# TRAINING SITUATION ANALYSIS STUDY FOR THE T-34C EXPANDED PRIMARY FLIGHT TRAINING PHASE

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This paper describes the activities performed and the procedures utilized to conduct a Training Situation Analysis of the proposed Navy Expanded Primary Flight Training Phase. The proposed expanded primary is the central feature of the Chief of Naval Air Training, Long Range Pilot Training System (LRPTS) (see Figure 1).

The objectives of the LRPTS are to modernize Navy pilot training, to reduce cost of training and manpower required, and to train to meet future fleet requirements. Additional objectives are to reduce downstream attrition and to improve the basis for pipeline selection. With the implementation of the Expanded Primary Flight Training Phase, the T-34B Aircraft and the instructional syllabus utilized in the present Primary Flight Training Phase will be replaced with the T-34C Aircraft and a significantly modified instructional syllabus.

The present Primary Flight Training Phase is of six weeks in duration and consists of two flight stages: Pre-solo and Precision-Acrobatic, nineteen flights for a total of twenty-six flight hours. In the Expanded Primary Flight Training Phase, training will include not only the present primary flight instruction (Pre-solo and Precision-Acrobatic) but will provide training in instruments, navigation, formation and night familiarization flight which is now part of Basic Flight Training. Planned duration of the Expanded Primary Flight Training Phase is seventeen weeks. It will consist of six flight stages and 42 flights for a total of 64.5 flight hours. Included in the seventeen weeks will be the Ground Support (Academic and Flight Support) Training to provide the basic knowledges and skills necessary to progress through the Primary Flight Training. The Expanded Primary Flight Training syllabus, utilizing the T-34C Aircraft, will have the capability of supporting the six flight stages. It will permit the movement of costly flight instructional hours from basic and advanced flight phases into the less expensive Expanded Primary Flight Training Phase; allow the basic attrition process to be moved to primary; and provide for a much more valid basis for student pipeline selection. Summary of the proposed Expanded Primary Flight Training Phase is as follows:

| STAGE | NO. OF FLTS. | TOTAL HRS. |
|---|---|---|
| Familiarization | 18 | 25.2 |
| Basic Instruments | 8 | 12.6 |
| Radio Instruments | 8 | 14.6 |
| Formation | 4 | 6.0 |
| Night Familiarization | 3 | 4.1 |
| Operational Navigation | 1 | 2.0 |
| | 42 | 64.5 |

A Training Situation Analysis is defined by OPNAVINST 1500.39 as "An analytic procedure for determining the nature of the tasks to be accomplished in work performance and classifying these tasks in a framework of frequency, difficulty, and criticality. The results of the analysis form the basis for recommendations for training device concepts and functional characteristics." The Chief of Naval Education and Training Support (CNETS) identifying the task as CNETS Task 52-73, requested the Naval Training Equipment Center to perform a comprehensive Training Situation Analysis for the Expanded Primary Phase, which on completion, would establish precisely the simulation and training media requirements for the phase. To implement the Training Situation Analysis Study, a three-member interdisciplinary team from the Analysis and Design Branch, Systems Engineering Division was established. In addition to the three-member team, specific discipline specialists assisted as necessary throughout the study.

Conduct of the Training Situation Analysis Study for T-34C Expanded Primary Flight Training was based on the key elements indicated in the design illustrated in Figure 2. The initial step was to determine the Terminal Behavioral Objectives of the Expanded Primary Phase. What was the Student Naval Aviator behavioral (performance) requirements at the completion of training in the Expanded Primary Phase? Under what conditions and to what standards will the job performance occur? Upon determination of the Terminal Behavioral Objectives, in coordination with CNATRA representatives, the next step within the context of a Task Analysis and using analytical procedures, the Specific Behavioral Objectives and supporting Enabling Behavioral Objectives were formulated and identified; domains and levels were assigned, using Bloom's (et al) Taxonomy of Educational Objectives. Concurrently with this effort,

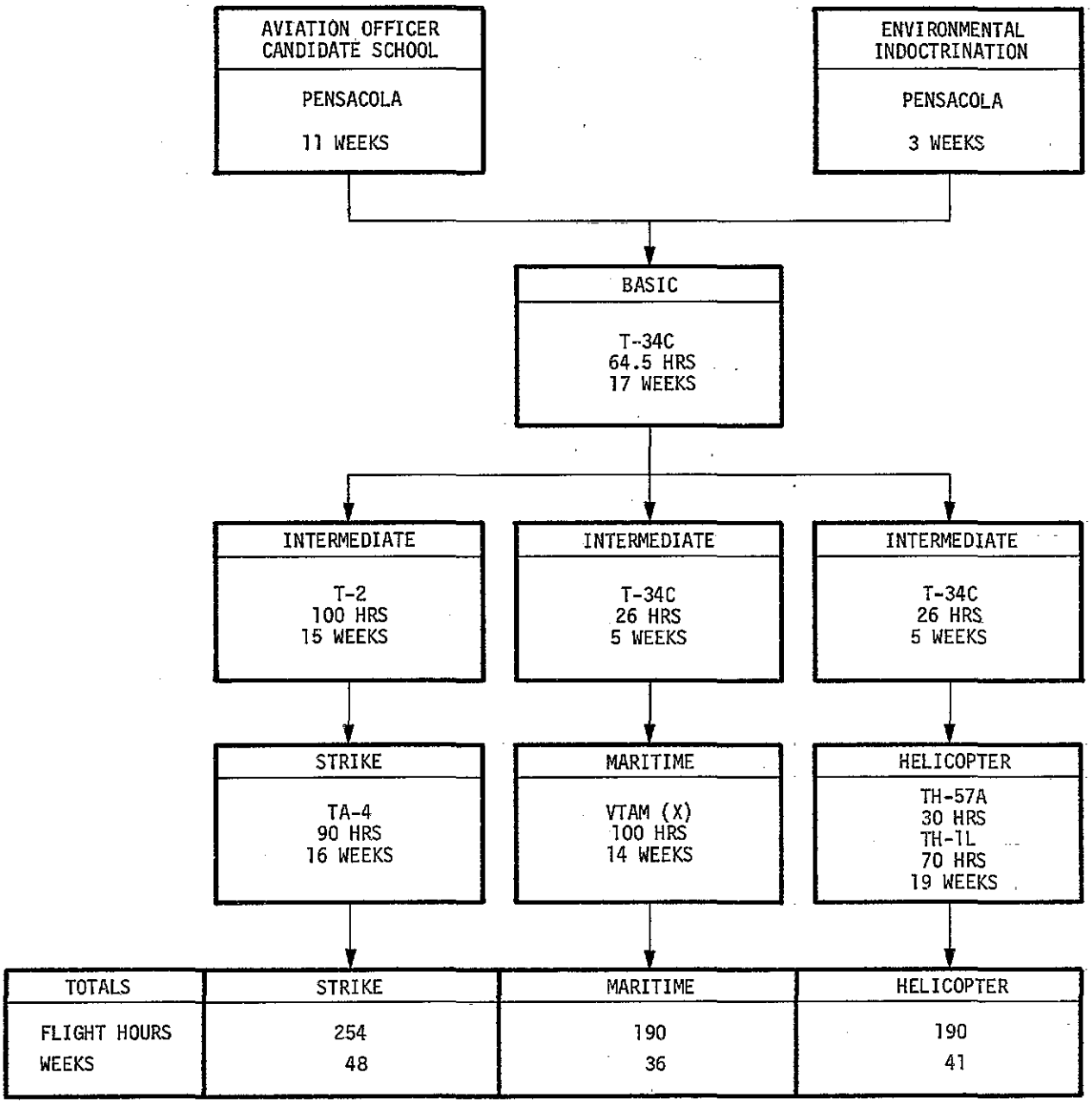


Figure 1. Long Range Pilot Training System

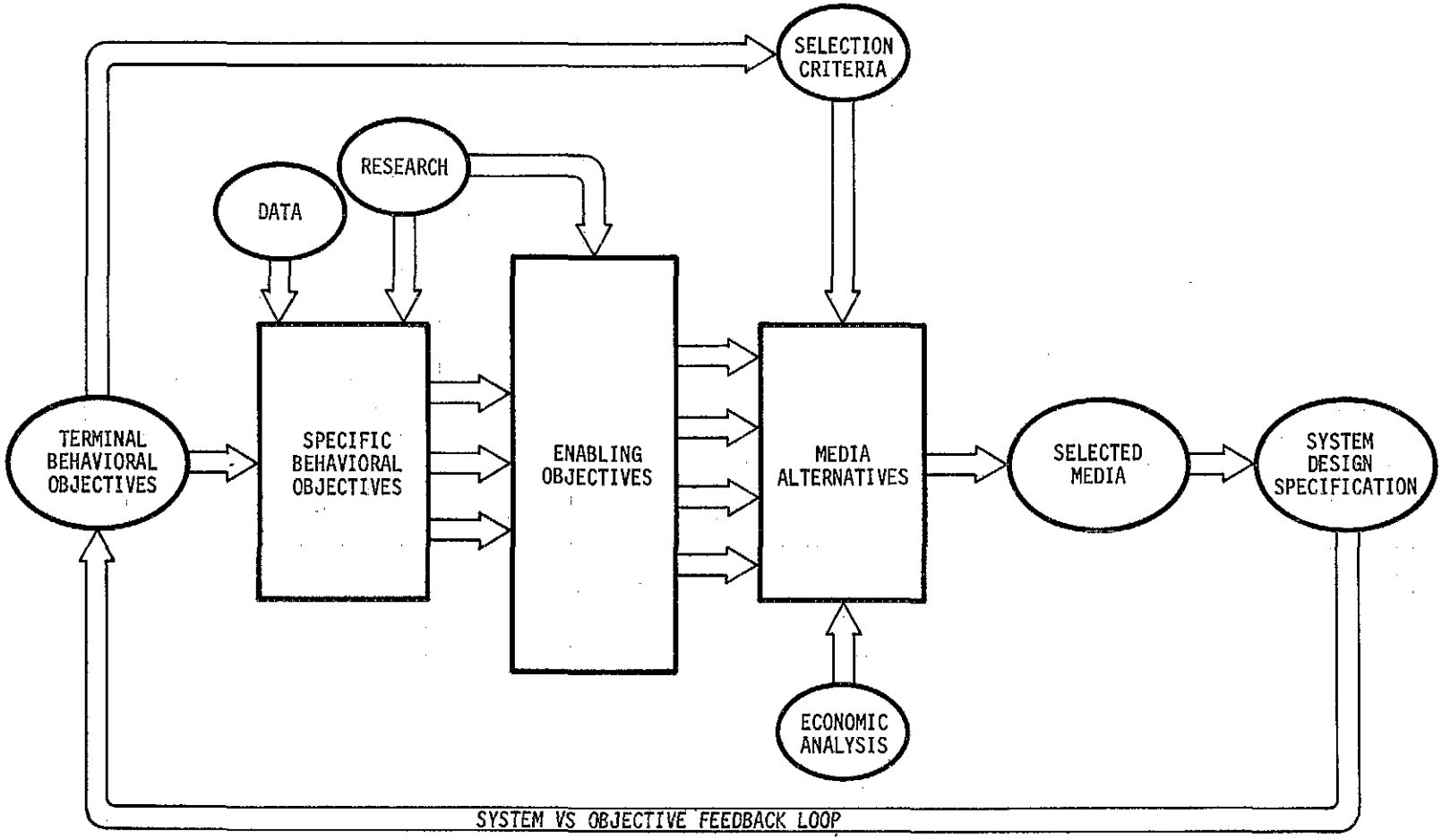


Figure 2. Training Situation Analysis Design

required data was collected, current educational material was analyzed, and current military and civilian training of pilots was investigated. All related pertinent information was utilized and incorporated in the development of the behavioral objectives.

Specific Behavioral Objectives and Enabling Behavioral Objectives were formulated and identified for the T-34C Expanded Primary Ground Support Training (Academic and Flight Support) and Flight Training. Through an analytical and evolutionary process, each Specific Behavioral Objective was validated that a requirement existed for each one and that each was supportive of the other, and that there was a logical progression of Specific Behavioral Objectives from Academics Training to Flight Support Training or Flight Support Training to Flight Training, or any combination thereof, which resulted in the achievement of the Terminal Behavioral Objectives. The building block approach to the acquisition of the cognitive and psychomotor skills on a cumulative basis lends itself to, and reinforces the systems-approach-to-training concept.

The next step within the Training Situation Analysis Design was the selection process for media alternatives. Tasks were classified in general categories, by level of difficulty, frequency, and similarity; after analysis and refinements, logical major task categories were established. Within major task categories, sub-categories of tasks were identified. These sub-categories were helpful in the process of task grouping. Task grouping in correlation with the Specific Behavioral Objectives evolved into compatible areas from which media alternatives were identified. The same type of process was utilized for the selection of both alternative training and simulation media. With the alternative media identified, a limited economic analysis was performed for each of the media to determine the most cost-effective media. Each of the alternative media was assumed to be equally training effective.

The final step in the Training Situation Analysis Design was the formulation and development of the training system design concept, to provide an optimum training program to achieve the Terminal Behavioral requirements of the T-34C Expanded Primary Flight Training Phase. Central to the optimum training system design concept is a recommended optimum training sequence. The sequence was developed after analysis of the pre-requisite knowledge and skills required in order to progress in the training program. Primarily, the sequence is keyed to the Student Naval Aviator having acquired the required knowledge and skills prior to a specific training flight in the aircraft. The sequence allows maximum effective use of the training and simulation media in the learning situation, and is supportive of the systems-approach-to-training concept.

Implementation for the conduct of the Training Situation Analysis Study was accomplished in the five phases listed below. It should be noted that the phases and the occurrence of events in a phase were not necessarily sequential, but on many occasions were concurrent.

PHASE I - was the investigation of the present Navy Primary and Basic Flight Training programs; collection of all relevant data; and determination of the Terminal Behavioral Objectives requirements for the Student Naval Aviator at the completion of the T-34C Expanded Primary Flight Training Phase.

PHASE II - was the performance of the task description and analysis, in terms of behavioral objectives and skill and knowledge training requirements.

PHASE III - was the determination and selection of simulation and training media, and simulation and instructional media optimum/alternatives to provide optimum training support based on a systems-approach-to-training concept.

PHASE IV - was the performance of an economic analysis to determine the most training-effective/cost-effective simulation/training media.

PHASE V - was the preparation and submission of the T-34C Expanded Primary Flight Training Phase Training Situation Analysis Study Report.

*The Training Situation Analysis* was conducted under external established guidelines which consisted of the following:

1. 64.5 flight hours for the proposed T-34C Expanded Primary Flight Training Phase were fixed and no recommendations, pro or con, were to be made.

2. T-34C Expanded Primary Flight Training Phase was seventeen weeks in duration.

3. Wide Angle Visual Simulation was not to be considered or recommended.

4. Student input to the primary flight would be 2300 per year. Average weekly input would be 46 per week, 50 weeks per year.

5. Training to be based on the individual instruction concept.

6. Training Situation Analysis would support the systems-approach-to-training concept.

7. Bloom (et al), Taxonomy of Educational Objectives, would be utilized in the analysis of behaviors.

Figure 2, the Training Situation Analysis Design, previously discussed, presented an overview of the requirements for the conduct of a Training Situation Analysis. In the actual conduct of the Training Situation Analysis Study for T-34C Expanded Primary Flight Training, many detailed procedures were used. These procedures are illustrated in Figure 3. Due to the confines of this paper, no elaboration of the detailed procedures reflected in Figure 3 is made. A complete explanation is contained in NAVTRAEQUIPCEN Report IH-238.

Through the procedures illustrated in Figure 3 and the analytical process utilized throughout the Training Situation Analysis, seven types of alternative training media were identified, each equally meeting the criteria of supporting the individualized instruction concept. Training media, obviously not cost-effective, were rejected and not considered. The selected training media alternatives are:

1. Media No. 1, Programmed Instruction Test, Print (Linear) with Adjunct Material and Equipment.

2. Media No. 2, Programmed Instruction Text, Print (Branching) with Adjunct Material and Equipment.

3. Media No. 3, Programmed Instruction (Linear) Microform Reader with Adjunct Material and Equipment.

4. Media No. 4, Programmed Instruction (Branching) Microform Reader with Adjunct Material and Equipment.

5. Media No. 5, Teaching Machine (Linear), with Adjunct Material and Equipment.

6. Media No. 6, Teaching Machine (Branching), with Adjunct Material and Equipment.

7. Media No. 7, Computer-Aided Instruction, with Adjunct Material and Equipment.

Each of the identified training media is a multi-media mix utilizing a form of programmed instruction and supportive material and equipment, which would be housed in an appropriate carrel. Based on the Economic Analysis performed on all the training media alternatives, Media No. 3, Programmed Instruction (Linear) Microform Reader with Adjunct Material and Equipment appeared as the most cost-effective and was selected as the primary training media.

Figure 4 illustrates the procedures and matrix which was utilized in the simulation media selection process. Three alternative simulation media were identified:

1. Media No. 1, a complex of four simulators using a building block approach, based on the systems-approach-to-training concept.

   a. SCAN Trainer

   b. Cockpit Procedures Trainer (CPT)

   c. Basic Flight Trainer (BFT)

   d. Flight Instrument Trainer (FIT)

2. Media No. 2, a combination of the SCAN Trainer and an Operational Flight Trainer. The Operational Flight Trainer to replace the Cockpit Procedures Trainer, Basic Flight Trainer and Flight Instrument Trainer in 1. above.

3. Media No. 3, utilized the T-34C Aircraft, eliminated all simulation media and assigned the simulator hours (40) to the aircraft.

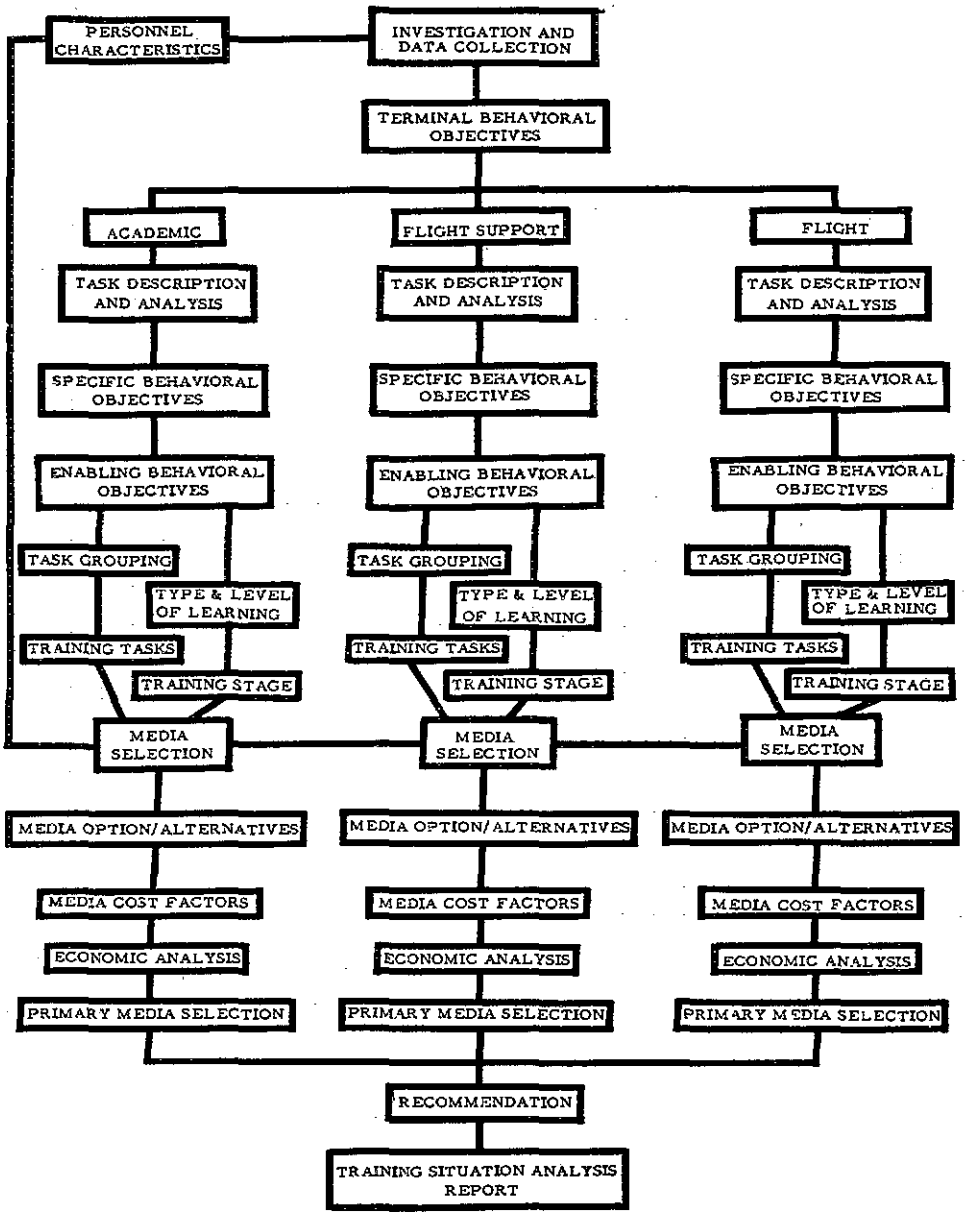


Figure 3. TSA Procedures

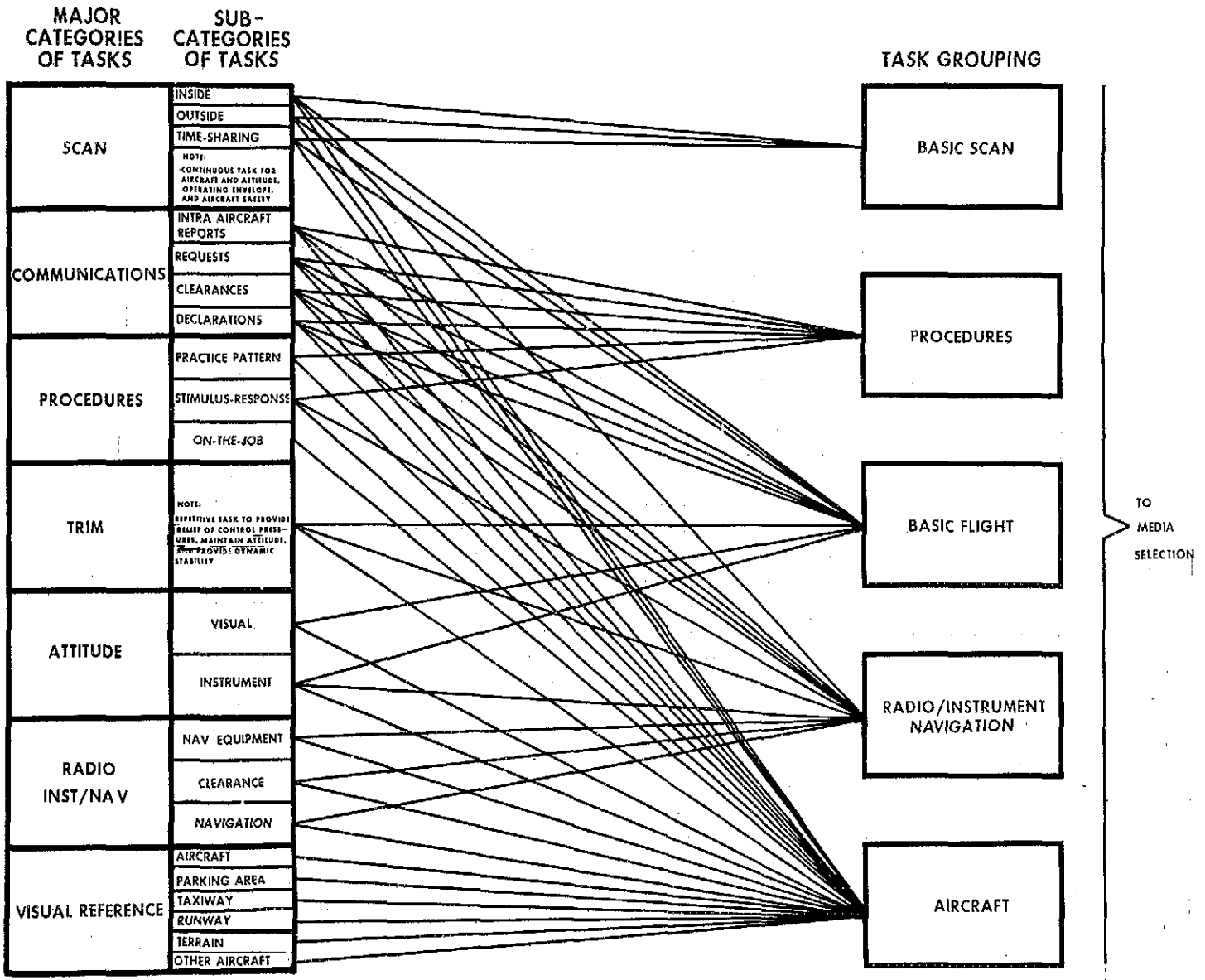


Figure 4. Procedure Leading To Media Selection

Media No. 1, a complex of four simulators identified above, was selected as the primary simulation media, based on the analytical process and procedures illustrated in Figure 4. The selected simulation media is based on the task groupings and the achievement of the Specific Behavioral Objectives each group supports. Each identified simulator is a step in a four-step building block training approach and supports the systems-approach-to-training concept.

The training capabilities of each of the four simulators are:

Scan Trainer - which will meet the training requirements to train the Student Naval Aviator in the effective use of the eyes in performing pilot tasks. The trainer has the capability of providing training in eye accommodation exercises, speed reading of the flight instruments, and eye exercises to improve peripheral vision. The final training provided is time-sharing, which requires the Student Naval Aviator to speed read the instruments, make control movements to maintain desired flight attitude and at the same time, detect intruders which enter his field of vision. The pilot scan skill acquired by the Student Naval Aviator in the trainer will be applicable to pilot tasks throughout the Naval Aviator's career. As a minimum, because of improved scan capability, it will make the Student Naval Aviator a safe pilot.

Cockpit Procedures Trainer - which will meet the training requirements to train the Student Naval Aviator in orientation of and familiarization with the T-34C cockpit, performance of checklists, normal procedures, communications procedures, and emergency procedures. The procedures learned in the Cockpit Procedures Trainer will provide the necessary procedural skills which are directly translated into the T-34C Aircraft. The final skill level in the practice of emergency procedures is achieved by training in the Cockpit Procedures Trainer, since only a limited number are simulated in T-34C Flight Training due to safety considerations. In support of the individualized training concept, the Cockpit Procedures Trainer has the capability of being operated without the instructor being present.

Basic Flight Trainer - which will meet the training requirements to train the Student Naval Aviator in the maintenance of visual and instrument flight attitude, use of trim and its relationship to aircraft performance, use and interpretation of the basic instruments, and scan reinforcement. It will be capable of supporting training in two modes - visual and instrument. In the visual mode, the Basic Flight Trainer will be surrounded by a movable screen, which has a simple scene or a horizon identifier, that will permit the Student Naval Aviator to control the aircraft nose attitude by an external visual reference. During basic instrument training the screen is removed or the cockpit enclosure is covered with an opaque cover, and the Basic Flight Trainer becomes an instrument attitude trainer. In either mode, reinforcement training is provided in the Scan pattern. The Basic Flight Trainer also continues reinforcement training in communication procedures and some checklist procedures.

Flight Instrument Trainer - which will meet the training requirements to train the Student Naval Aviator in operation and use of electronic navigational aids, instrument flight procedures, enroute planning, and instrument scan, trim, basic instruments, communication procedures, and limited emergency procedures.

A critical element in selection of simulation media, in order to provide optimum training support, is the sequence in which the simulators will be used. The training effectiveness of the selected simulation media will be diminished or nullified entirely by the incorrect utilization sequence (too late or too early). The recommended simulator training sequence and instructional hours utilization of the simulators was incorporated as part of the optimum training sequence and included in the T-34C Training System Design.

Based on the results of the Training Situation Analysis Study for T-34C Expanded Primary Flight Training, it was recommended that the primary training media to be utilized in Ground Support Training (Academics and Flight Support) instructional program is Programmed Instruction, Linear Text, using Microform Readers, with Support Materials and Equipment. It is recommended that the

instructional program be incorporated within a Learning Center concept. The Learning Center concept meets the requirements for the Training System Design proposed by the Training Situation Analysis in that the learning environment is student oriented, supports the individualized instruction (self-pacing) and systems-approach-to-training concept. Physically, the Learning Center is housed in a facility which has within it the appropriately equipped carrels, devices, materials and equipment to support instruction based on the primary training media.

It was recommended that the primary simulation media to be utilized in Ground Support Training (Flight Support) was the complex of four devices (Scan Trainer, Cockpit Procedures Trainer, Basic Flight Trainer, and Flight Instrument Trainer). The four devices, correctly utilized, will significantly contribute to the achievement of the student behavioral objective requirements. The results of the Training Situation Analysis indicated that the complex of four devices is the most cost-effective training approach and are supportive of the systems-approach-to-training concept.

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