast loading
;      C:\Documents and Settings\bbest\My Documents\NASA
HEM\NasaHEMv07-Jul-
2004c\nasav07\HPMv7\delivery\ole\client\idispatch.fasl
;   Fast loading
;      C:\Documents and Settings\bbest\My Documents\NASA
HEM\NasaHEMv07-Jul-
2004c\nasav07\HPMv7\delivery\ole\client\iclassfactory.fasl

Factory Started
CL-USER(1): (register-server)
Resistered Server EMC_NASAHPM.EMCReceiveCOMMessages
NIL
CL-USER(2):
Subject 0 Trial 0 Run 1
Initializing control

Control      5.034
  isa CONTROL
  speed 200.0d0
  altitude 2500.0d0
  waypoint nil
  distance nil
  flaps 5
  decision-altitude 600
  landing-gear Up
  airbrakes Off
  autopilots Engaged
  task nil
  last-task nil
  status Active
  landing-checklist nil
VISUAL      0.000 flaps Value 5
CHUNK NIL IS UNDEFINED.
CHUNK NIL IS UNDEFINED.
PROCEDURAL    3.638 Preparing for approach: engaging Speed-brakes full
MANUAL      3.638 airbrakes on/off 0
PROCEDURAL    4.571 Preparing for approach: engaging Autopilot
VISUAL      4.571 autopilots Value up
PROCEDURAL    5.619 Preparing for approach: setting LNAV
VISUAL      5.619 distance-next Value 1
PROCEDURAL    6.456 Preparing for approach: setting VNAV
VISUAL      6.456 waypoint Value 1
PROCEDURAL    8.683 Preparing for approach: setting Flaps 1
MANUAL      8.683 flaps set 1
PROCEDURAL    8.840 SubGoal checking Altitude
VISUAL      9.658 altitude Value 2500
**Goal6      5.313
  isa CHECK-ALTITUDE
```

```

    altitude 2500
    previous 2500.0d0GOAL6 NIL NIL T Ignore-Altitude
PROCEDURAL 10.313 SubGoal checking Flaps
VISUAL 11.171 speed Value 200
RETRIEVAL 11.321 Flaps 1
VISUAL 12.476 flaps Value 1
PROCEDURAL 12.526 Confirm Flaps already set to 1
**Goal8 4.999
    isa SET-FLAP
    speed 200
    flap 1GOAL8 DIAL NIL NIL Flaps-Already-Set
PROCEDURAL 14.132 SubGoal setting Dial Altitude
VISUAL 15.223 waypoint Value 1
RETRIEVAL 15.573 Altitude 2500
VISUAL 16.375 dial-altitude Value 2500
PROCEDURAL 16.425 Confirm Altitude already set to 2500
**Goal11 5.119
    isa DIAL-ALTITUDE
    waypoint 1
    altitude 2500GOAL11 SVS DIAL NIL Dial-Altitude-Already-Dialed
PROCEDURAL 18.034 SubGoal checking Landing Gear
VISUAL 18.928 waypoint Value 2
VISUAL 19.895 distance-next Value 4
RETRIEVAL 19.995 Waypoint 2 Next 4 Distance 15
VISUAL 21.061 landing-gear Value up
PROCEDURAL 21.111 Lowering Gear
MANUAL 23.076 landing-gear up/down 0
**Goal14 8.893
    isa MOVE-GEAR
    waypoint 2
    distance-next 4
    distance 15
    decision DownGOAL14 SVS DIAL NIL Move-Gear
PROCEDURAL 24.683 SubGoal checking Speed
VISUAL 25.721 waypoint Value 2
VISUAL 26.833 distance-next Value 3
RETRIEVAL 26.933 Waypoint 2 Next 3 Distance 14
RETRIEVAL 27.083 Speed
VISUAL 28.317 dial-speed Value 200
MANUAL 31.189 dial-speed set 165
**Goal19 4.981
    isa SET-SPEED
    waypoint 2
    distance-next 3
    distance 14
    speed 165GOAL19 DIAL SVS NIL Dial-Speed
PROCEDURAL 32.797 SubGoal checking Autopilot
VISUAL 33.958 otw_runway Value out-of-sight
VISUAL 34.971 autopilots Value up
VISUAL 36.105 altitude Value 2500
**Goal24 8.561
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 2500
    decision Engaged
    decision-altitude 600GOAL24 DIAL SVS NIL Ignore-Autopilot
PROCEDURAL 37.806 SubGoal checking Speed Brakes

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VISUAL    38.714 speed Value 194
VISUAL    39.595 airbrakes Value on
PROCEDURAL 39.645 Setting Speed Brakes
MANUAL    42.464 airbrakes on/off 0
**Goal128   8.640
    isa SPEED-BRAKES
    speed 194
    decision OffGOAL28 SVS DIAL NIL Set-Speed-Brakes
PROCEDURAL 44.064 SubGoal checking Decision Altitude
VISUAL    45.310 waypoint Value 2
VISUAL    46.308 distance-next Value 2
RETRIEVAL 46.408 Waypoint 2 Next 2 Distance 13
**Goal132   4.913
    isa SET-DECISION-ALTITUDE
    waypoint 2
    distance-next 2
    distance 13
    old 600
    decision 600GOAL32 SVS SVS T Ignore-Decision-Altitude
PROCEDURAL 47.065 SubGoal checking Altitude
VISUAL    48.106 altitude Value 2500
**Goal135   5.351
    isa CHECK-ALTITUDE
    altitude 2500
    previous 2500GOAL35 SVS SVS T Ignore-Altitude
PROCEDURAL 48.765 SubGoal checking Flaps
VISUAL    49.795 speed Value 185
RETRIEVAL 49.995 Flaps 5
VISUAL    51.068 flaps Value 1
MANUAL    53.210 flaps set 5
**Goal137   5.152
    isa SET-FLAP
    speed 185
    flap 5GOAL37 DIAL SVS NIL Set-Flaps
PROCEDURAL 54.815 SubGoal setting Dial Altitude
VISUAL    55.949 waypoint Value 2
RETRIEVAL 56.100 Altitude 1800
VISUAL    56.880 dial-altitude Value 2500
MANUAL    59.274 dial-altitude set 1800
**Goal141   5.341
    isa DIAL-ALTITUDE
    waypoint 2
    altitude 1800GOAL41 SVS DIAL NIL Dial-Altitude
PROCEDURAL 60.880 SubGoal checking Landing Gear
VISUAL    61.901 waypoint Value 2
VISUAL    62.888 distance-next Value 1
RETRIEVAL 62.988 Waypoint 2 Next 1 Distance 12
VISUAL    64.132 landing-gear Value down
**Goal145   8.665
    isa MOVE-GEAR
    waypoint 2
    distance-next 1
    distance 12
    decision DownGOAL45 SVS DIAL NIL Decide-Gear
PROCEDURAL 65.732 SubGoal checking Autopilot
VISUAL    66.561 otw_runway Value out-of-sight
VISUAL    67.418 autopilots Value up

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VISUAL 68.496 altitude Value 2500
**Goal49 7.945
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 2500
    decision Engaged
    decision-altitude 600GOAL49 SVS DIAL NIL Ignore-Autopilot
PROCEDURAL 70.197 SubGoal checking Decision Altitude
VISUAL 71.473 waypoint Value 2
VISUAL 72.365 distance-next Value 1
RETRIEVAL 72.465 Waypoint 2 Next 1 Distance 12
**Goal53 4.732
    isa SET-DECISION-ALTITUDE
    waypoint 2
    distance-next 1
    distance 12
    old 600
    decision 600GOAL53 SVS DIAL NIL Ignore-Decision-Altitude
PROCEDURAL 74.123 SubGoal checking Speed Brakes
VISUAL 74.948 speed Value 165
VISUAL 75.889 airbrakes Value off
**Goal56 8.263
    isa SPEED-BRAKES
    speed 165
    decision OffGOAL56 DIAL SVS NIL Decide-Speed-Brakes
PROCEDURAL 77.489 SubGoal checking Altitude
VISUAL 78.554 altitude Value 2500
**Goal59 4.913
    isa CHECK-ALTITUDE
    altitude 2500
    previous 2500GOAL59 DIAL SVS NIL Ignore-Altitude
PROCEDURAL 80.211 SubGoal checking Speed
VISUAL 81.391 atc Value random-listen
VISUAL 81.391 waypoint Value 2
VISUAL 82.577 distance-next Value 0
RETRIEVAL 82.677 Waypoint 2 Next 0 Distance 11
RETRIEVAL 82.777 Speed
VISUAL 83.532 atc Value ten-miles-out
VISUAL 83.532 dial-speed Value 165
MANUAL 86.094 dial-speed set 140
**Goal61 5.067
    isa SET-SPEED
    waypoint 2
    distance-next 0
    distance 11
    speed 140GOAL61 SVS DIAL NIL Dial-Speed
PROCEDURAL 87.702 SubGoal checking Altitude
VISUAL 88.620 altitude Value 2403
**Goal66 4.992
    isa CHECK-ALTITUDE
    altitude 2403
    previous 2500GOAL66 SVS DIAL NIL Ignore-Altitude
PROCEDURAL 90.278 SubGoal checking Flaps
VISUAL 91.413 speed Value 161
RETRIEVAL 91.563 Flaps 15
VISUAL 92.596 flaps Value 5
MANUAL 95.304 flaps set 15

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**Goal68      4.798
  isa SET-FLAP
  speed 161
  flap 15GOAL68 DIAL SVS NIL Set-Flaps
PROCEDURAL   96.911 SubGoal checking Decision Altitude
VISUAL     97.938 waypoint Value 3
VISUAL     98.982 distance-next Value 1
RETRIEVAL   99.082 Waypoint 3 Next 1 Distance 10
**Goal72      4.936
  isa SET-DECISION-ALTITUDE
  waypoint 3
  distance-next 1
  distance 10
  old 600
  decision 600GOAL72 DIAL SVS NIL Ignore-Decision-Altitude
PROCEDURAL   100.739 SubGoal checking Landing Gear
VISUAL     101.864 waypoint Value 3
VISUAL     103.034 distance-next Value 1
RETRIEVAL   103.134 Waypoint 3 Next 1 Distance 10
VISUAL     104.338 landing-gear Value down
**Goal75      8.358
  isa MOVE-GEAR
  waypoint 3
  distance-next 1
  distance 10
  decision DownGOAL75 DIAL SVS NIL Decide-Gear
PROCEDURAL   105.938 SubGoal setting Dial Altitude
VISUAL     107.133 waypoint Value 3
RETRIEVAL   107.283 Altitude 1000
VISUAL     108.443 dial-altitude Value 1800
MANUAL     110.801 dial-altitude set 1000
**Goal79      5.043
  isa DIAL-ALTITUDE
  waypoint 3
  altitude 1000GOAL79 SVS DIAL NIL Dial-Altitude
PROCEDURAL   112.406 SubGoal checking Speed Brakes
VISUAL     113.393 speed Value 155
VISUAL     114.293 airbrakes Value off
**Goal83      8.351
  isa SPEED-BRAKES
  speed 155
  decision OffGOAL83 SVS SVS T Decide-Speed-Brakes
PROCEDURAL   114.893 SubGoal checking Autopilot
VISUAL     115.926 otw_runway Value out-of-sight
VISUAL     116.976 autopilots Value up
VISUAL     118.146 altitude Value 1883
**Goal86      8.084
  isa SET-AUTOPILOT
  visibility Out-Of-Sight
  peek 1883
  decision Engaged
  decision-altitude 600GOAL86 SVS SVS T Ignore-Autopilot
PROCEDURAL   118.847 SubGoal checking Altitude
VISUAL     120.091 altitude Value 1850
**Goal90      5.051
  isa CHECK-ALTITUDE
  altitude 1850

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    previous 2403GOAL90 SVS SVS T Read-Altitude
PROCEDURAL 120.747 SubGoal checking Autopilot
VISUAL 122.038 otw_runway Value out-of-sight
VISUAL 123.150 autopilots Value up
VISUAL 124.242 altitude Value 1792
**Goal92 8.042
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1792
    decision Engaged
    decision-altitude 600GOAL92 SVS SVS T Ignore-Autopilot
PROCEDURAL 124.943 SubGoal checking Altitude
VISUAL 125.934 altitude Value 1781
**Goal96 4.516
    isa CHECK-ALTITUDE
    altitude 1781
    previous 1850GOAL96 SVS SVS T Ignore-Altitude
PROCEDURAL 126.592 SubGoal setting Dial Altitude
VISUAL 127.424 waypoint Value 4
RETRIEVAL 127.624 Altitude 700
VISUAL 128.544 dial-altitude Value 1000
MANUAL 131.701 dial-altitude set 700
**Goal98 5.093
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL98 SVS SVS T Dial-Altitude
PROCEDURAL 132.305 SubGoal completing landing checklist
PROCEDURAL 134.792 Landing checklist: preparing cabin for landing
VOCAL 134.792 nothing communication 2007
PROCEDURAL 136.896 Landing checklist: setting Gear down 1
MANUAL 136.896 landing-gear up/down 0
PROCEDURAL 140.802 Landing checklist: setting Speed-brakes to armed
MANUAL 140.802 airbrakes on/off 0
PROCEDURAL 143.359 Landing checklist: setting Flaps 15
MANUAL 143.359 flaps set 15
PROCEDURAL 146.287 Landing checklist: setting Speed to 135
MANUAL 146.287 speed set 135
VISUAL 146.287 speed Value 148
VOCAL 146.337 Landing Checklist Complete
PROCEDURAL 146.493 SubGoal checking Altitude
VISUAL 147.296 altitude Value 1644
**Goal109 5.132
    isa CHECK-ALTITUDE
    altitude 1644
    previous 1781GOAL109 SVS SVS T Ignore-Altitude
PROCEDURAL 147.953 SubGoal setting Dial Altitude
VISUAL 148.963 waypoint Value 4
RETRIEVAL 149.163 Altitude 700
VISUAL 150.223 dial-altitude Value 700
PROCEDURAL 150.273 Confirm Altitude already set to 700
**Goal111 5.051
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL111 DIAL SVS NIL Dial-Altitude-Already-Dialed
PROCEDURAL 151.881 SubGoal checking Altitude
VISUAL 153.071 altitude Value 1608
**Goal114 5.076

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isa CHECK-ALTITUDE
altitude 1608
previous 1644GOAL114 DIAL SVS NIL Ignore-Altitude
PROCEDURAL 154.726 SubGoal checking Autopilot
VISUAL 155.688 otw_runway Value out-of-sight
VISUAL 156.543 autopilots Value up
VISUAL 157.827 atc Value random-no-listen
VISUAL 157.827 altitude Value 1578
**Goal116 8.413
isa SET-AUTOPILOT
visibility Out-Of-Sight
peek 1578
decision Engaged
decision-altitude 600GOAL116 DIAL SVS NIL Ignore-Autopilot
PROCEDURAL 159.528 SubGoal checking Altitude
VISUAL 160.510 altitude Value 1562
**Goal120 5.038
isa CHECK-ALTITUDE
altitude 1562
previous 1608GOAL120 DIAL SVS NIL Ignore-Altitude
PROCEDURAL 162.165 SubGoal checking Autopilot
VISUAL 163.314 otw_runway Value out-of-sight
VISUAL 164.430 autopilots Value up
VISUAL 165.358 altitude Value 1531
**Goal122 8.059
isa SET-AUTOPILOT
visibility Out-Of-Sight
peek 1531
decision Engaged
decision-altitude 600GOAL122 DIAL SVS NIL Ignore-Autopilot
PROCEDURAL 167.059 SubGoal checking Altitude
VISUAL 168.312 altitude Value 1514
**Goal126 4.838
isa CHECK-ALTITUDE
altitude 1514
previous 1562GOAL126 DIAL SVS NIL Ignore-Altitude
PROCEDURAL 169.969 SubGoal setting Dial Altitude
VISUAL 170.836 waypoint Value 4
RETRIEVAL 170.987 Altitude 700
VISUAL 172.138 dial-altitude Value 700
PROCEDURAL 172.188 Confirm Altitude already set to 700
**Goal128 4.994
isa DIAL-ALTITUDE
waypoint 4
altitude 700GOAL128 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 172.792 SubGoal checking Altitude
VISUAL 173.861 altitude Value 1479
**Goal131 4.983
isa CHECK-ALTITUDE
altitude 1479
previous 1514GOAL131 DIAL DIAL T Ignore-Altitude
PROCEDURAL 174.517 SubGoal checking Autopilot
VISUAL 175.756 otw_runway Value out-of-sight
VISUAL 176.716 autopilots Value up
VISUAL 177.844 altitude Value 1455
**Goal133 8.268
isa SET-AUTOPILOT

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visibility Out-Of-Sight
peek 1455
decision Engaged
decision-altitude 600GOAL133 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 178.545 SubGoal checking Altitude
VISUAL 179.511 altitude Value 1445
**Goal137 4.954
isa CHECK-ALTITUDE
altitude 1445
previous 1479GOAL137 DIAL DIAL T Ignore-Altitude
PROCEDURAL 180.170 SubGoal setting Dial Altitude
VISUAL 181.382 waypoint Value 4
RETRIEVAL 181.532 Altitude 700
VISUAL 182.698 dial-altitude Value 700
PROCEDURAL 182.748 Confirm Altitude already set to 700
**Goal139 4.841
isa DIAL-ALTITUDE
waypoint 4
altitude 700GOAL139 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 183.357 SubGoal checking Altitude
VISUAL 184.490 altitude Value 1415
**Goal142 4.883
isa CHECK-ALTITUDE
altitude 1415
previous 1445GOAL142 DIAL DIAL T Ignore-Altitude
PROCEDURAL 185.147 SubGoal checking Autopilot
VISUAL 186.396 otw_runway Value out-of-sight
VISUAL 187.497 autopilots Value up
VISUAL 188.709 altitude Value 1390
**Goal144 7.947
isa SET-AUTOPILOT
visibility Out-Of-Sight
peek 1390
decision Engaged
decision-altitude 600GOAL144 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 189.410 SubGoal checking Altitude
VISUAL 190.482 altitude Value 1380
**Goal148 4.775
isa CHECK-ALTITUDE
altitude 1380
previous 1415GOAL148 DIAL DIAL T Ignore-Altitude
PROCEDURAL 191.140 SubGoal checking Autopilot
VISUAL 192.401 otw_runway Value out-of-sight
VISUAL 193.265 autopilots Value up
VISUAL 194.351 altitude Value 1356
**Goal150 7.739
isa SET-AUTOPILOT
visibility Out-Of-Sight
peek 1356
decision Engaged
decision-altitude 600GOAL150 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 195.052 SubGoal checking Altitude
VISUAL 196.011 altitude Value 1347
**Goal154 5.011
isa CHECK-ALTITUDE
altitude 1347
previous 1380GOAL154 DIAL DIAL T Ignore-Altitude

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PROCEDURAL 196.668 SubGoal setting Dial Altitude
VISUAL 197.747 waypoint Value 4
RETRIEVAL 197.897 Altitude 700
VISUAL 198.727 dial-altitude Value 700
PROCEDURAL 198.777 Confirm Altitude already set to 700
**Goal156 5.239
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL156 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 199.382 SubGoal checking Altitude
VISUAL 200.398 altitude Value 1320
**Goal159 4.969
    isa CHECK-ALTITUDE
    altitude 1320
    previous 1347GOAL159 DIAL DIAL T Ignore-Altitude
PROCEDURAL 201.055 SubGoal setting Dial Altitude
VISUAL 201.975 waypoint Value 4
RETRIEVAL 202.125 Altitude 700
VISUAL 203.361 dial-altitude Value 700
PROCEDURAL 203.411 Confirm Altitude already set to 700
**Goal161 4.894
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL161 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 204.018 SubGoal checking Altitude
VISUAL 204.819 altitude Value 1294
**Goal164 4.981
    isa CHECK-ALTITUDE
    altitude 1294
    previous 1320GOAL164 DIAL DIAL T Ignore-Altitude
PROCEDURAL 205.474 SubGoal checking Autopilot
VISUAL 206.430 otw_runway Value out-of-sight
VISUAL 207.405 autopilots Value up
VISUAL 208.400 altitude Value 1273
**Goal166 8.464
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1273
    decision Engaged
    decision-altitude 600GOAL166 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 209.101 SubGoal checking Altitude
VISUAL 210.295 altitude Value 1261
**Goal170 5.237
    isa CHECK-ALTITUDE
    altitude 1261
    previous 1294GOAL170 DIAL DIAL T Ignore-Altitude
PROCEDURAL 210.951 SubGoal setting Dial Altitude
VISUAL 211.891 waypoint Value 4
RETRIEVAL 212.041 Altitude 700
VISUAL 213.102 dial-altitude Value 700
PROCEDURAL 213.152 Confirm Altitude already set to 700
**Goal172 4.932
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL172 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 213.759 SubGoal checking Altitude
VISUAL 214.858 altitude Value 1234

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**Goal175    4.888
  isa CHECK-ALTITUDE
  altitude 1234
  previous 1261GOAL175 DIAL DIAL T Ignore-Altitude
PROCEDURAL  215.515 SubGoal setting Dial Altitude
VISUAL   216.526 waypoint Value 4
RETRIEVAL  216.676 Altitude 700
VISUAL   217.700 dial-altitude Value 700
PROCEDURAL  217.750 Confirm Altitude already set to 700
**Goal177    4.931
  isa DIAL-ALTITUDE
  waypoint 4
  altitude 700GOAL177 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL  218.357 SubGoal checking Altitude
VISUAL   219.512 altitude Value 1206
**Goal180    5.290
  isa CHECK-ALTITUDE
  altitude 1206
  previous 1234GOAL180 DIAL DIAL T Ignore-Altitude
PROCEDURAL  220.169 SubGoal checking Autopilot
VISUAL   221.030 otw_runway Value out-of-sight
VISUAL   222.065 autopilots Value up
VISUAL   223.064 altitude Value 1185
**Goal182    8.165
  isa SET-AUTOPILOT
  visibility Out-Of-Sight
  peek 1185
  decision Engaged
  decision-altitude 600GOAL182 DIAL DIAL T Ignore-Autopilot
PROCEDURAL  223.766 SubGoal checking Altitude
VISUAL   225.049 altitude Value 1173
**Goal186    5.125
  isa CHECK-ALTITUDE
  altitude 1173
  previous 1206GOAL186 DIAL DIAL T Ignore-Altitude
PROCEDURAL  225.705 SubGoal checking Autopilot
VISUAL   226.885 otw_runway Value out-of-sight
VISUAL   228.014 autopilots Value up
VISUAL   229.031 altitude Value 1150
**Goal188    7.727
  isa SET-AUTOPILOT
  visibility Out-Of-Sight
  peek 1150
  decision Engaged
  decision-altitude 600GOAL188 DIAL DIAL T Ignore-Autopilot
PROCEDURAL  229.733 SubGoal checking Altitude
VISUAL   230.984 altitude Value 1138
**Goal192    5.069
  isa CHECK-ALTITUDE
  altitude 1138
  previous 1173GOAL192 DIAL DIAL T Ignore-Altitude
PROCEDURAL  231.640 SubGoal setting Dial Altitude
VISUAL   232.860 waypoint Value 4
RETRIEVAL  233.010 Altitude 700
VISUAL   234.210 dial-altitude Value 700
PROCEDURAL  234.260 Confirm Altitude already set to 700
**Goal194    4.748

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isa DIAL-ALTITUDE
waypoint 4
altitude 700GOAL194 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 234.867 SubGoal checking Altitude
VISUAL 235.870 atc Value random-no-listen
VISUAL 235.870 altitude Value 1109
**Goal197 5.094
isa CHECK-ALTITUDE
altitude 1109
previous 1138GOAL197 DIAL DIAL T Ignore-Altitude
PROCEDURAL 236.526 SubGoal setting Dial Altitude
VISUAL 237.764 waypoint Value 4
RETRIEVAL 237.914 Altitude 700
VISUAL 239.145 dial-altitude Value 700
PROCEDURAL 239.195 Confirm Altitude already set to 700
**Goal199 5.060
isa DIAL-ALTITUDE
waypoint 4
altitude 700GOAL199 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 239.801 SubGoal checking Altitude
VISUAL 240.672 altitude Value 1080
**Goal202 5.058
isa CHECK-ALTITUDE
altitude 1080
previous 1109GOAL202 DIAL DIAL T Ignore-Altitude
PROCEDURAL 241.331 SubGoal setting Dial Altitude
VISUAL 242.167 waypoint Value 4
RETRIEVAL 242.317 Altitude 700
VISUAL 243.228 dial-altitude Value 700
PROCEDURAL 243.278 Confirm Altitude already set to 700
**Goal204 5.276
isa DIAL-ALTITUDE
waypoint 4
altitude 700GOAL204 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 243.885 SubGoal checking Altitude
VISUAL 244.724 altitude Value 1056
**Goal207 5.302
isa CHECK-ALTITUDE
altitude 1056
previous 1080GOAL207 DIAL DIAL T Ignore-Altitude
PROCEDURAL 245.382 SubGoal setting Dial Altitude
VISUAL 246.638 waypoint Value 4
RETRIEVAL 246.788 Altitude 700
VISUAL 247.612 dial-altitude Value 700
PROCEDURAL 247.662 Confirm Altitude already set to 700
**Goal209 5.022
isa DIAL-ALTITUDE
waypoint 4
altitude 700GOAL209 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 248.268 SubGoal checking Altitude
VISUAL 249.122 altitude Value 1030
**Goal212 4.885
isa CHECK-ALTITUDE
altitude 1030
previous 1056GOAL212 DIAL DIAL T Ignore-Altitude
PROCEDURAL 249.779 SubGoal checking Autopilot
VISUAL 250.662 otw_runway Value out-of-sight

```

VISUAL 251.888 autopilots Value up
 VISUAL 252.856 altitude Value 1007
 **Goal214 7.847
 isa SET-AUTOPILOT
 visibility Out-Of-Sight
 peek 1007
 decision Engaged
 decision-altitude 600GOAL214 DIAL DIAL T Ignore-Autopilot
 PROCEDURAL 253.558 SubGoal checking Altitude
 VISUAL 254.628 atc Value late-reassignment
 VISUAL 254.628 altitude Value 992
 **Goal218 4.999
 isa CHECK-ALTITUDE
 altitude 992
 previous 1030GOAL218 DIAL DIAL T Ignore-Altitude
 PROCEDURAL 255.285 SubGoal setting Dial Altitude
 VISUAL 256.296 waypoint Value 5
 RETRIEVAL 256.446 Altitude 500
 VISUAL 257.221 dial-altitude Value 700
 MANUAL 259.290 dial-altitude set 500
 **Goal220 5.508
 isa DIAL-ALTITUDE
 waypoint 5
 altitude 500GOAL220 DIAL DIAL T Dial-Altitude
 PROCEDURAL 259.897 SubGoal checking Altitude
 VISUAL 261.157 altitude Value 904
 **Goal224 4.767
 isa CHECK-ALTITUDE
 altitude 904
 previous 992GOAL224 DIAL DIAL T Ignore-Altitude
 PROCEDURAL 261.814 SubGoal setting Dial Altitude
 VISUAL 262.746 waypoint Value 5
 RETRIEVAL 262.896 Altitude 500
 VISUAL 264.026 dial-altitude Value 500
 PROCEDURAL 264.076 Confirm Altitude already set to 500
 **Goal226 5.234
 isa DIAL-ALTITUDE
 waypoint 5
 altitude 500GOAL226 DIAL DIAL T Dial-Altitude-Already-Dialed
 PROCEDURAL 264.684 SubGoal checking Altitude
 VISUAL 265.663 altitude Value 844
 **Goal229 5.040
 isa CHECK-ALTITUDE
 altitude 844
 previous 904GOAL229 DIAL DIAL T Ignore-Altitude
 PROCEDURAL 266.319 SubGoal checking Autopilot
 VISUAL 267.598 otw_runway Value out-of-sight
 VISUAL 268.669 autopilots Value up
 VISUAL 269.565 altitude Value 792
 **Goal231 7.600
 isa SET-AUTOPILOT
 visibility Out-Of-Sight
 peek 792
 decision Engaged
 decision-altitude 600GOAL231 DIAL DIAL T Ignore-Autopilot
 PROCEDURAL 270.266 SubGoal checking Altitude
 VISUAL 271.092 altitude Value 771

```

**Goal235      5.024
  isa CHECK-ALTITUDE
  altitude 771
  previous 844GOAL235 DIAL DIAL T Ignore-Altitude
PROCEDURAL 271.746 SubGoal setting Dial Altitude
VISUAL 272.775 waypoint Value 5
RETRIEVAL 272.925 Altitude 500
VISUAL 273.805 dial-altitude Value 500
PROCEDURAL 273.855 Confirm Altitude already set to 500
**Goal237      4.835
  isa DIAL-ALTITUDE
  waypoint 5
  altitude 500GOAL237 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 274.462 SubGoal checking Altitude
VISUAL 275.640 altitude Value 711
**Goal240      4.800
  isa CHECK-ALTITUDE
  altitude 711
  previous 771GOAL240 DIAL DIAL T Ignore-Altitude
PROCEDURAL 276.296 SubGoal checking Autopilot
VISUAL 277.474 otw_runway Value out-of-sight
VISUAL 278.503 autopilots Value up
VISUAL 279.340 altitude Value 633
**Goal242      7.898
  isa SET-AUTOPILOT
  visibility Out-Of-Sight
  peek 633
  decision Engaged
  decision-altitude 600GOAL242 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 280.041 SubGoal checking Altitude
VISUAL 281.213 altitude Value 599
**Goal246      5.278
  isa CHECK-ALTITUDE
  altitude 599
  previous 711GOAL246 DIAL DIAL T Ignore-Altitude
PROCEDURAL 281.870 SubGoal checking Autopilot
VISUAL 282.727 otw_runway Value in-sight
VISUAL 283.622 autopilots Value up
PROCEDURAL 283.672 Disengage Autopilot and land
MANUAL 286.709 autopilots up/down 0
**Goal248      9.895
  isa SET-AUTOPILOT
  visibility In-Sight
  peek nil
  decision Disengaged
  decision-altitude 600GOAL248 DIAL DIAL T Disengage-Autopilot

```

*** Finis ***

*** Setting ModelDone to 1***

```

MCP NAV PFD SVS CONTROLS OTW off Total-time
59.509125 22.109901 61.726612 15.363437 49.26687 66.0936 13.199982
287.26953
EMC End:T 287.26953

```

Look 1.0 Action 2.5 Listen 0.5 Ans 0.1

; ; Factory is idle.

9-SVS IMC Missed approach (go around)

dribbling to file "SVS-IMC-missed.drb"

```
Factory Started
CL-USER(1): (register-server)
Resistered Server EMC_NASAHPM.EMCReceiveCOMMessages
NIL
CL-USER(2):
Subject 0 Trial 0 Run 1
Initializing control

Control      4.560
  isa CONTROL
  speed 200.0d0
  altitude 2500.0d0
  waypoint nil
  distance nil
  flaps 5
  decision-altitude 600
  landing-gear Up
  airbrakes Off
  autopilots Engaged
  task nil
  last-task nil
  status Active
  landing-checklist nil
VISUAL      0.000 flaps Value 5
CHUNK NIL IS UNDEFINED.
CHUNK NIL IS UNDEFINED.
PROCEDURAL   3.566 Preparing for approach: engaging Speed-brakes full
MANUAL       3.566 airbrakes on/off 0
PROCEDURAL   6.172 Preparing for approach: setting Flaps 1
MANUAL       6.172 flaps set 1
PROCEDURAL   7.018 Preparing for approach: setting LNAV
VISUAL      7.018 distance-next Value 1
PROCEDURAL   8.055 Preparing for approach: setting VNAV
VISUAL      8.055 waypoint Value 1
PROCEDURAL   9.091 Preparing for approach: engaging Autopilot
VISUAL      9.091 autopilots Value up
PROCEDURAL   9.248 SubGoal checking Landing Gear
VISUAL      10.215 waypoint Value 1
VISUAL      11.523 distance-next Value 0
RETRIEVAL    11.623 Waypoint 1 Next 0 Distance 15
VISUAL      12.869 landing-gear Value up
PROCEDURAL   12.919 Lowering Gear
MANUAL       15.574 landing-gear up/down 0
**Goal6     8.840
  isa MOVE-GEAR
  waypoint 1
  distance-next 0
  distance 15
  decision DownGOAL6 DIAL DIAL T Move-Gear
PROCEDURAL   16.180 SubGoal checking Altitude
VISUAL      17.385 altitude Value 2500
**Goal11    4.969
```

```

isa CHECK-ALTITUDE
altitude 2500
previous 2500.0d0GOAL11 DIAL DIAL T Ignore-Altitude
PROCEDURAL 18.040 SubGoal checking Autopilot
VISUAL 19.302 otw_runway Value out-of-sight
VISUAL 20.466 autopilots Value up
VISUAL 21.311 altitude Value 2500
**Goal13 8.750
isa SET-AUTOPILOT
visibility Out-Of-Sight
peek 2500
decision Engaged
decision-altitude 600GOAL13 DIAL DIAL T Ignore-Autopilot
PROCEDURAL 22.012 SubGoal checking Speed
VISUAL 23.020 waypoint Value 2
VISUAL 24.205 distance-next Value 3
RETRIEVAL 24.305 Waypoint 2 Next 3 Distance 14
RETRIEVAL 24.455 Speed
VISUAL 25.440 dial-speed Value 200
MANUAL 27.641 dial-speed set 165
**Goal17 5.013
isa SET-SPEED
waypoint 2
distance-next 3
distance 14
speed 165GOAL17 SVS SVS T Dial-Speed
PROCEDURAL 28.247 SubGoal checking Speed Brakes
VISUAL 29.407 speed Value 199
VISUAL 30.637 airbrakes Value on
PROCEDURAL 30.687 Setting Speed Brakes
MANUAL 33.285 airbrakes on/off 0
**Goal22 8.346
isa SPEED-BRAKES
speed 199
decision OffGOAL22 DIAL SVS NIL Set-Speed-Brakes
PROCEDURAL 34.885 SubGoal checking Decision Altitude
VISUAL 36.170 waypoint Value 2
VISUAL 37.432 distance-next Value 3
RETRIEVAL 37.532 Waypoint 2 Next 3 Distance 14
**Goal26 5.068
isa SET-DECISION-ALTITUDE
waypoint 2
distance-next 3
distance 14
old 600
decision 600GOAL26 SVS SVS T Ignore-Decision-Altitude
PROCEDURAL 38.191 SubGoal setting Dial Altitude
VISUAL 39.060 waypoint Value 2
RETRIEVAL 39.210 Altitude 1800
VISUAL 40.351 dial-altitude Value 2500
MANUAL 42.362 dial-altitude set 1800
**Goal29 4.936
isa DIAL-ALTITUDE
waypoint 2
altitude 1800GOAL29 SVS SVS T Dial-Altitude
PROCEDURAL 42.968 SubGoal checking Flaps
VISUAL 44.225 speed Value 187

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RETRIEVAL 44.575 Flaps 20
VISUAL 45.327 flaps Value 1
MANUAL 48.382 flaps set 20
**Goal33 5.148
  isa SET-FLAP
  speed 187
  flap 20GOAL33 SVS SVS T Set-Flaps
PROCEDURAL 48.990 SubGoal checking Altitude
VISUAL 50.238 altitude Value 2500
**Goal37 5.126
  isa CHECK-ALTITUDE
  altitude 2500
  previous 2500GOAL37 SVS SVS T Ignore-Altitude
PROCEDURAL 50.894 SubGoal checking Autopilot
VISUAL 51.785 otw_runway Value out-of-sight
VISUAL 52.999 autopilots Value up
VISUAL 54.128 altitude Value 2500
**Goal39 8.209
  isa SET-AUTOPILOT
  visibility Out-Of-Sight
  peek 2500
  decision Engaged
  decision-altitude 600GOAL39 SVS SVS T Ignore-Autopilot
PROCEDURAL 54.829 SubGoal checking Landing Gear
VISUAL 55.674 waypoint Value 2
VISUAL 56.755 distance-next Value 1
RETRIEVAL 56.855 Waypoint 2 Next 1 Distance 12
VISUAL 58.004 landing-gear Value down
**Goal43 8.635
  isa MOVE-GEAR
  waypoint 2
  distance-next 1
  distance 12
  decision DownGOAL43 SVS DIAL NIL Decide-Gear
PROCEDURAL 59.604 SubGoal checking Decision Altitude
VISUAL 60.785 waypoint Value 2
VISUAL 61.794 distance-next Value 1
RETRIEVAL 61.894 Waypoint 2 Next 1 Distance 12
**Goal47 5.547
  isa SET-DECISION-ALTITUDE
  waypoint 2
  distance-next 1
  distance 12
  old 600
  decision 600GOAL47 DIAL DIAL T Ignore-Decision-Altitude
PROCEDURAL 62.552 SubGoal checking Speed
VISUAL 63.474 waypoint Value 2
VISUAL 64.614 distance-next Value 1
RETRIEVAL 64.714 Waypoint 2 Next 1 Distance 12
RETRIEVAL 64.814 Speed
VISUAL 65.707 dial-speed Value 165
MANUAL 67.906 dial-speed set 140
**Goal50 5.180
  isa SET-SPEED
  waypoint 2
  distance-next 1
  distance 12

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    speed 140GOAL50 DIAL DIAL T Dial-Speed
PROCEDURAL 68.512 SubGoal setting Dial Altitude
VISUAL 69.690 waypoint Value 2
RETRIEVAL 69.840 Altitude 1800
VISUAL 70.828 dial-altitude Value 1800
PROCEDURAL 70.878 Confirm Altitude already set to 1800
**Goal55 4.533
    isa DIAL-ALTITUDE
    waypoint 2
    altitude 1800GOAL55 SVS DIAL NIL Dial-Altitude-Already-Dialed
PROCEDURAL 72.485 SubGoal checking Speed Brakes
VISUAL 73.595 speed Value 163
VISUAL 74.458 airbrakes Value off
**Goal58 8.574
    isa SPEED-BRAKES
    speed 163
    decision OffGOAL58 SVS SVS T Decide-Speed-Brakes
PROCEDURAL 75.058 SubGoal checking Altitude
VISUAL 76.257 altitude Value 2500
**Goal61 5.031
    isa CHECK-ALTITUDE
    altitude 2500
    previous 2500GOAL61 SVS SVS T Ignore-Altitude
PROCEDURAL 76.912 SubGoal checking Flaps
VISUAL 78.096 speed Value 160
RETRIEVAL 78.246 Flaps 15
VISUAL 79.280 flaps Value 20
MANUAL 81.394 flaps set 15
VISUAL 81.394 atc Value random-listen
CHUNK NIL IS UNDEFINED.
CHUNK NIL IS UNDEFINED.
**Goal63 5.170
    isa SET-FLAP
    speed 160
    flap 15GOAL63 SVS SVS T Set-Flaps
PROCEDURAL 82.001 SubGoal checking Decision Altitude
VISUAL 82.863 waypoint Value 2
VISUAL 84.071 distance-next Value 0
RETRIEVAL 84.171 Waypoint 2 Next 0 Distance 11
**Goal67 4.824
    isa SET-DECISION-ALTITUDE
    waypoint 2
    distance-next 0
    distance 11
    old 600
    decision 600GOAL67 DIAL SVS NIL Ignore-Decision-Altitude
PROCEDURAL 85.827 SubGoal checking Autopilot
VISUAL 87.117 atc Value ten-miles-out
VISUAL 87.117 otw_runway Value out-of-sight
VISUAL 87.964 autopilots Value up
VISUAL 88.986 altitude Value 2420
**Goal70 8.767
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 2420
    decision Engaged
    decision-altitude 600GOAL70 DIAL SVS NIL Ignore-Autopilot

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PROCEDURAL 90.687 SubGoal checking Speed Brakes
VISUAL 91.816 speed Value 157
VISUAL 92.926 airbrakes Value off
**Goal74 8.376
    isa SPEED-BRAKES
    speed 157
    decision OffGOAL74 SVS DIAL NIL Decide-Speed-Brakes
PROCEDURAL 94.526 SubGoal setting Dial Altitude
VISUAL 95.371 waypoint Value 3
RETRIEVAL 95.521 Altitude 1000
VISUAL 96.596 dial-altitude Value 1800
MANUAL 98.853 dial-altitude set 1000
**Goal77 4.823
    isa DIAL-ALTITUDE
    waypoint 3
    altitude 1000GOAL77 SVS SVS T Dial-Altitude
PROCEDURAL 99.459 SubGoal checking Landing Gear
VISUAL 100.664 waypoint Value 3
VISUAL 101.915 distance-next Value 1
RETRIEVAL 102.015 Waypoint 3 Next 1 Distance 10
VISUAL 103.012 landing-gear Value down
**Goal81 8.203
    isa MOVE-GEAR
    waypoint 3
    distance-next 1
    distance 10
    decision DownGOAL81 SVS SVS T Decide-Gear
PROCEDURAL 103.612 SubGoal checking Altitude
VISUAL 104.693 altitude Value 2147
**Goal85 5.153
    isa CHECK-ALTITUDE
    altitude 2147
    previous 2500GOAL85 SVS SVS T Read-Altitude
PROCEDURAL 105.351 SubGoal checking Speed
VISUAL 106.208 waypoint Value 3
VISUAL 107.550 distance-next Value 1
RETRIEVAL 107.650 Waypoint 3 Next 1 Distance 10
RETRIEVAL 107.750 Speed
VISUAL 108.832 dial-speed Value 140
PROCEDURAL 108.882 Confirm Speed already set to 140
**Goal87 5.233
    isa SET-SPEED
    waypoint 3
    distance-next 1
    distance 10
    speed 140GOAL87 SVS SVS T Speed-Already-Dialed
PROCEDURAL 109.490 SubGoal checking Autopilot
VISUAL 110.530 otw_runway Value out-of-sight
VISUAL 111.368 autopilots Value up
VISUAL 112.422 altitude Value 2015
**Goal91 8.551
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 2015
    decision Engaged
    decision-altitude 600GOAL91 SVS SVS T Ignore-Autopilot
PROCEDURAL 113.123 SubGoal checking Decision Altitude

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VISUAL 114.040 waypoint Value 3
VISUAL 114.969 distance-next Value 0
RETRIEVAL 115.069 Waypoint 3 Next 0 Distance 9
**Goal95 5.050
    isa SET-DECISION-ALTITUDE
    waypoint 3
    distance-next 0
    distance 9
    old 600
    decision 600GOAL95 SVS SVS T Ignore-Decision-Altitude
PROCEDURAL 115.725 SubGoal checking Flaps
VISUAL 116.900 speed Value 151
RETRIEVAL 117.050 Flaps 25
VISUAL 118.286 flaps Value 15
MANUAL 120.508 flaps set 25
**Goal98 5.270
    isa SET-FLAP
    speed 151
    flap 25GOAL98 SVS SVS T Set-Flaps
PROCEDURAL 121.116 SubGoal checking Altitude
VISUAL 122.375 altitude Value 1846
**Goal102 5.165
    isa CHECK-ALTITUDE
    altitude 1846
    previous 2147GOAL102 SVS SVS T Read-Altitude
PROCEDURAL 123.031 SubGoal setting Dial Altitude
VISUAL 124.313 waypoint Value 3
RETRIEVAL 124.463 Altitude 1000
VISUAL 125.645 dial-altitude Value 1000
PROCEDURAL 125.695 Confirm Altitude already set to 1000
**Goal104 5.024
    isa DIAL-ALTITUDE
    waypoint 3
    altitude 1000GOAL104 DIAL SVS NIL Dial-Altitude-Already-Dialed
PROCEDURAL 127.301 SubGoal checking Altitude
VISUAL 128.510 altitude Value 1779
**Goal107 4.959
    isa CHECK-ALTITUDE
    altitude 1779
    previous 1846GOAL107 DIAL SVS NIL Ignore-Altitude
PROCEDURAL 130.167 SubGoal checking Autopilot
VISUAL 130.974 otw_runway Value out-of-sight
VISUAL 131.863 autopilots Value up
VISUAL 133.053 altitude Value 1750
**Goal109 8.267
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1750
    decision Engaged
    decision-altitude 600GOAL109 DIAL SVS NIL Ignore-Autopilot
PROCEDURAL 134.754 SubGoal checking Altitude
VISUAL 135.780 altitude Value 1733
**Goal113 4.987
    isa CHECK-ALTITUDE
    altitude 1733
    previous 1779GOAL113 DIAL SVS NIL Ignore-Altitude
PROCEDURAL 137.436 SubGoal setting Dial Altitude

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VISUAL 138.545 waypoint Value 4
RETRIEVAL 138.696 Altitude 700
VISUAL 139.698 dial-altitude Value 1000
MANUAL 142.840 dial-altitude set 700
**Goal115 5.193
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL115 SVS DIAL NIL Dial-Altitude
PROCEDURAL 144.448 SubGoal completing landing checklist
PROCEDURAL 147.484 Landing checklist: setting Gear down 1
MANUAL 147.484 landing-gear up/down 0
PROCEDURAL 150.278 Landing checklist: setting Speed to 135
MANUAL 150.278 speed set 135
VISUAL 150.278 speed Value 145
CHUNK NIL IS UNDEFINED.
CHUNK NIL IS UNDEFINED.
PROCEDURAL 154.408 Landing checklist: setting Speed-brakes to armed
MANUAL 154.408 airbrakes on/off 0
PROCEDURAL 157.378 Landing checklist: setting Flaps 15
MANUAL 157.378 flaps set 15
PROCEDURAL 159.385 Landing checklist: preparing cabin for landing
VOCAL 159.385 nothing communication 2007
VISUAL 159.385 atc Value random-listen
Warning: Unknown Comm Type RANDOM-LISTEN
AURAL 161.392 ATC message Random-Listen
VOCAL 161.392 atc communication 2007
PROCEDURAL 161.550 SubGoal checking Altitude
VISUAL 162.394 altitude Value 1569
**Goal127 5.059
    isa CHECK-ALTITUDE
    altitude 1569
    previous 1733GOAL127 SVS DIAL NIL Read-Altitude
PROCEDURAL 164.051 SubGoal checking Autopilot
VISUAL 165.060 otw_runway Value out-of-sight
VISUAL 166.137 autopilots Value up
VISUAL 167.173 altitude Value 1540
**Goal129 8.277
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1540
    decision Engaged
    decision-altitude 600GOAL129 SVS DIAL NIL Ignore-Autopilot
PROCEDURAL 168.875 SubGoal checking Altitude
VISUAL 169.982 altitude Value 1523
**Goal133 5.082
    isa CHECK-ALTITUDE
    altitude 1523
    previous 1569GOAL133 SVS DIAL NIL Ignore-Altitude
PROCEDURAL 171.638 SubGoal checking Autopilot
VISUAL 172.715 otw_runway Value out-of-sight
VISUAL 173.827 autopilots Value up
VISUAL 175.126 altitude Value 1492
**Goal135 7.561
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1492
    decision Engaged

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    decision-altitude 600GOAL135 SVS DIAL NIL Ignore-Autopilot
PROCEDURAL 176.827 SubGoal checking Altitude
VISUAL 178.004 altitude Value 1475
**Goal139 4.909
    isa CHECK-ALTITUDE
    altitude 1475
    previous 1523GOAL139 SVS DIAL NIL Ignore-Altitude
PROCEDURAL 179.664 SubGoal setting Dial Altitude
VISUAL 180.469 waypoint Value 4
RETRIEVAL 180.619 Altitude 700
VISUAL 181.395 dial-altitude Value 700
PROCEDURAL 181.445 Confirm Altitude already set to 700
**Goal141 5.373
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL141 DIAL SVS NIL Dial-Altitude-Already-Dialed
PROCEDURAL 183.051 SubGoal checking Altitude
VISUAL 183.888 altitude Value 1440
**Goal144 5.310
    isa CHECK-ALTITUDE
    altitude 1440
    previous 1475GOAL144 DIAL SVS NIL Ignore-Altitude
PROCEDURAL 185.546 SubGoal checking Autopilot
VISUAL 186.642 otw_runway Value out-of-sight
VISUAL 187.622 autopilots Value up
VISUAL 188.766 altitude Value 1411
**Goal146 8.041
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1411
    decision Engaged
    decision-altitude 600GOAL146 DIAL SVS NIL Ignore-Autopilot
PROCEDURAL 190.467 SubGoal checking Altitude
VISUAL 191.643 altitude Value 1393
**Goal150 4.800
    isa CHECK-ALTITUDE
    altitude 1393
    previous 1440GOAL150 DIAL SVS NIL Ignore-Altitude
PROCEDURAL 193.300 SubGoal setting Dial Altitude
VISUAL 194.176 waypoint Value 4
RETRIEVAL 194.326 Altitude 700
VISUAL 195.444 dial-altitude Value 700
PROCEDURAL 195.494 Confirm Altitude already set to 700
**Goal152 5.112
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL152 DIAL DIAL T Dial-Altitude-Already-Dialed
PROCEDURAL 196.102 SubGoal checking Altitude
VISUAL 197.041 altitude Value 1361
**Goal155 4.877
    isa CHECK-ALTITUDE
    altitude 1361
    previous 1393GOAL155 DIAL DIAL T Ignore-Altitude
PROCEDURAL 197.697 SubGoal setting Dial Altitude
VISUAL 198.724 waypoint Value 4
RETRIEVAL 198.874 Altitude 700
VISUAL 200.103 dial-altitude Value 700

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PROCEDURAL 200.153 Confirm Altitude already set to 700
**Goal157 4.930
  isa DIAL-ALTITUDE
  waypoint 4
  altitude 700GOAL157 SVS DIAL NIL Dial-Altitude-Already-Dialed
PROCEDURAL 201.759 SubGoal checking Altitude
VISUAL 202.893 altitude Value 1326
**Goal160 4.851
  isa CHECK-ALTITUDE
  altitude 1326
  previous 1361GOAL160 SVS DIAL NIL Ignore-Altitude
PROCEDURAL 204.549 SubGoal setting Dial Altitude
VISUAL 205.484 waypoint Value 4
RETRIEVAL 205.634 Altitude 700
VISUAL 206.475 dial-altitude Value 700
PROCEDURAL 206.525 Confirm Altitude already set to 700
**Goal162 5.026
  isa DIAL-ALTITUDE
  waypoint 4
  altitude 700GOAL162 DIAL SVS NIL Dial-Altitude-Already-Dialed
PROCEDURAL 208.130 SubGoal checking Altitude
VISUAL 208.977 altitude Value 1290
**Goal165 4.993
  isa CHECK-ALTITUDE
  altitude 1290
  previous 1326GOAL165 DIAL SVS NIL Ignore-Altitude
PROCEDURAL 210.634 SubGoal checking Autopilot
VISUAL 211.855 otw_runway Value out-of-sight
VISUAL 212.770 autopilots Value up
VISUAL 213.656 altitude Value 1262
**Goal167 7.926
  isa SET-AUTOPILOT
  visibility Out-Of-Sight
  peek 1262
  decision Engaged
  decision-altitude 600GOAL167 DIAL SVS NIL Ignore-Autopilot
PROCEDURAL 215.357 SubGoal setting Dial Altitude
VISUAL 216.499 waypoint Value 4
RETRIEVAL 216.649 Altitude 700
VISUAL 217.482 dial-altitude Value 700
PROCEDURAL 217.532 Confirm Altitude already set to 700
**Goal171 5.037
  isa DIAL-ALTITUDE
  waypoint 4
  altitude 700GOAL171 SVS DIAL NIL Dial-Altitude-Already-Dialed
PROCEDURAL 219.139 SubGoal checking Altitude
VISUAL 220.424 altitude Value 1222
**Goal174 4.829
  isa CHECK-ALTITUDE
  altitude 1222
  previous 1290GOAL174 SVS DIAL NIL Ignore-Altitude
PROCEDURAL 222.082 SubGoal completing landing checklist
PROCEDURAL 225.379 Landing checklist: setting Speed-brakes to armed
MANUAL 225.379 airbrakes on/off 0
PROCEDURAL 228.176 Landing checklist: setting Speed to 135
MANUAL 228.176 speed set 135
VISUAL 228.176 speed Value 140

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PROCEDURAL 231.242 Landing checklist: preparing cabin for landing
 VOCAL 231.242 nothing communication 2007
 PROCEDURAL 233.665 Landing checklist: setting Flaps 15
 MANUAL 233.665 flaps set 15
 PROCEDURAL 235.853 Landing checklist: setting Gear down 1
 MANUAL 235.853 landing-gear up/down 0
 VOCAL 235.903 Landing Checklist Complete
 PROCEDURAL 236.059 SubGoal checking Altitude
 VISUAL 237.003 altitude Value 1123
 **Goal183 4.924
 isa CHECK-ALTITUDE
 altitude 1123
 previous 1222GOAL183 SVS DIAL NIL Ignore-Altitude
 PROCEDURAL 238.659 SubGoal setting Dial Altitude
 VISUAL 239.846 atc Value random-listen
 VISUAL 239.846 waypoint Value 4
 RETRIEVAL 239.996 Altitude 700
 VISUAL 241.165 dial-altitude Value 700
 PROCEDURAL 241.215 Confirm Altitude already set to 700
 **Goal185 4.837
 isa DIAL-ALTITUDE
 waypoint 4
 altitude 700GOAL185 DIAL SVS NIL Dial-Altitude-Already-Dialed
 PROCEDURAL 242.824 SubGoal checking Altitude
 VISUAL 244.049 altitude Value 1080
 **Goal188 4.669
 isa CHECK-ALTITUDE
 altitude 1080
 previous 1123GOAL188 DIAL SVS NIL Ignore-Altitude
 PROCEDURAL 245.705 SubGoal setting Dial Altitude
 VISUAL 246.621 waypoint Value 4
 RETRIEVAL 246.771 Altitude 700
 VISUAL 247.824 dial-altitude Value 700
 PROCEDURAL 247.874 Confirm Altitude already set to 700
 **Goal190 4.877
 isa DIAL-ALTITUDE
 waypoint 4
 altitude 700GOAL190 DIAL DIAL T Dial-Altitude-Already-Dialed
 PROCEDURAL 248.481 SubGoal checking Altitude
 VISUAL 249.528 altitude Value 1048
 **Goal193 4.738
 isa CHECK-ALTITUDE
 altitude 1048
 previous 1080GOAL193 DIAL DIAL T Ignore-Altitude
 PROCEDURAL 250.185 SubGoal setting Dial Altitude
 VISUAL 251.378 waypoint Value 4
 RETRIEVAL 251.528 Altitude 700
 VISUAL 252.322 dial-altitude Value 700
 PROCEDURAL 252.372 Confirm Altitude already set to 700
 **Goal195 5.511
 isa DIAL-ALTITUDE
 waypoint 4
 altitude 700GOAL195 SVS DIAL NIL Dial-Altitude-Already-Dialed
 PROCEDURAL 253.979 SubGoal checking Altitude
 VISUAL 254.898 altitude Value 1016
 **Goal198 5.309
 isa CHECK-ALTITUDE

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    altitude 1016
    previous 1048GOAL198 SVS DIAL NIL Ignore-Altitude
PROCEDURAL 256.553 SubGoal checking Autopilot
VISUAL 257.359 otw_runway Value out-of-sight
VISUAL 258.435 autopilots Value up
VISUAL 259.592 altitude Value 972
**Goal200 7.906
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 972
    decision Engaged
    decision-altitude 600GOAL200 SVS DIAL NIL Ignore-Autopilot
PROCEDURAL 261.293 SubGoal checking Altitude
VISUAL 262.366 altitude Value 935
**Goal204 5.047
    isa CHECK-ALTITUDE
    altitude 935
    previous 1016GOAL204 SVS DIAL NIL Ignore-Altitude
PROCEDURAL 264.024 SubGoal setting Dial Altitude
VISUAL 264.867 waypoint Value 5
RETRIEVAL 265.017 Altitude 500
VISUAL 265.915 dial-altitude Value 700
MANUAL 268.181 dial-altitude set 500
**Goal206 5.075
    isa DIAL-ALTITUDE
    waypoint 5
    altitude 500GOAL206 SVS SVS T Dial-Altitude
PROCEDURAL 268.787 SubGoal checking Altitude
VISUAL 269.971 altitude Value 833
**Goal210 4.889
    isa CHECK-ALTITUDE
    altitude 833
    previous 935GOAL210 SVS SVS T Ignore-Altitude
PROCEDURAL 270.628 SubGoal checking Autopilot
VISUAL 271.780 otw_runway Value out-of-sight
VISUAL 272.799 autopilots Value up
VISUAL 273.820 altitude Value 782
**Goal212 7.869
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 782
    decision Engaged
    decision-altitude 600GOAL212 SVS SVS T Ignore-Autopilot
PROCEDURAL 274.521 SubGoal checking Altitude
VISUAL 275.370 altitude Value 760
**Goal216 5.182
    isa CHECK-ALTITUDE
    altitude 760
    previous 833GOAL216 SVS SVS T Ignore-Altitude
PROCEDURAL 276.026 SubGoal checking Autopilot
VISUAL 276.913 otw_runway Value out-of-sight
VISUAL 277.823 autopilots Value up
VISUAL 279.024 altitude Value 712
**Goal218 8.074
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 712

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decision Engaged
decision-altitude 600GOAL218 SVS SVS T Ignore-Autopilot
PROCEDURAL 279.725 SubGoal checking Altitude
VISUAL 280.621 altitude Value 681
**Goal222 4.857
isa CHECK-ALTITUDE
altitude 681
previous 760GOAL222 SVS SVS T Ignore-Altitude
PROCEDURAL 281.277 SubGoal checking Autopilot
VISUAL 282.496 otw_runway Value out-of-sight
VISUAL 283.705 autopilots Value up
VISUAL 284.809 altitude Value 597
**Goal224 7.680
isa SET-AUTOPILOT
visibility Out-Of-Sight
peek 597
decision Engaged
decision-altitude 600GOAL224 SVS SVS T Ignore-Autopilot
PROCEDURAL 285.511 SubGoal checking Altitude
VISUAL 286.597 altitude Value 574
**Goal228 4.978
isa CHECK-ALTITUDE
altitude 574
previous 681GOAL228 SVS SVS T Ignore-Altitude
PROCEDURAL 289.443 Missed Approach (Altitude below decision
altitude!)
*** Setting ModelDone to 3***

MCP NAV PFD SVS CONTROLS OTW off Total-time
53.246872 14.381488 59.82372 26.944912 60.047085 55.90945 19.089691
289.4432
EMC End:T 289.4432

Look 1.0 Action 2.5 Listen 0.5 Ans 0.1

;; Factory is idle.

```

10-SVS IMC Terrain mismatch

dribbling to file "SVS-IMC-mismatch.drb"

```
Factory Started
CL-USER(1): (register-server)
Resistered Server EMC_NASAHPM.EMCReceiveCOMMessages
NIL
CL-USER(2):
Subject 0 Trial 0 Run 1
Initializing control

Control      5.011
  isa CONTROL
  speed 200.0d0
  altitude 2500.0d0
  waypoint nil
  distance nil
  flaps 5
  decision-altitude 600
  landing-gear Up
  airbrakes Off
  autopilots Engaged
  task nil
  last-task nil
  status Active
  landing-checklist nil
VISUAL      0.000 flaps Value 5
CHUNK NIL IS UNDEFINED.
CHUNK NIL IS UNDEFINED.
PROCEDURAL   2.463 Preparing for approach: setting Flaps 1
MANUAL       2.463 flaps set 1
PROCEDURAL   3.692 Preparing for approach: setting VNAV
VISUAL      3.692 waypoint Value 1
PROCEDURAL   7.111 Preparing for approach: engaging Speed-brakes full
MANUAL       7.111 airbrakes on/off 0
PROCEDURAL   7.972 Preparing for approach: setting LNAV
VISUAL      7.972 distance-next Value 0
PROCEDURAL   9.173 Preparing for approach: engaging Autopilot
VISUAL      9.173 autopilots Value up
PROCEDURAL   9.330 SubGoal checking Autopilot
VISUAL      10.189 otw_runway Value out-of-sight
VISUAL      11.000 autopilots Value up
VISUAL      12.080 altitude Value 2500
**Goal6     8.545
  isa SET-AUTOPILOT
  visibility Out-Of-Sight
  peek 2500
  decision Engaged
  decision-altitude 600GOAL6 NIL NIL T Ignore-Autopilot
PROCEDURAL   12.781 SubGoal setting Dial Altitude
VISUAL      13.985 waypoint Value 1
RETRIEVAL    14.186 Altitude 2500
VISUAL      15.068 dial-altitude Value 2500
PROCEDURAL   15.118 Confirm Altitude already set to 2500
**Goal10    4.747
```

```

isa DIAL-ALTITUDE
waypoint 1
altitude 2500GOAL10 DIAL NIL NIL Dial-Altitude-Already-Dialed
PROCEDURAL 16.723 SubGoal checking Decision Altitude
VISUAL 17.934 waypoint Value 2
VISUAL 18.985 distance-next Value 4
RETRIEVAL 19.085 Waypoint 2 Next 4 Distance 15
**Goal13 4.977
    isa SET-DECISION-ALTITUDE
    waypoint 2
    distance-next 4
    distance 15
    old 600
    decision 600GOAL13 SVS SVS T Ignore-Decision-Altitude
PROCEDURAL 19.741 SubGoal checking Landing Gear
VISUAL 20.644 waypoint Value 2
VISUAL 21.874 distance-next Value 4
RETRIEVAL 21.974 Waypoint 2 Next 4 Distance 15
VISUAL 23.113 landing-gear Value up
PROCEDURAL 23.163 Lowering Gear
MANUAL 25.432 landing-gear up/down 0
**Goal16 9.028
    isa MOVE-GEAR
    waypoint 2
    distance-next 4
    distance 15
    decision DownGOAL16 DIAL SVS NIL Move-Gear
PROCEDURAL 27.039 SubGoal checking Flaps
VISUAL 27.934 speed Value 200
RETRIEVAL 28.184 Flaps 20
VISUAL 29.146 flaps Value 1
MANUAL 31.993 flaps set 20
**Goal21 4.887
    isa SET-FLAP
    speed 200
    flap 20GOAL21 DIAL DIAL T Set-Flaps
PROCEDURAL 32.600 SubGoal checking Altitude
VISUAL 33.587 altitude Value 2500
**Goal25 4.763
    isa CHECK-ALTITUDE
    altitude 2500
    previous 2500.0d0GOAL25 DIAL DIAL T Ignore-Altitude
PROCEDURAL 34.245 SubGoal checking Speed Brakes
VISUAL 35.406 speed Value 200
VISUAL 36.410 airbrakes Value on
PROCEDURAL 36.460 Setting Speed Brakes
MANUAL 39.539 airbrakes on/off 0
**Goal27 8.526
    isa SPEED-BRAKES
    speed 200
    decision OffGOAL27 SVS DIAL NIL Set-Speed-Brakes
PROCEDURAL 41.139 SubGoal checking Speed
VISUAL 42.217 waypoint Value 2
VISUAL 43.494 distance-next Value 2
RETRIEVAL 43.594 Waypoint 2 Next 2 Distance 13
RETRIEVAL 43.694 Speed
VISUAL 44.833 dial-speed Value 200

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MANUAL    47.791 dial-speed set 165
**Goal31    5.152
  isa SET-SPEED
  waypoint 2
  distance-next 2
  distance 13
  speed 165GOAL31 SVS DIAL NIL Dial-Speed
PROCEDURAL   49.398 SubGoal checking Autopilot
VISUAL     50.558 otw_runway Value out-of-sight
VISUAL     51.798 autopilots Value up
VISUAL     52.740 altitude Value 2500
**Goal36    8.203
  isa SET-AUTOPILOT
  visibility Out-Of-Sight
  peek 2500
  decision Engaged
  decision-altitude 600GOAL36 SVS DIAL NIL Ignore-Autopilot
PROCEDURAL   54.442 SubGoal checking Decision Altitude
VISUAL     55.623 waypoint Value 2
VISUAL     56.832 distance-next Value 1
RETRIEVAL   56.932 Waypoint 2 Next 1 Distance 12
**Goal40    5.249
  isa SET-DECISION-ALTITUDE
  waypoint 2
  distance-next 1
  distance 12
  old 600
  decision 600GOAL40 DIAL DIAL T Ignore-Decision-Altitude
PROCEDURAL   57.589 SubGoal checking Altitude
VISUAL     58.687 altitude Value 2500
**Goal43    5.005
  isa CHECK-ALTITUDE
  altitude 2500
  previous 2500GOAL43 DIAL DIAL T Ignore-Altitude
PROCEDURAL   59.343 SubGoal setting Dial Altitude
VISUAL     60.475 waypoint Value 2
RETRIEVAL   60.625 Altitude 1800
VISUAL     61.560 dial-altitude Value 2500
MANUAL     63.933 dial-altitude set 1800
**Goal45    5.063
  isa DIAL-ALTITUDE
  waypoint 2
  altitude 1800GOAL45 SVS DIAL NIL Dial-Altitude
PROCEDURAL   65.538 SubGoal checking Flaps
VISUAL     66.472 speed Value 185
RETRIEVAL   66.623 Flaps 5
VISUAL     67.688 flaps Value 20
MANUAL     69.879 flaps set 5
**Goal49    5.028
  isa SET-FLAP
  speed 185
  flap 5GOAL49 DIAL SVS NIL Set-Flaps
PROCEDURAL   71.486 SubGoal checking Landing Gear
VISUAL     72.685 waypoint Value 2
VISUAL     74.001 distance-next Value 0
RETRIEVAL   74.102 Waypoint 2 Next 0 Distance 11
VISUAL     75.092 landing-gear Value down

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**Goal53    8.354
  isa MOVE-GEAR
  waypoint 2
  distance-next 0
  distance 11
  decision DownGOAL53 DIAL DIAL T Decide-Gear
PROCEDURAL  75.692 SubGoal checking Speed Brakes
VISUAL    76.619 speed Value 177
VISUAL    77.820 airbrakes Value off
**Goal57    8.294
  isa SPEED-BRAKES
  speed 177
  decision OffGOAL57 SVS DIAL NIL Decide-Speed-Brakes
PROCEDURAL  79.420 SubGoal checking Altitude
VISUAL    80.483 atc Value random-listen
VISUAL    80.483 atc Value ten-miles-out
VISUAL    80.483 altitude Value 2494
**Goal60    4.959
  isa CHECK-ALTITUDE
  altitude 2494
  previous 2500GOAL60 SVS DIAL NIL Ignore-Altitude
PROCEDURAL  82.139 SubGoal checking Speed
VISUAL    82.952 waypoint Value 3
VISUAL    84.096 distance-next Value 2
RETRIEVAL   84.196 Waypoint 3 Next 2 Distance 11
RETRIEVAL   84.296 Speed
VISUAL    85.332 dial-speed Value 165
MANUAL    87.749 dial-speed set 140
**Goal62    4.696
  isa SET-SPEED
  waypoint 3
  distance-next 2
  distance 11
  speed 140GOAL62 DIAL DIAL T Dial-Speed
PROCEDURAL  88.358 SubGoal checking Decision Altitude
VISUAL    89.548 waypoint Value 3
VISUAL    90.508 distance-next Value 1
RETRIEVAL   90.608 Waypoint 3 Next 1 Distance 10
**Goal67    5.004
  isa SET-DECISION-ALTITUDE
  waypoint 3
  distance-next 1
  distance 10
  old 600
  decision 600GOAL67 SVS SVS T Ignore-Decision-Altitude
PROCEDURAL  91.264 SubGoal checking Autopilot
VISUAL    92.308 otw_runway Value out-of-sight
VISUAL    93.205 autopilots Value up
VISUAL    94.408 altitude Value 2233
**Goal70    8.409
  isa SET-AUTOPILOT
  visibility Out-Of-Sight
  peek 2233
  decision Engaged
  decision-altitude 600GOAL70 SVS SVS T Ignore-Autopilot
PROCEDURAL  95.109 SubGoal checking Landing Gear
VISUAL    96.065 waypoint Value 3

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VISUAL 97.060 distance-next Value 1
RETRIEVAL 97.160 Waypoint 3 Next 1 Distance 10
VISUAL 98.452 landing-gear Value down
**Goal74 8.120
    isa MOVE-GEAR
    waypoint 3
    distance-next 1
    distance 10
    decision DownGOAL74 SVS SVS T Decide-Gear
PROCEDURAL 99.052 SubGoal setting Dial Altitude
VISUAL 100.036 waypoint Value 3
RETRIEVAL 100.186 Altitude 1000
VISUAL 101.256 dial-altitude Value 1800
MANUAL 104.086 dial-altitude set 1000
**Goal78 5.308
    isa DIAL-ALTITUDE
    waypoint 3
    altitude 1000GOAL78 SVS SVS T Dial-Altitude
PROCEDURAL 104.693 SubGoal checking Altitude
VISUAL 105.575 altitude Value 2032
**Goal82 4.723
    isa CHECK-ALTITUDE
    altitude 2032
    previous 2494GOAL82 SVS SVS T Read-Altitude
PROCEDURAL 106.230 SubGoal checking Speed Brakes
VISUAL 107.105 speed Value 158
VISUAL 108.419 airbrakes Value off
**Goal84 8.360
    isa SPEED-BRAKES
    speed 158
    decision OffGOAL84 SVS SVS T Decide-Speed-Brakes
PROCEDURAL 109.019 SubGoal checking Flaps
VISUAL 110.066 speed Value 157
RETRIEVAL 110.216 Flaps 25
VISUAL 111.278 flaps Value 5
MANUAL 113.680 flaps set 25
**Goal87 4.962
    isa SET-FLAP
    speed 157
    flap 25GOAL87 SVS SVS T Set-Flaps
PROCEDURAL 114.285 SubGoal checking Decision Altitude
VISUAL 115.367 waypoint Value 3
VISUAL 116.546 distance-next Value 0
RETRIEVAL 116.646 Waypoint 3 Next 0 Distance 9
**Goal91 4.833
    isa SET-DECISION-ALTITUDE
    waypoint 3
    distance-next 0
    distance 9
    old 600
    decision 600GOAL91 SVS DIAL NIL Ignore-Decision-Altitude
PROCEDURAL 118.304 SubGoal checking Altitude
VISUAL 119.281 altitude Value 1798
**Goal94 4.859
    isa CHECK-ALTITUDE
    altitude 1798
    previous 2032GOAL94 SVS DIAL NIL Read-Altitude

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PROCEDURAL 120.937 SubGoal checking Autopilot
VISUAL 121.955 otw_runway Value out-of-sight
VISUAL 123.137 autopilots Value up
VISUAL 124.247 altitude Value 1765
**Goal96 7.936
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1765
    decision Engaged
    decision-altitude 600GOAL96 SVS DIAL NIL Ignore-Autopilot
PROCEDURAL 125.948 SubGoal checking Altitude
VISUAL 126.901 altitude Value 1748
**Goal100 4.894
    isa CHECK-ALTITUDE
    altitude 1748
    previous 1798GOAL100 SVS DIAL NIL Ignore-Altitude
PROCEDURAL 128.559 SubGoal setting Dial Altitude
VISUAL 129.768 waypoint Value 4
RETRIEVAL 129.918 Altitude 700
VISUAL 131.077 dial-altitude Value 1000
MANUAL 133.565 dial-altitude set 700
**Goal102 5.009
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL102 SVS SVS T Dial-Altitude
PROCEDURAL 134.171 SubGoal completing landing checklist
PROCEDURAL 137.089 Landing checklist: setting Speed to 135
MANUAL 137.089 speed set 135
VISUAL 137.089 speed Value 151
CHUNK NIL IS UNDEFINED.
CHUNK NIL IS UNDEFINED.
PROCEDURAL 140.390 Landing checklist: setting Speed-brakes to armed
MANUAL 140.390 airbrakes on/off 0
PROCEDURAL 143.107 Landing checklist: setting Flaps 15
MANUAL 143.107 flaps set 15
PROCEDURAL 145.543 Landing checklist: setting Gear down 1
MANUAL 145.543 landing-gear up/down 0
PROCEDURAL 148.680 Landing checklist: preparing cabin for landing
VOCAL 148.680 nothing communication 2007
VOCAL 148.730 Landing Checklist Complete
PROCEDURAL 148.886 SubGoal checking Altitude
VISUAL 149.751 altitude Value 1600
**Goal113 4.815
    isa CHECK-ALTITUDE
    altitude 1600
    previous 1748GOAL113 SVS SVS T Ignore-Altitude
PROCEDURAL 150.407 SubGoal checking Autopilot
VISUAL 151.359 otw_runway Value out-of-sight
VISUAL 152.213 autopilots Value up
VISUAL 153.390 altitude Value 1577
**Goal115 8.254
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1577
    decision Engaged
    decision-altitude 600GOAL115 SVS SVS T Ignore-Autopilot
PROCEDURAL 154.091 SubGoal checking Altitude

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VISUAL 155.330 altitude Value 1565
**Goal119 4.838
  isa CHECK-ALTITUDE
  altitude 1565
  previous 1600GOAL119 SVS SVS T Ignore-Altitude
PROCEDURAL 155.988 SubGoal setting Dial Altitude
VISUAL 157.105 waypoint Value 4
RETRIEVAL 157.255 Altitude 700
VISUAL 158.224 atc Value random-no-listen
VISUAL 158.224 dial-altitude Value 700
PROCEDURAL 158.274 Confirm Altitude already set to 700
**Goal121 5.148
  isa DIAL-ALTITUDE
  waypoint 4
  altitude 700GOAL121 SVS SVS T Dial-Altitude-Already-Dialed
PROCEDURAL 158.881 SubGoal checking Autopilot
VISUAL 159.839 otw_runway Value out-of-sight
VISUAL 161.007 autopilots Value up
VISUAL 161.837 altitude Value 1524
**Goal124 8.112
  isa SET-AUTOPILOT
  visibility Out-Of-Sight
  peek 1524
  decision Engaged
  decision-altitude 600GOAL124 SVS SVS T Ignore-Autopilot
PROCEDURAL 162.538 SubGoal checking Altitude
VISUAL 163.360 altitude Value 1515
**Goal128 4.908
  isa CHECK-ALTITUDE
  altitude 1515
  previous 1565GOAL128 SVS SVS T Ignore-Altitude
PROCEDURAL 164.019 SubGoal setting Dial Altitude
VISUAL 165.247 waypoint Value 4
RETRIEVAL 165.397 Altitude 700
VISUAL 166.248 dial-altitude Value 700
PROCEDURAL 166.298 Confirm Altitude already set to 700
**Goal130 5.033
  isa DIAL-ALTITUDE
  waypoint 4
  altitude 700GOAL130 DIAL SVS NIL Dial-Altitude-Already-Dialed
PROCEDURAL 167.905 SubGoal checking Autopilot
VISUAL 168.940 otw_runway Value out-of-sight
VISUAL 169.849 autopilots Value up
VISUAL 170.877 altitude Value 1468
**Goal133 8.405
  isa SET-AUTOPILOT
  visibility Out-Of-Sight
  peek 1468
  decision Engaged
  decision-altitude 600GOAL133 DIAL SVS NIL Ignore-Autopilot
PROCEDURAL 172.579 SubGoal checking Altitude
VISUAL 173.504 altitude Value 1452
**Goal137 4.978
  isa CHECK-ALTITUDE
  altitude 1452
  previous 1515GOAL137 DIAL SVS NIL Ignore-Altitude
PROCEDURAL 175.161 SubGoal checking Autopilot

```

VISUAL 176.055 otw_runway Value out-of-sight
 VISUAL 177.111 autopilots Value up
 VISUAL 178.354 altitude Value 1422
 **Goal139 7.778
 isa SET-AUTOPILOT
 visibility Out-Of-Sight
 peek 1422
 decision Engaged
 decision-altitude 600GOAL139 DIAL SVS NIL Ignore-Autopilot
 PROCEDURAL 180.055 SubGoal checking Altitude
 VISUAL 181.012 altitude Value 1406
 **Goal143 5.469
 isa CHECK-ALTITUDE
 altitude 1406
 previous 1452GOAL143 DIAL SVS NIL Ignore-Altitude
 PROCEDURAL 182.667 SubGoal setting Dial Altitude
 VISUAL 183.863 waypoint Value 4
 RETRIEVAL 184.013 Altitude 700
 VISUAL 185.229 dial-altitude Value 700
 PROCEDURAL 185.279 Confirm Altitude already set to 700
 **Goal145 5.045
 isa DIAL-ALTITUDE
 waypoint 4
 altitude 700GOAL145 DIAL DIAL T Dial-Altitude-Already-Dialed
 PROCEDURAL 185.886 SubGoal checking Altitude
 VISUAL 186.902 altitude Value 1371
 **Goal148 4.962
 isa CHECK-ALTITUDE
 altitude 1371
 previous 1406GOAL148 DIAL DIAL T Ignore-Altitude
 PROCEDURAL 187.559 SubGoal checking Autopilot
 VISUAL 188.665 otw_runway Value out-of-sight
 VISUAL 189.488 autopilots Value up
 VISUAL 190.316 altitude Value 1350
 **Goal150 7.821
 isa SET-AUTOPILOT
 visibility Out-Of-Sight
 peek 1350
 decision Engaged
 decision-altitude 600GOAL150 DIAL DIAL T Ignore-Autopilot
 PROCEDURAL 191.018 SubGoal checking Altitude
 VISUAL 192.095 altitude Value 1340
 **Goal154 5.173
 isa CHECK-ALTITUDE
 altitude 1340
 previous 1371GOAL154 DIAL DIAL T Ignore-Altitude
 PROCEDURAL 192.752 SubGoal setting Dial Altitude
 VISUAL 193.856 waypoint Value 4
 RETRIEVAL 194.006 Altitude 700
 VISUAL 194.761 dial-altitude Value 700
 PROCEDURAL 194.811 Confirm Altitude already set to 700
 **Goal156 4.978
 isa DIAL-ALTITUDE
 waypoint 4
 altitude 700GOAL156 SVS DIAL NIL Dial-Altitude-Already-Dialed
 PROCEDURAL 196.416 SubGoal checking Altitude
 VISUAL 197.417 altitude Value 1308

```

**Goal159      5.019
  isa CHECK-ALTITUDE
  altitude 1308
  previous 1340GOAL159 SVS DIAL NIL Ignore-Altitude
PROCEDURAL 199.073 SubGoal checking Autopilot
VISUAL 200.268 otw_runway Value out-of-sight
VISUAL 201.093 autopilots Value up
VISUAL 202.292 altitude Value 1279
**Goal161      7.820
  isa SET-AUTOPILOT
  visibility Out-Of-Sight
  peek 1279
  decision Engaged
  decision-altitude 600GOAL161 SVS DIAL NIL Ignore-Autopilot
PROCEDURAL 203.994 SubGoal checking Altitude
VISUAL 205.285 altitude Value 1261
**Goal165      4.846
  isa CHECK-ALTITUDE
  altitude 1261
  previous 1308GOAL165 SVS DIAL NIL Ignore-Altitude
PROCEDURAL 206.942 SubGoal setting Dial Altitude
VISUAL 207.880 waypoint Value 4
RETRIEVAL 208.030 Altitude 700
VISUAL 209.147 dial-altitude Value 700
PROCEDURAL 209.197 Confirm Altitude already set to 700
**Goal167      5.119
  isa DIAL-ALTITUDE
  waypoint 4
  altitude 700GOAL167 DIAL SVS NIL Dial-Altitude-Already-Dialed
PROCEDURAL 210.803 SubGoal checking Altitude
VISUAL 211.774 altitude Value 1222
**Goal170      5.134
  isa CHECK-ALTITUDE
  altitude 1222
  previous 1261GOAL170 DIAL SVS NIL Ignore-Altitude
PROCEDURAL 213.430 SubGoal setting Dial Altitude
VISUAL 214.465 waypoint Value 4
RETRIEVAL 214.615 Altitude 700
VISUAL 215.843 dial-altitude Value 700
PROCEDURAL 215.893 Confirm Altitude already set to 700
**Goal172      4.923
  isa DIAL-ALTITUDE
  waypoint 4
  altitude 700GOAL172 SVS DIAL NIL Dial-Altitude-Already-Dialed
PROCEDURAL 217.499 SubGoal checking Altitude
VISUAL 218.416 altitude Value 1182
**Goal175      4.963
  isa CHECK-ALTITUDE
  altitude 1182
  previous 1222GOAL175 SVS DIAL NIL Ignore-Altitude
PROCEDURAL 220.074 SubGoal setting Dial Altitude
VISUAL 221.047 waypoint Value 4
RETRIEVAL 221.197 Altitude 700
VISUAL 222.438 dial-altitude Value 700
PROCEDURAL 222.488 Confirm Altitude already set to 700
**Goal177      5.052
  isa DIAL-ALTITUDE

```

```

waypoint 4
    altitude 700GOAL177 DIAL SVS NIL Dial-Altitude-Already-Dialed
PROCEDURAL 224.097 SubGoal checking Altitude
VISUAL 225.147 altitude Value 1142
**Goal180 5.036
    isa CHECK-ALTITUDE
    altitude 1142
    previous 1182GOAL180 DIAL SVS NIL Ignore-Altitude
PROCEDURAL 226.803 SubGoal checking Autopilot
VISUAL 228.089 otw_runway Value out-of-sight
VISUAL 228.938 autopilots Value up
VISUAL 230.078 altitude Value 1113
**Goal182 8.040
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1113
    decision Engaged
    decision-altitude 600GOAL182 DIAL SVS NIL Ignore-Autopilot
PROCEDURAL 231.780 SubGoal setting Dial Altitude
VISUAL 232.656 waypoint Value 4
RETRIEVAL 232.806 Altitude 700
VISUAL 233.722 dial-altitude Value 700
PROCEDURAL 233.772 Confirm Altitude already set to 700
**Goal186 4.916
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL186 SVS DIAL NIL Dial-Altitude-Already-Dialed
PROCEDURAL 235.379 SubGoal checking Autopilot
VISUAL 236.631 otw_runway Value out-of-sight
VISUAL 237.863 autopilots Value up
VISUAL 238.941 atc Value random-no-listen
VISUAL 238.941 altitude Value 1060
**Goal189 7.395
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 1060
    decision Engaged
    decision-altitude 600GOAL189 SVS DIAL NIL Ignore-Autopilot
PROCEDURAL 240.643 SubGoal checking Altitude
VISUAL 241.868 altitude Value 1042
**Goal193 4.911
    isa CHECK-ALTITUDE
    altitude 1042
    previous 1142GOAL193 SVS DIAL NIL Ignore-Altitude
PROCEDURAL 243.524 SubGoal setting Dial Altitude
VISUAL 244.543 waypoint Value 4
RETRIEVAL 244.693 Altitude 700
VISUAL 245.934 dial-altitude Value 700
PROCEDURAL 245.984 Confirm Altitude already set to 700
**Goal195 4.571
    isa DIAL-ALTITUDE
    waypoint 4
    altitude 700GOAL195 SVS SVS T Dial-Altitude-Already-Dialed
PROCEDURAL 246.591 SubGoal checking Altitude
VISUAL 247.739 altitude Value 1007
**Goal198 4.963
    isa CHECK-ALTITUDE

```

```

    altitude 1007
    previous 1042GOAL198 SVS SVS T Ignore-Altitude
PROCEDURAL 248.398 SubGoal checking Autopilot
VISUAL 249.245 otw_runway Value out-of-sight
VISUAL 250.367 autopilots Value up
VISUAL 251.277 altitude Value 968
**Goal200 7.861
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 968
    decision Engaged
    decision-altitude 600GOAL200 SVS SVS T Ignore-Autopilot
PROCEDURAL 251.978 SubGoal checking Altitude
VISUAL 253.025 altitude Value 945
**Goal204 5.415
    isa CHECK-ALTITUDE
    altitude 945
    previous 1007GOAL204 SVS SVS T Ignore-Altitude
PROCEDURAL 253.683 SubGoal setting Dial Altitude
VISUAL 254.944 waypoint Value 5
RETRIEVAL 255.094 Altitude 500
VISUAL 255.899 dial-altitude Value 700
MANUAL 258.025 dial-altitude set 500
**Goal206 4.798
    isa DIAL-ALTITUDE
    waypoint 5
    altitude 500GOAL206 DIAL SVS NIL Dial-Altitude
PROCEDURAL 259.631 SubGoal checking Altitude
VISUAL 260.638 altitude Value 843
**Goal210 4.950
    isa CHECK-ALTITUDE
    altitude 843
    previous 945GOAL210 DIAL SVS NIL Ignore-Altitude
PROCEDURAL 262.294 SubGoal setting Dial Altitude
VISUAL 263.527 waypoint Value 5
RETRIEVAL 263.677 Altitude 500
VISUAL 264.910 dial-altitude Value 500
PROCEDURAL 264.960 Confirm Altitude already set to 500
**Goal212 5.029
    isa DIAL-ALTITUDE
    waypoint 5
    altitude 500GOAL212 SVS DIAL NIL Dial-Altitude-Already-Dialed
PROCEDURAL 266.566 SubGoal checking Altitude
VISUAL 267.803 altitude Value 747
**Goal215 5.074
    isa CHECK-ALTITUDE
    altitude 747
    previous 843GOAL215 SVS DIAL NIL Ignore-Altitude
PROCEDURAL 269.459 SubGoal checking Autopilot
VISUAL 270.516 otw_runway Value out-of-sight
VISUAL 271.815 autopilots Value up
VISUAL 273.015 altitude Value 657
**Goal217 7.731
    isa SET-AUTOPILOT
    visibility Out-Of-Sight
    peek 657
    decision Engaged

```

```
    decision-altitude 600GOAL217 SVS DIAL NIL Ignore-Autopilot
PROCEDURAL 274.716 SubGoal checking Altitude
VISUAL 275.636 altitude Value 606
**Goal221 4.747
    isa CHECK-ALTITUDE
    altitude 606
    previous 747GOAL221 SVS DIAL NIL Ignore-Altitude
PROCEDURAL 277.291 SubGoal checking Autopilot
VISUAL 278.202 otw_runway Value runway-off-alignment
VISUAL 279.396 autopilots Value up
PROCEDURAL 279.446 Runway misaligned -- going around
MANUAL 281.631 autopilots up/down 0
VISUAL 282.919 altitude Value 616
**Goal223 9.969
    isa SET-AUTOPILOT
    visibility Runway-Off-Alignment
    peek 616
    decision Disengaged
    decision-altitude 600GOAL223 SVS DIAL NIL Read-Peek
```

*** Finis ***

*** Setting ModelDone to 1***

```
MCP NAV PFD SVS CONTROLS OTW off Total-time
57.927048 16.852587 57.351456 23.192522 48.949028 67.49562 12.750977
284.51923
EMC End:T 284.51923
```

Look 1.0 Action 2.5 Listen 0.5 Ans 0.1

; ; Factory is idle.

Appendix C – ACT-R Approach Model

```
;;; ACT-R Model

(defparameter *svs-present* t) ;; set to true when svs is enabled
(dribble "NASA-hpm-model-results.drb")

;;; Areas of interest for validation with eye-tracking data
(initialized to 0 seconds of viewing)
(defparameter *MCP-dwell* 0) ;; mode control panel -- speed dial,
altitude dial
(defparameter *NAV-dwell* 0) ;; navigation display -- not used in
this model
(defparameter *PFD-dwell* 0) ;; primary flight display --
decision height, altitude, autopilot
(defparameter *SVS-dwell* 0) ;; synthetic vision display
(defparameter *CONTROLS-dwell* 0) ;; controls
(defparameter *OTW-dwell* 0) ;; out the window

(defparameter *mark* 0) ;; used to mark the point in time where a
watching incident starts

(defun display-dwell-times ()
  (let* ((total-time (actr-time))
         (off-time (- total-time (+ *MCP-dwell* *NAV-dwell* *PFD-dwell*
*SVS-dwell* *CONTROLS-dwell* *OTW-dwell*))))
    (format t "~~~TMCP~TNAV~TPFD~TSVS~TCONTROLS~TOTW~Toff~TTotal-time")
    (format t "~~~T~s~T~s~T~s~T~s~T~s~T~s~T~s~%" *MCP-dwell* *NAV-
dwell* *PFD-dwell*
*SVS-dwell* *CONTROLS-dwell* *OTW-dwell* off-time total-time)))

;;; Learning
;;; Generalization of ACT-R 5.0 learning to multiple goals
;;; All learning is goal-specific, but no discounting for subgoals
;;; This makes sense given no goal stack and is plausible in a number
of ways
;;; *previous-instantiations* is now an a-list indexed by goal
;;; Need to remove the length of time spent in the other goals?

(defparameter *goal* nil)

(defun learn-parameters (success failure &key (latency 0.0)
(instantiation *instantiation*))
  "Applies the parameters learning equations to instantiation. The
success and/or
failure of the goal has already been determined and is passed along
with the latency
of this instantiation and the instantiation itself (if it exists)."
  (let ((production (when instantiation (instantiation-production
instantiation)))
        (previous-instantiations (assoc *goal* *previous-
instantiations*)))
    (unless previous-instantiations
      (setf previous-instantiations (list *goal*))
      (push previous-instantiations *previous-instantiations*)))
```

```

(cond ((and success failure)    ;; clear the history
       (setf *previous-instantiations*
             (delete previous-instantiations *previous-
instantiations)))
      ((or success failure)    ;; register success or failure for all
productions
       (when production
         (push (cons production (- *time* latency)) (rest previous-
instantiations)))
         (dolist (production-time (rest previous-instantiations))
           (let* ((previous-production (car production-time))
                  (previous-time (cdr production-time))
                  (effort (- *time* previous-time)))
               (add-reference (if success (production-successes
previous-production)
                               (production-failures previous-
production))
                             (not (numberp *parameters-learning*)))
                             1.0 previous-time)
               (add-reference (production-efforts previous-production)
                             (not (numberp *parameters-learning*)))
                             1.0 effort)
               (recompute-production-parameters previous-production)))
           (setf *previous-instantiations*
                 (delete previous-instantiations *previous-
instantiations*)))
         (t    ;; simply add the production
          (when production
            (push (cons production (- *time* latency)) (rest previous-
instantiations)))))))

;;; The robust version sets the global variables in productions (or
hooks)
;;; rather than in wrapping code, which is too model-specific

(defparameter *task-history* nil)

(defparameter *source-history* nil)

(defparameter *window* '(5 5 5 40 40 40 40 5))

(defun select-task-success ()
  (not (select-task-failure)))

(defun select-task-failure ()
  (let* ((task (first *task-history*))
         (index (chunk-slot-value-fct task 'number)))
    (member task (subseq *task-history* 0
                           (min (if (numberp *window*) *window*
                                   (nth (1- index) *window*))
                                 (length *task-history*))))))

(defun task-effort ()
  (let ((new-source (first *source-history*))
        (old-source (second *source-history*)))
    (format t "~~S ~S ~S ~S ~S~%" new-source old-source
            (length *source-history*))))


```

```

(goal-focus) new-source old-source
(eq new-source old-source)
(first (first (rest (assoc *goal* *previous-
instantiations*)))))
(if (eq new-source old-source) 0.5 1.5))

(defun set-globals (instantiation)
  "Sets the global variables as a function of instantiation."
  (setf *goal* *wmfocus*)
  (let ((production (production-name (instantiation-production
instantiation))))
    (case production
      (DO-SET-FLAP (push 'flap *task-history*))
      (DO-SET-ALTITUDE (push 'altitude *task-history*))
      (DO-SET-SPEED (push 'speed *task-history*))
      (DO-GEAR-DOWN (push 'gear *task-history*))
      (DO-SPEED-BRAKES-ON (push 'brakes *task-history*))
      (DO-SET-DECISION-ALTITUDE (push 'decision *task-history*))
      (DO-SET-AUTOPILOT (push 'autopilot *task-history*))
      (DO-CHECK-ALTITUDE (push 'altimeter *task-history*))
      ((get-speed-dial get-waypoint-dial get-distance-next-dial)
       (push 'dial *source-history*))
      ((get-speed-svs get-waypoint-svs get-distance-next-svs)
       (push 'svs *source-history*))
      (t)))
  )

;; Handling of the task

(defvar *landings* 0) ;Count of landings
(defparameter *look-delay* 0.5)
(defparameter *action-delay* 1.5)
(defparameter *listen-delay* 0.5)
(defparameter *dat* 0.05)
(defparameter *ans* 0.1)
;10 minutes

(defun actr-time-sd (time)
  (actr-time-fct (* time (+ 0.75 (random 0.5)))))

(defun chatter (type)
  ;; Advances time and produces return code.
  (case type
    (2000 (actr-time-sd (* *listen-delay* 2.0)) 2005)
    (2001 (actr-time-sd (* *listen-delay* 5.0)) 2004)
    (2002 (actr-time-sd *listen-delay*) 2002)
    (2003 (actr-time-sd (* *listen-delay* 3.0)) 2003)
    (otherwise (warn "Unknown Comm Type ~a" type) 2007)))

(defun initialize-control (&key (speed 200) (altitude 25000) (flaps 5))
  (setq *look* nil) (setq *action* nil)
  (add-dm-fct `((control isa control
                    speed ,speed altitude ,altitude flaps ,flaps
                    landing-gear up airbrakes off autopilots engaged
                    decision-altitude 600
                    task nil
      )))
```

```

;; (goal-focus control)
(when (and *output-trace* *verbose*)
  (format *output-trace* "~&Initializing control~% ")
  (dm control)))
(defparameter *set-waypoint-instances*
  '((1 15) (2 11) (3 9) (4 3) (5 2) (6 0)))

;;; Code to automatically generate instances given arrays of data

(defun generate-instances (type slots values-list)
  (let ((chunks nil))
    (dolist (values values-list)
      (let ((name (symbol-name type)))
        (dolist (value values)
          (setf name (concatenate 'string name "-" (format nil "~D"
value))))
        (let ((chunk (list (intern name) 'isa type)))
          (dolist (slot slots)
            (push-last slot chunk)
            (push-last (pop values) chunk))
          (push-last chunk chunks))))
      (add-dm-fct chunks)))

(defparameter *set-flap-instances*
  '((125 30)
    (145 20)
    (145 30)
    (165 15)
    (165 25)
    (185 5)
    (185 25)
    (195 1)
    (195 20)
    (205 1)
    (205 15)
    (210 0)
    (210 15)
    (220 0)
    (220 5)
    (240 0)
    (240 1)))

;; waypoint vs altitude instances for final approach and landing
(defparameter *dial-altitude-instances*
  '((1 2500)
    (2 1800)
    (3 1000)
    (4 700)
    (5 500))) ;Uses next waypoint (12/2/02)

;; distance vs speed instances for final approach and landing
(defparameter *set-speed-instances*
  '((60 160)
    (15 160)
    (13 165) ;speed plus 5 when gear and flaps are deployed
    (12 140)
    (5 125))

```

```

(0 117)
))

(defun number-ratio-similarities (x y)
  "Defines ratio similarities between numbers. It generally makes
sense
given the scales involved which are on widely different orders.
But how to deal with 0? Let's accept full dissimilarity, i.e. flaps
off
or being on the ground is fundamentally different from other
values."
  ;;; if not numbers, defaults to chunk similarities
  (when (and (numberp x) (numberp y))
    ;;; Need to handle the x=y=0 case separately
    (if (and (zerop x) (zerop y)) 1.0
        ;;; similarity computations like floats better
        ;;; min/max produces the [0,1] similarity scale
        (coerce (/ (min x y) (max x y)) 'float)))

(defvar *look* nil)

(defun look (arguments)
  (actr-time-sd *look-delay*)
  (let ((chunk (create-buffer-chunk arguments)))
    ;;; always returns 200 for simplicity
    ;;; (mod-chunk-fct chunk (list 'setting 200)) ;;; this default
value caused problems when Imprint didn't return value
  )
  (setq *stop* t)
  )

(defvar *action* nil)

(defun action (arguments)
  (actr-time-sd *action-delay*)
  (create-buffer-chunk arguments)
  (setq *stop* t)
  )

(clear-all)

(setf *firing-hook-fn* 'set-globals)

;; Parameters

;; Need to turn on blending for instance-based control?
;; Then the options need to be narrowed to avoid generating all
numbers

(sgp :era t :pm t :mp 5.0 :blc 5.0 :v t :ct nil :lt nil ;;; turn off
traces
  :ut nil ;;; always picks something
  :rt -5.0 ;;; always retrieves
  :pl 0.5 ;;; turn on parameters learning
  :egs 0.25) ;;; turn on selection noise

(sgp-fct (list :ans *ans* :dat *dat*))

```

```

;;; Add a buffer called look for getting external information
(chunk-type look setting where source)

;;; Add an action buffer for setting external information
(chunk-type action what do setting)

;;; Separate instance chunk types for each control mapping
;;; It makes sense because they all represent different domains
;;; Practically, it helps avoid interference between different types

;;; Supertypes for reading distance and speed

(chunk-type speed-decision speed)
(chunk-type waypoint-decision waypoint)
;;; Distance is to waypoint for distance to runway calculate
(chunk-type (distance-decision (:include waypoint-decision))
           distance-next distance)

;;; Waypoints used to calculate distance to runway
(chunk-type waypoint id range)

;;; Set flaps based on speed
(chunk-type (set-flap (:include speed-decision)) flap)

;;; Dial altitude based on distance
(chunk-type (dial-altitude (:include waypoint-decision)) altitude)

;;; Set speed based on distance
(chunk-type (set-speed (:include distance-decision)) speed)

;;; Put gear down at right distance
(chunk-type (move-gear (:include distance-decision)) decision)

;;; Put speed brakes on at right speed
(chunk-type (speed-brakes (:include speed-decision)) decision)

;;; Set decision altitude at right distance
(chunk-type (set-decision-altitude (:include distance-decision))
            old decision)

;;; Set autopilot based on runway visibility
(chunk-type set-autopilot visibility peek decision decision-altitude)

;;; Occasionally look at altimeter
(chunk-type check-altitude altitude previous)

;;; Prepare for approach
(chunk-type approach lnav vnav autopilot speed-brakes flaps status)

;;; Landing checklist

```

```

(chunk-type landing-checklist gear speed-brakes flaps speed cabin
status)

;;; Communications
(chunk-type communication chatter)

;;; Top-level control goal
(chunk-type control speed altitude waypoint distance flaps decision-
altitude
    landing-gear airbrakes autopilots task last-task (status
active) landing-checklist)

;;; Tasks and Sources
(chunk-type index number)

(chunk-type (task (:include index)))

(chunk-type (source (:include index)))

;;; Constant chunks
(add-dm
(up isa chunk)
(down isa chunk)
(on isa chunk)
(off isa chunk)
(yes isa chunk)
;;; (speed isa chunk)
;;; add the tasks and sources
(flap isa task number 1)
(altitude isa task number 2)
(speed isa task number 3)
(gear isa task number 4)
(brakes isa task number 5)
(decision isa task number 6)
(autopilot isa task number 7)
(altimeter isa task number 8)
(dial isa source number 1)
(svs isa source number 2)
)

;;; Generating instances

(generate-instances 'set-flap '(speed flap) *set-flap-instances*)

(generate-instances 'dial-altitude '(waypoint altitude)
*dial-altitude-instances*)

(generate-instances 'set-speed '(distance speed) *set-speed-
instances*)

(generate-instances 'waypoint '(id range) *set-waypoint-instances*)

;;; Set ratio similarities between numbers

(setq *similarity-hook-fn* #'number-ratio-similarities)

```

```

;;; Define modular look and act buffers
(define-buffer look *look*
  :plus-rhs look)

(define-buffer action *action*
  :plus-rhs action)

;;; Initialize system to the approach checklist for the scenario
(add-dm (approach-checklist isa approach))
(goal-focus approach-checklist)

;;; Productions

;;; Top-level productions
;;; Looking is an action. We must halt and give IMPRINT a turn.
;;; Control needs to be initialized.

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;;;
;;; Control
;;; Constant monitoring: speed, altitude, flaps
;;; Set points followed by monitoring: gear, speed brakes, decision
altitude, autopilot
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;;;

(p do-landing-checklist
=goal>
  isa      control
  task     nil
  >= waypoint 4
  landing-checklist nil
==>
=goal>
  task      landing-checklist
+goal>
  isa      landing-checklist
!output! "PROCEDURAL ~8,3F SubGoal completing landing checklist~%"
(actr-time)
  !eval! (setf *mark* (actr-time))
)

(p do-check-altitude
=goal>
  isa      control
  task     nil
  - last-task check-altitude
  altitude =previous
==>
=goal>
  task      check-altitude
+goal>
  isa      check-altitude
  previous =previous
!output! "PROCEDURAL ~8,3F SubGoal checking Altitude~%" (actr-time)
  !eval! (setf *mark* (actr-time))
)

```

```

(p do-set-flap
  =goal>
    isa          control
    task         nil
    - last-task set-flap
    autopilots  engaged
    >= altitude 2000      ;; don't bother during final approach
==>
  =goal>
    task         set-flap
  +goal>
    isa          set-flap
!output! "PROCEDURAL ~8,3F SubGoal checking Flaps~%" (actr-time)
!eval! (setf *mark* (actr-time))
)

(p do-set-altitude
  =goal>
    isa          control
    task         nil
    - last-task dial-altitude
    >= altitude 750      ;; don't bother during final approach
==>
  =goal>
    task         dial-altitude
  +goal>
    isa          dial-altitude
!output! "PROCEDURAL ~8,3F SubGoal setting Dial Altitude~%" (actr-
time)
!eval! (setf *mark* (actr-time))
)

(p do-set-speed
  =goal>
    isa          control
    task         nil
    - last-task set-speed
    >= altitude 2000      ;; don't bother during final approach
==>
  =goal>
    task         set-speed
  +goal>
    isa          set-speed
!output! "PROCEDURAL ~8,3F SubGoal checking Speed~%" (actr-time)
!eval! (setf *mark* (actr-time))
)

(p do-gear-down
  =goal>
    isa          control
    task         nil
    - last-task move-gear
    >= altitude 2000      ;; don't bother during final approach
==>
  =goal>
    task         move-gear

```

```

+goal>
    isa      move-gear
!output! "PROCEDURAL ~8,3F SubGoal checking Landing Gear~%" (actr-
time)
    !eval! (setf *mark* (actr-time))
)

(p do-speed-brakes-on
=goal>
    isa      control
    task     nil
    - last-task speed-brakes
    >= altitude 2000    ;; speed brakes should be armed by 12 miles
out, > 2000 ft
==>
=goal>
    task     speed-brakes
+goal>
    isa      speed-brakes
!output! "PROCEDURAL ~8,3F SubGoal checking Speed Brakes~%" (actr-
time)
    !eval! (setf *mark* (actr-time))
)

;;; do not forget to pass the old decision altitude

(p do-set-decision-altitude
=goal>
    isa      control
    task     nil
    - last-task set-decision-altitude
    decision-altitude =old
    >= altitude 2000           ;;decision altitude is set
by 2000 ft/11 miles out
==>
=goal>
    task     set-decision-altitude
+goal>
    isa      set-decision-altitude
    old     =old
!output! "PROCEDURAL ~8,3F SubGoal checking Decision Altitude~%" (actr-
time)
    !eval! (setf *mark* (actr-time))
)

(p do-set-autopilot
=goal>
    isa      control
    task     nil
    - last-task set-autopilot
    decision-altitude =decision-altitude
==>
=goal>
    task     set-autopilot
+goal>
    isa      set-autopilot
    decision-altitude =decision-altitude

```

```

!output! "PROCEDURAL ~8,3F SubGoal checking Autopilot~%" (actr-time)
!eval! (setf *mark* (actr-time))
)

(p missed-approach
=goal>
  isa      control
  task     nil
  decision-altitude =decision-altitude
  altitude =altitude
  !eval! (< =altitude (- =decision-altitude 25)) ;; below decision
altitude
==>
+action>
  isa      action
  what    ATC
  do      Communication
  setting Go-Around
  !output! "PROCEDURAL ~8,3F Missed Approach (Altitude below decision
altitude!)" (actr-time)
  !eval! (signal-done 3)
  !eval! (display-dwell-times)
)

(p finis
=goal>
  isa      control
  - task      nil
  autopilots  disengaged
==>
  !output! "~2&*** Finis ***~2%"
  !eval! (signal-done 1)
  !eval! (display-dwell-times)
  !stop!
)

;; Place end-task at the end so it has a lower priority than finis
;; Actually, since utility of end-task will be learned, we need to
;; set a high prior for finis, or rely on the default

(p end-task
=goal>
  isa      control
  task      =task ; not nil
==>
=goal>
  last-task =task
  task      nil
)

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;;;;update top goal (for subgoals) -- passes value from subgoal back to
control chunk and makes it the goal

```

```

;;; also update speed, waypoint, and waypoint depending on whether
it's a speed, waypoint, or distance decision
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

(p update-top-goal-communication
=goal>
    isa communication
=retrieval>
    isa control
==>
+goal>
    =retrieval
)

(p update-top-goal-set-flap
=goal>
    isa set-flap
    flap =flap
    speed =speed ;;speed decision
=retrieval>
    isa control
==>
=retrieval>
    flaps =flap
    speed =speed
+goal>
    =retrieval
!eval! (setf *CONTROLS-dwell* (+ *CONTROLS-dwell* (- (actr-time)
*mark*)))
)

(p update-top-goal-check-altitude
=goal>
    isa check-altitude
    altitude =altitude
    - altitude looking
=retrieval>
    isa control
==>
=retrieval>
    altitude =altitude
+goal>
    =retrieval
!eval! (setf *PFD-dwell* (+ *PFD-dwell* (- (actr-time) *mark*)))
)

(p update-top-goal-set-altitude
=goal>
    isa dial-altitude
    altitude =altitude
    waypoint =waypoint ;;waypoint decision
=retrieval>
    isa control
==>
=retrieval>
    waypoint =waypoint

```

```

+goal>
    =retrieval
!eval! (setf *MCP-dwell* (+ *MCP-dwell* (- (actr-time) *mark*)))
)

(p update-top-goal-set-speed
=goal>
    isa      set-speed
    speed   =speed
    distance =distance ;;distance decision
=retrieval>
    isa      control
==>
    =retrieval>
        speed   =speed
        distance =distance
+goal>
    =retrieval
!eval! (setf *MCP-dwell* (+ *MCP-dwell* (- (actr-time) *mark*)))
)

(p update-top-goal-move-gear
=goal>
    isa      move-gear
    decision =decision
    distance =distance ;;distance decision
=retrieval>
    isa      control
==>
    =retrieval>
        landing-gear =decision
        distance   =distance
+goal>
    =retrieval
!eval! (setf *CONTROLS-dwell* (+ *CONTROLS-dwell* (- (actr-time)
*mark*)))
)

(p update-top-goal-speed-brakes
=goal>
    isa      speed-brakes
    decision =decision
    speed   =speed ;;speed decision
=retrieval>
    isa      control
==>
    =retrieval>
        airbrakes =decision
        speed     =speed
+goal>
    =retrieval
!eval! (setf *CONTROLS-dwell* (+ *CONTROLS-dwell* (- (actr-time)
*mark*)))
)

(p update-top-goal-set-decision-alt
=goal>

```

```

        isa      set-decision-altitude
        decision =decision
        distance =distance ;;distance decision
=retrieval>
        isa      control
==>
=retrieval>
        decision-altitude =decision
        distance   =distance
+goal>
    =retrieval
!eval! (setf *PFD-dwell* (+ *PFD-dwell* (- (actr-time) *mark*)))
)

(p update-top-goal-set-autopilot
=goal>
    isa      set-autopilot
    decision =decision
=retrieval>
    isa      control
==>
=retrieval>
    autopilots =decision
+goal>
    =retrieval
!eval! (setf *OTW-dwell* (+ *OTW-dwell* (- (actr-time) *mark*))) ;;
this goal always forces look out the window
)

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;; Approach - a scripted set of actions to put the aircraft in
configuration for approach
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
(p approach-checklist-lnav
=goal>
    isa      approach
    lnav     nil
!eval! (null *retrieval-scheduler*)
==>
=goal>
    lnav      set
+look>
    isa      look
    where   Distance-next
;; +action> ;; not simulated yet
;;     isa      action
;;     what    lnav
;;     do      do
;;     setting engaged
    !output! "PROCEDURAL ~8,3F Preparing for approach: setting LNAV~%"
(actr-time)
    !eval! (setf *PFD-dwell* (+ *PFD-dwell* (- (actr-time) *mark*)))
    !eval! (setf *mark* (actr-time))
)

```

```

(p approach-checklist-vnav
  =goal>
    isa      approach
    vnav     nil
  !eval! (null *retrieval-scheduler*)
==>
  +look>
    isa      look
    where   waypoint
  =goal>
    vnav     set
;;  +action> ;; not simulated yet
;;  isa      action
;;  what     vnav
;;  do      set
;;  setting engaged
  !output! "PROCEDURAL ~8,3F Preparing for approach: setting VNAV~%"
(actr-time)
  !eval! (setf *PFD-dwell* (+ *PFD-dwell* (- (actr-time) *mark*)))
  !eval! (setf *mark* (actr-time))
)

(p approach-checklist-autopilot
  =goal>
    isa      approach
    autopilot  nil
  !eval! (null *retrieval-scheduler*)
==>
  +look>
    isa      look
    where   autopilots
  =goal>
    autopilot  set
;;  +action> ;;they're already set and it's a toggle, so don't un-set
;;  isa      action
;;  what     autopilot
;;  do      set
;;  setting engaged
  !output! "PROCEDURAL ~8,3F Preparing for approach: engaging
Autopilot~%" (actr-time)
  !eval! (setf *MCP-dwell* (+ *MCP-dwell* (- (actr-time) *mark*)))
  !eval! (setf *mark* (actr-time))
)

(p approach-checklist-flaps
  =goal>
    isa      approach
    flaps    nil
  !eval! (null *retrieval-scheduler*)
==>
  =goal>
    flaps    set
+action>
  isa      action
  setting  1
  what     flaps

```

```

        do      set
!output! "PROCEDURAL ~8,3F Preparing for approach: setting Flaps
1~%" (actr-time)
    !eval! (setf *CONTROLS-dwell* (+ *CONTROLS-dwell* (- (actr-time)
*mark*)))
    !eval! (setf *mark* (actr-time))
)

(p approach-checklist-speedbrakes
=goal>
    isa          approach
    speed-brakes nil
    !eval! (null *retrieval-scheduler*)
==>
+look>
    isa          look
    where       airbrakes
=goal>
    speed-brakes      set
+action>
    isa          action
    what         airbrakes
    do on/off
    !output! "PROCEDURAL ~8,3F Preparing for approach: engaging Speed-
brakes full~%" (actr-time)
    !eval! (setf *CONTROLS-dwell* (+ *CONTROLS-dwell* (- (actr-time)
*mark*)))
    !eval! (setf *mark* (actr-time))
)

(p approach-checklist-complete
=goal>
    isa          approach
    - autopilot   nil
    - speed-brakes nil
    - lnav        nil
    - vnav        nil
    - flaps       nil
    status       nil
    !eval! (null *retrieval-scheduler*)
==>
=goal>
    status checklist-complete
-look>
+retrieval>
    isa          control
)

(p return-from-approach-checklist
=goal>
    isa      approach
    status  checklist-complete
=retrieval>
    isa      control
==>
    -goal>
    +goal>

```

```

        =retrieval
    )

;////////////////////////////////////////////////////////////////
;; Landing-checklist - a scripted set of actions to prepare for
landing on final approach
;; have to maintain separate dwell times for each of these...
;////////////////////////////////////////////////////////////////

(p landing-checklist-flaps
  =goal>
    isa          landing-checklist
    flaps        nil
  !eval! (null *retrieval-scheduler*)
==>
  =goal>
    flaps        set
  +action>
    isa          action
    setting     15
    what         flaps
    do           set
  !output! "PROCEDURAL ~8,3F Landing checklist: setting Flaps 15~%"
(actr-time)
  !eval! (setf *CONTROLS-dwell* (+ *CONTROLS-dwell* (- (actr-time)
*mark*)))
  !eval! (setf *mark* (actr-time))
)

(p landing-checklist-speedbrakes
  =goal>
    isa          landing-checklist
    speed-brakes nil
  !eval! (null *retrieval-scheduler*)
==>
  +look>
    isa          look
    where        airbrakes
  =goal>
    speed-brakes set
  +action>
    isa          action
    what         airbrakes
    do on/off
  !output! "PROCEDURAL ~8,3F Landing checklist: setting Speed-brakes
to armed~%" (actr-time)
  !eval! (setf *CONTROLS-dwell* (+ *CONTROLS-dwell* (- (actr-time)
*mark*)))
  !eval! (setf *mark* (actr-time))
)

(p landing-checklist-speed
  =goal>
    isa          landing-checklist

```

```

        speed      nil
!eval! (null *retrieval-scheduler*)
==>
=goal>
    speed      set
+action>
    isa       action
    setting   135
    what      speed
    do        set
    !output! "PROCEDURAL ~8,3F Landing checklist: setting Speed to
135~%" (actr-time)
    !eval! (setf *CONTROLS-dwell* (+ *CONTROLS-dwell* (- (actr-time)
*mark*)))
    !eval! (setf *mark* (actr-time))
)

(p landing-checklist-gear
=goal>
    isa       landing-checklist
    gear     nil
!eval! (null *retrieval-scheduler*)
==>
=goal>
    gear      set
+action>
    isa       action
    what      landing-gear
    do up/down ;Toggle
    !output! "PROCEDURAL ~8,3F Landing checklist: setting Gear down 1~%" (actr-time)
    !eval! (setf *CONTROLS-dwell* (+ *CONTROLS-dwell* (- (actr-time)
*mark*)))
    !eval! (setf *mark* (actr-time))
)

(p landing-checklist-cabin
=goal>
    isa       landing-checklist
    cabin    nil
!eval! (null *retrieval-scheduler*)
==>
=goal>
    cabin    set
+action>
    isa       action
    what      nothing
    do       Communication
    setting   2007
    !output! "PROCEDURAL ~8,3F Landing checklist: preparing cabin for
landing~%" (actr-time)
    !eval! (setf *mark* (actr-time)) ;; this goes into "off" time
)

(p landing-checklist-complete
=goal>
    isa       landing-checklist

```

```

        - speed-brakes      nil
        - flaps            nil
        - speed            nil
        - gear             nil
        - cabin            nil
        status            nil
    !eval! (null *retrieval-scheduler*)
==>
=goal>
    status checklist-complete
-look>
+retrieval>
    isa      control
!output! "VOCAL ~8,3F Landing Checklist Complete~%" (actr-time)
)

(p return-from-landing-checklist
=goal>
    isa      landing-checklist
    status checklist-complete
=retrieval>
    isa      control
==>
=retrieval>
    landing-checklist checked
+goal>
=retrieval
)
;

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;; Communications
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;

(p chatter
=goal>
    isa      communication
    chatter =type
!eval! (null *retrieval-scheduler*)
==>
!bind! =reply (chatter =type) ;Takes time
+action>
    isa      action
    what    nothing
    do      Communication
    setting =reply
+retrieval>
    isa      control
)

;; atc message interrupts current goal
(p atc-message
=look>
    isa look

```

```

        where atc
==>
+goal>
    =look
-look>
-retrieval>
)

(p clear-atc-message
=goal>
    isa look
    where atc
    setting =type
    - setting clear-atc
    - setting 2001
==>
-look>
=goal>
    setting clear-atc
!bind! =reply (chatter =type)
+action>
    isa      action
    what     ATC
    do       Communication
    setting  =reply
+retrieval>
    isa      control
!output! "AURAL ~8,3F ATC message ~S~%" (actr-time) =type
)

(p late-reassignment
=goal>
    isa look
    where atc
    setting 2001
    setting =type
==>
-look>
=goal>
    setting clear-atc
!bind! =reply (chatter =type)
+action>
    isa      action
    what     ATC
    do       Communication
    setting  =reply
+retrieval>
    isa      control
!output! "AURAL ~8,3F ATC message ~S~%" (actr-time) =type
!output! "PROCEDURAL ~8,3F Late Reassignment (Switch to parallel
runway)" (actr-time)
;;!eval! (signal-done 3)
)

```

```

(p reestablish-goal-after-atc-message
=goal>
  isa look
  where atc
  setting clear-atc
=retrieval>
  isa control
==>
+goal>
=retrieval
)

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;;;
;;; Productions for reading decision values (for the three super-types
for controls: speed, waypoint, distance)
;;;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;;;
;;; Speed-decision
;;;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;;;

(p get-speed-svs
=goal>
  isa          speed-decision
  speed        nil
  !eval! (not (null *svs-present*))
==>
+look>
  isa          look
  where        speed
  source       svs
=goal>
  speed        looking
  !eval! (setf *SVS-dwell* (+ *SVS-dwell* (- (actr-time) *mark*))) ;;
this was the time to look at speed
)

(p get-speed-dial
=goal>
  isa          speed-decision
  speed        nil
==>
+look>
  isa          look
  where        speed
  source       dial
=goal>
  speed        looking
  !eval! (setf *MCP-dwell* (+ *MCP-dwell* (- (actr-time) *mark*))) ;;
this was the time to look at speed
)

(p read-speed

```

```

=goal>
  isa          speed-decision
  speed        looking
=look>
  isa          look
  where speed
  setting     =speed
==>
-look>
=goal>
  speed      =speed
  !eval! (setf *mark* (actr-time)) ;;
start a new clock for the rest of the supergoal
)

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;; Waypoint-decision
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
(p get-waypoint-svs
=goal>
  isa          waypoint-decision
  waypoint    nil
  !eval! (not (null *svs-present*))
==>
+look>
  isa          look
  where       waypoint
  source      svs
=goal>
  waypoint    looking
  !eval! (setf *SVS-dwell* (+ *SVS-dwell* (- (actr-time) *mark*))) ;;
this was the time to look at speed
)

(p get-waypoint-dial
=goal>
  isa          waypoint-decision
  waypoint    nil
==>
+look>
  isa          look
  where       waypoint
  source      dial
=goal>
  waypoint    looking
  !eval! (setf *NAV-dwell* (+ *NAV-dwell* (- (actr-time) *mark*))) ;;
this was the time to look at waypoint
)

(p read-waypoint
=goal>
  isa          waypoint-decision
  waypoint    looking
=look>

```

```

        isa      look
        where   waypoint
        setting =waypoint
==>
-look>
=goal>
    waypoint =waypoint
!eval! (setf *mark* (actr-time)) ;;
start a new clock for the rest of the supergoal
)

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;; Distance-decision
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;

(p get-distance-next-svs
=goal>
    isa      distance-decision
    - waypoint looking
    waypoint =got
    distance-next nil
!eval! (not (null *svs-present*))
==>
+look>
    isa      look
    where   distance-next
    source   svs
=goal>
    distance-next looking
!eval! (setf *SVS-dwell* (+ *SVS-dwell* (- (actr-time) *mark*))) ;;
this was the time to look at speed
)

(p get-distance-next-dial
=goal>
    isa      distance-decision
    - waypoint looking
    waypoint =got
    distance-next nil
==>
+look>
    isa      look
    where   distance-next
    source   dial
=goal>
    distance-next looking
!eval! (setf *NAV-dwell* (+ *NAV-dwell* (- (actr-time) *mark*))) ;;
this was the time to look at distance
)

(p read-distance
=goal>
    isa      distance-decision
    distance-next looking
=look>

```

```

        isa      look
        where   distance-next
        setting =distance
==>
-look>
=goal>
    distance-next =distance)

(p compute-distance
=goal>
    isa      distance-decision
    waypoint =which
    - distance-next looking
    distance-next =next
    distance   nil
=waypoint>
    isa      waypoint
    id      =which
    range   =range
==>
!bind! =distance (+ =next =range)
!output! "RETRIEVAL ~8,3F Waypoint ~d Next ~d Distance ~d~%"
(actr-time) =which =next =distance
-look>
=goal>
    distance   =distance
    !eval! (setf *mark* (actr-time)) ;;
start a new clock for the rest of the supergoal
)

::::::::::::::::::
::::::::::
;;; Remove the ignore productions and
;;; the !eval! for redundant decisions

;;; Separate productions for each instance-based decision
;;; When the goal is set up (presumably externally),
;;; perform a retrieval, call the action function if necessary,
;;; update the goal then pop it to enrich the instance base.

;;; one (or two) of these reading productions for each subgoal

;;; Note that the retrieval must check that flaps are not nil
;;; otherwise the current can and usually will be retrieved
;;; leading to an infinite loop

::::::::::::::::::
::::::::::
;;; Set-flap
::::::::::::::::::
::::::::::

(p retrieve-flap
=goal>
    isa      set-flap
    - speed   looking

```

```

        speed      =speed  ;;get speed decision first
        flap       nil
;;;      flap      =current
!eval! (null *retrieval-scheduler*)
==>
+retrieval>
    isa      set-flap
    speed   =speed
    - flap   nil
;; change the goal after initiating the retrieval so it can't be
retrieved (it's still nil) -- the implementation is sequential!
;;  =goal>
;;  flap      get-flap
)

(p compute-flap
=goal>
    isa      set-flap
    - speed  looking
    speed   =speed
;;  flap      get-flap
    flap    nil
;;;   flap      =current
=retrieval>
    isa      set-flap
;;  speed   =speed
    flap    =flap
    - flap   get-flap
;;;  !eval! (not (equalp =current =flap))
==>
=goal>
    flap    =flap
!output! "RETRIEVAL ~8,3F Flaps ~S~%" (actr-time) =flap
+look>
    isa      look
    where   flaps
)

(p set-flaps
=goal>
    isa      set-flap
    flap    =flap
=look>
    isa      look
    where   flaps
    - setting =flap
    setting  =old
!eval! (null *retrieval-scheduler*)
==>
-look>
+action>
    isa      action
    setting =flap
    what    flaps
    do     set
+retrieval>

```

```

        isa      control
)

(p flaps-already-set
=goal>
    isa      set-flap
    flap     =flap
=look>
    isa      look
    where   flaps
    setting =flap
    !eval! (null *retrieval-scheduler*)
==>
    -look>
    !output! "PROCEDURAL ~8,3F Confirm Flaps already set to ~S~%" (actr-
time) =flap
    +retrieval>
        isa      control
)

(p ignore-flap
=goal>
    isa      set-flap
    - speed  nil
    - speed  looking
    flap     nil
    !eval! (null *retrieval-scheduler*)
==>
    +retrieval>
        isa      control
)

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;;;
;;; Check-Altitude
;;;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;


(p check-altitude
=goal>
    isa      check-altitude
    altitude  nil
    !eval! (null *retrieval-scheduler*)
==>
    +look>
        isa      look
        where   altitude
=goal>
    altitude  looking
)

(p read-altitude
=goal>
    isa      check-altitude
    altitude looking
    previous =previous
=look>

```

```

        isa      look
        where   altitude
        setting =altitude
!eval! (null *retrieval-scheduler*)
!eval! (> (abs (- =previous =altitude)) 150)
==>
=goal>
    altitude =altitude
-look>
+retrieval>
    isa      control
)

;; still update the altitude -- penalize if the change isn't big or the
model only looks at altitude
(p ignore-altitude
=goal>
    isa      check-altitude
    altitude looking
    previous =previous
=look>
    isa      look
    where   altitude
    setting =altitude
==>
=goal>
    altitude =altitude
-look>
+retrieval>
    isa      control
)

::::::::::::::::::
::::::::::
;;; Dial-Altitude
::::::::::::::::::
::::::::::

(p get-dial-altitude
=goal>
    isa      dial-altitude
    - waypoint looking
    waypoint =which ;;get waypoint decision first
    altitude nil
!eval! (null *retrieval-scheduler*)
==>
+retrieval>
    isa      dial-altitude
    waypoint =which
    - altitude nil
)

(p figure-dial-altitude
=goal>
    isa      dial-altitude
    - waypoint looking
    waypoint =which

```

```

        altitude      nil
=retrieval>
        isa          dial-altitude
        altitude    =altitude
==>
=goal>
        altitude    =altitude
!output! "RETRIEVAL ~8,3F Altitude ~S~%" (actr-time) =altitude
+look>
        isa          look
        where        dial-altitude)

(p dial-altitude
=goal>
        isa          dial-altitude
        altitude    =altitude
=look>
        isa          look
        where        dial-altitude
        - setting   =altitude
        setting    =old
!eval! (null *retrieval-scheduler*)
==>
+action>
        isa          action
        what        dial-altitude
        do          set
        setting   =altitude
-look>
+retrieval>
        isa          control
)

(p dial-altitude-already-dialed
=goal>
        isa          dial-altitude
        altitude    =altitude
=look>
        isa          look
        where        dial-altitude
        setting   =altitude
!eval! (null *retrieval-scheduler*)
==>
-look>
!output! "PROCEDURAL ~8,3F Confirm Altitude already set to ~S~%""
(actr-time) =altitude
+retrieval>
        isa          control
)

(p ignore-dial-altitude
=goal>
        isa          dial-altitude
        - waypoint  nil
        - waypoint  looking
        altitude   nil
!eval! (null *retrieval-scheduler*)

```

```

==>
-look>
+retrieval>
    isa          control
)

::::::::::::::::::
:::: Set-Speed
::::::::::::::::::
::::::::::::::::::
(p retrieve-speed
=goal>
    isa      set-speed
    - distance looking
    distance =distance ;;get distance decision first
    speed    nil
!eval! (null *retrieval-scheduler*)
==>
+retrieval>
    isa      set-speed
    distance =distance
    - speed nil
)

(p figure-speed
=goal>
    isa      set-speed
    - distance looking
    speed    nil
=retrieval>
    isa      set-speed
    distance =distance
    speed    =speed
==>
=goal>
    speed    =speed
!output! "RETRIEVAL ~8,3F Speed ~%" (actr-time) =speed
+look>
    isa      look
    where    dial-speed
)

(p dial-speed
=goal>
    isa      set-speed
    speed    =speed
=look>
    isa      look
    where    dial-speed
    - setting =speed
    setting   =old
!eval! (null *retrieval-scheduler*)
==>
+action>
    isa      action
    what    dial-speed

```

```

        do      set
        setting =speed
-look>
+retrieval>
    isa      control
)

(p speed-already-dialed
=goal>
    isa      set-speed
    speed   =speed
=look>
    isa      look
    where   dial-speed
    setting =speed
!eval! (null *retrieval-scheduler*)
==>
-look>
!output! "PROCEDURAL ~8,3F Confirm Speed already set to ~S~%" (actr-
time) =speed
+retrieval>
    isa      control
)

(p ignore-speed
=goal>
    isa      set-speed
    - distance nil
    - distance looking
    speed     nil
!eval! (null *retrieval-scheduler*)
==>
+retrieval>
    isa      control
)

;;; What to do for rule-based productions?
;;; Currently, only rules for one-time decisions

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;;;
;;; Move-Gear
;;;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;;;

#|
(p abort-landing
=goal>
    isa      move-gear
    - distance looking
    distance =distance ;;get distance decision first
    !eval! (zerop =distance)
    !eval! (null *retrieval-scheduler*)
==>
    !output! "PROCEDURAL ~8,3F Over Runway (Abort Landing)" (actr-time)
    !eval! (signal-done 3)
    !stop!

```

```

+retrieval>
    isa          control
)
| #

(p decide-gear
=goal>
    isa          move-gear
    - distance  looking
    distance    =distance
    decision    nil
    !bind! =decision (if (<= =distance 15.0) 'down 'up)
==>
+look>
    isa          look
    where        landing-gear
=goal>
    decision    =decision)

(p move-gear
=goal>
    isa          move-gear
    decision    =decision
=look>
    isa          look
    where        landing-gear
    - setting   =decision
    setting    =old
    !eval! (null *retrieval-scheduler*)
==>
-look>
!output! "PROCEDURAL ~8,3F Lowering Gear" (actr-time)
+action>
    isa          action
    what        landing-gear
    do up/down           ;Toggle
=goal>
    decision    =decision
+retrieval>
    isa          control
)

(p gear-already-moved
=goal>
    isa          move-gear
    decision    =decision
=look>
    isa          look
    where        landing-gear
    setting    =decision
    !eval! (null *retrieval-scheduler*)
==>
-look>
!output! "PROCEDURAL ~8,3F Confirm Gear already set to ~S~%" (actr-
time) =decision
=goal>

```

```

        decision      =decision
+retrieval>
    isa          control
)

(p ignore-gear
=goal>
    isa          move-gear
- distance   nil
- distance   looking
!eval! (null *retrieval-scheduler*)
==>
+retrieval>
    isa          control
)

;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;; speed-brakes
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

(p decide-speed-brakes
=goal>
    isa          speed-brakes
- speed      looking
    speed      =speed ;:get speed decision first
    decision   nil
!bind! =decision (if (<= =speed 145.0) 'on 'off)
==>
+look>
    isa          look
    where       airbrakes
=goal>
    decision   =decision)

(p set-speed-brakes
=goal>
    isa          speed-brakes
    decision   =decision
=look>
    isa          look
    where       airbrakes
- setting    =decision
    setting    =old
!eval! (null *retrieval-scheduler*)
==>
-look>
!output! "PROCEDURAL ~8,3F Setting Speed Brakes" (actr-time)
+action>
    isa          action
    what        airbrakes
    do on/off           ;Toggle?
+retrieval>
    isa          control
)

```

```

(p speed-brakes-already-set
=goal>
    isa      speed-brakes
    decision =decision
=look>
    isa      look
    where   airbrakes
    setting =decision
!eval! (null *retrieval-scheduler*)
==>
    -look>
    !output! "PROCEDURAL ~8,3F Confirm Speed Brakes already set to ~S~%"
(actr-time) =decision
+retrieval>
    isa      control
)

(p ignore-speed-brakes
=goal>
    isa      speed-brakes
    - speed  nil
    - speed  looking
    decision =decision
!eval! (null *retrieval-scheduler*)
==>
+retrieval>
    isa      control
)

;;;;;;;;;;;;;;
;;;;;;
;; Set decision altitude
;;;;;;;;;;;;;;
;;;;;;

(p figure-decision-altitude
=goal>
    isa      set-decision-altitude
    - distance  looking
    distance   =distance ;;get distance decision first
    old       =current
!eval! (and (< =distance 12) (/= =current 600.0))
!eval! (null *retrieval-scheduler*)
==>
    !output! "PROCEDURAL ~8,3F Setting Decision Altitude to 600 feet"
(actr-time)
;; Chancy
+action>
    isa      action
    what   decision-altitude
    do     set
    value  600.0
=goal>
    decision  600.0
+retrieval>
    isa      control
)

```

```

(p ignore-decision-altitude
  =goal>
    isa      set-decision-altitude
    - distance nil
    - distance looking
    old      =current
  !eval! (null *retrieval-scheduler*)
==>
  =goal>
    decision   =current
  +retrieval>
    isa       control
)

;////////////////////////////////////////////////////////////////
;; Set autopilot
;////////////////////////////////////////////////////////////////
;////////////////////////////////////////////////////////////////

(p get-visibility
  =goal>
    isa      set-autopilot
    visibility  nil
==>
  +look>
    isa      look
;;      where   otw_ground
    where   otw_runway
=goal>
  visibility looking)

(p read-visibility
  =goal>
    isa      set-autopilot
    visibility looking
  =look>
    isa      look
;;      where   otw_ground
    where   otw_runway
    setting  =visibility
==>
  +look>
    isa      look
    where   autopilots
=goal>
  visibility =visibility)

;; disengaging autopilot concludes vectored approach, and late
reassignment
(p disengage-autopilot
  =goal>
    isa      set-autopilot
    visibility in-sight
  =look>

```

```

        isa      look
        where    autopilots
        setting  up
!eval! (null *retrieval-scheduler*)
==>
!eval! (incf *landings*)
-look>
!output! "PROCEDURAL ~8,3F Disengage Autopilot and land" (actr-time)
+action>           ;Toggle
        isa      action
        what    autopilots
        do      up/down
=goal>
        decision  disengaged
+retrieval>
        isa      control
)

;; disengaging autopilot for traffic on runway
(p disengage-autopilot-runway-traffic
=goal>
        isa      set-autopilot
        visibility  runway-traffic
=look>
        isa      look
        where    autopilots
        setting  up
!eval! (null *retrieval-scheduler*)
==>
!eval! (incf *landings*)
-look>
!output! "PROCEDURAL ~8,3F Traffic on runway -- going around" (actr-
time)
+action>           ;Toggle
        isa      action
        what    autopilots
        do      up/down
=goal>
        decision  disengaged
+retrieval>
        isa      control
)

;; disengaging autopilot for runway misaligned
(p disengage-autopilot-runway-misaligned
=goal>
        isa      set-autopilot
        visibility  runway-off-alignment
=look>
        isa      look
        where    autopilots
        setting  up
!eval! (null *retrieval-scheduler*)
==>
!eval! (incf *landings*)
-look>

```

```

!output! "PROCEDURAL ~8,3F Runway misaligned -- going around" (actr-
time)
+action>                                ;Toggle
  isa          action
  what         autopilots
  do           up/down
=goal>
  decision    disengaged
+retrieval>
  isa          control
)

(p peek
=goal>
  isa          set-autopilot
  visibility   =v
  - visibility looking
  - visibility   in-sight
  peek         nil
==>
+look>
  isa          look
  where        altitude
=goal>
  peek         looking)

(p read-peek
=goal>
  isa          set-autopilot
  visibility   =v
  peek         looking
=look>
  isa          look
  where        altitude
  setting     =alt
==>
=goal>
  peek         =alt)

(p ignore-autopilot
=goal>
  isa          set-autopilot
  visibility   out-of-sight
  peek         =p
  decision    nil
  !eval! (null *retrieval-scheduler*)
==>
-look>
=goal>
  decision    engaged
+retrieval>
  isa          control
)

::::::::::::::::::
::::::::::::::::::

```

```

(setq *quitting-time* 600.0)

;;; Penalize the ignore productions

(spp (ignore-flap ignore-dial-altitude ignore-speed ignore-gear
    ignore-speed-brakes ignore-decision-altitude ignore-autopilot
    speed-brakes-already-set gear-already-moved speed-already-dialed
    dial-altitude-already-dialed flaps-already-set ignore-altitude)
    :successes 1 :failures 100 :efforts 10000)

;;; Learning parameters
(spp (UPDATE-TOP-GOAL-COMMUNICATION UPDATE-TOP-GOAL-SET-FLAP
    UPDATE-TOP-GOAL-SET-ALTITUDE UPDATE-TOP-GOAL-SET-SPEED
    UPDATE-TOP-GOAL-MOVE-GEAR UPDATE-TOP-GOAL-SPEED-BRAKES
    UPDATE-TOP-GOAL-SET-DECISION-ALT UPDATE-TOP-GOAL-SET-AUTOPILOT
    UPDATE-TOP-GOAL-CHECK-ALTITUDE)
    :effort (task-effort) :efforts 1.0 ;;; do not bias the initial
utility
    :success t
    )

(spp end-task
    :successes 10 :failures 20
    :success (select-task-success) :failure (select-task-failure))

```