SIMULATOR INSTRUCTIONAL FEATURE DESIGN GUIDE

Feature:

Demonstration Preparation

Definition:

Demonstration Preparation (Demo Prep) is a simulator instructional feature that enables a simulator instructor to prepare a Demonstration (Demo) for repeated use during subsequent periods of pilot training.

Purpose and Intended Use:

The purpose of the Demo Prep feature is to permit Demos to be prepared by recording a period of performance in the simulator, modifying that recording to enhance its instructional value, and adding an expository or instructional commentary. The skills required to prepare a Demo using this feature are those normally found among simulator instructors who are pilots, and no additional technical training or computer programming skills are required. Nevertheless, it is expected that only designated instructors will prepare Demos in order that control may be exercised over Demonstration content and format.

Recording a Demo in the simulator will normally be preceded by the development of a scenario for the Demo. A script of the planned instructional commentary will be prepared and, in addition, the scenario will identify the simulated conditions under which the maneuver(s) of interest will be flown, the number of repetitions of all or designated portions of the maneuver that are to be included in the completed Demo, where Pauses are to appear, and which segments are to be presented in Slow Time. The scenario also will identify the beginning of each Demo segment that is to be directly accessible by the instructor. The script will be edited to assure that proper time relationships will be maintained between the content of the Demo and the related commentary.

Following development of the scenario, with its accompanying audio commentary, the Demo described in it will be developed by flying the simulated aircraft through the maneuver or series of maneuvers to be demonstrated while the flight is being recorded. This process may be repeated until the instructor is satisfied that the maneuver has been flown to the required standards. While making the recording, the instructor (with the assistance of a second instructor located at the IOS) would make use of the simulator's other instructional features such as Freeze, and Store/Reset Current Conditions, as often as necessary to obtain a "model" performance of the maneuver being flown. If the scenario requires that the Demo include more than a single repetition of the maneuver, as usually will be the case, the recording process will be repeated as many times as may be required.

Upon completing the recording of the maneuver, the instructor will "edit" it in accordance with the scenario by inserting Pauses when extended instructional commentary might be required or by "stretching" to Slow Time parts of the maneuver which occur too rapidly in real time for the pilot to be able to see important task interrelationships. He then would add Demo segment identifiers that will permit direct access to the beginning of individual segments when the Demo is employed in the instructional process.

Finally, using the script prepared for that purpose, the instructor will add the prepared instructional commentary to the recorded Demo. Recording the audio, which would normally be done while the newly prepared Demo is being replayed and monitored, will require careful attention--and possibly several practice trials--to synchronize the commentary with the instructional events being commented upon.

Because of limits upon humans' attention span and short-term recall abilities, the more effective Demos will tend to be relatively brief. The subject matter of Demos will consist of complex individual maneuvers or rapidly occurring series of maneuvers of which verbal descriptions alone might not provide enough information for pilots to learn rapidly to perform them. It is not expected that Demos will be prepared to illustrate mission segments in which individual maneuvers are separated by extended periods of relatively simple aircraft control tasks. For these reasons, most Demos, including those which contain Pauses and Slow Time segments, will be of less than five minutes duration. Demos of more than ten minutes would be counterproductive in most instances and should not be prepared.

Function Descriptions:

ENABLE. Preparation of a Demonstration is a function that cannot be performed while instruction is in progress. To assure preservation of previously prepared Demonstrations, and to exercise administrative control over preparation of new ones, the Demo Prep feature cannot be enabled from the IOS.

SET UP SIMULATOR. Setting up the simulator for the task of preparing a Demo, except for the necessary enablement, is comparable to setting it up for an instructional activity. Thus, initial condition parameters which define the flight environment and the aircraft position and status must be selected and entered. After this has been done, the simulator may be flown just as during a period of simulator instruction, and the instructional activity control features of the simulator normally available during such training may be used in preparing the Demo.

RECORD MANEUVER. Upon terminating freeze status, the simulator performance will be recorded as flown. The instructor will fly the maneuvers that comprise the first (or next) portion of the Demo scenario.

REPLAY. After a portion of the Demo is recorded the instructor will use the replay function

to determine if the recording is satisfactory. He may erase and rerecord (i.e., record over) maneuver records that he judges not to be satisfactory.

RECORDING COMPLETED. The recording and replay processes described above will be continued until the instructor has assembled the necessary examples of the maneuver that is the subject of the Demo being developed. The instructor making the Demo may record numerous satisfactory trials sequentially until he has the number of satisfactory trials and variations of trials his scenario requires. For each period of Demo recording he may reestablish the previously selected initial conditions, or a different set of conditions as may be required, to produce a Demo consistent with the scenario.

EDIT. When the instructor has completed recording all of the necessary segments of flight, he will edit the recording as described below to meet the Pause and Slow Time requirements of the scenario.

ADD PAUSE. The instructor will play back the recorded maneuver, and, at points during the playback indicated in the scenario, he will insert periods of Pause. During these periods, the Demo will continue to replay, but the simulated events will be in a suspended or "stop-action" status. Suspending these simulated events without stopping the Demo will permit the later recording of a more lengthy commentary explaining the event than would be possible without Pauses. A Pause may be of any length within the limits of playback time permitted for a Demo.

CHANGE TO SLOW TIME. Segments of the recorded maneuver may be "stretched" from real time to slow time so it will be easier for a pilot to see just what the performance being demonstrated consists of. This stretching will be done, in accordance with the previously developed scenario, by replaying the portion of the maneuver to be stretched while the Change to Slow Time function is exercised. The length of the segment changed to Slow Time is limited only by the total time available for that Demo.

ADD SEGMENT IDENTIFICATION. After all Pauses have been entered and Slow Time conversions have been made, the instructor will replay the Demo (which will now be at its full length) and divide it into independently addressable segments by "flagging" the points at which each such segment is to begin. These "flags" will be located in accordance with scenario specifications and will generally be at the beginning and/or at the end of Pauses and Slow Time segments, and at the beginning of complete cycles of the maneuver being demonstrated.

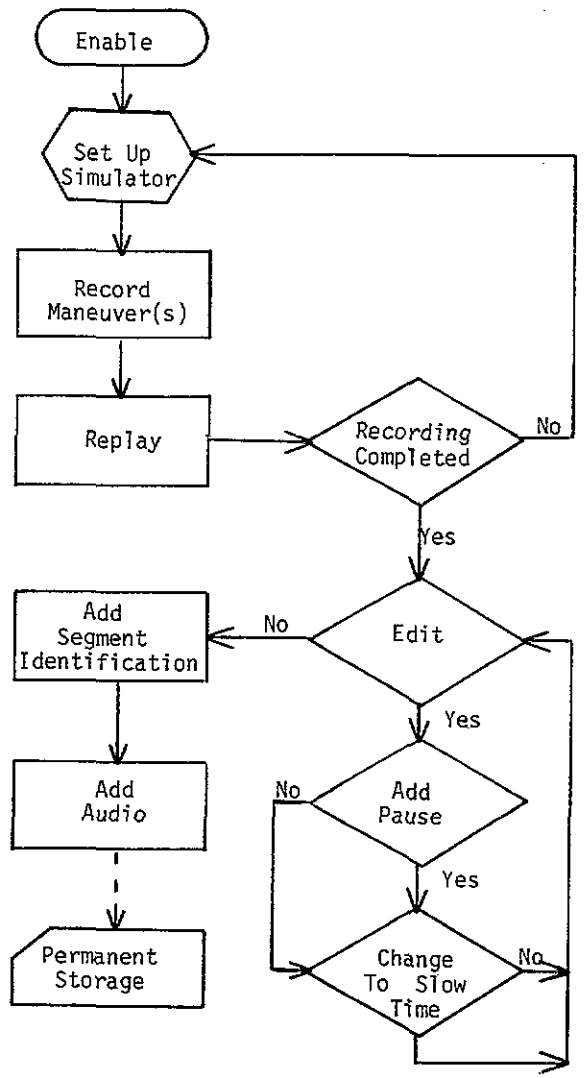
ADD AUDIO. The final task of the instructor preparing a Demo will be to add the instructional commentary. This will be done by reading the script prepared during development of the Demo scenario onto a synchronized tape or other recording medium while the Demo is being replayed and monitored.

PERMANENT STORAGE. When the Demo has been prepared and reviewed by the instructor, and he is fully satisfied that it will provide the instruction intended (i.e., that no further editing or re-recording is required), it will be stored with other Demos for use during subsequent periods of instruction.

Concurrent Events:

While a Demo is being prepared, all simulator controls normally available during periods of instruction will retain their normal functions except those associated with the Record/Playback feature. These controls may be used to create and modify conditions and events that will be included in the recorded Demo. Thus, the instructor may employ the Store/Reset Current Conditions feature, or he may change visibility on the visual display or activate hostile weapons. He also may employ the Hardcopy and Remote Display instructional features and the performance measurement and data summary capabilities of the simulator to examine the maneuver he has just recorded in order to determine its adequacy for his instructional purposes.

Feature Diagram:



SIMULATOR INSTRUCTIONAL FEATURE DESIGN GUIDE

Feature:

Demonstration

Definition:

Demonstration (Demo) is a simulator instructional feature that consists of a prerecorded aircraft maneuver, or series of contiguous maneuvers, that provides a model of the desired performance of the maneuver being demonstrated. The Demo reproduces all simulated flight conditions and aircraft performance that occurred when the maneuver was originally recorded, including appropriate actuation of cockpit instruments, indicators and flight controls, motion system movement, visual display scenes, and mechanical and aerodynamic sounds. A Demo includes a synchronized audio briefing, explanation, and instructional commentary designed to facilitate the pilot's subsequent performance of the maneuver.

The content of a Demo is not necessarily limited to a simple execution of the maneuver(s) being demonstrated. A Demo may include repetitions of the entire maneuver or of any one or more of its segments, segments presented in Slow Time, and Pauses, each with unique instructional commentary, whenever such variations in format of presentation may facilitate an understanding by the pilot of the associated performance requirements.

Demos may be divided into segments that correspond to significant parts of the maneuver being demonstrated or to events in the Demo itself. Each such segment is independently addressable from the IOS. Thus, each segment provides a "mini Demo" that addresses a particular aspect or portion of the maneuver being demonstrated.

Purpose and Intended Use:

The purpose of the Demo feature is to provide standardized instruction in the performance of difficult and/or complex aircraft maneuvers or series of contiguous maneuvers. The content and format of that instruction may vary significantly from one Demo to another, but all Demos illustrate idealized performance, identify the significant cues and discriminations the pilot must learn to make in executing a maneuver, and provide other instructional commentary that may facilitate tasks mastery. A properly prepared Demo will aid the pilot in the acquisition of both knowledge and skills associated with performance of the maneuver demonstrated.

Demos normally will be used by the instructor to introduce a new maneuver to the pilot, and the pilot will observe the entire Demo without interruption before attempting to perform the maneuver in the simulator. He might wish to repeat all of a portion of the Demo immediately, or after he has attempted to perform the maneuver himself. Alternatively, the instructor might re-present the Demo, or one or more of its segments, for the further instruction of a pilot who may find the maneuver particularly difficult to understand or to perform correctly. The instructor may re-present only a segment on which the maneuver is recorded in slow time or in which a particular explanation is included. Or, he might repeat the entire Demo or a segment of it with the accompanying instructional commentary off so that he can provide his own commentary.

Function Descriptions:

ENTER. A Demo may be employed through controls located at the IOS at the option of the instructor or the pilot at any time during simulator training. A Demo can only be entered when the simulator is in freeze status.

SELECT SEGMENT. The instructor must select the Demo and the segment (usually the first) of that Demo to be presented, and he must initiate its presentation once the necessary initial conditions have been established. Establishment of the initial conditions for any Demo segment must not require more than 30 seconds.

MONITOR. Once initiated, the Demo will continue to its completion without interruption, change, or instructor or student input unless the instructor elects to turn the audio (sounds and instructional commentary) off, interrupt the Demo temporarily, or terminate it altogether. During the Demo, the instructor and student will monitor it.

AUDIO OFF. The instructor may elect to substitute his own instructional commentary for that provided with the Demo for one or more of the segments. Turning the Audio Off will enable him to do this. During such periods, however, the audio will continue to maintain synchronization with the Demo so that the instructor can reinstate the recorded instructional commentary at any time.

MANUAL FREEZE. The instructor may temporarily interrupt the Demo by initiating a period of Freeze in order to discuss some aspect of it with the pilot or to engage in some other instructional activity. Regardless of prior activities, the instructor may terminate the period of Freeze and continue monitoring the Demo with or without audio accompaniment until its final segment has been completed. Alternatively, he may terminate the Demo at any time and initiate another instructional activity.

COMPLETE. Unless the instructor intervenes, the Demo, once initiated will continue until its final segment has been completed. When that end point is reached, the simulator will automatically revert to a Freeze status with all simulation conditions "frozen" at the values which define the end point of the Demo.

TERMINATE. The instructor may terminate the Demo at any point after its initiation rather than complete it. When a Demo is terminated, the simulated conditions existent at that time, rather than the ones that define the end of the Demo, will

obtain. From those conditions, the pilot may assume control of the simulated aircraft and "fly out," or other initial conditions may be established by the instructor. A Demo will always end or be terminated with the simulation in Freeze status.

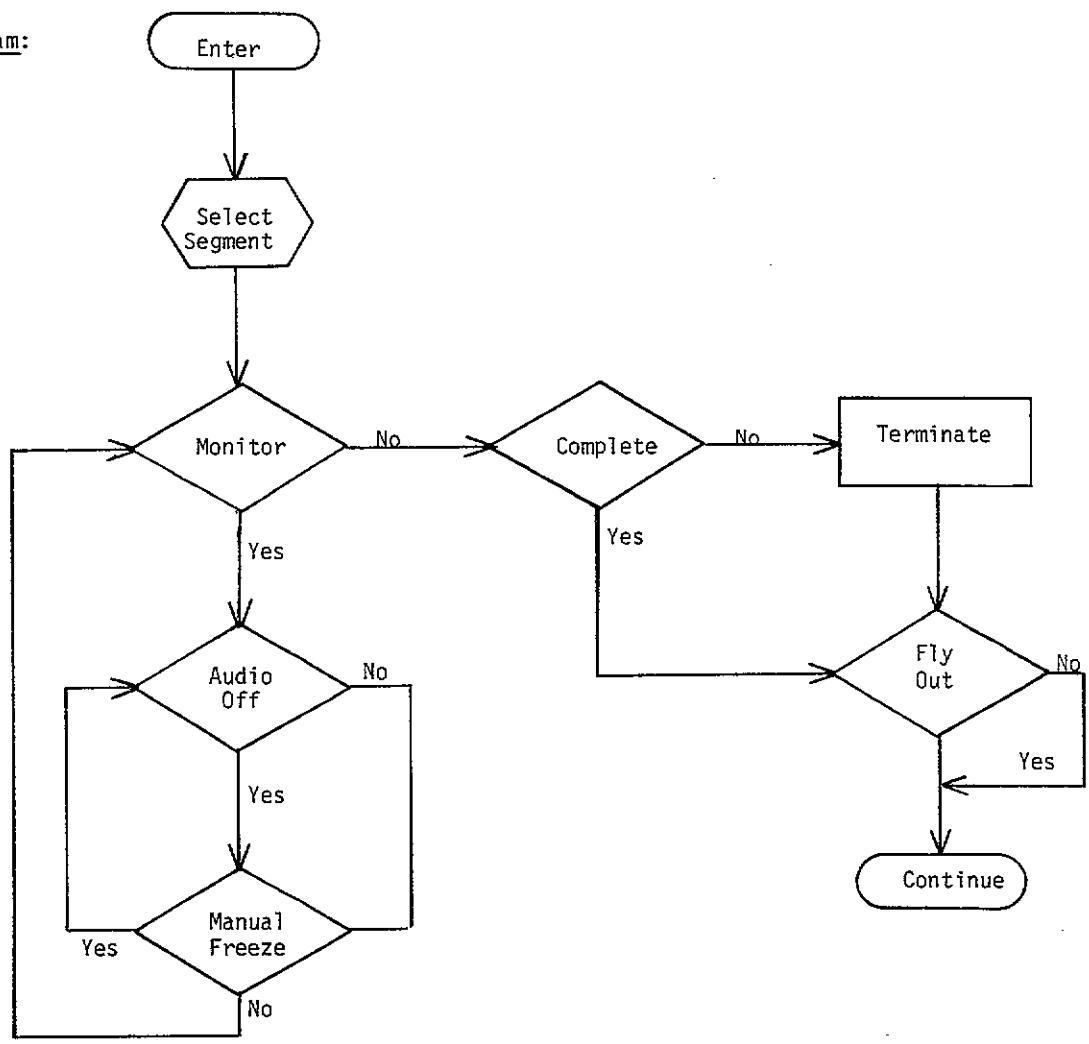
FLY OUT. There will be times when the instructor wishes the pilot to assume control of the simulated aircraft when a Demo has been completed (or terminated before its completion) and to "fly out" from that point. The Fly Out function will permit this to occur.

CONTINUE. Upon completing or terminating a Demo, the instructor may elect to employ any other feature of the simulator in his process of instructing the pilot. Alternatively, he may repeat the same or another recorded Demo or any Demo segment by selecting the desired Demo and segment and repeating the process described above. If he elects this latter course, he retains all options available during the initial Demo presentation, including monitoring the synchronized audio with its instructional commentary. Only a short time interval (e.g., not more than 30 seconds) should be required to re-enter the Demo feature at the beginning of any segment regardless of the point of termination of a Demo.

Concurrent Events:

While a Demo is in progress, the instructor may interact verbally with the pilot in order to contribute to the pilot's understanding of the maneuver(s) demonstrated. He may access previously recorded performance data summaries that will enable him to provide verbal feedback to the pilot concerning his prior performance of the maneuver being demonstrated, and he may index and search data display pages for information that will facilitate the subsequent setup and employment of other simulator instructional features. He may also employ the Remote Display and Hardcopy instructional features, and he may store conditions to which he may wish to reset (using the Store/Reset Current Conditions feature) upon completion or termination of the Demo.

Feature Diagram:



ABOUT THE AUTHORS

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