

REPORT NO. DOT-TSC-OST-74-14. IIC

**AUTOMATION APPLICATIONS  
IN AN ADVANCED AIR TRAFFIC  
MANAGEMENT SYSTEM**

**Volume IIC: Functional Analysis of Air Traffic Management  
(Cont'd)**

F. Mertes  
L. Jenney  
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AUGUST 1974

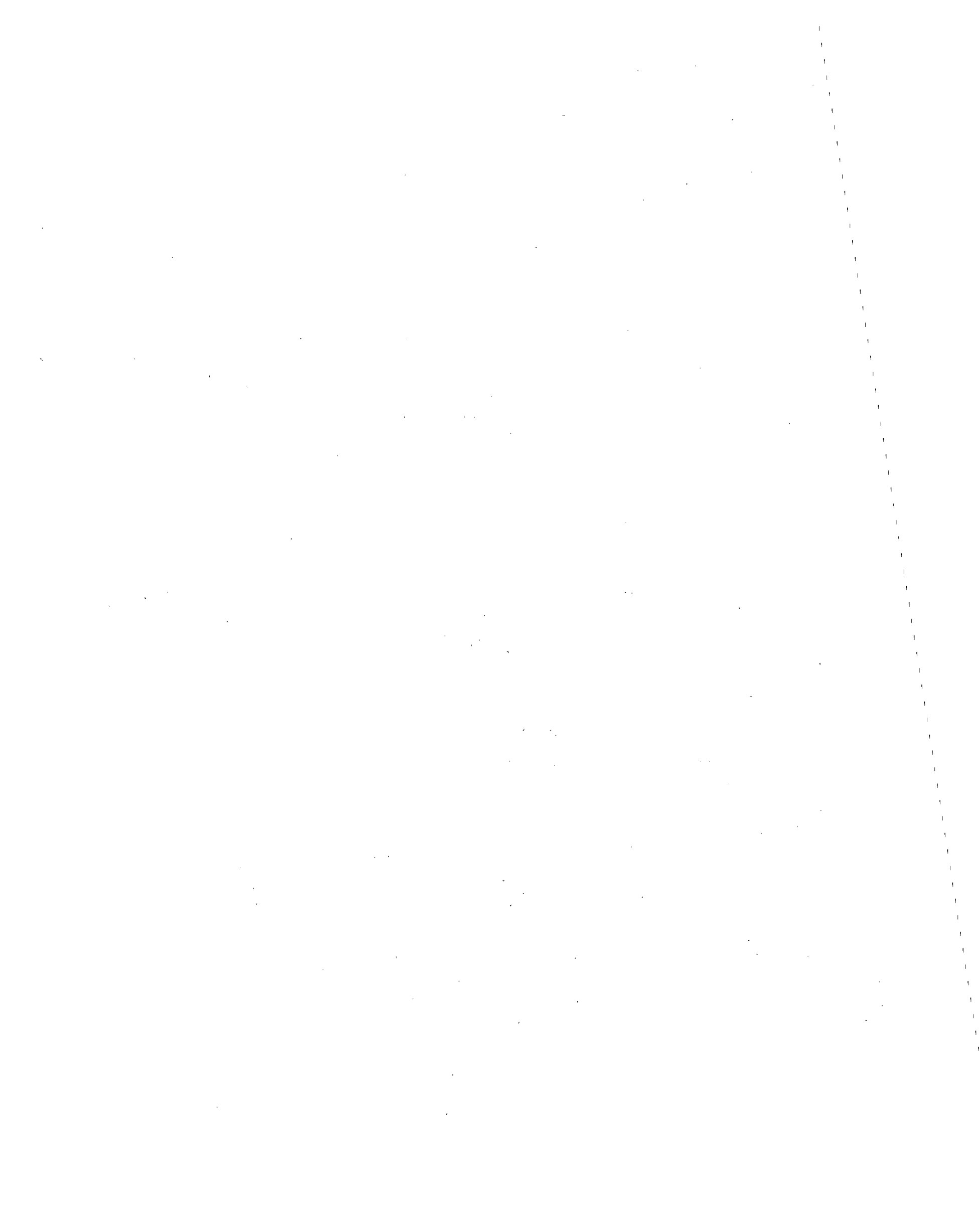
FINAL REPORT

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VIRGINIA 22151

Prepared for  
**U.S. DEPARTMENT OF TRANSPORTATION**  
OFFICE OF THE SECRETARY  
Office of the Assistant Secretary  
for Systems Development and Technology  
Office of Systems Engineering  
Washington DC 20590



1. Report No. DOT-TSC-OST-74-14. IIC		2. Government Accession No.		3. Basic Report Number <b>PB 236 804</b>	
4. Title and Subtitle AUTOMATION APPLICATIONS IN AN ADVANCED AIR TRAFFIC MANAGEMENT SYSTEM Volume IIC-- Functional Analysis of Air Traffic Management (Cont'd)				5. Report Date August 1974	
				6. Performing Organization Code	
7. Author(s) F. Mertes, L. Jenney, R. Jones				8. Performing Organization Report No. DOT-TSC-OST-74-14. IIC	
9. Performing Organization Name and Address TRW Incorporated Westgate Research Park 7600 Colshire Drive McLean VA 22101				10. Work Unit No. (TRAIS) PPA OS404 R4509	
				11. Contract or Grant No. DOT-TSC-512-2C	
12. Sponsoring Agency Name and Address U.S. Department of Transportation Office of the Secretary Office of the Ass't. Sec. for Sys. Dev. & Tech. Office of Systems Engineering Washington DC 20590				13. Type of Report and Period Covered Final Report Nov. 72 to Jan. 74	
				14. Sponsoring Agency Code	
15. Supplementary Notes Under contract to: U.S. Department of Transportation Transportation Systems Center Kendall Square Cambridge MA 02142					
16. Abstract <p>The Advanced Air Traffic Management System (AATMS) program is a long-range investigation of new concepts and techniques for controlling air traffic and providing services to the growing number of commercial, military, and general aviation users of the national airspace. This study of the applications of automation was undertaken as part of the AATMS program. The purposes were to specify and describe the desirable extent of automation in AATMS, to estimate the requirements for man and machine resources associated with such a degree of automation, and to examine the prospective employment of humans and automata as air traffic management is converted from a labor-intensive to a machine-intensive activity.</p> <p>Volume II contains the analysis and description of air traffic management activities at three levels of detail - functions, sub-functions, and tasks. A total of 265 tasks are identified and described, and the flow of information inputs and outputs among the tasks is specified.</p> <p style="text-align: center;"><b>PRICES SUBJECT TO CHANGE</b></p>					
17. Key Words Automation, Air Traffic Control, Human Factors, Computers, Computer Architecture, Man-Machine Interface, Advanced ATC System, Manpower Requirements, Failure Analysis				18. Distribution Statement  DOCUMENT IS AVAILABLE TO THE PUBLIC THROUGH THE NATIONAL TECHNICAL INFORMATION SERVICE, SPRINGFIELD, VIRGINIA 22151.	
19. Security Classif. (of this report) Unclassified			20. Security Classif. (of this page) Unclassified		

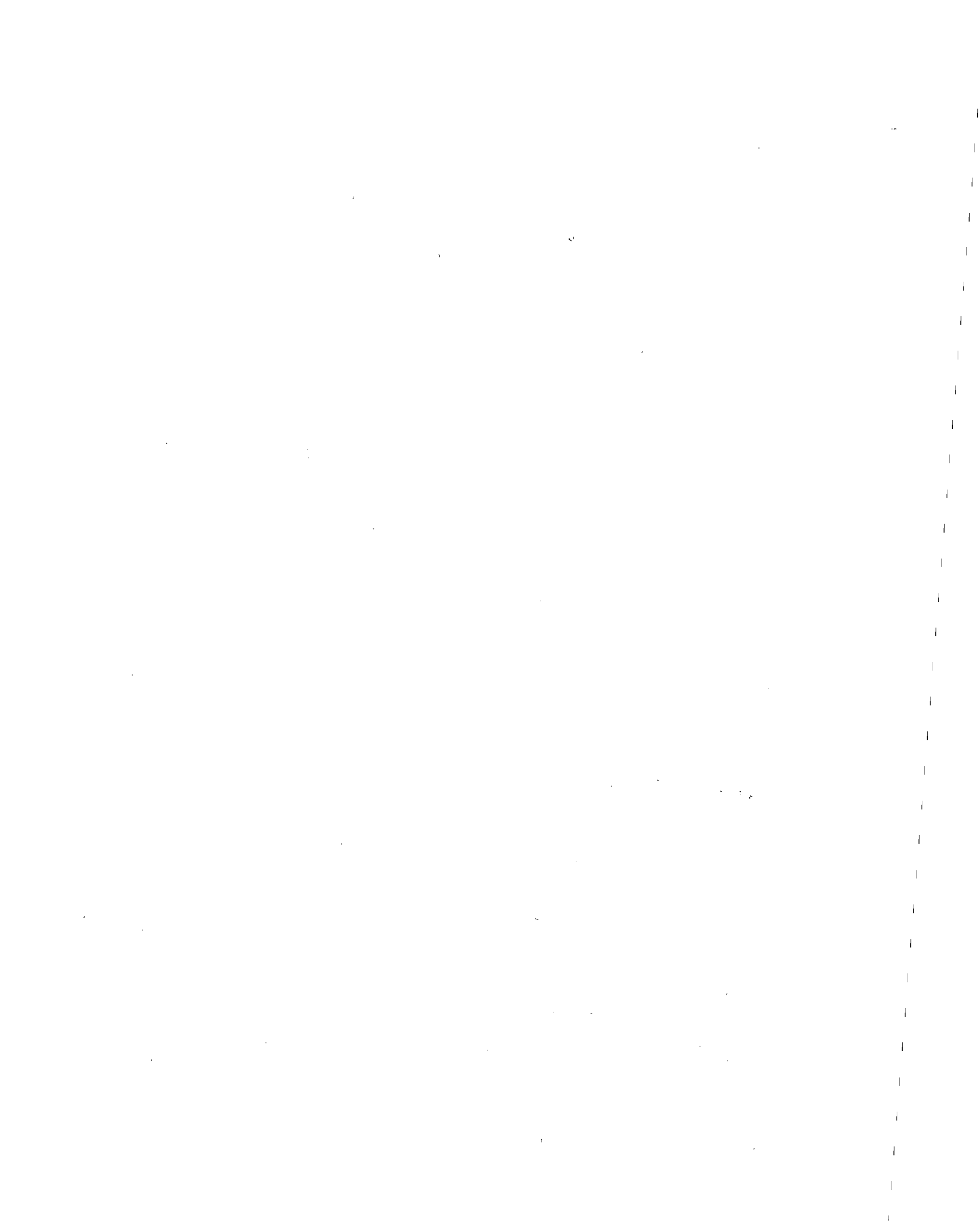


## PREFACE

This is the third of four books which together contain a detailed function analysis of air traffic management. The four books represent Volume II of a five-volume report describing work performed during Phase B of the Automation Applications Study for an Advanced Air Traffic Management System sponsored by the Transportation Systems Center of the Department of Transportation.

The first book describes the methodology employed and contains a description of the 17 generic air traffic management functions. It contains also detailed descriptions of the subfunctions and tasks of Functions 1-4. The second book contains detailed descriptions of the subfunctions and tasks of Functions 5-8. The third book contains similar material for Functions 9-13 and the final book contains similar material for Functions 12-17.

Preface and reference material for the entire Volume can be found in the front of Volume IIA. The Table of Contents, List of Figures and List of Tables for this book follows.



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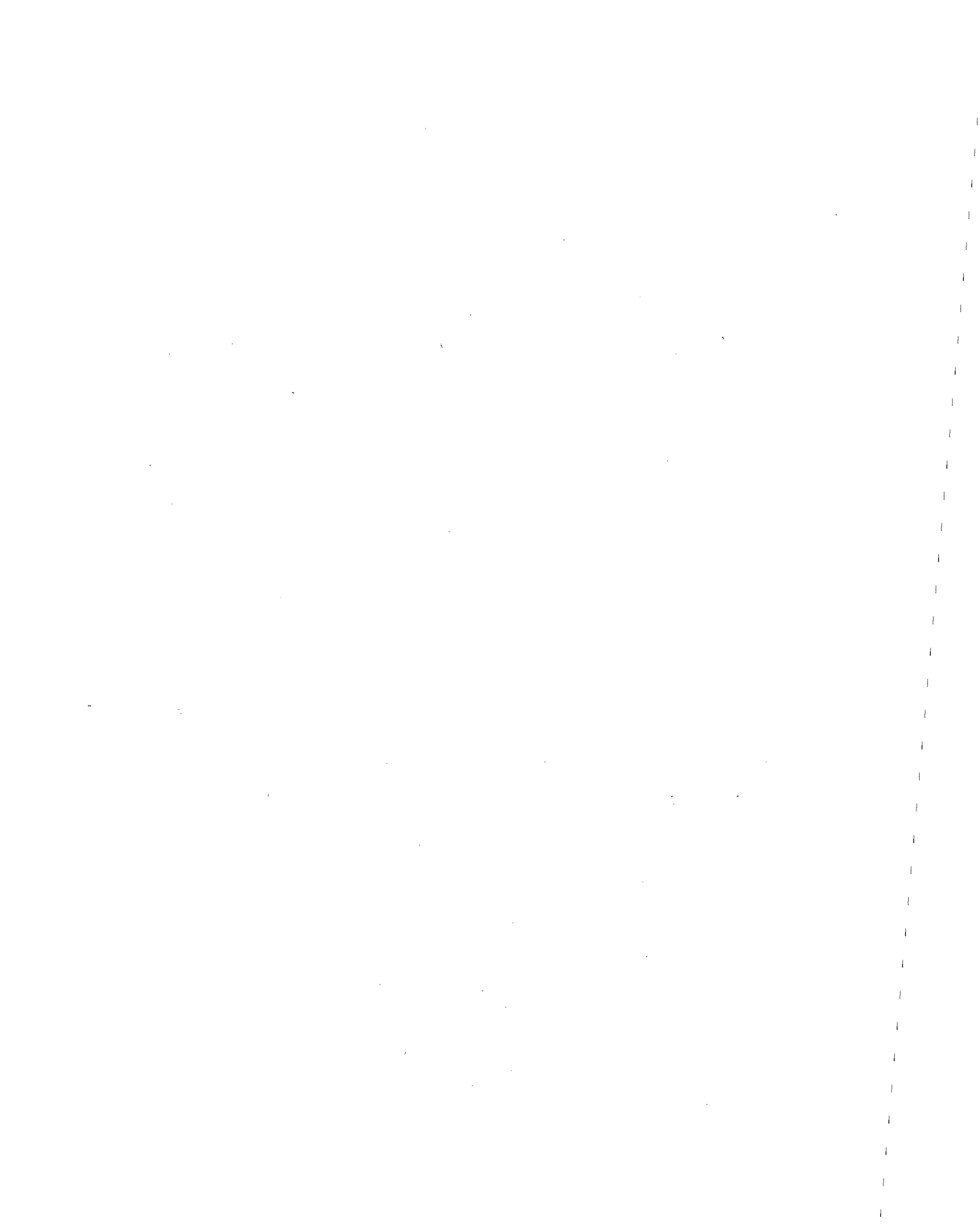
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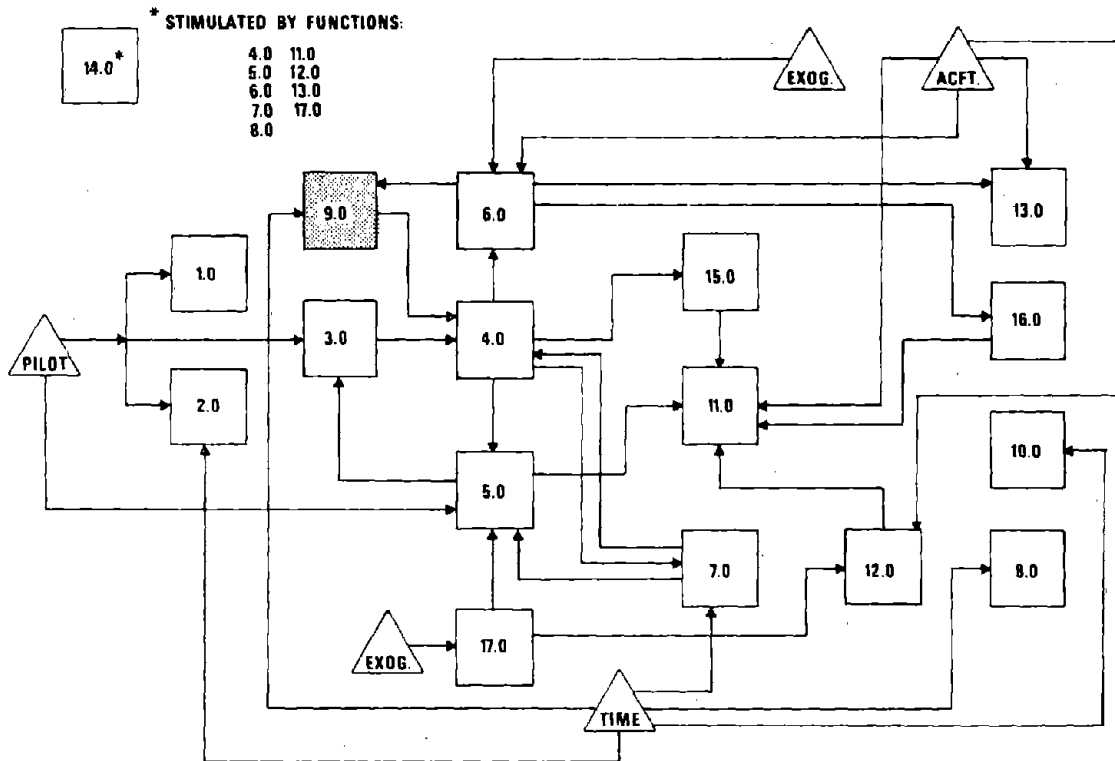
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## FUNCTION 9.0: CONTROL SPACING OF AIRCRAFT



- 1.0: PROVIDE FLIGHT PLANNING INFORMATION
- 2.0: CONTROL TRAFFIC FLOW
- 3.0: PREPARE FLIGHT PLAN
- 4.0: PROCESS FLIGHT PLAN
- 5.0: ISSUE CLEARANCES AND CLEARANCE CHANGES
- 6.0: MONITOR AIRCRAFT PROGRESS
- 7.0: MAINTAIN CONFORMANCE WITH FLIGHT PLAN
- 8.0: ASSURE SEPARATION OF AIRCRAFT
- 9.0: CONTROL SPACING OF AIRCRAFT
- 10.0: PROVIDE AIRBORNE, LANDING AND GROUND NAVIGATION CAPABILITY
- 11.0: PROVIDE AIRCRAFT GUIDANCE
- 12.0: ISSUE FLIGHT ADVISORIES AND INSTRUCTIONS
- 13.0: HANDOFF
- 14.0: MAINTAIN SYSTEM RECORDS
- 15.0: PROVIDE ANCILLARY AND SPECIAL SERVICES
- 16.0: PROVIDE EMERGENCY SERVICES
- 17.0: MAINTAIN SYSTEM CAPABILITY AND STATUS INFORMATION

9.0 CONTROL SPACING OF AIRCRAFT

9.1 Maintain Predicted Arrival/Departure Schedule for Each Airport

- 9.1.1 Determine identity and ETA of arriving aircraft
- 9.1.2 Determine identity and ETD of departing aircraft
- 9.1.3 List arriving and departing aircraft and ETA/ETD

9.2 Determine Requirement for Spacing Control

- 9.2.1 Determine airport capacity
- 9.2.2 Analyze predicted schedule for alternating periods of excess demand and slack

9.3 Establish Runway Configuration Schedule

- 9.3.1 Analyze temporal distribution of arrivals and departures
- 9.3.2 Allocate blocks of time for arrivals and departures

9.4 Determine Most Efficient Arrival and Departure Sequence/  
Schedule for Runway

- 9.4.1 Compare predicted arrival and departure times with runway schedule
- 9.4.2 Change ETA's and ETD's to be compatible with runway schedule

9.5 Initiate Implementation of Sequence/Schedule

- 9.5.1 Select sequence/schedule change to be implemented
- 9.5.2 Hypothesize performance change required to implement desired sequence/schedule
- 9.5.3 Check proposed performance change for predicted conflict
- 9.5.4 Assess control implications of performance required to implement sequence/schedule change
- 9.5.5 Submit performance changes within existing flight plan to clearance function
- 9.5.6 Propose revised flight plan to implement sequence/schedule change
- 9.5.7 Submit revised flight plan for approval

SUBFUNCTION DESCRIPTION

FILE: 9.1

SUBFUNCTION: Maintain Predicted Arrival/Departure Schedule for Each Airport

FUNCTION: Control Spacing of Aircraft

OUTPUTS: List of arriving and departing aircraft by ETA/ETD

DESCRIPTION:

Purpose: To determine the identity and expected time of arrival of all aircraft at each airport

Stimulus: Time-stimulated

Tasks:

- (1) Determine identity and ETA of arriving aircraft
- (2) Determine identity and ETD of departing aircraft
- (3) List arriving and departing aircraft by ETA/ETD

Critical Performance Parameters:

- (1) Timeliness
- (2) Accuracy

Allocation Sensitivities:

INPUTS:

- (1) From Subfunction 6.3, Predict Future Positions ETA's of the Aircraft:
  - Predicted long-range time-position profile
- (2) From Subfunction 4.4, Determine Responsibility for Control and Communication:
  - Accepted flight plan
- (3) From exogenous source:
  - Time stimulus
- (4) From Subfunction 5.1, Check Clearance Status:
  - Request approach

TASK DESCRIPTION

FILE: 9.1.1

TASK: Determine Identity and ETA\* of Arriving Aircraft

SUBFUNCTION: Maintain Predicted Arrival/Departure Schedule for Each Airport

FUNCTION: Control Spacing of Aircraft

OUTPUTS: Identity and ETA of arriving aircraft

DESCRIPTION:

Purpose: To determine the identity and expected time of arrival of all aircraft at each airport

Stimulus: Time-stimulated

Decisions and Actions:

- (1) Retrieve predicted flight profiles
- (2) Determine identity of arriving aircraft
- (3) Determine ETA of aircraft

Phase of Flight:

Not applicable

Critical Performance Parameters:

- (1) Timeliness
- (2) Accuracy

Performance Capabilities Required:

- (1) Storing and retrieving information:
  - Selective retrieval/recall
- (2) Information processing:
  - Analysis

Allocation Sensitivities:

External Constraints:

\* ETA - estimated time of arrival

- INPUTS:
- (1) From Task 6.3.3, Compute Long-Range Extrapolations:
    - Predicted long-range time-position profile for the aircraft
  - (2) From Task 5.1.3, Determine Pilot Intentions Following Missed Approach:
    - Request approach
  - (3) From Exogenous Source:
    - Time stimulus

TASK DESCRIPTION

FILE: 9.1.2

TASK: Determine Identity and ETD\* of Departing Aircraft

SUBFUNCTION: Maintain Predicted Arrival/Departure Schedule for Each Airport

FUNCTION: Control Spacing of Aircraft

OUTPUTS: Identity and ETD of departing aircraft

DESCRIPTION:

Purpose: To determine the identity and expected time of departure of all aircraft at each airport

Stimulus: Time-stimulated

Decisions and Actions:

- (1) Retrieve approved flight plans
- (2) Determine identity of departing aircraft
- (3) Determine ETD of aircraft

Phase of Flight:

Not applicable

Critical Performance Parameters:

- (1) Timeliness
- (2) Accuracy

Performance Capabilities Required:

- (1) Storing and retrieving information:
  - Selective retrieval/recall
- (2) Information processing:
  - Analysis

Allocation Sensitivities:

External Constraints:

\* ETD - estimated time of departure

- INPUTS:
- (1) From Task 4.4.1, Receive and Enter Pilot's Response:
    - Accepted flight plan
  - (2) From Exogenous Source:
    - Time Stimulus

TASK DESCRIPTION

FILE: 9.1.3

TASK: List Arriving and Departing Aircraft by ETA/ETD

SUBFUNCTION: Maintain Predicted Arrival/Departure Schedule for each Airport

FUNCTION: Control Spacing of Aircraft

OUTPUTS: List of arriving and departing aircraft by ETA/ETD

DESCRIPTION:

Purpose: To compile a list of arriving and departing aircraft ordered by the ETA/ETD of the aircraft

Stimulus: Event-stimulated by determinations of aircraft ETA's and ETD's

Decisions and Actions:

- (1) Retrieve aircraft identities and ETA's
- (2) Retrieve aircraft identities and ETD's
- (3) Compile list of aircraft arriving and departing by ETA/ETD

Phase of Flight:

Not applicable

Critical Performance Parameters:

- (1) Timeliness
- (2) Accuracy

Performance Capabilities Required:

- (1) Storing and retrieving information:
  - Selective retrieval/recall
- (2) Information processing:
  - Sorting

Allocation Sensitivities:



External Constraints:

- INPUTS:
- (1) From Task 9.1.1, Determine Identity and ETA of Arriving Aircraft:
    - Identity and ETA of arriving aircraft
  - (2) From Task 9.1.2, Determine Identity and ETD of Departing Aircraft:
    - Identity and ETD of departing aircraft

SUBFUNCTION DESCRIPTION

FILE: 9.2

SUBFUNCTION: Determine Requirement for Spacing Control

FUNCTION: Control Spacing of Aircraft

- OUTPUTS:
- (1) Acceptable distribution
  - (2) Alternating periods of excess demand and slack

DESCRIPTION:

Purpose: To determine the traffic rate that the airport can accommodate and to detect alternating periods of excess demand and slack in predicted schedules

Stimulus: Time-stimulated and event-stimulated by additions to the predicted arrival/departure schedule

- Tasks:
- (1) Determine airport capacity
  - (2) Analyze predicted schedule for alternating periods of excess demand and slack

Critical Performance Parameters:

- (1) Timeliness
- (2) Accuracy
- (3) Validity

Allocation Sensitivities:

- INPUTS:
- (1) From Subfunction 17.1, Determine Current and Forecast Weather:
    - Stored weather sequences
    - Stored weather forecast
  - (2) From Subfunction 17.8, Determine Capability and Status of Ground Facilities:
    - Stored data base items (ground facilities status)
  - (3) From exogenous source:
    - Baseline capability
    - Time stimulus
    - Criteria of excess demand and slack

(4) From Subfunction 9.1, Maintain Predicted Arrival/  
Departure Schedule for Each Airport:

- List of arriving and departing aircraft by ETA/  
ETD

TASK DESCRIPTION

FILE: 9.2.1  
TASK: Determine Airport Capacity  
SUBFUNCTION: Determine Requirement for Spacing Control  
FUNCTION: Control Spacing of Aircraft

OUTPUTS: Airport capacity

DESCRIPTION:

Purpose: To determine the traffic rate that the airport can accommodate at the present time based on its base-line traffic rate, the weather, and the status of the ground facilities

Stimulus: Time-stimulated

Decisions and Actions:

- (1) Determine effects of weather on baseline capacity
- (2) Determine effects of the status of the ground facilities on the baseline capacity
- (3) Determine present capacity of airport

Phase of Flight:

Not applicable

Critical Performance Parameters:

- (1) Timeliness
- (2) Accuracy
- (3) Validity

Performance Capabilities Required:

- (1) Decision making:
  - Induction/inference/deduction
- (2) Information processing:
  - Analysis
- (3) Interpreting:
  - Association

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 17.1.8, Store Weather Information:
    - Stored weather sequences
    - Stored weather forecasts
  - (2) From Task 17.8.5, Store Data Base Items:
    - Stored data base items (ground facilities status)
  - (3) From exogenous source:
    - Baseline traffic capacity
    - Time stimulus

TASK DESCRIPTION

FILE: 9.2.2

TASK: Analyze Predicted Schedule for Alternating Periods of Excess Demand and Slack

SUBFUNCTION: Determine Requirement for Spacing Control

FUNCTION: Control Spacing of Aircraft

- OUTPUTS:
- (1) Alternating periods of excess demand and slack
  - (2) Acceptable distribution (spacing not required)

DESCRIPTION:

Purpose: To determine if there are alternating periods of excess demand and slack in the predicted schedule of arrivals and departures

Stimulus: Event-stimulated by additions to the predicted arrival/ departure schedule

Decisions and Actions:

- (1) Determine time period to be analyzed
- (2) Determine if these are periods of excessive demand
- (3) Determine if there are periods of slack

Phase of Flight:

Not applicable

Critical Performance Parameters:

- (1) Timeliness
- (2) Accuracy

Performance Capabilities Required:

- (1) Information processing:
  - Analysis
- (2) Interpreting:
  - Classification
- (3) Decision making:
  - Probability/contingency estimation

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 9.1.3, List Arriving and Departing Aircraft by ETA/ETD:
    - List of arriving and departing aircraft by ETA/ETD
  - (2) From exogenous source:
    - Criteria of excess demand and slack
  - (3) From Task 9.2.1, Determine Airport Capacity:
    - Airport capacity

SUBFUNCTION DESCRIPTION

FILE: 9.3

SUBFUNCTION: Establish Runway Configuration Schedule

FUNCTION: Control Spacing of Aircraft

OUTPUTS: Runway configuration schedule

DESCRIPTION:

Purpose: To analyze the temporal distribution of arrivals and departing and to allocate blocks of time for arrivals and departures

Stimulus: Event-stimulated by the determination of periods of excess demand and slack

Tasks:

- (1) Analyze temporal distribution of arrivals and departures
- (2) Allocate blocks of time for arrivals and departures

Critical Performance Parameters:

- (1) Timeliness
- (2) Accuracy

Allocation Sensitivities:

INPUTS:

- (1) From Subfunction 17.1, Determine Current and Forecast Weather:
  - Stored weather forecasts
  - Stored weather sequences
- (2) From Subfunction 17.8, Determine Capability and Status of Ground Facilities:
  - Stored data base items (ground facilities status)
- (3) From Subfunction 9.2, Determine Requirements for Spacing Control:
  - Alternate periods of excess demand and slack



- (4) From Subfunction 9.1, Maintain Predicted Arrival/Departure Schedule for Each Airport:
- List of arriving and departing aircraft by ETA/ETD

TASK DESCRIPTION

FILE: 9.3.1

TASK: Analyze Temporal Distribution of Arrivals and Departures

SUBFUNCTION: Establish Runway Configuration Schedule

FUNCTION: Control Spacing of Aircraft

OUTPUTS: Distribution of arrivals and departures

DESCRIPTION:

Purpose: To analyze the temporal distribution of arrivals and departures

Stimulus: Event-stimulated by the determination of periods of excess demand and slack

Decisions and Actions:

- (1) Determine number of arrivals and departures in various periods of time
- (2) Determine ratio of arrivals and departures in the periods of time

Phase of Flight:

Not applicable

Critical Performance Parameters:

- (1) Timeliness
- (2) Accuracy

Performance Capabilities Required:

- (1) Information processing:
  - Analysis
- (2) Interpreting:
  - Classification

Allocation Sensitivities:

External Constraints:

INPUTS:

- (1) From Task 9.1.3, List Arriving and Departing Aircraft by ETA/ETD:
  - List of arriving and departing aircraft by ETA/ETD
- (2) From Task 9.2.3, Analyze Predicted Schedule For Alternating Periods of Excess Demand and Slack:
  - Alternating periods of excess demand and slack

TASK DESCRIPTION

FILE: 9.3.2

TASK: Allocate Blocks of Time For Arrivals and Departures

SUBFUNCTION: Establish Runway Configuration Schedule

FUNCTION: Control Spacing of Aircraft

OUTPUTS: Runway configuration schedule

DESCRIPTION:

Purpose: To allocate blocks of time for arrivals and departures

Stimulus: Event-stimulated by receipt of the analysis of arrivals and departures

Decisions and Actions:

Determine allocation of blocks of time for arrivals and departures

Phase of Flight:

Not applicable

Critical Performance Parameters:

(1) Timeliness

(2) Accuracy

Performance Capabilities Required:

(1) Decision making:

- Induction/inference/deduction

(2) Interpreting:

- Classification

Allocation Sensitivities:

External Constraints:

INPUTS: (1) From Task 9.3.1, Analyze Temporal Distribution of Arrivals and Departures:

- Distribution of arrivals and departures

(2) From Task 17.8.5, Store Data Base Items:

- Stored data base items (ground facilities status)

(3) From Task 17.1.8, Store Weather Information:

- Stored weather sequences
- Stored weather forecasts

SUBFUNCTION DESCRIPTION

FILE: 9.4

SUBFUNCTION: Determine Most Efficient Arrival and Departure Sequence/  
Schedule for Runway

FUNCTION: Control Spacing of Aircraft

OUTPUTS: (1) No ETA/ETD changes required  
(2) Changed ETA's and ETD's

DESCRIPTION:

Purpose: To assure compatibility with runway schedule by making necessary changes in ETA's and ETD's of arriving and departing aircraft

Stimulus: Event-stimulated by receipt of list of arriving and departing aircraft

Tasks: (1) Compare predicted arrival and departure times with runway schedule  
(2) Change ETA's and ETD's to be compatible with runway schedule

Critical Performance Parameters:

- (1) Timeliness
- (2) Accuracy
- (3) Validity

Allocation Sensitivities:

INPUTS: (1) From Subfunction 9.1, Maintain Predicted Arrival/Departure Schedule for Each Aircraft:  
● List of arriving and departing aircraft by ETA/ETD

(2) From Subfunction 9.3, Establish Runway Configuration Schedule:  
● Runway configuration schedule

(3) From Subfunction 17.9, Maintain User Class Information:  
● Stored user class data base items

(4) From Subfunction 17.2, Update Rules and Procedures Information:

- Stored data base item (rules and procedures - minimum allowable separation)

TASK DESCRIPTION

FILE: 9.4.1

TASK: Compare Predicted Arrival and Departure Times With Runway Schedule

SUBFUNCTION: Determine Most Efficient Arrival and Departure Sequence/  
Schedule for Runway

FUNCTION: Control Spacing of Aircraft

- OUTPUTS: (1) Arrivals occurring during departure blocks  
(2) Departures occurring during arrival blocks

DESCRIPTION:

Purpose: To compare the times of the predicted arrivals and departures with the times allocated for arrivals and departures in the runway schedule

Stimulus: Event-stimulated by receipt of the list of arriving and departing aircraft

Decisions and Actions:

- (1) Compare each predicted arrival and departure with the runway schedule
- (2) Flag those predicted arrivals and/or departures which are not compatible with the runway schedule

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Timeliness
- (2) Accuracy

Performance Capabilities Required:

- (1) Decision making:
  - Comparison with standard
- (2) Information processing:
  - Sorting
- (3) Storing and retrieving information:
  - Selective retrieval/recall



Allocations Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 9.1.3, List Arriving and Departing Aircraft by ETA/ETD:
    - List of arriving and departing aircraft by ETA/ETD
  - (2) From Task 9.3.2, Allocate Blocks of Time for Arrivals and Departures:
    - Runway configuration schedule

TASK DESCRIPTION

FILE: 9.4.2

TASK: Change ETA's and ETD's To Be Compatible With Runway Schedule

SUBFUNCTION: Determine Most Efficient Arrival and Departure Sequence/  
Schedule for Runway

FUNCTION: Control Spacing of Aircraft

- OUTPUTS:
- (1) Changed ETA's and ETD's
  - (2) No ETA/ETD changes required

DESCRIPTION:

Purpose: To make changes in the ETA's and ETD's of the arriving and departing aircraft so there will be compatibility with the runway schedule

Stimulus: Event-stimulated by receipt of the comparison of the predicted arrivals and departures with the runway schedule

Decisions and Actions:

- (1) Identify predicted ETA's and ETD's which are not compatible with runway schedule
- (2) Determine ETA and ETD changes which will not be in conflict with runway schedule
- (3) Determine if changes are practical
- (4) Make changes to ETA's and ETD's

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Timeliness
- (2) Validity

Performance Capabilities Required:

- (1) Decision making:
  - Comparison with a standard
  - Induction/inference/deduction

(2) Responding:

- Communication/data transmission

(3) Information processing:

- Encoding/recoding

Allocation Sensitivities:

External Constraints:

INPUTS:

(1) From Task 9.4.1, Compare Predicted Arrival and Departure Times With Runway Schedules:

- Departures occurring during arrival blocks
- Arrivals occurring during departure blocks

(2) From Task 17.9.6, Store User Class Data Base Items:

- Stored user class data base items

(3) From Task 17.2.6, Store Data Base Item:

- Stored data base item (rules and procedures - minimum allowable separation)

SUBFUNCTION DESCRIPTION

FILE: 9.5

SUBFUNCTION: Initiate Implementation of Sequence/Schedule

FUNCTION: Control Spacing of Aircraft

- OUTPUTS:
- (1) Proposed revised flight plan
  - (2) Performance necessary to implement sequence change

DESCRIPTION:

Purpose: To select and check performance sequence/schedule changes to determine performance changes within existing flight plan or propose and revise flight plan

Stimulus: Event-stimulated by receipt of changed ETA's and ETD's

- Tasks:
- (1) Select sequence/schedule change to be implemented
  - (2) Hypothesize performance change required to implement desired sequence/schedule
  - (3) Check proposed performance change for predicted conflicts
  - (4) Assess control implications of performance required to implement sequence/schedule change
  - (5) Submit performance changes within existing flight plan
  - (6) Propose revised flight plan to implement sequence/schedule change
  - (7) Submit revised flight plan for approval

Critical Performance Parameters:

- (1) Timeliness
- (2) Accuracy
- (3) Validity

Allocation Sensitivities:

- INPUTS:
- (1) From Subfunction 9.4, Determine Most Efficient Arrival and Departure Sequence/Schedule for Runway:
    - Changed ETA's and ETD's

- (2) From Subfunction 4.2, Review Flight Plan:
  - Priority of the proposed flight plan
- (3) From Subfunction 17.2, Update Rules and Procedures Information:
  - Data base items (rules and procedures - minimum allowable separation)
- (4) From Subfunction 17.9, Maintain User Class and Aircraft Performance Capabilities Information:
  - Stored user class data base item
- (5) From Subfunction 6.3, Predict Future Positions/ETA's of the Aircraft:
  - Predicted short-range time-position profiles
  - Predicted long-range time-position profiles
- (6) From Subfunction 2.2, Determine System Demand:
  - Terminal/jurisdictional total demand as a function of time
- (7) From Subfunction 5.2, Determine Clearance to be Issued:
  - Flight plan tolerances
- (8) From Subfunction 4.4, Determine Responsibility for Control and Communication:
  - Accepted flight plan
- (9) From Subfunction 6.4, Determine Aircraft Capability and Status:
  - Current aircraft capabilities

TASK DESCRIPTION

FILE: 9.5.1

TASK: Select Sequence/Schedule Change to be Implemented

SUBFUNCTION: Initiate Implementation of Sequence/Schedule

FUNCTION: Control Spacing of Aircraft

OUTPUTS: Sequence/schedule change to be implemented

DESCRIPTION:

Purpose: To select the sequence/schedule change which should now be implemented

Stimulus: Event-stimulated by the receipt of changed ETA's and ETD's

Decisions and Actions:

- (1) Determine changes which have the least amount of time to be implemented
- (2) Select changes to be implemented

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Timeliness
- (2) Validity

Performance Capability Required:

- (1) Decision making:
  - Comparison of alternatives
  - Selection/choice
- (2) Interpreting:
  - Association
- (3) Information processing:
  - Filtering

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 9.4.2, Change ETA's and ETD's To Be Compatible With Runway Schedule:
    - Changed ETA's and ETD's
  - (2) From Task 4.2.9, Determine Flight Plan Priority:
    - Priority of the proposed flight plans
  - (3) From Task 17.2.6, Store Data Base Items:
    - Stored data base items (rules and procedures)
  - (4) From Task 17.9.6, Store User Class Data Base Items:
    - Stored user class data base items (aircraft capabilities, compiled by type of aircraft)

TASK DESCRIPTION

FILE: 9.5.2

TASK: Hypothesize Performance Change Required To Implement Desired Sequence Schedule

SUBFUNCTION: Initiate Implementation of Sequence/Schedule

FUNCTION: Control Spacing of Aircraft

- OUTPUTS:
- (1) Control point for implementing change
  - (2) Required actions to implement change

DESCRIPTION:

Purpose: To hypothesize the performance change which would be required to implement the selected sequence/schedule change

Stimulus: Event-stimulated by the selection of a sequence/schedule change to be implemented

Decisions and Actions:

- (1) Determine the kind of performance change
- (2) Determine the control point for implementing the change
- (3) Determine the required actions to implement the change

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Timeliness
- (2) Accuracy

Performance Capabilities Required:

- (1) Decision making:
  - Hypothesis formulation
  - Induction/inference/deduction
- (2) Interpreting:
  - Association



(3) Information processing:

- Analysis

INPUTS:

(1) From Task 9.5.1, Select Sequence/Schedule Change to be Implemented:

- Sequence/schedule change to be implemented

(2) From Task 9.5.3, Check Proposed Performance Change For Predicted Conflicts:

- Conflicts predicted

TASK DESCRIPTION

FILE: 9.5.3

TASK: Check Proposed Performance Change for Predicted Conflicts

SUBFUNCTION: Initiate Implementation of Sequence/Schedule

FUNCTION: Control Spacing of Aircraft

- OUTPUTS:
- (1) No conflicts predicted
  - (2) Conflict(s) predicted

DESCRIPTION:

Purpose: To determine if the hypothesized performance change is conflict free

Stimulus: Event-stimulated by receipt of a tentative performance change

Decisions and Actions:

- (1) Develop time-position profile for hypothesized performance change
- (2) Determine identity of aircraft to be checked for conflict
- (3) Check other time-position profile for a conflict with the hypothesized performance

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Timeliness
- (2) Accuracy

Performance Capabilities Required:

- (1) Information processing:
  - Calculation
- (2) Interpreting:
  - Association
  - Prediction

(3) Decision making:

- Hypothesis formulation

(4) Storing and retrieving information:

- Selective retrieval/recall

Allocation Sensitivities:

External Constraints:

INPUTS:

(1) From Task 9.5.2, Hypothesize Performance Change Required to Implement Desired Sequence/Schedule:

- Control point for implementing change
- Required actions to implement change

(2) From Task 6.3.3, Compute Long-Range Extrapolation:

- Predicted long-range time-position profiles for the aircraft

(3) From Task 6.3.2, Compute Short-Range Extrapolations:

- Predicted short-range time-position profiles for the aircraft

TASK DESCRIPTION

FILE: 9.5.4

TASK: Assess Control Implications of Performance Required to Implement Sequence/Schedule Change

SUBFUNCTION: Initiate Implementation of Sequence/Schedule

FUNCTION: Control Spacing of Aircraft

- OUTPUTS:
- (1) Performance requires clearance within existing flight plan
  - (2) Performance requires flight plan change

DESCRIPTION:

Purpose: To determine if the performance change requires a flight plan change or falls within the existing flight plan

Stimulus: Event-stimulated by the determination that no conflicts exist with the proposed performance change

Decisions and Actions:

- (1) Determine if performance change takes aircraft outside of its flight plan tolerances
- (2) If so, determine if aircraft will remain outside of the tolerance
- (3) Determine if clearance change or flight plan change is required

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Timeliness
- (2) Accuracy

Performance Capabilities Required:

- (1) Decision making:
  - Comparison with a standard
  - Induction/inference/deduction
- (2) Information processing:
  - Analysis

(3) Interpreting:

- Prediction

(4) Storing and retrieving information:

- Selective retrieval/recall

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 9.5.3, Check Proposed Performance Change for Predicted Conflicts:
    - No conflicts predicted
  - (2) From Task 2.2.4, Determine Total Jurisdiction/Terminal Demand:
    - Terminal/jurisdiction total demand as a function of time
  - (3) From Task 5.2.2, Determine Clearance Tolerances:
    - Flight plan tolerances
  - (4) From Task 6.4.7, Update Aircraft Capability:
    - Current aircraft capability (includes performance capability and user class)

TASK DESCRIPTION

FILE: 9.5.5

TASK: Submit Performance Changes Within Existing Flight Plan to Clearance Function

SUBFUNCTION: Initiate Implementation of Sequence/Schedule

FUNCTION: Control Spacing of Aircraft

OUTPUTS: Performance necessary to implement sequence change

DESCRIPTION:

Purpose: To transmit to the clearance function, the necessary performance changes required to conform to the revised sequence/schedule

Stimulus: Event-stimulated by receipt of performance changes requiring a clearance within the existing flight plan

Decisions and Actions:

Transmit performance changes to clearance function

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

Timeliness

Performance Capabilities Required:

- (1) Responding:
  - Data transmission
- (2) Information processing:
  - Encoding/recoding

Allocation Sensitivities:

External Constraints:

- INPUTS: (1) From Task 9.5.4, Assess Control Implications of Performance Required to Implement Sequence/Schedule Change:
- Performance requiring clearance within existing flight plan

TASK DESCRIPTION

FILE: 9.5.6

TASK: Propose Revised Flight Plan To Implement Sequence/Schedule Change

SUBFUNCTION: Initiate Implementation of Sequence/Schedule

FUNCTION: Control Spacing of Aircraft

OUTPUTS: Proposed revised flight plan

DESCRIPTION:

**Purpose:** To propose a revised flight plan by modifying the existing flight plan to incorporate the performance changes required by the sequence change

**Stimulus:** Event-stimulated by the determination that the performance change requires a flight plan change

**Decisions and Actions:**

- (1) Determine the changes which must be made to the existing flight plan
- (2) Prepare proposed flight plan

**Phase of Flight:**

All phases except preflight and postflight

**Critical Performance Parameters:**

- (1) Timeliness
- (2) Accuracy

**Performance Capabilities Required:**

- (1) Decision making:
  - Induction/inference/deduction
- (2) Information processing:
  - Encoding/decoding
- (3) Interpreting:
  - Classification
- (4) Storing and retrieving information:
  - Selective retrieval/recall

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 9.5.4, Assess Control Implication of Performance Required to Implement Sequence/Schedule Change:
    - Performance requires flight plan change
  - (2) From Task 4.4.1, Receive and Enter Pilot's Response:
    - Accepted flight plan
  - (3) From Task 6.4.7, Update Aircraft Capability:
    - Current aircraft capability (includes performance capability and user class)



TASK DESCRIPTION

FILE: 9.5.7

TASK: Submit Revised Flight Plan for Approval

SUBFUNCTION: Initiate Implementation of Sequence/Schedule

FUNCTION: Control Spacing of Aircraft

OUTPUTS: Proposed revised flight plan

DESCRIPTION:

Purpose: To submit the revised flight plan for approval

Stimulus: Event-stimulated by the preparation of a proposed flight plan

Decisions and Actions:

Transmit revised flight plan to approval function

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

Timeliness

Performance Capabilities Required:

- (1) Responding:
  - Data transmission
- (2) Information processing:
  - Encoding/recoding

Allocation Sensitivities:

External Constraints:

INPUTS: From Task 9.5.6, Propose Revised Flight Plan:

- Proposed revised flight plan

Table 4.9-I: Flow of Information  
Function 9.0: Control Spacing of Aircraft

TASK	INPUTS		OUTPUTS	
	IDENTIFICATION	SOURCE	IDENTIFICATION	DESTIN.
9.1.1	*Time stimulus Predicted long-range time-position profile Request approach	Exog.  5.1.3	Identify and ETA of arriving aircraft	9.1.3
9.1.2	*Time stimulus Accepted flight plan	Exog. 4.4.1	Identify and ETD of departing aircraft	9.1.3
9.1.3	*Identity and ETA of arriving aircraft *Identity and ETD of de- parting aircraft	9.1.1 9.1.2	List of arriving and departing acft by ETA/ETD	9.2.2 9.4.1 9.3.1
9.2.1	*Stored weather sequences Stored weather forecasts Ground facilities status *Time stimulus Baseline capacity	17.1.8 17.1.8 17.8.5 Exog. Exog.	Airport capacity	9.2.2
9.2.2	*List of arriving and de- parting aircraft by ETA/ ETD Airport capacity Criteria for excess demand and slack	9.1.3 9.2.1 Exog.	Distribution of arrivals and departure  Acceptable distribu- tion (Spacing not required)	9.3.2  End
9.3.1	List of arriving and departing aircraft *Alternating periods of excess demand and slack	9.1.3 9.2.1	Distribution of arrivals and departure	9.3.2
9.3.2	Stored weather sequences Stored weather forecasts *Distribution of arrivals and departures Ground facilities status	17.1.8 17.1.8 9.3.1 17.8.5	Runway configuration schedule	9.4.1

\*Task stimulus

Table 4.9-I: Flow of Information  
Function 9.0: Control Spacing of Aircraft (Cont'd.)

TASK	INPUTS		OUTPUTS	
	IDENTIFICATION	SOURCE	IDENTIFICATION	DESTIN.
9.4.1	*List of arriving and departing aircraft by ETA/ETD	9.1.3	Arrivals occurring during departure blocks	9.4.2
	Runway configuration schedule	9.3.2	Departures occurring arrival blocks	9.4.2
9.4.2	*Departures occurring during arrival blocks	9.4.1	Changed ETA's & ETD's	9.5.1
	*Arrivals occurring during departure blocks	9.4.1	No ETA/ETD changes required	End
	User class data	17.9.6		
	Min. allowable separation	17.2.6		
9.5.1	*Changed ETA's and ETD's	9.4.2	Sequence/schedule change to be implemented	9.5.2
	Priority of the proposed flight plans	4.2.9		
	Rules and procedures	17.2.6		
	User class data	17.9.6		
9.5.2	*Sequence/schedule change to be implemented	9.5.1	Control point for implementing change	9.5.3
	Conflicts predicted	9.5.3	Required actions to implement change	9.5.3
9.5.3	Control point for implementation change	9.5.2	No conflicts predicted	9.5.4
	*Required actions to implemented change	9.5.2	Conflicts predicted	9.5.2
	Predicted long-range time position profiles	6.3.3		
	Predicted short-range time position profiles	6.3.2		
9.5.4	*No conflicts predicted	9.5.3	Performance requiring clearance within existing flt plan	9.5.5
	Terminal/jurisdictional total demand as a function of time	2.2.4		
	Flight plan tolerances	5.2.2		
	Current aircraft capabilities	6.4.7		

\*Task stimulus

Table 4.9-I: Flow of Information  
 Function 9.0: Control Spacing of Aircraft (Cont'd.)

TASK	INPUTS		OUTPUTS	
	IDENTIFICATION	SOURCE	IDENTIFICATION	DESTIN.
9.5.5	*Performance requiring clearance within existing flight plan	9.5.4	Performance necessary to implement sequence change	5.2.2
9.5.6	*Performance requiring flt plan change Accepted flight plan Current acft capability	9.5.4 4.4.1 6.4.7	Proposed revised flt plan	9.5.7
9.5.7	*Proposed revised flight plan	9.5.6	Revised flight plan	4.1.1 4.1.2 4.2.1 4.2.2 4.2.3 4.2.4 4.2.5 4.2.7 4.2.9 4.2.10

\*Task stimulus

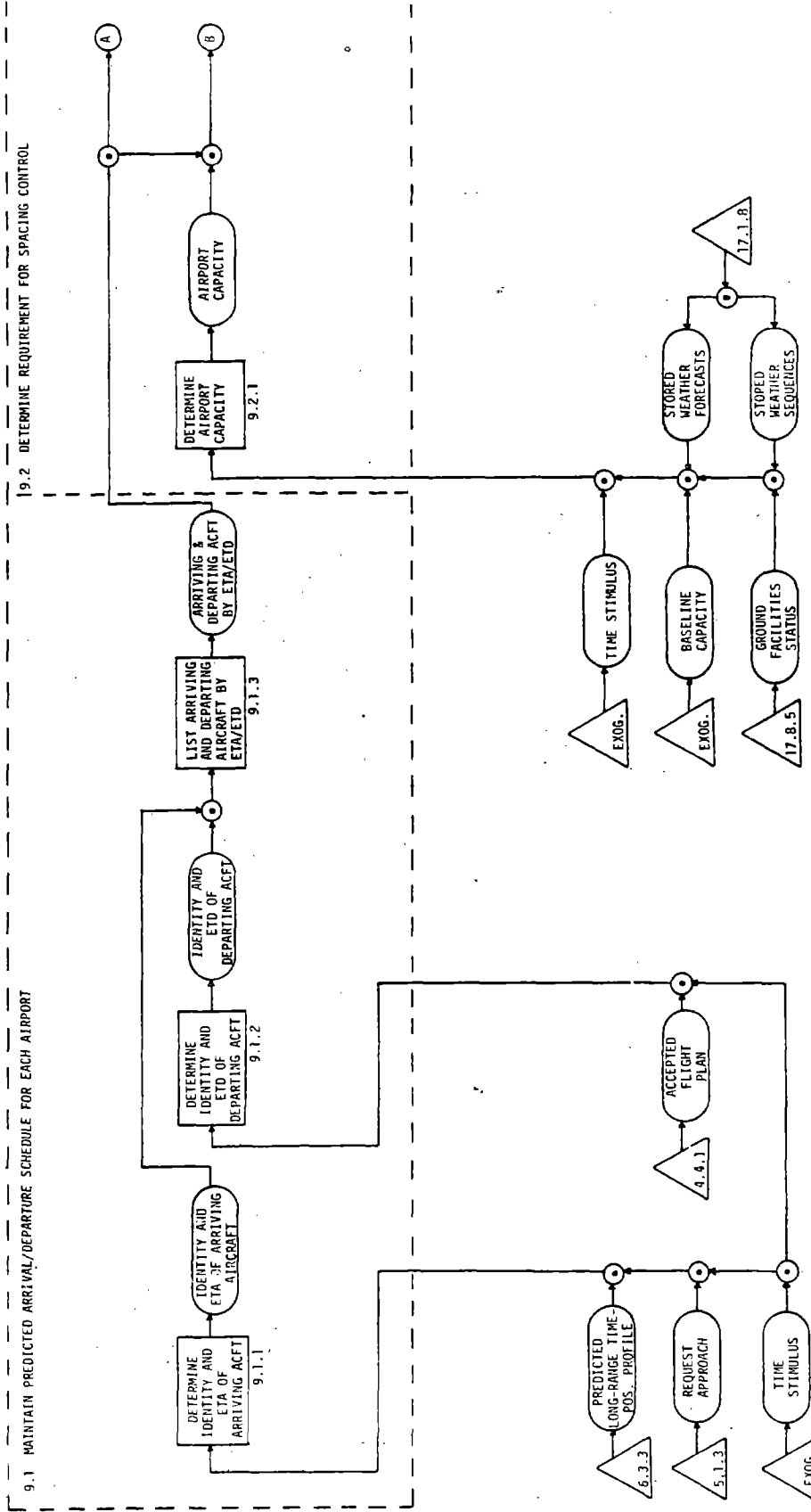
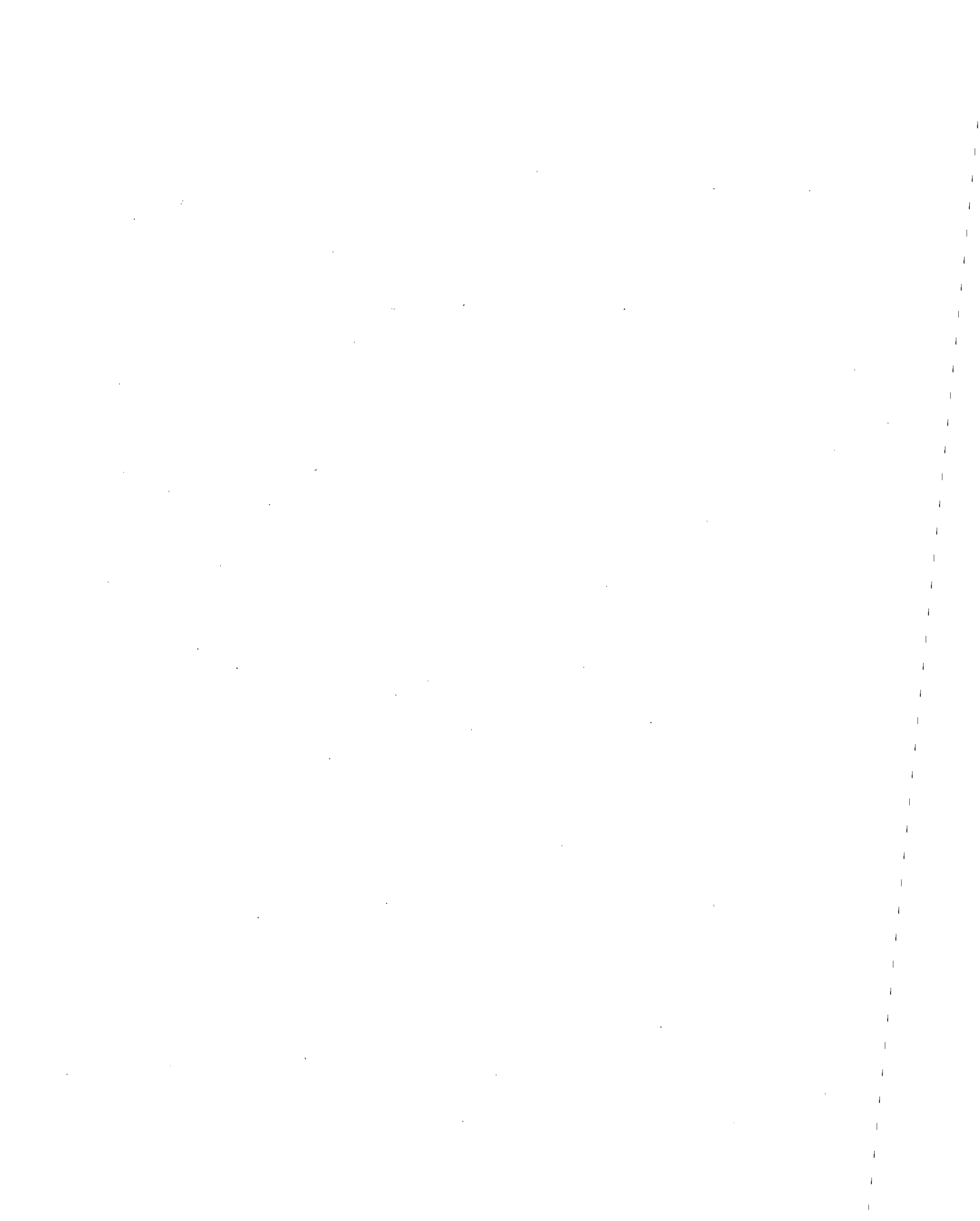


FIGURE 4.9-1. FUNCTION 9.0- CONTROL SPACING OF AIRCRAFT (SHEET 1 OF 4)



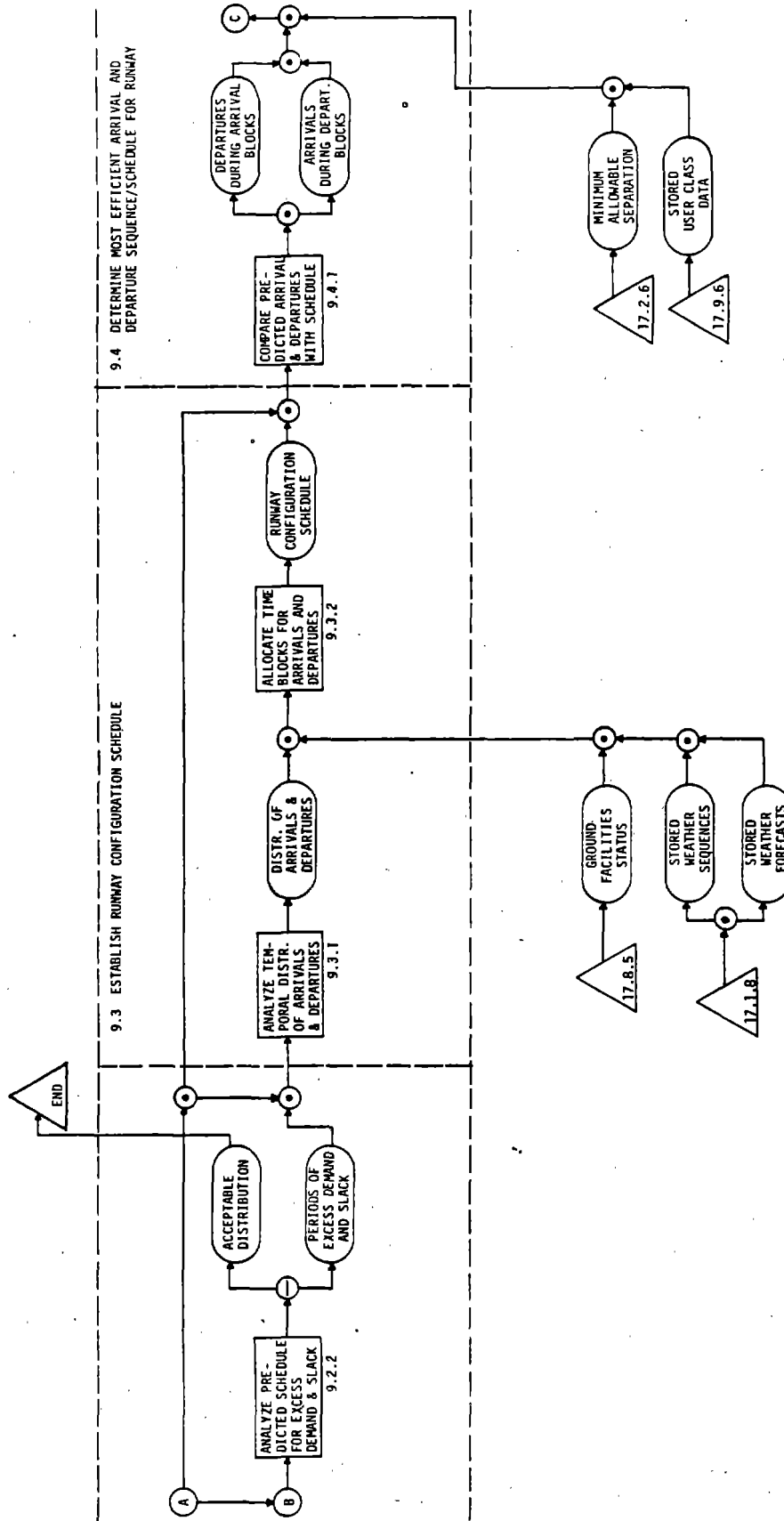
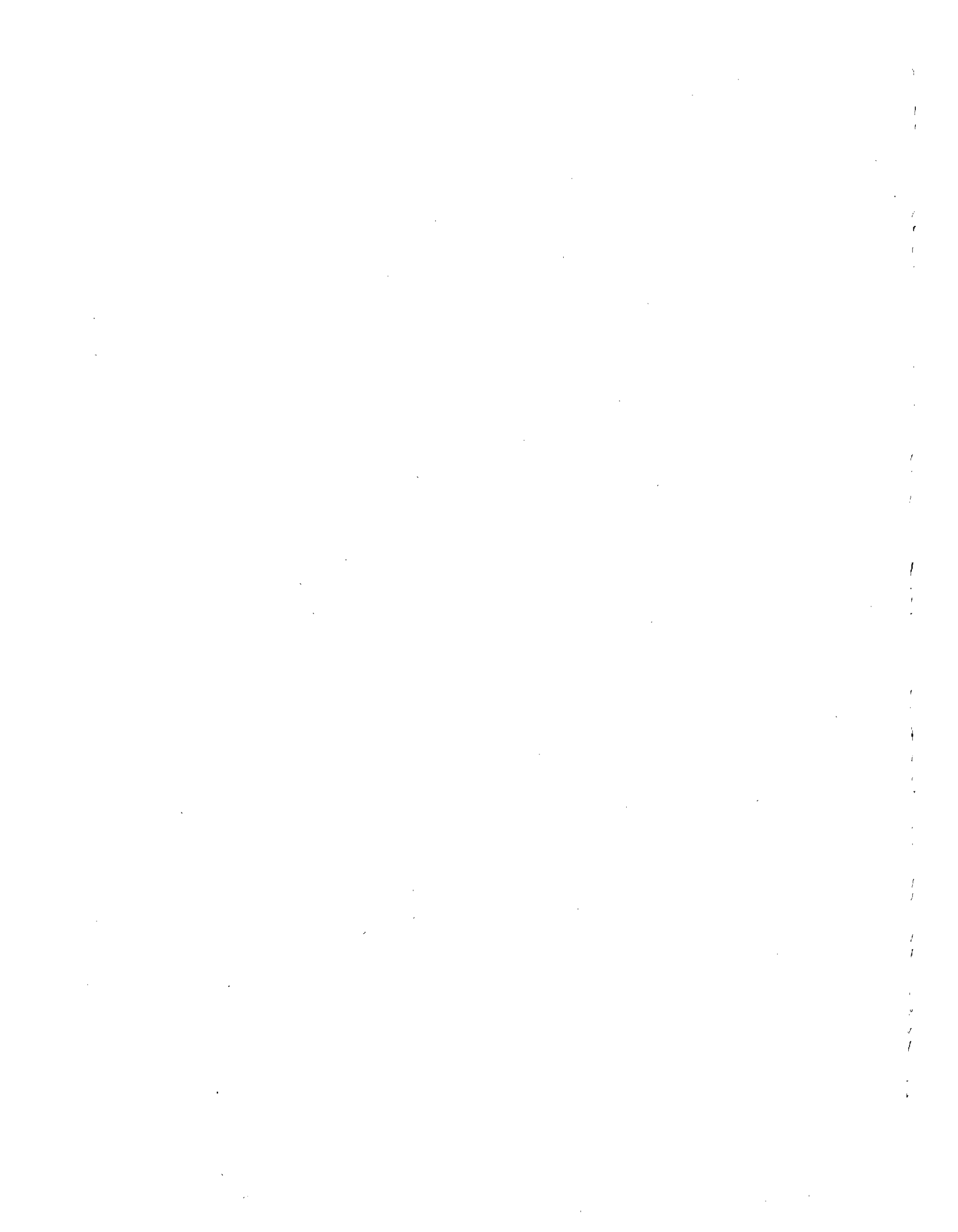


FIGURE 4.9-1. FUNCTION 9.0: CONTROL SPACING OF AIRCRAFT (SHEET 2 OF 4)





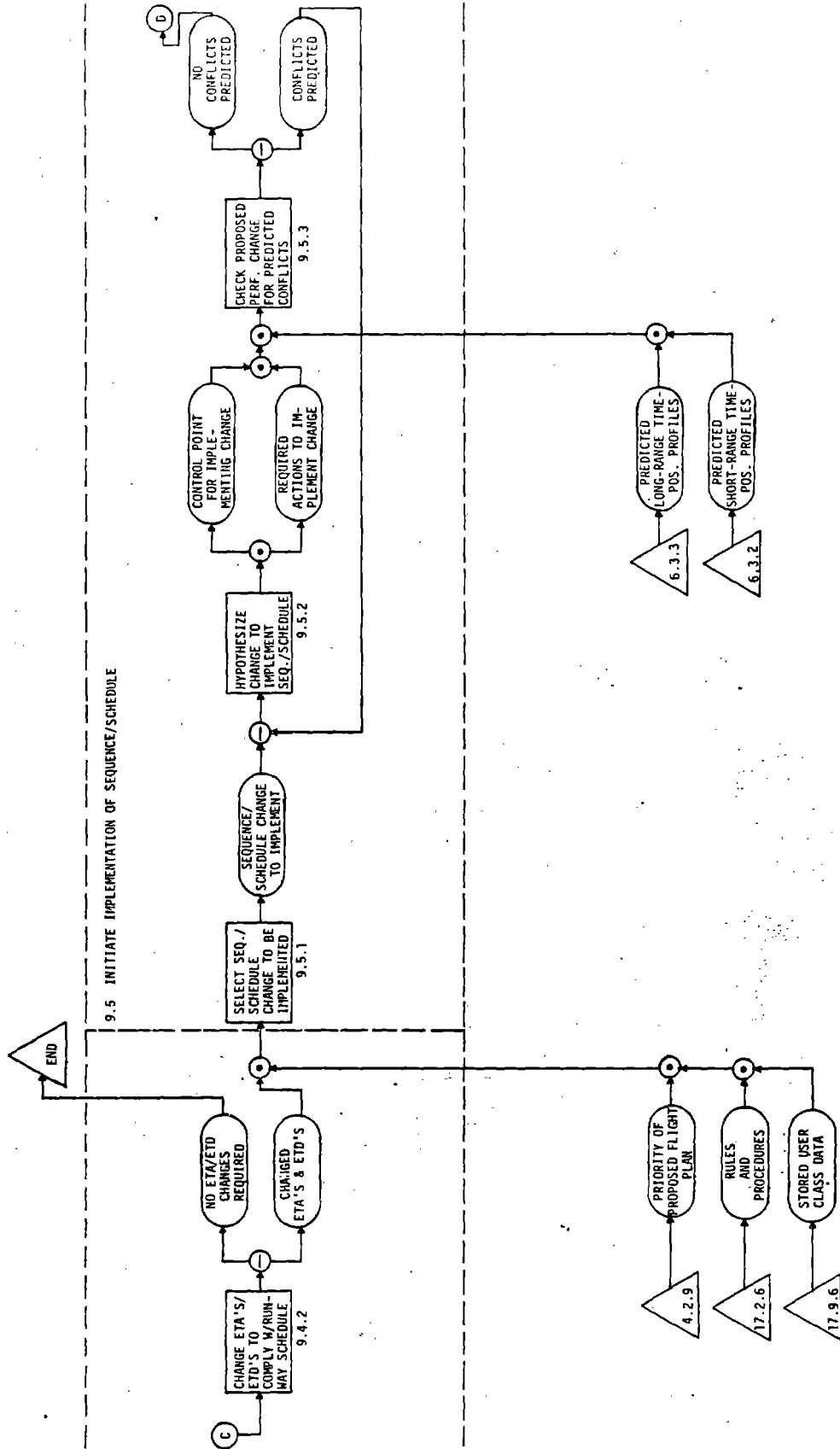
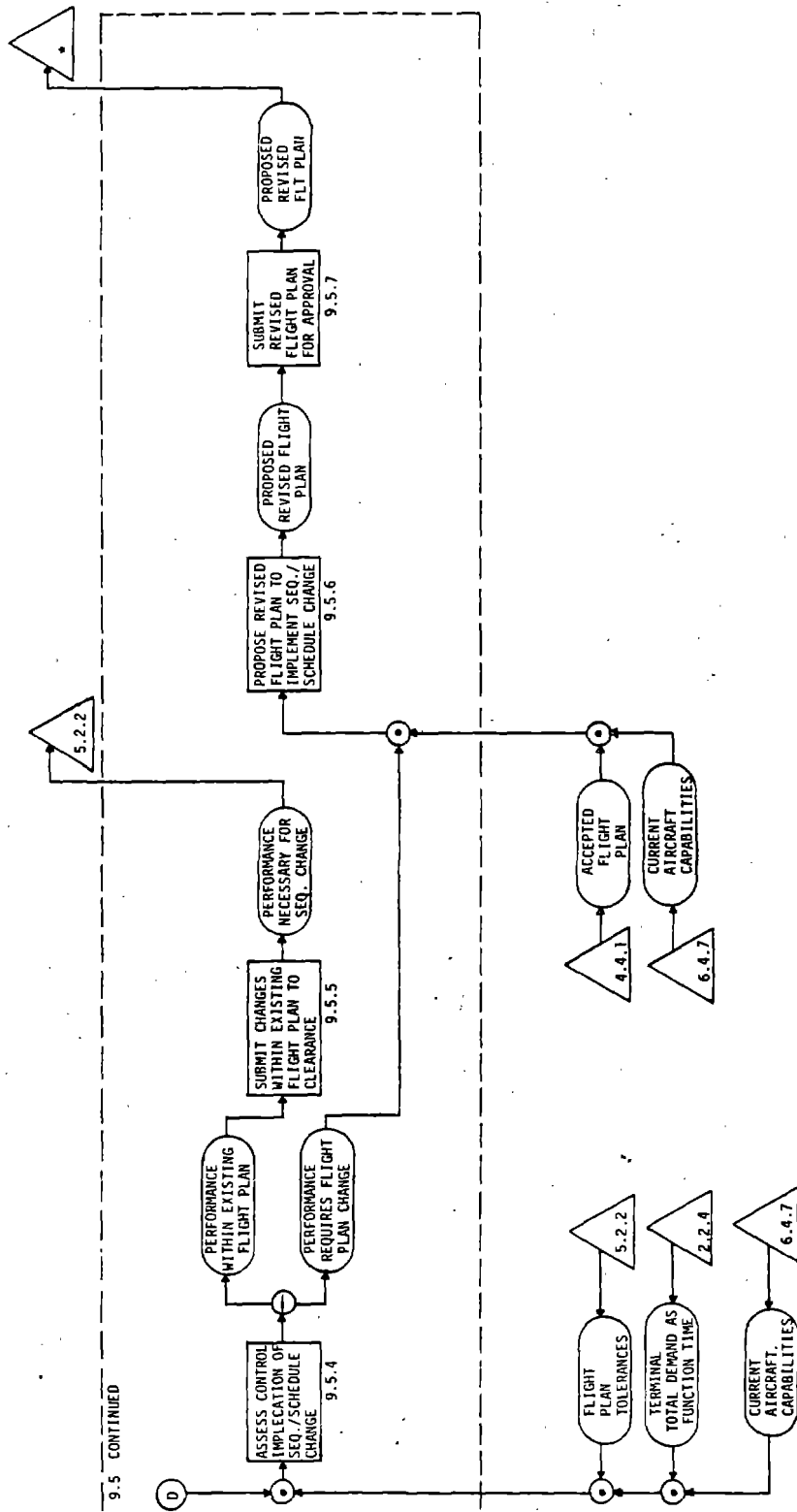


FIGURE 4.9-1. FUNCTION 9.0: CONTROL SPACING OF AIRCRAFT (SHEET 3 OF 4)



- 4.1.1
- 4.1.2
- 4.2.1
- 4.2.2
- 4.2.3
- 4.2.4
- 4.2.5
- 4.2.7
- 4.2.9
- 4.2.10

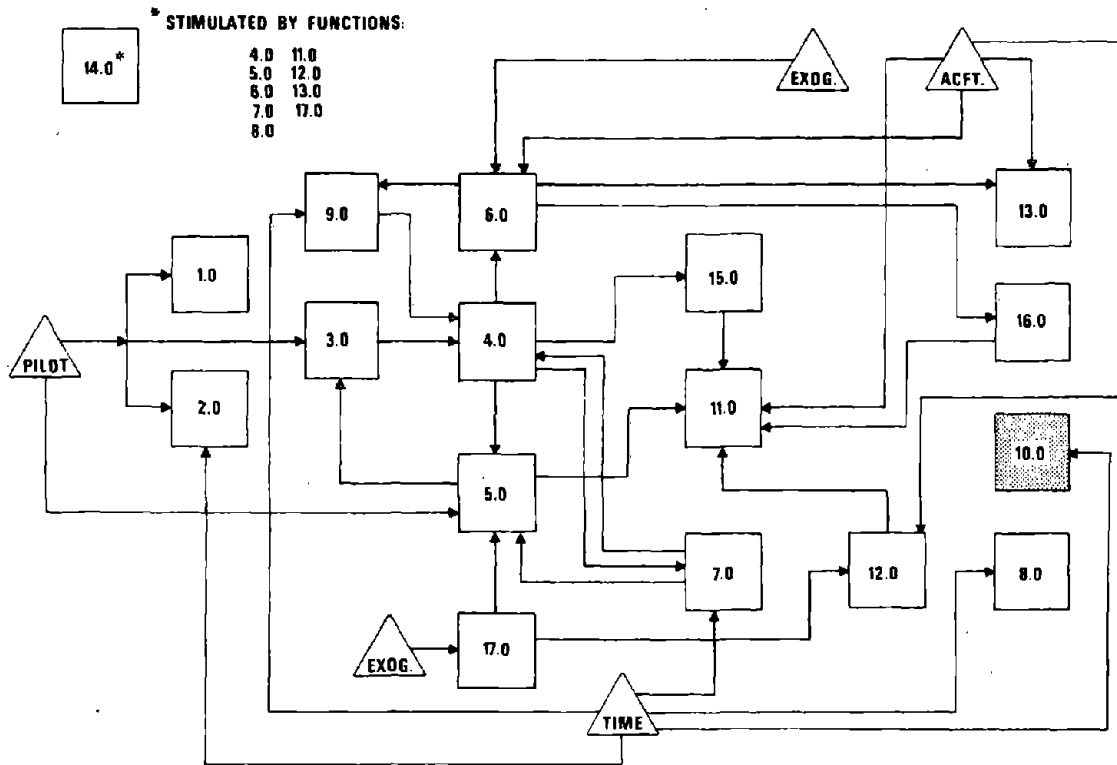


9.5 CONTINUED

FIGURE 4.9-1. FUNCTION 9.0: CONTROL SPACING OF AIRCRAFT (SHEET 4 OF 4)



## FUNCTION 10.0: PROVIDE AIRBORNE, LANDING AND GROUND NAVIGATION CAPABILITY



- 1.0: PROVIDE FLIGHT PLANNING INFORMATION
- 2.0: CONTROL TRAFFIC FLOW
- 3.0: PREPARE FLIGHT PLAN
- 4.0: PROCESS FLIGHT PLAN
- 5.0: ISSUE CLEARANCES AND CLEARANCE CHANGES
- 6.0: MONITOR AIRCRAFT PROGRESS
- 7.0: MAINTAIN CONFORMANCE WITH FLIGHT PLAN
- 8.0: ASSURE SEPARATION OF AIRCRAFT
- 9.0: CONTROL SPACING OF AIRCRAFT
- 10.0: PROVIDE AIRBORNE, LANDING AND GROUND NAVIGATION CAPABILITY
- 11.0: PROVIDE AIRCRAFT GUIDANCE
- 12.0: ISSUE FLIGHT ADVISORIES AND INSTRUCTIONS
- 13.0: HANDOFF
- 14.0: MAINTAIN SYSTEM RECORDS
- 15.0: PROVIDE ANCILLARY AND SPECIAL SERVICES
- 16.0: PROVIDE EMERGENCY SERVICES
- 17.0: MAINTAIN SYSTEM CAPABILITY AND STATUS INFORMATION

10.0 PROVIDE AIRBORNE, LANDING AND GROUND NAVIGATION CAPABILITY

10.1 Produce and Transmit Enroute Navigation Signals

10.2 Produce and Transmit Landing Navigation Signals

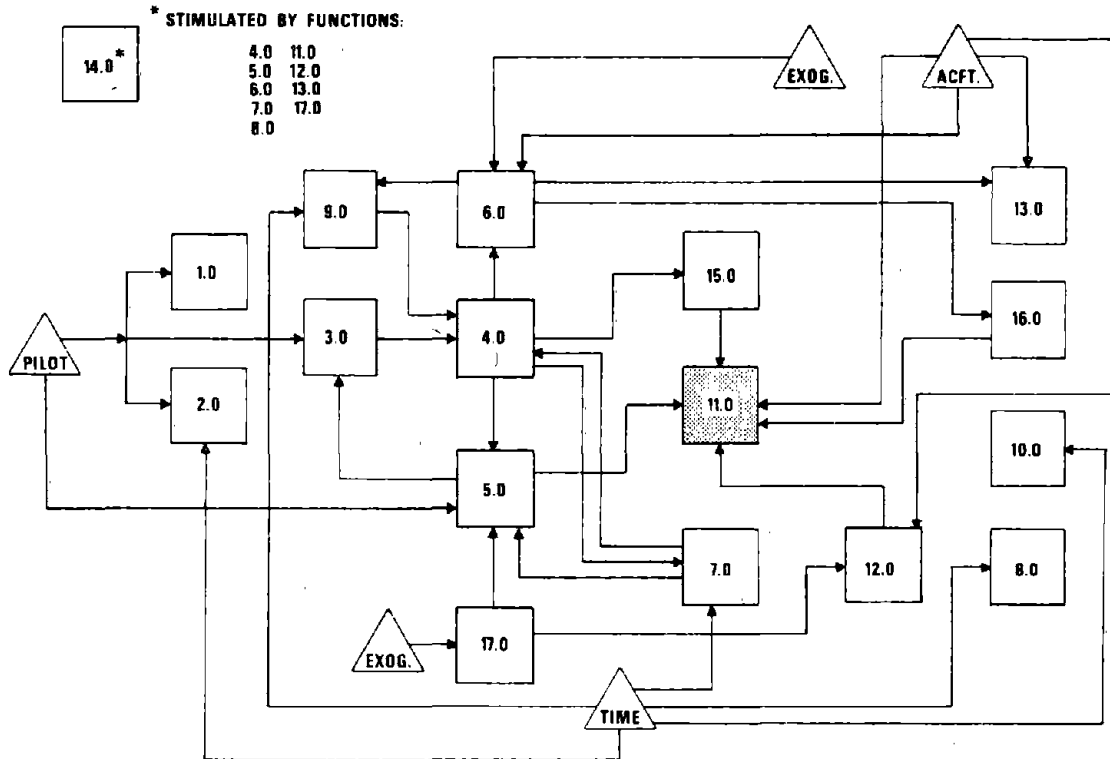
10.3 Produce and Transmit Ground Navigation Signals

NOTE: The airborne, landing and ground navigation service provides a position location capability which is available for use by the aircraft. It does not determine an aircraft's position, merely provides signals which may be used onboard the aircraft to make that determination. These signals are produced and transmitted by the function equipment. Their production places no demands on the "controllers". This results in the "function" which produces that service being considerably different from the other ATM functions.

This function does not utilize inputs produced by the other functions, nor produce outputs used by them. It does not require a series of man-machine interactions to produce the service provided.

There are, of course, monitoring, calibration, and maintenance tasks which must be performed. However, monitoring to determine if the function equipment is operating properly has been included with similar tasks in Function 17.0, Maintain System Capability and Status Information. The nature of calibration and maintenance activities are a function of system implementation. They are not generic air traffic management activities. Therefore, the analysis of Function 10.0 has not been extended to the function level.

## FUNCTION 11.0: PROVIDE AIRCRAFT GUIDANCE



- 1.0: PROVIDE FLIGHT PLANNING INFORMATION
- 2.0: CONTROL TRAFFIC FLOW
- 3.0: PREPARE FLIGHT PLAN
- 4.0: PROCESS FLIGHT PLAN
- 5.0: ISSUE CLEARANCES AND CLEARANCE CHANGES
- 6.0: MONITOR AIRCRAFT PROGRESS
- 7.0: MAINTAIN CONFORMANCE WITH FLIGHT PLAN
- 8.0: ASSURE SEPARATION OF AIRCRAFT
- 9.0: CONTROL SPACING OF AIRCRAFT
- 10.0: PROVIDE AIRBORNE, LANDING AND GROUND NAVIGATION CAPABILITY
- 11.0: PROVIDE AIRCRAFT GUIDANCE
- 12.0: ISSUE FLIGHT ADVISORIES AND INSTRUCTIONS
- 13.0: HANDOFF
- 14.0: MAINTAIN SYSTEM RECORDS
- 15.0: PROVIDE ANCILLARY AND SPECIAL SERVICES
- 16.0: PROVIDE EMERGENCY SERVICES
- 17.0: MAINTAIN SYSTEM CAPABILITY AND STATUS INFORMATION

11.0 PROVIDE AIRCRAFT GUIDANCE

11.1 Initiate/Terminate Guidance

11.1.1 Determine desired position

11.1.2 Determine requirements for further vectoring

11.2 Compute Vector Requirements

11.2.1 Measure course and distance

11.2.2 Compute time interval

11.2.3 Compute ground speed

11.2.4 Compute altitude difference

11.3 Compute Air Vector

11.3.1 Compute airspeed

11.3.2 Compute vertical speed

11.3.3 Compute heading

11.4 Compute Guidance Commands

11.4.1 Compute heading command

11.4.2 Compute airspeed command

11.4.3 Compute vertical speed command

11.5 Compile and Transmit Guidance Instructions

11.5.1 Compile vectoring instructions

11.5.2 Transmit vectoring instructions to pilot

11.5.3 Assess aircraft response



## SUBFUNCTION DESCRIPTION

FILE: 11.1

SUBFUNCTION: Initiate/Terminate Guidance

FUNCTION: Provide Aircraft Guidance

- OUTPUTS:
- (1) Vectoring not required
  - (2) Course vectoring required
  - (3) Desired x and y
  - (4) Speed vectoring required
  - (5) Desired t
  - (6) Altitude vectoring required
  - (7) Desired h

## DESCRIPTION:

Purpose: To initiate or terminate guidance for the aircraft

Stimulus: Event-stimulated by receipt of:

- A request for vectoring from the pilot as a result of a hazardous weather warning
- A pilot-initiated vectoring request
- Vectoring instructions as a result of a clearance
- Description of guidance assistance required (special service)
- Description of guidance required (emergency)

- Tasks:
- (1) Determine desired position
  - (2) Determine requirements for further vectoring

Critical Performance Parameters:

- (1) Accuracy
- (2) Timeliness
- (3) Speed
- (4) Validity

Allocation Sensitivities:

- INPUTS:
- (1) From the aircraft:
    - Vectoring request
  - (2) From Subfunction 5.2, Determine Clearance To Be Issued:
    - Vectoring requirement
  - (3) From Subfunction 12.3, Notify Pilot of Imminent Encounter with Hazardous Weather Phenomenon:
    - Request for vectoring
  - (4) From Subfunction 17.1, Determine Current and Forecast Weather:
    - Stored severe weather phenomena data
  - (5) From Subfunction 11.5, Compile and Transmit Guidance Instructions:
    - Responding as commanded
  - (6) From Subfunction 6.1, Determine Present Position:
    - Present aircraft position (x, y, h & t) correlated with identification
  - (7) From Subfunction 17.6, Update Hazards to Flight Information:
    - Stored data base items (hazards to flight)
  - (8) From Subfunction 16.2, Determine Required Response to Emergency:
    - Description of guidance assistance required
  - (9) From Subfunction 15.2, Initiate Action to Provide Service:
    - Description of guidance required

TASK DESCRIPTION

FILE: 11.1.1

TASK: Determine Desired Position

SUBFUNCTION: Initiate/Terminate Guidance

FUNCTION: Provide Aircraft Guidance

- OUTPUTS:
- (1) Desired x and y
  - (2) Desired t
  - (3) Desired h

DESCRIPTION:

Purpose: To determine the desired position or positions to which the aircraft should be vectored, and the time it should arrive (if required)

Stimulus: Event-stimulated, by receipt of: (1) A request for vectoring from the pilot as a result of hazardous weather warning, (2) a pilot-initiated vectoring request, (3) vectoring instructions as a result of a clearance action, or (4) an indication that the aircraft is responding as commanded, or an emergency or special service

Decisions and Actions:

- (1) Determine if desired time of arrival is a necessary parameter in this instance
- (2) Determine the x and y coordinates of each vector position
- (3) Determine the height(s) at each vector position
- (4) If time has been determined to be a necessary parameter, determine time (t) at each vector position

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Accuracy
- (2) Timeliness
- (3) Speed
- (4) Validity

Performance Capabilities Required:

- (1) Classification:
  - Association
- (2) Decision making:
  - Induction/inference/deduction
- (3) Information processing:
  - Calculation

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From the aircraft:
    - Vectoring request
  - (2) From Task 5.2.4, Determine Required Clearance Instructions:
    - Vectoring requirement
  - (3) From Task 12.3.4, Receive Pilot Response:
    - Vectoring desired
  - (4) From Task 17.1.8, Store Weather Information:
    - Stored severe weather phenomena data
  - (5) From 17.6.6, Store Data Base Items:
    - Stored data base items (flight hazards)
  - (6) From Task 11.5.3, Assess Aircraft Response:
    - Responding as commanded
  - (7) From Task 16.2.9, Determine Required Guidance Assistance:
    - Description of guidance assistance required

(8) From Task 15.2.2, Determine Guidance Service Required:

- Description of guidance required

TASK DESCRIPTION

FILE: 11.1.2  
TASK: Determine Requirements for Further Vectoring  
SUBFUNCTION: Initiate/Terminate Guidance  
FUNCTION: Provide Aircraft Guidance

- OUTPUTS:
- (1) Vectoring not required
  - (2) Speed vectoring required
  - (3) Course vectoring required
  - (4) Altitude vectoring required

DESCRIPTION:

Purpose: To determine if further vectoring is required, and if so, the type of vectoring which is required

Stimulus: Event-stimulated by determination of desired x, y, h & t

Decisions and Actions:

- (1) Determine if vectoring has been done to all previously determined positions, compare present positions and desired positions
- (2) Determine if altitude vectoring is required
- (3) Determine if course vectoring is required
- (4) Determine if speed vectoring is required

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Timeliness
- (2) Validity
- (3) Accuracy

Performance Capability Required:

- (1) Decision making:
  - Induction/inference/deduction

(2) Storing and retrieving information:

- Short-term memory
- Selective retrieval/recall

(3) Sensing:

- Recognition of dynamic change
- Recognition of discrete change

(4) Information Processing:

- Analysis

(5) Interpreting:

- Classification

Allocation Sensitivities:

External Constraints:

INPUTS:

(1) From Task 11.1.1, Determine Desired Positions:

- Desired  $x + y$
- Desired  $t$
- Desired  $h$

(2) From Task 6.1.1, Receive/Enter Correlated Position and Identification (or Task 6.1.3 or 6.1.5):

- Correlated position and identification

SUBFUNCTION DESCRIPTION.

FILE: 11.2  
SUBFUNCTION: Compute Vector Requirements  
FUNCTION: Provide Aircraft Guidance

OUTPUTS: (1) Required course  
(2) Time interval  
(3) Required ground speed  
(4) Altitude difference

DESCRIPTION:

Purpose: To determine the requirements for course, groundspeed, and altitude to be used for computing vectors

Stimulus: Event-stimulated by determination of the desired x, y, t and h

Tasks: (1) Measure course and distance  
(2) Compute time interval  
(3) Compute ground speed  
(4) Compute altitude difference

Critical Performance Parameters:

- (1) Timeliness
- (2) Validity
- (3) Accuracy

Allocation Sensitivities:

INPUTS: (1) From Subfunction 11.1, Initiate/Terminate Guidance:

- Course vectoring required
- Desired x and y
- Speed vectoring required
- Desired t
- Altitude vectoring required
- Desired h



(2) From Subfunction 6.1, Determine Present Position:

- Present x and y.
- Present t
- Present h

TASK DESCRIPTION

FILE: 11.2.1  
TASK: Measure Course and Distance  
SUBFUNCTION: Compute Vector Requirements  
FUNCTION: Provide Aircraft Guidance

OUTPUTS: (1) Required course to desired x and y  
(2) Distance to desired x and y

DESCRIPTION:

Purpose: To determine the course and distance between the present position and the desired position

Stimulus: Event-stimulated by the determination that course vectoring is required

Decisions and Actions:

- (1) Determine distance between present and desired positions
- (2) Determine course from present to desired position

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Timeliness
- (2) Validity
- (3) Accuracy

Performance Capabilities Required:

- (1) Information processing:
  - Calculation
- (2) Storing and retrieving information:
  - Selective retrieval/recall

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 11.1.1, Determine Desired Positions:
    - Desired x and y
  - (2) From Task 11.1.2, Determine Requirement for Further Vectoring:
    - Course vectoring required
  - (3) From Task 6.1.1, Receive/Enter Correlated Position and Identification (or Task 6.1.3 or 6.1.5):
    - Correlated position and identification

TASK DESCRIPTION

FILE: 11.2.2  
TASK: Compute Time Interval  
SUBFUNCTION: Compute Vector Requirements  
FUNCTION: Provide Aircraft Guidance

OUTPUTS: Time interval

DESCRIPTION:

Purpose: To determine the time interval from the present time to the desired time of arrival

Stimulus: Event stimulated, by the determination that speed vectoring is required

Decisions and Actions:

Determine time interval (difference between present t and desired t)

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Timeliness
- (2) Accuracy

Performance Capabilities Required:

- (1) Information processing:
  - Calculation
- (2) Storing and retrieving information:
  - Selective retrieval/recall

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 6.1.1, Receive/Enter Correlated Position and Identification (or Task 6.1.3 or 6.1.5):
    - Correlated position and identification (for present t)
  - (2) From Task 11.1.1, Determine Desired Positions:
    - Desired t
  - (3) From Task 11.1.2, Determine Requirement for Further Vectoring:
    - Speed vectoring required

TASK DESCRIPTION

FILE: 11.2.3  
TASK: Compute Ground Speed  
SUBFUNCTION: Compute Vector Requirements  
FUNCTION: Provide Aircraft Guidance

OUTPUT: Required ground speed

DESCRIPTION:

Purpose: To determine the ground speed required to cover the required distance in the allowable time interval

Stimulus: Event-stimulated by receipt of the allowable time interval and the distances to x and y

Decisions and Actions:

Compute ground speed

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Timeliness
- (2) Accuracy

Performance Capabilities Required:

Information processing:

- Calculation

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 11.2.1, Measure Course and Distance:
    - Distance to desired x and y
  - (2) From Task 11.2.2, Compute Time Interval:
    - Time interval

TASK DESCRIPTION

FILE: 11.2.4

TASK: Compute Altitude Difference

SUBFUNCTION: Compute Vector Requirements

FUNCTION: Provide Aircraft Guidance

OUTPUT: Altitude difference

DESCRIPTION:

Purpose: To determine the amount of altitude change required (difference between present altitude and desired altitude)

Stimulus: Event-stimulated by the determination that altitude vectoring is required

Decisions and Actions:

Determine altitude difference

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Timeliness
- (2) Accuracy

Performance Capabilities Required:

Information processing:

- Calculation

Allocation Sensitivities:

External Constraints:

INPUTS: (1) From Task 11.1.2, Determine Requirements for Further Vectoring:

- Altitude vectoring required

(2) From Task 11.1.1, Determine Desired Positions:

- Desired h

(3) From Task 6.1.1, Receive/Enter Correlated Position and Identification (or Task 6.1.3 or 6.1.5)

- Correlated position and identification (for altitude)



SUBFUNCTION DESCRIPTION

FILE: 11.3  
SUBFUNCTION: Compute Air Vector  
FUNCTION: Provide Aircraft Guidance

OUTPUTS: (1) Required heading  
(2) Required airspeed  
(3) Required vertical speed

DESCRIPTION:

Purpose: To determine the air vectors which are required to get the aircraft on the desired course, ground speed and altitude

Stimulus: Event-stimulated by the determination of the vector requirements for course, ground speed, and altitude

Tasks: (1) Compute airspeed  
(2) Compute vertical speed  
(3) Compute heading

Critical Performance Parameters:

- (1) Timeliness
- (2) Accuracy

Allocation Sensitivities:

INPUTS: (1) From Subfunction 17.1, Determine Current and Forecast Weather:

- Stored weather sequences
- Stored weather forecasts

(2) From Subfunction 11.2, Compute Vector Requirements:

- Required course
- Required ground speed
- Altitude difference
- Time interval

(3) From the aircraft:

- Present heading

TASK DESCRIPTION

FILE: 11.3.1  
TASK: Compute Airspeed  
SUBFUNCTION: Compute Air Vector  
FUNCTION: Provide Aircraft Guidance

OUTPUT: Required airspeed

DESCRIPTION:

Purpose: To determine the airspeed required to attain the required ground speed

Stimulus: Event-stimulated, by the determination of the required ground speed

Decisions and Actions:

Compute airspeed

Phase of Flight:

All phases of flight except preflight and postflight

Critical Performance Parameters:

- (1) Timeliness
- (2) Accuracy

Performance Capability Required:

Information processing:

- Calculation

Allocation Sensitivities:

External Constraints:

INPUTS: (1) From Task 17.1.8, Store Weather Information:

- Stored weather sequences (for wind speed and direction)

- (2) From Task 11.2.3, Compute Ground Speed:
  - Required ground speed
- (3) From Task 11.2.1, Measure Course and Distance:
  - Required course

TASK DESCRIPTION

FILE: 11.3.2  
TASK: Compute Vertical Speed  
SUBFUNCTION: Compute Air Vector  
FUNCTION: Provide Aircraft Guidance

OUTPUT: Required vertical speed

DESCRIPTION:

Purpose: To determine the required vertical speed for the aircraft

Stimulus: Event-stimulated by the determination that there is a difference between present and desired altitude

Decisions and Actions:

Compute vertical speed requirement

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Timeliness
- (2) Accuracy

Performance Capability Required:

Information processing:

- Calculation

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 11.2.2, Compute Time Interval:
    - Time interval
  - (2) From Task 11.2.4, Compute Altitude Difference:
    - Altitude difference

TASK DESCRIPTION

FILE: 11.3.3  
TASK: Compute Heading  
SUBFUNCTION: Compute Air Vector  
FUNCTION: Provide Aircraft Guidance

OUTPUT: Required heading

DESCRIPTION:

Purpose: To determine the heading for the aircraft

Stimulus: Event-stimulated by the determination of a required course for the aircraft which is different from its present course

Decisions and Actions:

Compute heading

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Timeliness
- (2) Accuracy

Performance Capability Required:

Information processing:

- Calculation

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 11.2.1, Measure Course and Distance:
    - Required course
  - (2) From Task 11.3.1, Compute Airspeed:
    - Required airspeed

(3) From Task 17.1.8, Store Weather Information:

- Stored weather sequences (for wind speed and direction)

SUBFUNCTION DESCRIPTION

FILE: 11.4  
SUBFUNCTION: Compute Guidance Commands  
FUNCTION: Provide Aircraft Guidance

OUTPUTS: (1) Heading command  
(2) Airspeed command  
(3) Vertical speed command

DESCRIPTION:

Purpose: To determine the guidance commands for the aircraft to attain the required air vector

Stimulus: Event-stimulated by determination of the required heading, airspeed, and/or vertical speed

Tasks: (1) Compute heading command  
(2) Compute airspeed command

Critical Performance Parameters:

- (1) Timeliness
- (2) Accuracy

Allocation Sensitivities:

INPUTS: (1) From Subfunction 11.3, Compute Air Vector:

- Required heading
- Required airspeed
- Required vertical speed

(2) From the aircraft:

- Present heading
- Present airspeed
- Present vertical speed



TASK DESCRIPTION

FILE: 11.4.1  
TASK: Compute Heading Command  
SUBFUNCTION: Compute Guidance Commands  
FUNCTION: Provide Aircraft Guidance

OUTPUT: Heading command (e.g., turn right/left \_\_\_ degrees  
to a heading of \_\_\_ degrees)

DESCRIPTION:

Purpose: To determine the command which will get the aircraft  
to the required heading

Stimulus: Event-stimulated by the determination of the required  
heading for the aircraft

Decisions and Actions:

- (1) Compute deviation between present heading and  
required heading
- (2) Determine direction (right/left) of turn required
- (3) Determine heading command

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Timeliness
- (2) Accuracy

Performance Capabilities Required:

- (1) Information processing:
  - Calculation
  - Encoding/decoding
- (2) Interpreting:
  - Classification

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 11.3.3, Compute Heading:
    - Required heading
  - (2) From the aircraft
    - Present heading

TASK DESCRIPTION

FILE: 11.4.2  
TASK: Compute Airspeed Command  
SUBFUNCTION: Compute Guidance Commands  
FUNCTION: Provide Aircraft Guidance

OUTPUT:           Airspeed command (e.g., increase/decrease airspeed \_\_\_  
                  knots to \_\_\_knots)

DESCRIPTION:

Purpose:        To determine the command which will get the aircraft to  
                  the required airspeed

Stimulus:     Event-stimulated by the determination of the required  
                  airspeed

Decisions and Actions:

- (1) Compute deviation between present airspeed and required airspeed
- (2) Determine direction (increase/decrease) of change
- (3) Compile airspeed command

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Timeliness
- (2) Accuracy

Performance Capabilities Required:

- (1) Information processing:
  - Calculation
  - Encoding/decoding
- (2) Interpreting:
  - Classification

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 11.3.1, Compute Airspeed:
    - Required airspeed
  - (2) From the Aircraft:
    - Present airspeed

TASK DESCRIPTION

FILE: 11.4.3

TASK: Compute Vertical Speed Command

SUBFUNCTION: Compute Guidance Commands

FUNCTION: Provide Aircraft Guidance

OUTPUT: Vertical speed command (e.g., increase/decrease rate of climb/descent to \_\_\_\_\_ft/min.)

DESCRIPTION:

Purpose: To determine the vertical speed command which will get the aircraft to the required altitude

Stimulus: Event-stimulated by the determination of the required vertical speed for the aircraft

Decisions and Actions:

- (1) Compute difference between present and required vertical speed
- (2) Determine direction of deviation and of required change
- (3) Compile vertical speed command

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Timeliness
- (2) Accuracy

Performance Capability Required:

- (1) Information processing:
  - Calculation
  - Encoding/decoding
- (2) Interpreting:
  - Classification

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 11.3.2, Compute Vertical Speed:
    - Required vertical speed
  - (2) From the aircraft:
    - Present vertical speed

SUBFUNCTION DESCRIPTION

FILE: 11.5

SUBFUNCTION: Compile and Transmit Guidance Instructions

FUNCTION: Provide Aircraft Guidance

- OUTPUTS:
- (1) Transmitted vectoring message
  - (2) Responding as commanded
  - (3) Not responding as commanded, retransmit
  - (4) Not responding as commanded, declare emergency

DESCRIPTION:

Purpose: To compile and transmit the guidance instructions to the aircraft

Stimulus: Event-stimulated, by the determination of the heading command, airspeed command, and/or vertical speed command

- Tasks:
- (1) Compile vectoring instructions
  - (2) Transmit vectoring instructions to the aircraft
  - (3) Assess aircraft response

Critical Performance Parameters:

- (1) Timeliness
- (2) Validity
- (3) Completeness

Allocation Sensitivities:

- INPUTS:
- (1) From Subfunction 11.4, Compute Guidance Commands:
    - Heading command
    - Airspeed command
    - Vertical speed command
  - (2) From the aircraft:
    - Heading

- Airspeed
  - Vertical speed
- (3) From exogenous source:
- Vectoring message format



TASK DESCRIPTION

FILE: 11.5.1

TASK: Compile Vectoring Instructions

SUBFUNCTION: Compile and Transmit Guidance Instructions

FUNCTION: Provide Aircraft Guidance

OUTPUT: Vectoring message

DESCRIPTION:

Purpose: To compile the vectoring instructions for the aircraft

Stimulus: Event-stimulated by the computation of heading, air-speed, and/or vertical speed commands

Decisions and Actions:

- (1) Determine if all necessary computations have been completed
- (2) Compile message

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Timeliness
- (2) Validity
- (3) Completeness

Performance Capability Required:

- (1) Decision making:
  - Induction/inference/deduction
- (2) Information processing:
  - Encoding/decoding
- (3) Interpreting:
  - Classification

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From exogenous source:
    - Vectoring message format
  - (2) From Task 11.4.1, Compute Heading Command:
    - Heading command
  - (3) From Task 11.4.2, Compute Airspeed Command:
    - Airspeed command
  - (4) From Task 11.4.3, Compute Vertical Speed Command:
    - Vertical speed command

TASK DESCRIPTION

FILE: 11.5.2

TASK: Transmit Vectoring Instructions to Pilot

SUBFUNCTION: Compile and Transmit Guidance Instructions

FUNCTION: Provide Aircraft Guidance

OUTPUT: Transmitted vectoring message

DESCRIPTION:

Purpose: To transmit the compiled vectoring instructions to the pilot

Stimulus: Event-stimulated by the determination of the vectoring instructions

Decisions and Actions:

- (1) Determine transmission channel
- (2) Transmit message to pilot

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Timeliness
- (2) Accuracy

Performance Capabilities Required:

- (1) Decision making:
  - Selection/choice
- (2) Responding:
  - Communication
  - Data transmission
- (3) Information processing:
  - Encoding/decoding

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 11.5.1, Compile Vectoring Instructions:
    - Vectoring message
  - (2) From Task 11.5.3, Assess Aircraft Response:
    - Not responding as commanded, retransmit

TASK DESCRIPTION

FILE: 11.5.3  
TASK: Assess Aircraft Response  
SUBFUNCTION: Compile and Transmit Guidance Instructions  
FUNCTION: Provide Aircraft Guidance

- OUTPUTS:
- (1) Responding as commanded
  - (2) Not responding as commanded, retransmit
  - (3) Not responding as commanded, declare emergency

DESCRIPTION:

Purpose: To determine if the aircraft has received the correct vectoring instructions and is executing them correctly, or needs the message retransmitted or an emergency declared

Stimulus: Event-stimulated by the transmission of the vectoring message

Decisions and Actions:

- (1) Determine if the aircraft is responding as commanded
- (2) If not, determine if the message should be retransmitted or an emergency declared

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Timeliness
- (2) Validity

Performance Capabilities Required:

- (1) Decision making:
  - Comparison with standard
  - Selection/choice
  - Induction/inference/deduction

- (2) Monitoring:
  - Watch-keeping
- (3) Sensing:
  - Discrimination
- (4) Information processing:
  - Ordering
- (5) Interpreting:
  - Pattern Recognition

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 11.5.2, Transmit Vectoring Instructions to Pilot:
    - Transmitted vectoring message
  - (2) From the aircraft:<sup>\*</sup>
    - Heading
    - Airspeed
    - Vertical speed

\* NOTE: In the absence of inputs from the aircraft, changes in position of the aircraft could be used.

Table 4.11-I. Flow of Information  
Function 11.0: Provide Aircraft Guidance

TASK	INPUTS		OUTPUTS	
	IDENTIFICATION	SOURCE	IDENTIFICATION	DESTIN.
11.1.1	*Vectoring desired	Acft	Desired x and y	11.1.2
	*Vectoring requirement	5.2.4		11.2.1
	*Request for vectoring	12.3.4	Desired t	11.1.2
	*Description of guidance assistance required	16.2.9	Desired h	11.2.2
	Stored severe weather phenomena	17.1.8		11.1.2
	Flight hazard information	17.6.6		11.2.4
	Responding as commanded	11.5.3		
	Description of guidance required	15.2.3		
Special service no longer required	15.1.2			
11.1.2	*Desired x and y	11.1.1	Vectoring not required	End
	*Desired t	11.1.1	Speed vectoring req'd.	11.2.2
	*Desired h	11.1.1	Course vectoring req'd	11.2.1
	Correlated position and identification	6.1.1	Altitude vectoring required	11.2.4
		6.1.3 6.1.5		
11.2.1	Desired x and y	11.1.1	Required course to desired X & Y	11.3.1
	*Course vectoring required	11.1.2		11.3.3
	Correlated position and identification	6.1.1	Distance to desired X & Y	11.2.3
		6.1.3 6.1.5		
11.2.2	Desired t	11.1.1	Time interval	11.2.3
	*Speed vectoring required	11.1.2		11.3.2
	Correlated position and identification	6.1.1		
		6.1.3 6.1.5		
11.2.3	*Distance to required x & y	11.2.1	Required ground speed	11.3.1
	*Time interval	11.2.2		

\*Task stimulus

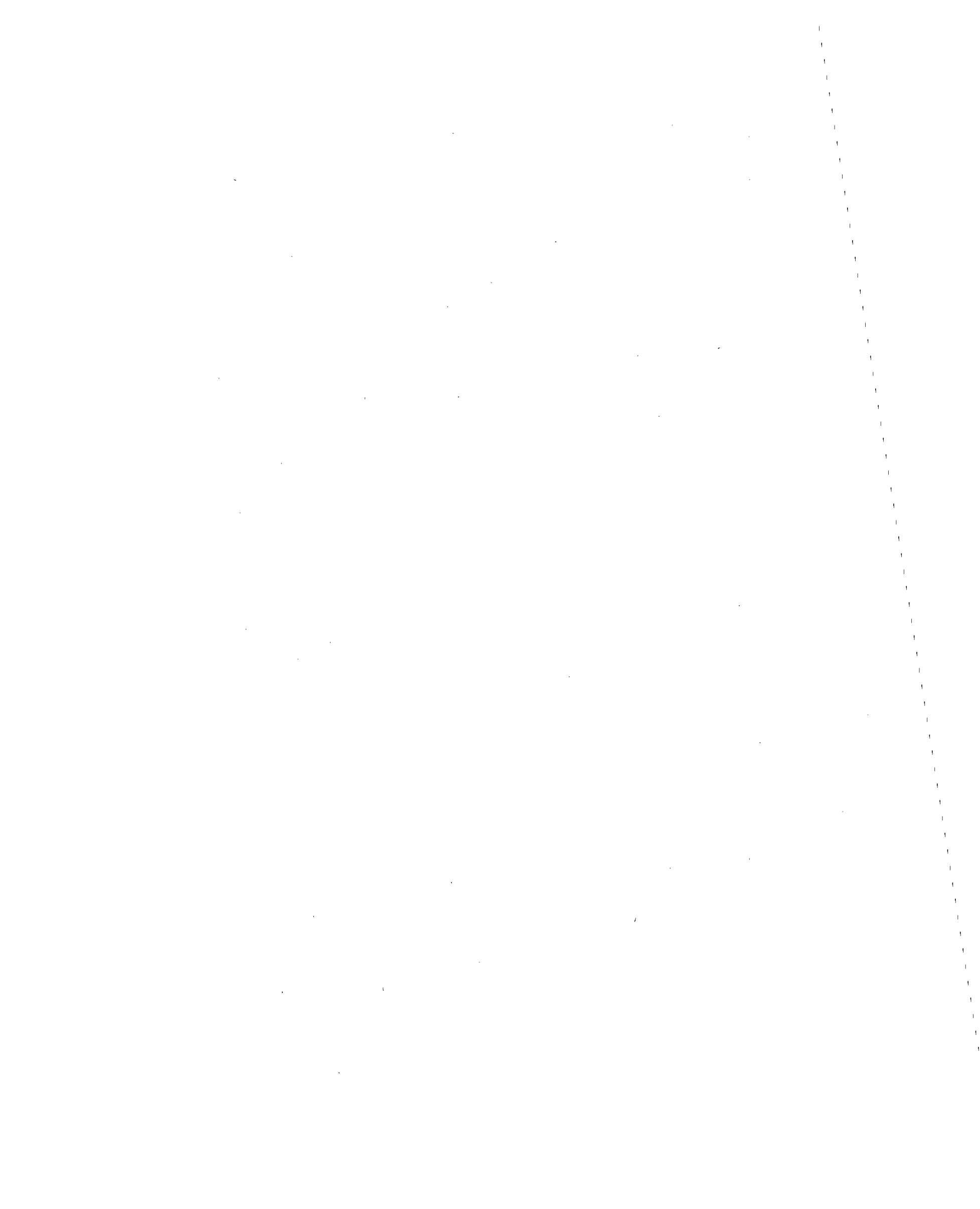
Table 4.11-I. Flow of Information  
Function 11.0: Provide Aircraft Guidance (Cont'd.)

TASK	INPUTS		OUTPUTS	
	IDENTIFICATION	SOURCE	IDENTIFICATION	DESTIN.
11.2.4	*Altitude vectoring req'd. Desired h Correlated position and identification	11.1.2 11.1.1 6.1.1 6.1.3 6.1.5	Altitude difference	11.3.2
11.3.1	Stored weather sequences *Required ground speed Required course	17.1.8 11.2.3 11.2.1	Required airspeed	11.3.3 11.4.2
11.3.2	Time interval *Altitude difference	11.2.2 11.2.4	Required vertical spd.	11.4.3
11.3.3	Present heading *Required course Required airspeed Stored weather sequences	Acft 11.2.1 11.3.1 17.1.8	Required heading	11.4.1
11.4.1	*Required heading Present heading	11.3.3 Acft	Heading command	11.5.1
11.4.2	*Required airspeed Present airspeed	11.3.1 Acft	Airspeed command	11.5.1
11.4.3	*Required vertical speed Present vertical speed	11.3.2 Acft	Vertical speed command	11.5.1
11.5.1	Vectoring message format *Heading command *Airspeed command *Vertical speed command	Exog. 11.4.1 11.4.2 11.4.3	Vectoring message	11.5.2
11.5.2	*Vectoring message Not responding as commanded retransmit	11.5.1 11.5.3	Transmitted vectoring message	Acft 14.2.1 11.5.3



Table 4.11-I. Flow of Information  
 Function 11.0: Provide Aircraft Guidance (Cont'd.)

TASK	INPUTS		OUTPUTS	
	IDENTIFICATION	SOURCE	IDENTIFICATION	DESTIN.
11.5.3	*Transmitted vectoring message	11.5.2	Responding as commanded	11.1.1 14.2.1
	Heading	Acft	Not responding as commanded, retransmit	11.5.2 14.1.1 14.2.1
	Airspeed	Acft	Not responding as commanded, declare emergency	14.2.1 16.1.3
	Vertical speed	Acft		



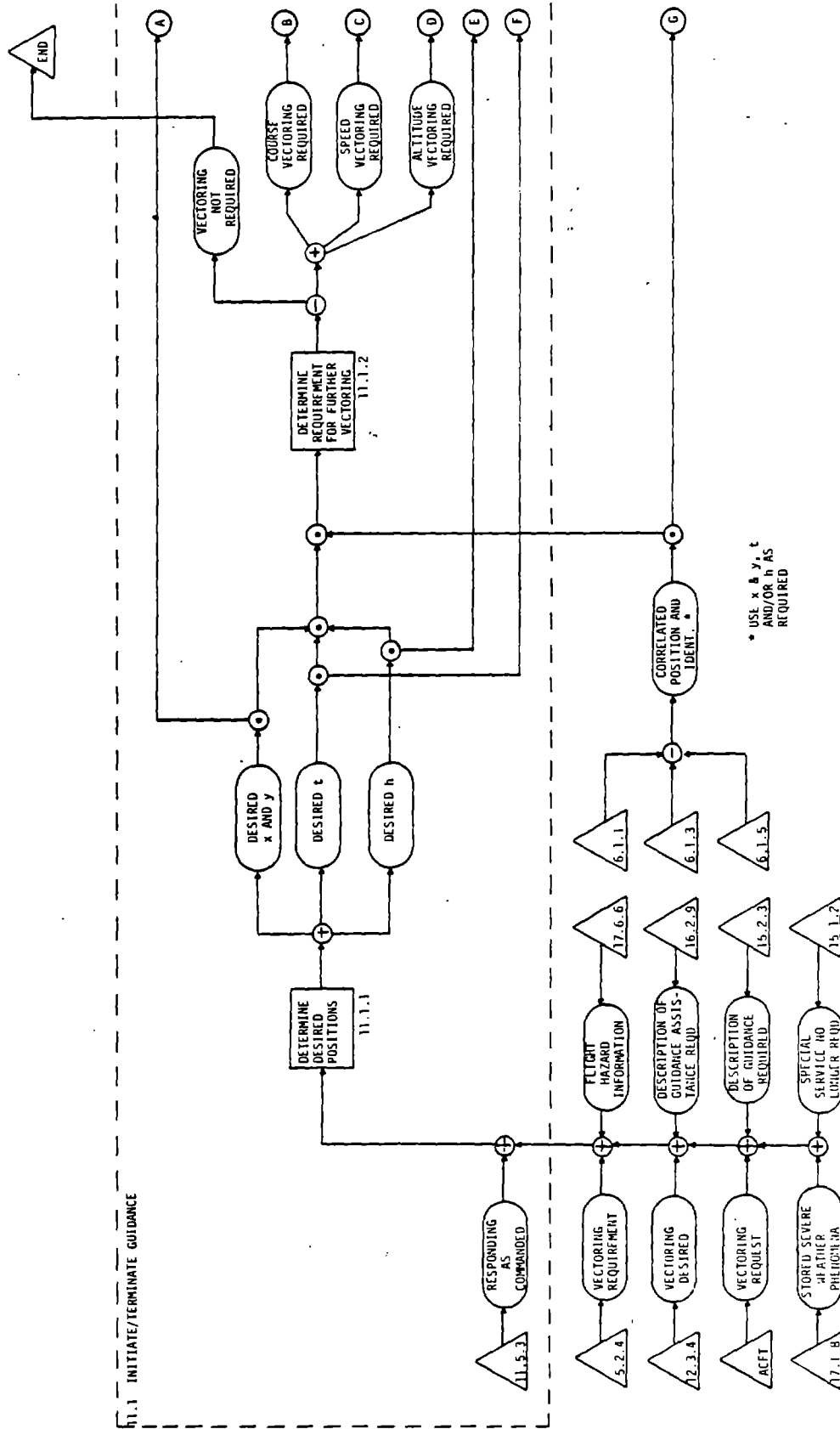


FIGURE 4.11-1. FUNCTION 11.0; PROVIDE AIRCRAFT GUIDANCE (SHEET 1 OF 4)



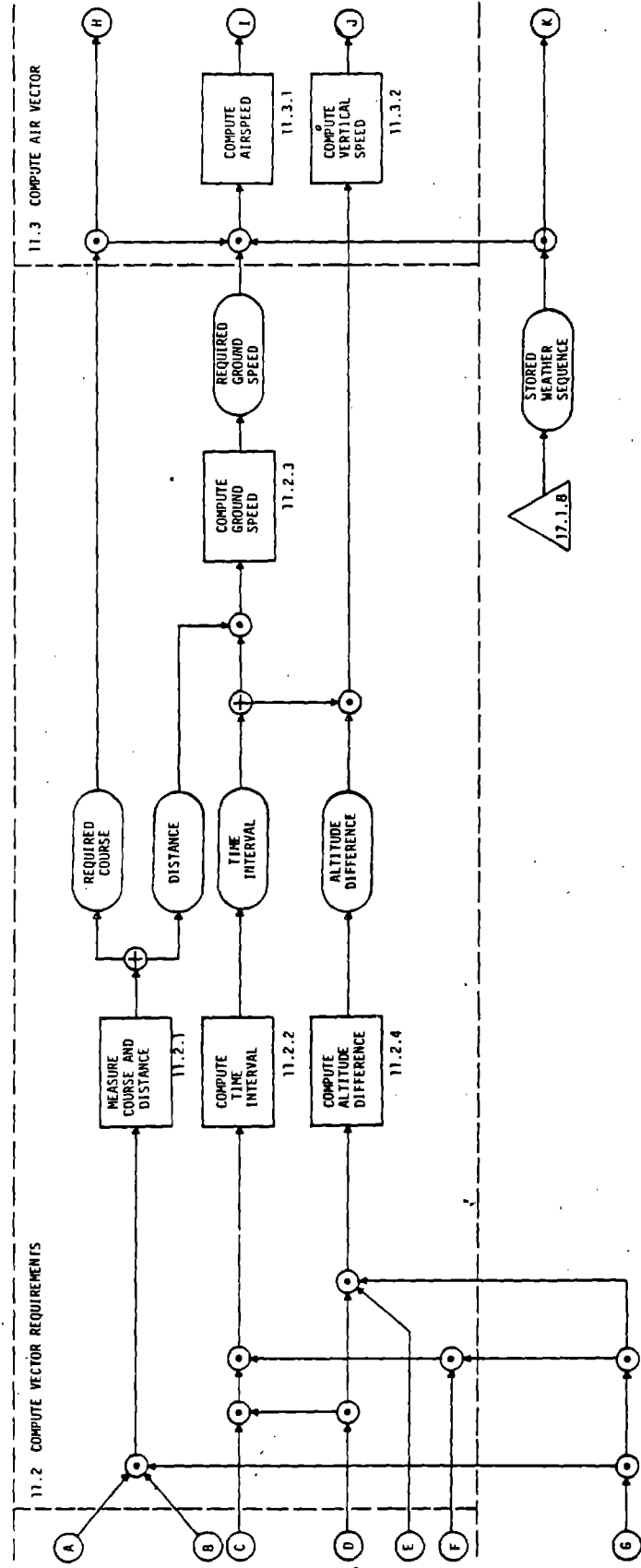


FIGURE 4.11-1. FUNCTION 11.0: PROVIDE AIRCRAFT GUIDANCE (SHEET 2 OF 4)



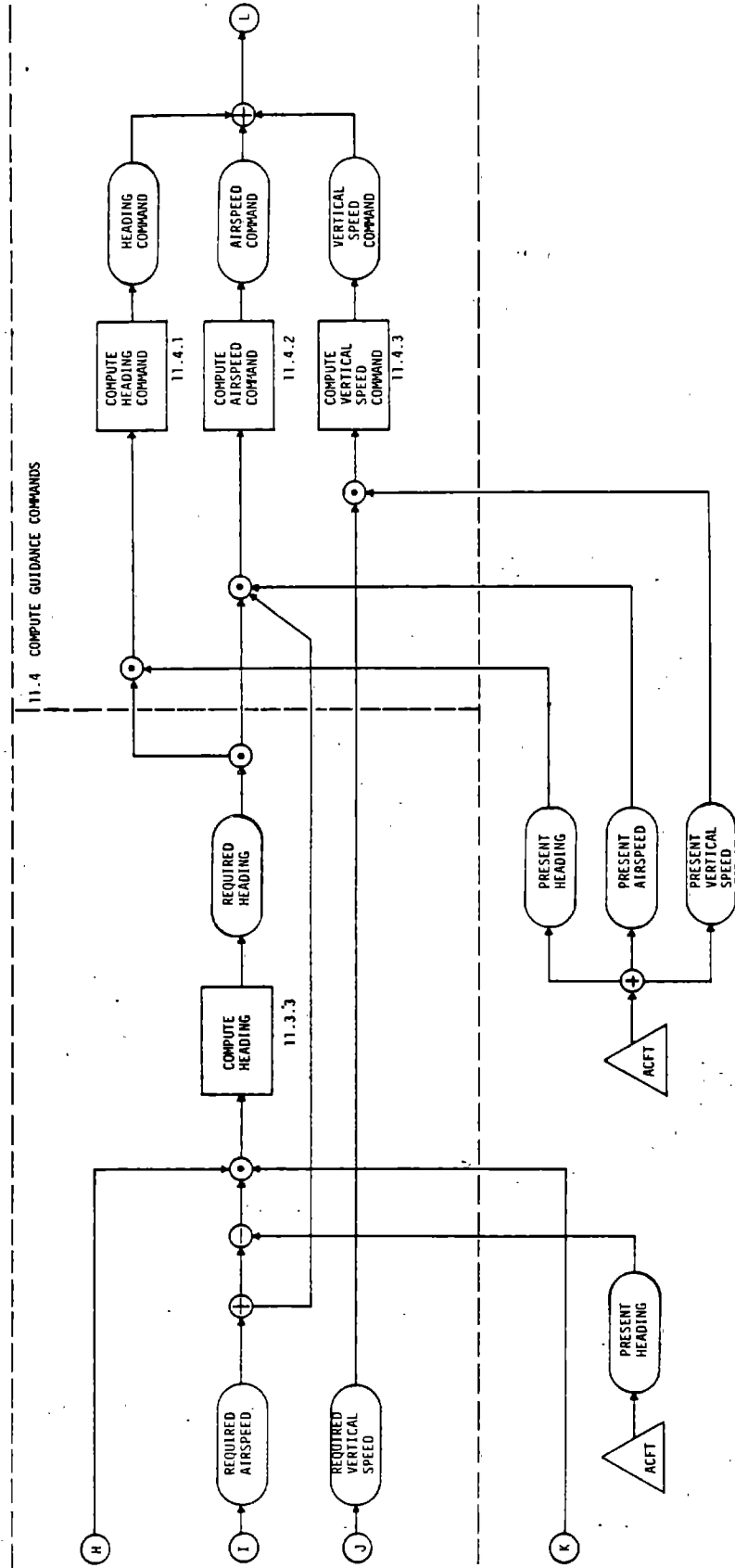
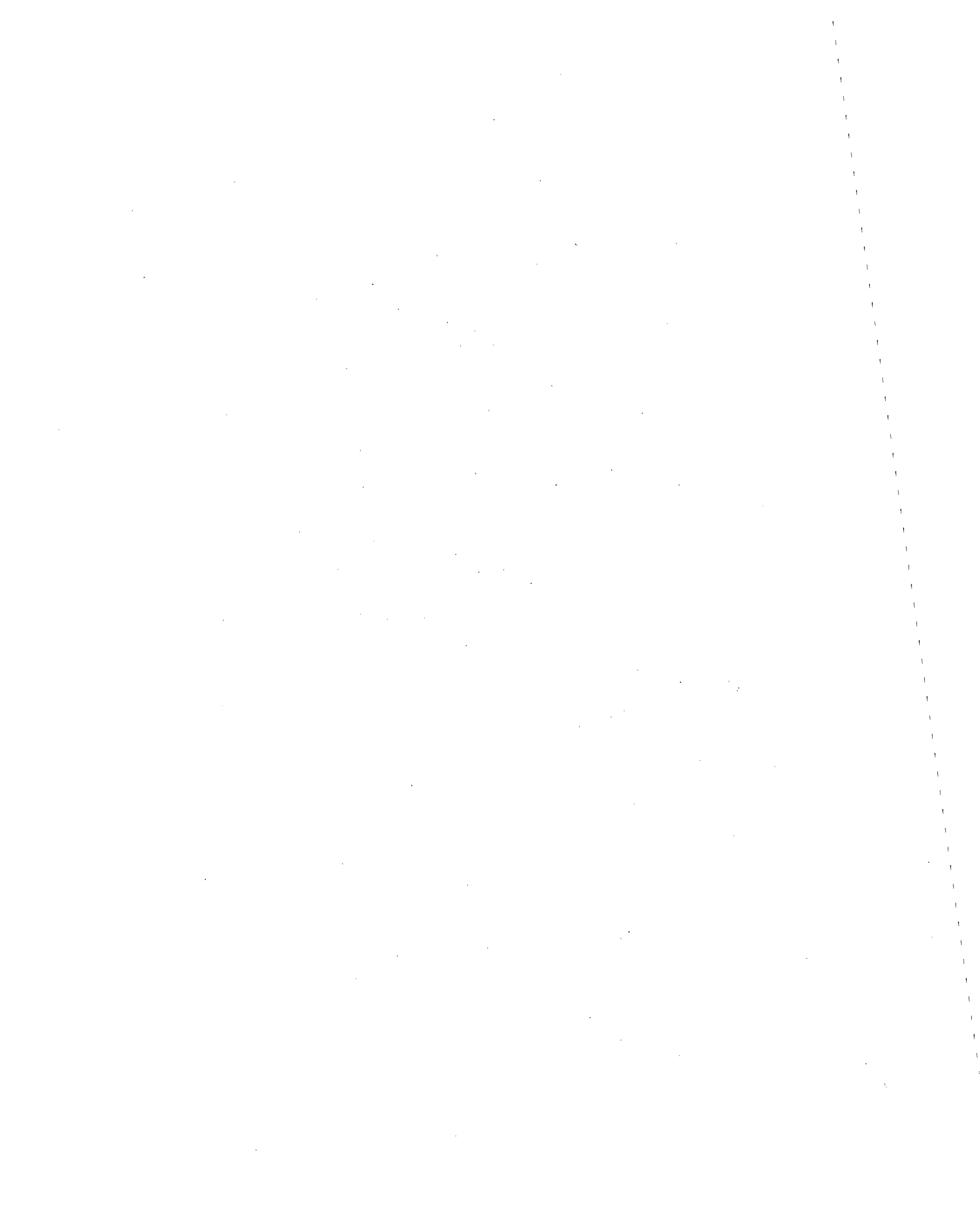


FIGURE 4.11-1. FUNCTION 11-0: PROVIDE AIRCRAFT GUIDANCE (SHEET 3 OF 4)





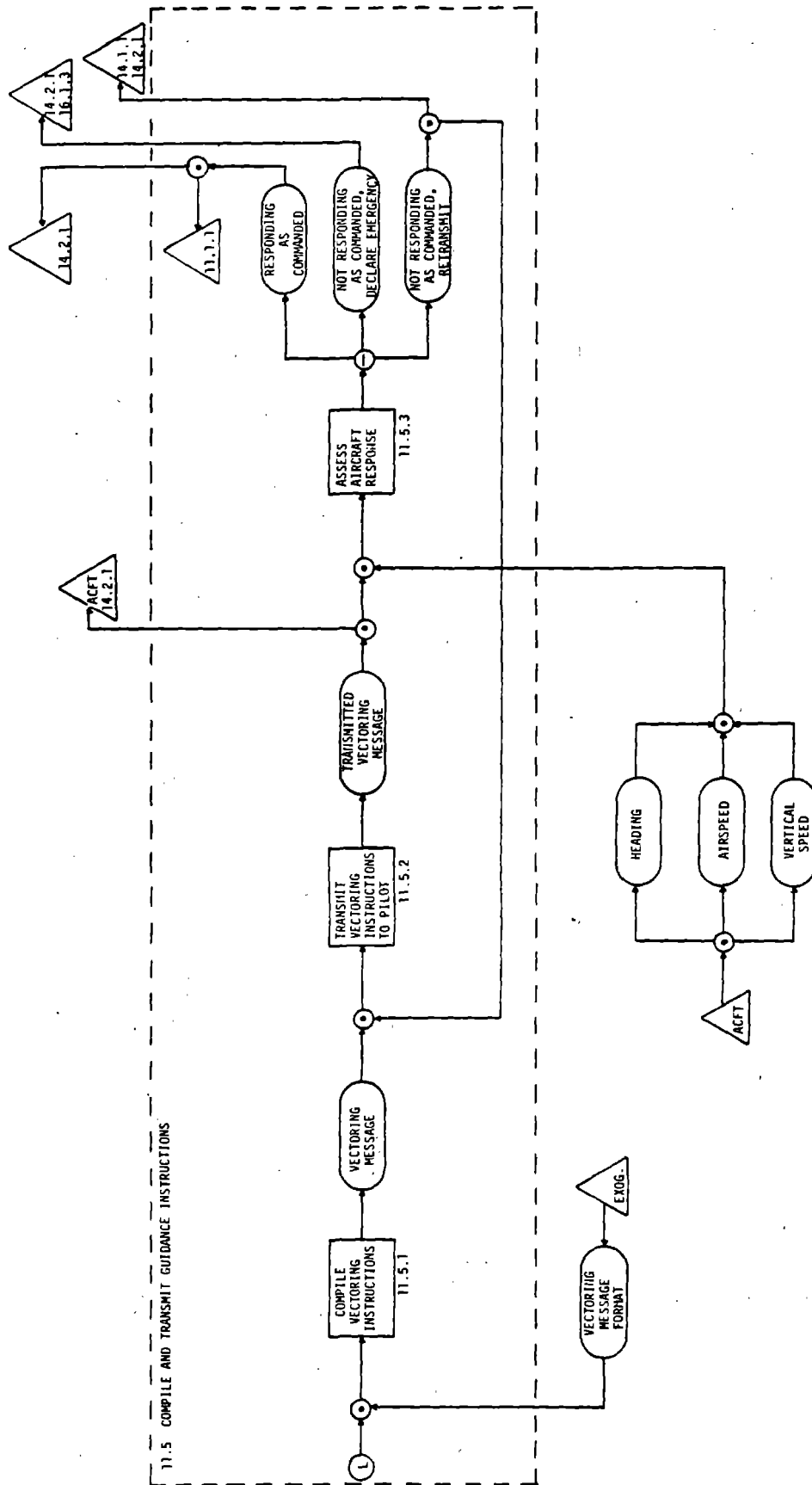
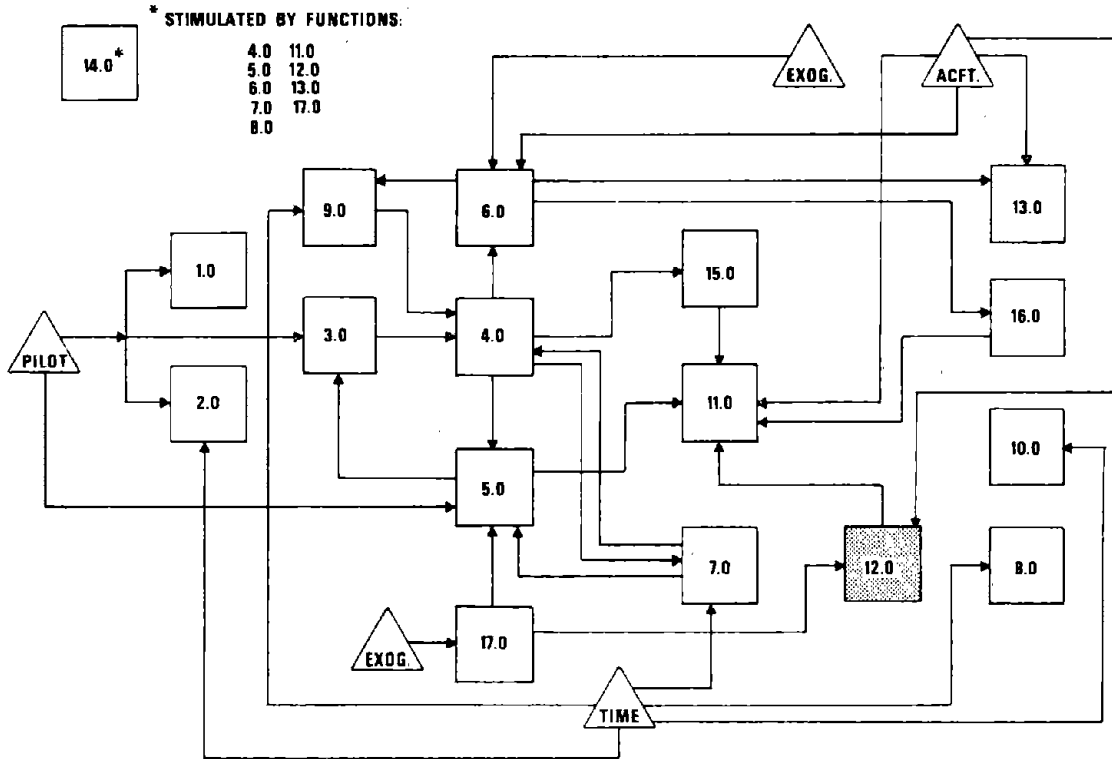


FIGURE 4.11-1. FUNCTION 11.0: PROVIDE AIRCRAFT GUIDANCE (SHEET 4 OF 4)



## FUNCTION 12.0: ISSUE FLIGHT ADVISORIES AND INSTRUCTIONS



- 1.0: PROVIDE FLIGHT PLANNING INFORMATION
- 2.0: CONTROL TRAFFIC FLOW
- 3.0: PREPARE FLIGHT PLAN
- 4.0: PROCESS FLIGHT PLAN
- 5.0: ISSUE CLEARANCES AND CLEARANCE CHANGES
- 6.0: MONITOR AIRCRAFT PROGRESS
- 7.0: MAINTAIN CONFORMANCE WITH FLIGHT PLAN
- 8.0: ASSURE SEPARATION OF AIRCRAFT
- 9.0: CONTROL SPACING OF AIRCRAFT
- 10.0: PROVIDE AIRBORNE, LANDING AND GROUND NAVIGATION CAPABILITY
- 11.0: PROVIDE AIRCRAFT GUIDANCE
- 12.0: ISSUE FLIGHT ADVISORIES AND INSTRUCTIONS
- 13.0: HANDOFF
- 14.0: MAINTAIN SYSTEM RECORDS
- 15.0: PROVIDE ANCILLARY AND SPECIAL SERVICES
- 16.0: PROVIDE EMERGENCY SERVICES
- 17.0: MAINTAIN SYSTEM CAPABILITY AND STATUS INFORMATION

12.0 ISSUE FLIGHT ADVISORIES AND INSTRUCTIONS

12.1 Service Request for Information

- 12.1.1 Receive pilot's request for information
- 12.1.2 Acknowledge pilot request for information
- 12.1.3 Select applicable preformatted messages
- 12.1.4 Retrieve information requested
- 12.1.5 Compile special response to request
- 12.1.6 Transmit preformatted advisory to pilot
- 12.1.7 Transmit special response to pilot

12.2 Issue Flight Service Advisories and Instructions

- 12.2.1 Evaluate advisory for data content
- 12.2.2 Determine aircraft to which information applies
- 12.2.3 Determine method of flight advisory distribution
- 12.2.4 Determine distribution position for each identified aircraft
- 12.2.5 Determine time of simultaneous distribution
- 12.2.6 Prepare transmission schedule
- 12.2.7 Correlate present position with distribution position

12.3 Notify Pilot of Imminent Encounter with Hazardous Weather Phenomenon

- 12.3.1 Determine endangered aircraft
- 12.3.2 Compile alert message
- 12.3.3 Transmit warning advisory to pilot
- 12.3.4 Receive pilot's response

SUBFUNCTION DESCRIPTION

FILE: 12.1

SUBFUNCTION: Service Request for Information

FUNCTION: Provide Flight Advisories and Instruction

- OUTPUTS:
- (1) Transmitted preformatted advisory message
  - (2) Information requested not available
  - (3) Transmitted special response
  - (4) Acknowledgement of pilot request

DESCRIPTION:

Purpose: To receive and acknowledge a pilot's request for information, obtain the format and transmit the information in response to the request

Stimulus: Event-stimulated by receipt of pilot's request for information

- Tasks:
- (1) Receive pilot's request for information
  - (2) Acknowledge pilot's request for information
  - (3) Select applicable preformatted messages
  - (4) Retrieve information requested
  - (5) Compile special response to request
  - (6) Transmit preformatted advisory to pilot
  - (7) Transmit specially formatted message to pilot

Critical Performance Parameters:

- (1) Availability
- (2) Completeness
- (3) Flexibility
- (4) Accuracy

Allocation Sensitivities:

- INPUTS:
- (1) From Subfunction 16.2, Determine Required Response to Emergency:
    - Description of required technical instruction
  - (2) From the aircraft:
    - Pilot's information request
  - (3) From exogenous sources:
    - Response message format
  - (4) From Subfunction 17.1, Determine Current and Forecast Weather:
    - Stored weather sequences
    - Stored weather forecasts
  - (5) From Subfunction 17.2, Update Rules and Procedures Information:
    - Stored data base items (rules and procedures)
  - (6) From Subfunction 17.4, Update Route Information:
    - Stored data base items (routes information)
  - (7) From Subfunction 17.5, Update Airspace Restrictions Information:
    - Stored data base items (airspace restrictions)
  - (8) From Subfunction 17.6, Update Hazards to Flight Information:
    - Stored data base items (flight hazard information)
  - (9) From Subfunction 17.7, Determine Capabilities and Status of COMM-NAV:
    - Stored data base items (COMM-NAV system status)
  - (10) From Subfunction 17.8, Determine Capability and Status of Ground Facilities:
    - Stored data base items (ground facilities status)

- (11) From Subfunction 17.9, Maintain User Class and Aircraft Performance Capabilities Information:
  - Stored user class data base item
- (12) From Subfunction 17.10, Compile Traffic Summaries:
  - Stored traffic data
- (13) From Subfunction 17.11, Store System Capability and Status Information:
  - Printouts (NOTAMS)
  - Voice tapes
  - Electronic displays
- (14) From exogenous source:
  - Message format
- (15) From Subfunction 12.2, Issue Flight Advisories and Instructions:
  - Planned distribution position for each aircraft
  - Aircraft at distribution position
  - Advisory distribution list of times
- (16) From Subfunction 2.3, Determine and Resolve Capacity Overload Situations:
  - Terminal delays
- (17) From Subfunction 15.2, Initiate Action to Provide Service:
  - Description of required advisories

TASK DESCRIPTION

FILE: 12.1.1

TASK: Receive Pilot's Request for Information

SUBFUNCTION: Service Requests for Information

FUNCTION: Provide Flight Advisories and Instructions

OUTPUTS: Pilot's request

DESCRIPTION:

Purpose: To receive and enter requests for information from pilots in flight

Stimulus: Event-stimulated by receipt of pilot's request for flight information

Decisions and Actions:

- (1) Monitor for incoming request
- (2) Detect incoming requests
- (3) Interpret incoming request
- (4) Enter request into the system

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Availability
- (2) Accuracy
- (3) Flexibility

Performance Capability Required:

- (1) Monitoring:
  - Watch keeping
- (2) Sensing:
  - Discrimination



(3) Information processing:

- Encoding

(4) Interpreting:

- Interpolation

Allocation Sensitivities:

External Constraints:

INPUTS: (1) From aircraft:

- Pilot information request message

TASK DESCRIPTION

FILE: 12.1.2

TASK: Acknowledge Pilot's Request for Information

SUBFUNCTION: Service Requests for Information

FUNCTION: Provide Flight Advisories and Instructions

OUTPUTS: Acknowledgement of pilot's request

DESCRIPTION:

Purpose: To inform the pilot that his request for information has been received and will be serviced

Stimulus: Event-stimulated by receipt of a pilot's request for information (Task 12.1.1)

Decisions and Actions:

- (1) Compose or select acknowledgement message
- (2) Transmit acknowledgement message

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Availability
- (2) Flexibility

Performance Capabilities Required:

- (1) Responding:
  - Communication
  - Verification
- (2) Information processing:
  - Encoding/decoding

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 12.1.1, Receive Pilot's Request for Information:
    - Pilot's request
  - (2) From exogenous:
    - Response message format

TASK DESCRIPTION

FILE: 12.1.3

TASK: Select Applicable Preformatted Messages

SUBFUNCTION: Service Requests for Information

FUNCTION: Provide Flight Advisories and Instructions

- OUTPUTS:
- (1) Selected preformatted message
  - (2) Decision that a special message must be compiled

DESCRIPTION:

Purpose: To determine if pilot's request can be serviced by the available preformatted messages

Stimulus: Event-stimulated by receipt of request for information from the pilot, of description of required advisories (Task 15.2.5), or of description of required technical instruction

Decisions and Actions:

- (1) Determine if preformatted message is available
- (2) Select preformatted message

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Availability
- (2) Validity

Performance Capabilities Required:

- (1) Interpreting:
  - Classification
- (2) Decision making:
  - Selection/choice
- (3) Storing and retrieving information:
  - Selective retrieval

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 12.1.1, Receive Pilot's Request for Information:
    - Pilot's request
  - (2) From Task 17.11.2, Compile Preformatted Data Modules:
    - Printouts (NOTAMS)
    - Voice tapes
    - Electronic displays
  - (3) From Task 16.2.5, Determine Required Technical Instructions to Aircraft in Emergency Situation:
    - Description of required technical instruction
  - (4) From Task 15.2.5, Determine Advisories Required:
    - Description of required advisories

TASK DESCRIPTION

FILE: 12.1.4

TASK: Retrieve Information Requested

SUBFUNCTION: Service Requests for Information

FUNCTION: Provide Flight Advisories and Instructions

OUTPUT: (1) Information requested not available  
(2) Information for response to request

DESCRIPTION:

Purpose: To determine availability of and to collect the information to answer the pilot's request

Stimulus: Event-stimulated by the decision to compile special message (Task 12.1.3)

Decision and Actions:

- (1) Determine what information to retrieve
- (2) Formulate instructions to retrieve information
- (3) Obtain information to fulfill request, if available

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Availability
- (2) Completeness

Performance Capabilities Required:

- (1) Information processing:
  - Sorting
- (2) Storing and retrieving information:
  - Selective retrieval/recall
- (3) Interpreting:
  - Association

(4) Decision making:

- Induction/inference/deduction

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 12.1.3, Select Applicable Preformatted Messages:
    - Decision to compile special message
  - (2) From Task 17.1.8, Store Weather Information:
    - Stored weather sequences
    - Stored weather forecasts
  - (3) From Task 17.10.3, Store Traffic Data:
    - Stored traffic data
  - (4) From Task 17.2.6, Store Data Base Items:
    - Stored data base items (rules and procedures)
  - (5) From Task 17.4.6, Store Data Base Items:
    - Stored data base items (routes information)
  - (6) From Task 17.7.5, Store Data Base Items:
    - Stored data base items (COMM-NAV system status)
  - (7) From Task 17.8.5, Store Data Base Items:
    - Stored data base items (ground facilities status)
  - (8) From Task 17.6.6, Store Data Base Items:
    - Stored data base items (flight hazards information)
  - (9) From Task 17.5.6, Store Data Base Items:
    - Stored data base items (airspace restrictions)

- (10) From Task 17.9.6, Store User Class Data Base Items:
  - Stored user class data base items
- (11) From Task 2.3.4, Determine Where Delays Are to Be Absorbed:
  - Terminal delays



TASK DESCRIPTION

FILE: 12.1.5

TASK: Compile Special Response to Request

SUBFUNCTION: Service Requests for Information

FUNCTION: Provide Flight Advisories and Instructions

OUTPUT: Compiled special response to pilot's information request

DESCRIPTION:

Purpose: To place the response to the pilot's request in the proper format for transmission

Stimulus: Event-stimulated by receipt of information retrieved in response to pilot's request

Decisions and Actions:

- (1) Compile the information into proper format and prepare message for transmission

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Validity
- (2) Completeness

Performance Capabilities Required:

- (1) Information Processing:
  - Merging
  - Encoding

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 12.1.4, Determine Availability of Information Requested:
    - Information for response to request
    - Information requested not available
  - (2) From exogenous source:
    - Message format

TASK DESCRIPTION

FILE: 12.1.6

TASK: Transmit Preformatted Advisory to Pilot

SUBFUNCTION: Service Requests for Information

FUNCTION: Provide Flight Advisories and Instructions

OUTPUTS: Transmitted preformatted message to pilot

DESCRIPTION:

Purpose: To transmit preformatted advisories to the pilot

Stimulus: Event-stimulated by selection of a preformatted message in response to pilot's request, by having reached the time at which an ATC-initiated advisory is to be released, or by an aircraft's arrival at a message distribution position

Decisions and Actions:

Transmit preformatted message to pilot

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Completeness
- (2) Timeliness

Performance Capabilities Required:

- (1) Responding:
  - Data transmission/communications
- (2) Information processing:
  - Encoding/decoding

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 12.1.3, Select Applicable Preformatted Messages:
    - Selected preformatted message
  - (2) From Task 12.2.7, Correlate Present Position with Distribution Position:
    - Aircraft at distribution position
  - (3) From Task 12.2.6, Prepare Transmission Schedule:
    - Advisory distribution list of times
  - (4) From Task 17.11.2, Compile Preformatted Data Modules:
    - Printouts (NOTAMS)
    - Voice tapes
    - Electronic displays

TASK DESCRIPTION

FILE: 12.1.7

TASK: Transmit Special Response to Pilot

SUBFUNCTION: Service Requests for Information

FUNCTION: Provide Flight Advisories and Instructions

OUTPUTS: Transmitted specially formatted message to pilot

DESCRIPTION:

Purpose: To transmit specially formatted information to the pilot

Stimulus: Event-stimulated by the compiled response to pilot's request

Decisions and Actions:

Transmit compiled response

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Completeness
- (2) Timeliness

Performance Capabilities Required:

- (1) Responding:
  - Data transmission/communication
- (2) Information processing:
  - Encoding/decoding

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 12.1.5, Compile Information Requested:
    - Compiled special response to pilot's information request
  - (2) From Task 12.2.4, Determine Advisory Distribution Time For Each Identified Aircraft:
    - Planned distribution position of advisories to each aircraft

SUBFUNCTION DESCRIPTION

FILE: 12.2

SUBFUNCTION: Issue Flight Advisories and Instructions

FUNCTION: Provide Flight Advisories and Instructions

- OUTPUTS:
- (1) Planned distribution position for each aircraft
  - (2) Aircraft at distribution position
  - (3) Advisory distribution list of times
  - (4) No applicable aircraft

DESCRIPTION:

Purpose: To determine the information content, geographic area and aircraft involved, and release times of the advisory

Stimulus: Event-stimulated by the receipt of an advisory from Function 17.0

- Tasks:
- (1) Evaluate advisory for data content
  - (2) Determine aircraft to which information applies
  - (3) Determine method of flight advisory distribution
  - (4) Determine distribution position for each identified aircraft
  - (5) Determine time of simultaneous distribution
  - (6) Prepare transmission schedule
  - (7) Correlate present position with distribution position

Critical Performance Parameters:

- (1) Validity
- (2) Timeliness
- (3) Accuracy
- (4) Flexibility
- (5) Completeness

Allocation Sensitivities:

- INPUTS:
- (1) From Subfunction 17.11, Store System Capability and Status Information:
    - Printouts (NOTAMS)
    - Voice tapes
    - Electronic displays
  - (2) From Subfunction 4.4, Determine Responsibility for Control and Communications:
    - Accepted flight plan
  - (3) From exogenous source:
    - Priority distribution paradigm
    - Flight advisory distribution paradigm
    - Time stimulus
    - Advisory priority distribution paradigm
  - (4) From Subfunction 6.1, Determine Present Position:
    - Aircraft present position and identity



TASK DESCRIPTION

FILE: 12.2.1

TASK: Evaluate Advisory for Data Content

SUBFUNCTION: Issue Flight Advisories and Instructions

FUNCTION: Provide Flight Advisories and Instructions

- OUTPUTS:
- (1) Advisory information content
  - (2) Position or geographic area involved

DESCRIPTION:

Purpose: To determine the geographic position and the information content of the advisory

Stimulus: Event-stimulated by the receipt of a flight advisories (Task 17.11.2)

Decisions and Actions:

- (1) Breakdown flight advisory into position and content categories
- (2) Format each category for subsequent function utilization

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Completeness
- (2) Utility
- (3) Accuracy

Performance Capabilities Required:

- (1) Information processing:
  - Analysis
- (2) Interpreting:
  - Classification
- (3) Decision making:
  - Induction/inference/deduction

Allocation Sensitivities:

External Constraints:

- INPUTS:           (1) From Task 17.11.2, Compile Preformatted Data Modules:
- Printouts (NOTAMS)
  - Voice tapes
  - Electronic displays

TASK DESCRIPTION

FILE: 12.2.2

TASK: Determine Aircraft to Which Information Applies

SUBFUNCTION: Issue Flight Advisories and Instructions

FUNCTION: Provide Flight Advisories and Instructions

- OUTPUTS:           (1) Identification of applicable aircraft  
                    (2) No applicable aircraft

DESCRIPTION:

Purpose:       To relate the advisory position data to the accepted flight plan for the purpose of identifying those aircraft which are affected by the flight service advisory (this includes the possibility of the advisory going to all aircraft)

Stimulus:    Event-stimulated by the receipt of advisory position data (Task 12.2.1)

Decisions and Actions:

- (1) Compare advisory position data with accepted flight plans
- (2) Specify affected aircraft by ATC identification number

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Timeliness
- (2) Validity

Performance Capabilities Required:

- (1) Information processing:
  - Sorting
- (2) Decision making:
  - Selection/choice
- (3) Interpreting:
  - Association

(4) Storing and retrieving information:

- Selective retrieval/recall

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 12.2.1, Evaluate Advisory for Data Content:
    - Position or geographic area involved
    - Advisory information content
  - (2) From Task 4.4.1, Receive and Enter Pilot's Response:
    - Accepted flight plan

TASK DESCRIPTION

FILE: 12.2.3

TASK: Determine Method of Flight Advisory Distribution

SUBFUNCTION: Issue Flight Advisories and Instructions

FUNCTION: Provide Flight Advisories and Instructions

- OUTPUTS:
- (1) Distribution at specified position to identified aircraft
  - (2) Distribution simultaneously to all identified aircraft

DESCRIPTION:

Purpose: To determine the method to be followed for informing the pilot(s) of flight advisories

Stimulus: Event-stimulated by receipt of aircraft identification(s) (Task 12.2.2)

Decisions and Actions:

Compare distribution paradigm with the number of aircraft identified and advisory content to determine method of distribution

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Validity
- (2) Timeliness

Performance Capabilities Required:

- (1) Interpreting:
  - Classification
- (2) Decision making:
  - Selection/choice

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 12.2.2, Determine Aircraft to Which Information Applies:
    - Identification of applicable aircraft
  - (2) From Task 12.2.1, Evaluate Advisory for Data Content:
    - Advisory information content
  - (3) From exogenous source:
    - Flight advisory distribution paradigm

TASK DESCRIPTION

FILE: 12.2.4

TASK: Determine Distribution Position for Each Identified Aircraft

SUBFUNCTION: Issue Flight Advisories and Instructions

FUNCTION: Provide Flight Advisories and Instructions

OUTPUTS: Planned distribution position of advisories to each aircraft

DESCRIPTION:

Purpose: To determine where, in terms of the intended time-position profile, the aircraft is to receive the advisory

Stimulus: Event-stimulated by the determination that the advisory will be distributed to each identified aircraft when it reaches a specified position in its flight

Decisions and Actions:

Compare advisory position data with accepted flight plan to determine the aircraft position at which the advisory will be issued

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Accuracy
- (2) Validity

Performance Capabilities Required:

- (1) Information processing:
  - Calculations
- (2) Interpreting:
  - Association
- (3) Decision making:
  - Selection/choice
- (4) Storing and retrieving information:
  - Selective retrieval/recall

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 12.2.3, Determine Method of Flight Advisory Distribution:
    - Distribution at specified position to identified aircraft
  - (2) From Task 12.2.1, Evaluate Advisory for Data Content:
    - Position or geographic area involved
  - (3) From Task 4.4.1, Receive and Enter Pilot's Response:
    - Accepted flight plan



TASK DESCRIPTION

FILE: 12.2.5

TASK: Determine Time of Simultaneous Distribution

SUBFUNCTION: Issue Flight Advisories and Instructions

FUNCTION: Provide Flight Advisories and Instructions

OUTPUTS: Release time of simultaneous advisory distribution

DESCRIPTION:

Purpose: To determine when the advisory is to be "broadcast" after the decision has been made to notify all aircraft simultaneously

Stimulus: Event-stimulated by the decision that all aircraft are going to be notified simultaneously (Task 12.2.3)

Decisions and Actions:

- (1) Determine distribution priority
- (2) Compare the advisory information content with the advisory distribution paradigm to determine when the advisory will be released

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Validity
- (2) Flexibility

Performance Capabilities Required:

- (1) Information processing:
  - Analysis
- (2) Interpreting:
  - Classification
- (3) Decision making:
  - Selection/choice

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 12.2.3, Determine Method of Flight Advisory Distribution:
    - Distribution simultaneously to all identified aircraft
  - (2) From Task 12.2.1, Evaluate Advisory for Data Content:
    - Advisory information content
  - (3) From exogenous source:
    - Advisory priority distribution paradigm

TASK DESCRIPTION

FILE: 12.2.6

TASK: Prepare Transmission Schedule

SUBFUNCTION: Issue Flight Advisories and Instructions

FUNCTION: Provide Flight Advisories and Instructions

- OUTPUTS:
- (1) Advisory distribution list of times
  - (2) Advisory distribution list of positions

DESCRIPTION:

Purpose: To prepare a schedule for transmitting advisories to the aircraft

Stimulus: Event-stimulated by determination of the planned distribution position (Task 12.2.4) or time (Task 12.2.5) for each aircraft

Decisions and Actions:

Determine a sequential ordering of advisory transmissions

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Accuracy
- (2) Availability
- (3) Flexibility

Performance Capabilities Required:

- (1) Information processing:
  - Sorting
  - Ordering
- (2) Interpreting:
  - Association
- (3) Decision making:
  - Selection/choice

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 12.2.5, Determine Time of Simultaneous Distribution:
    - Release time of simultaneous advisory distribution
  - (2) From Task 12.2.4, Determine Distribution Position of Each Identified Aircraft:
    - Planned distribution position of advisories to each aircraft

TASK DESCRIPTION

FILE: 12.2.7

TASK: Correlate Present Position with Distribution Position

SUBFUNCTION: Issue Flight Advisories and Instructions

FUNCTION: Provide Flight Advisories and Instructions

- OUTPUTS:
- (1) Aircraft at distribution position
  - (2) Aircraft not at distribution position

DESCRIPTION:

Purpose: To determine when the actual aircraft position agrees with the planned distribution position

Stimulus: Initially event-stimulated by the receipt of the planned distribution position for each aircraft; subsequently time-stimulated until the aircraft is at the distribution position

Decisions and Actions:

Compare aircraft position with planned distribution position

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Timeliness
- (2) Accuracy

Performance Capabilities Required:

- (1) Information processing:
  - Calculation
- (2) Decision making:
  - Comparison with standard
- (3) Interpreting:
  - Association

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 12.2.6, Prepare Transmission Schedule:
    - Advisory distribution list of positions
  - (2) From Task 6.1.1, Receive/Enter Correlated Position and Identification (or Task 6.1.3 or 6.1.5):
    - Correlated position and identification
  - (3) From exogenous source:
    - Time stimulus
  - (4) From Task 12.2.7, Correlate Present Position with Distribution Position:
    - Aircraft not at distribution position

SUBFUNCTION DESCRIPTION

FILE: 12.3

SUBFUNCTION: Notify Pilot of Imminent Encounter with Hazardous Weather Phenomenon

FUNCTION: Provide Flight Advisories and Instruction

OUTPUTS: (1) Transmitted message to pilot  
(2) Vectoring desired  
(3) No vectoring desired  
(4) No response

DESCRIPTION:

Purpose: To relate advisory position data to the predicted aircraft position for the purpose of identifying endangered aircraft, and to compile and transmit alert message to the endangered aircraft

Stimulus: Event-stimulated by receipt of weather phenomenon position (Subfunction 17.1)

Tasks: (1) Determine endangered aircraft  
(2) Compile alert message  
(3) Transmit warning advisory to pilot  
(4) Receive pilot response

Critical Performance Parameters:

- (1) Validity
- (2) Speed
- (3) Completeness

Allocation Sensitivities:

INPUTS: (1) From Subfunction 17.1, Determine Current and Forecast Weather:  
● Stored severe weather phenomenon data  
(2) From Subfunction 6.3, Predict Future Position/ETAs of Aircraft:  
● Short-range predicted time-position profile

(3) From exogenous source:

- Transmission format

(4) From the aircraft:

- No response
- Response



TASK DESCRIPTION

FILE: 12.3.1

TASK: Determine Endangered Aircraft

SUBFUNCTION: Notify Pilot of Imminent Encounter with Hazardous Weather Phenomenon

FUNCTION: Provide Flight Advisories and Instructions

OUTPUTS: Identification of endangered aircraft

DESCRIPTION:

Purpose: To relate advisory position data to the predicted aircraft position for the purpose of identifying endangered aircraft

Stimulus: Event-stimulated by receipt of severe weather position data

Decisions and Actions:

- (1) Compare severe weather position data with short-range predicted profile
- (2) Specify affected aircraft

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Speed
- (2) Validity

Performance Capabilities Required:

- (1) Information processing:
  - Sorting
  - Merging
- (2) Decision making:
  - Selection/choice
- (3) Interpreting:
  - Association
- (4) Sensing:
  - Signal detection

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 6.3.2, Compute Short-Range Extrapolations:
    - Short-range predicted time-position profile for the aircraft
  - (2) From Task 17.1.8, Store Weather Information:
    - Stored severe weather phenomenon data

TASK DESCRIPTION

FILE: 12.3.2

TASK: Compile Alert Message

SUBFUNCTION: Notify Pilot of Imminent Encounter with Hazardous Weather  
Phenomenon

FUNCTION: Provide Flight Advisories and Instructions

OUTPUTS: Compiled alert message for aircraft

DESCRIPTION:

Purpose: To compile and format the alert message for transmission

Stimulus: Event-stimulated by identification of endangered aircraft

Decisions and Actions:

Compile information into proper format and prepare for  
transmission

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Validity
- (2) Speed
- (3) Completeness

Performance Capabilities Required:

- (1) Information processing:
  - Merging
  - Encoding

Allocation Sensitivities:

External Constraints:

- INPUTS: (1) From Task 17.1,8, Store Weather Information:
- Stored severe weather phenomenon data

- (2) From exogenous source:
  - Transmission format
- (3) From Task 12.3.1, Determine Endangered Aircraft:
  - Identification of endangered aircraft

TASK DESCRIPTION

FILE: 12.3.3

TASK: Transmit Warning Advisory to Pilot

SUBFUNCTION: Notify Pilot of Imminent Encounter with Hazardous Weather Phenomenon

FUNCTION: Provide Flight Advisories and Instructions

OUTPUTS: Transmitted message to pilot

DESCRIPTION:

Purpose: To transmit warning message to affected aircraft

Stimulus: Event-stimulated by compilation of an alert message to an aircraft (Task 12.3.2) or by no response from pilot (Task 12.3.4)

Decisions and Actions:

Transmit message to pilot

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Completeness
- (2) Timeliness

Performance Capabilities Required:

- (1) Responding:
  - Data transmission/communication
- (2) Information processing:
  - Encoding/decoding

Allocation Sensitivities:

External Constraints:

- INPUTS: (1) From Task 12.3.2, Compile Alert Message:
- Compiled alert message for aircraft

(2) From Task 12.3.4, Receive Pilot's Response:

- No response

TASK DESCRIPTION

FILE: 12.3.4

TASK: Receive Pilot Response

SUBFUNCTION: Notify Pilot of Imminent Encounter with Hazardous Weather Phenomenon

FUNCTION: Provide Flight Advisories and Instructions

- OUTPUTS:
- (1) No response
  - (2) Vectoring desired
  - (3) No vectoring desired

DESCRIPTION:

Purpose: To receive pilot's response indicating he does or does not desire vectoring around the weather phenomenon

Stimulus: Event-stimulated by transmission of the warning advisory to the aircraft (Task 12.3.3)

Decisions and Actions:

Receive pilot's response if forthcoming, and accommodate pilot's request

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Capacity
- (2) Availability

Performance Capabilities Required:

- (1) Monitoring:
  - Vigilance
  - Surveillance
- (2) Sensing:
  - Discrimination
- (3) Information processing:
  - Sorting

- (4) Interpreting:
  - Classification
- (5) Revision making:
  - Selection/choice

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From the aircraft:
    - Pilot's response
    - No response
  - (2) From Task 12.3.3, Transmit Warning Advisory to Pilot:
    - Transmitted message to pilot



Table 4.12-I. Flow of Information  
Function 12.0: Provide Flight Advisories and Instructions

TASK	INPUTS		OUTPUTS	
	IDENTIFICATION	SOURCE	IDENTIFICATION	DESTIN.
12.1.1	*Pilot's information request	Acft	Pilot's request	12.1.2
12.1.2	*Pilot's request Response message format	12.1.1 Exog.	Acknowledgement of pilot's request	Acft
12.1.3	*Pilot's request *Description of required advisories *Description of required technical instructions Printouts (NOTAMS) Voice Tapes Electronic displays	12.1.1 15.2.5 16.2.5 17.11.2 17.11.2 17.11.2	Selected preformatted message Special message must be compiled	12.1.6 12.1.4
12.1.4	*Special message must be compiled Stored weather sequences Stored weather forecasts Stored traffic data Rules and procedures Route information COMM-NAV system status Ground facilities status Flight hazards information Airspace restrictions User class data Terminal delays	12.1.3 17.1.8 17.1.8 17.10.3 17.2.6 17.4.6 17.7.5 17.8.5 17.6.6 17.5.6 17.9.6 2.3.4	Information not available Information for re- sponse to request	16.1.3 12.1.5 12.1.5
12.1.5	*Information for response to request Message format Information requested not available	12.1.4 Exog. 12.1.4	Compiled special re- sponse to request	12.1.7

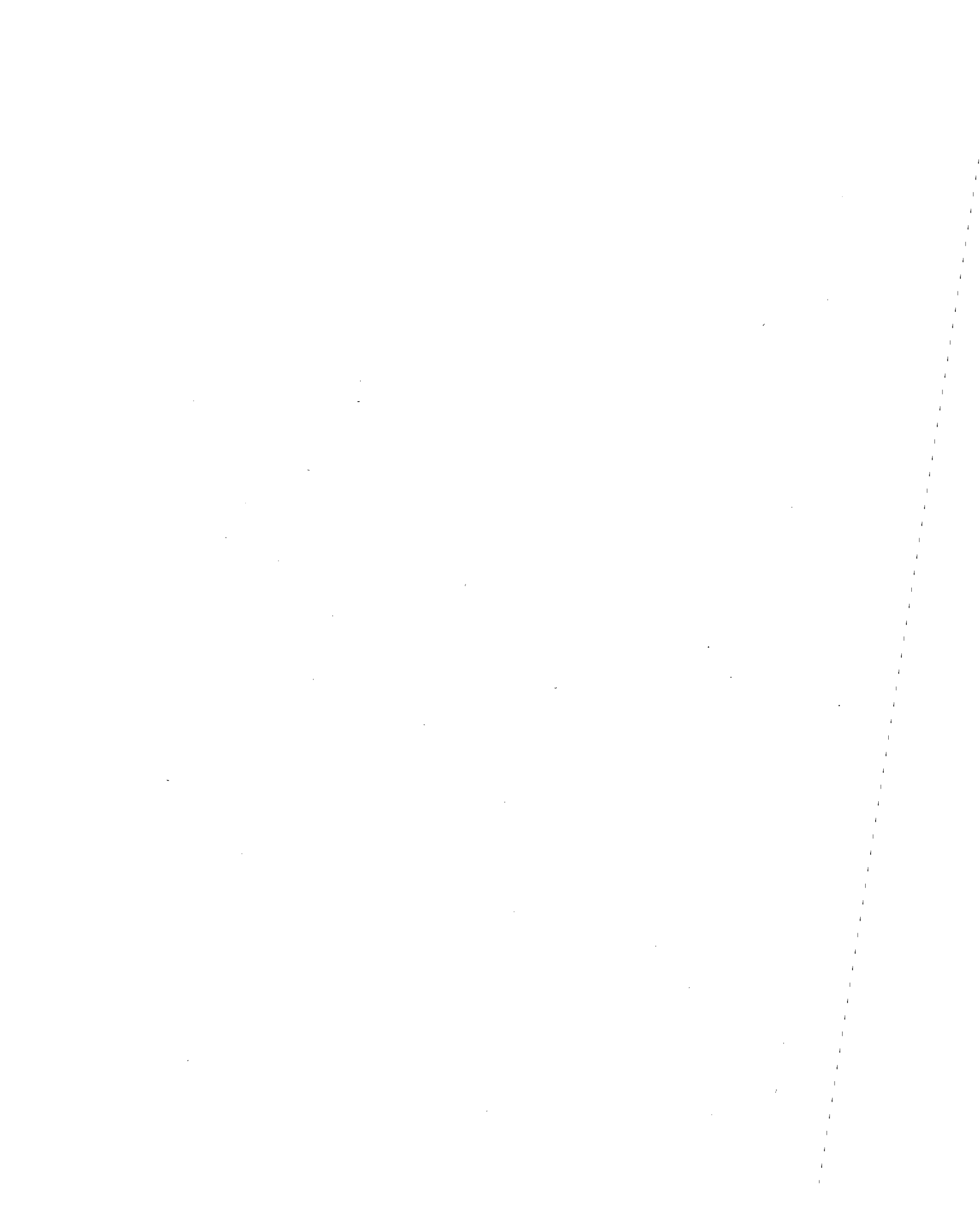
\*Task stimulus

Table 4.12-I, Flow of Information  
Function 12.0: Provide Flight Advisories and Instructions (Cont'd.)

TASK	INPUTS		OUTPUTS	
	IDENTIFICATION	SOURCE	IDENTIFICATION	DESTIN.
12.1.6	*Selected preformatted message	12.1.3	Transmitted preformatted advisory	Acft 14.2.1
	*Aircraft at distribution position	12.2.7		
	*Advisory distribution list of times	12.2.6		
	Voice tapes	17.11.2		
	Printouts (NOTAMS)	17.11.2		
	Electronic displays	17.11.2		
12.1.7	*Compiled special response to request	12.1.5	Transmitted specially formatted message	Acft 14.2.1
	Planned distribution position for each aircraft	12.2.4		
12.2.1	*Printouts (NOTAMS)	17.11.2	Advisory information content	12.2.2 12.2.3 12.2.5
	*Voice tapes	17.11.2		
	*Electronic displays	17.11.2		
12.2.2	Advisory information content	12.2.1	Identification of applicable aircraft	12.2.3
	*Position or geographic area involved	12.2.1	No applicable aircraft	End
	Accepted flight plan	4.4.1		
12.2.3	*Identification of applicable aircraft	12.2.2	Distribute at specified position to identified aircraft	12.2.4
	Advisory information content	12.2.1	Distribute simultaneously to all aircraft	12.2.5
	Flight advisory distribution paradigm	Exog.		
12.2.4	*Distribute at specified position to identified acft	12.2.3	Planned position of distribution to each aircraft	12.1.7 12.2.6
	Position or geographic area involved	12.2.1		
	Accepted flight plan	4.4.1		

Table 4.12-I. Flow of Information  
Function 12.0: Provide Flight Advisories and Instructions (Cont'd.)

TASK	INPUTS		OUTPUTS	
	IDENTIFICATION	SOURCE	IDENTIFICATION	DESTIN.
12.2.5	*Distribute simultaneously to all aircraft Advisory information content Advisory priority distribution paradigm	12.2.3 12.2.1 Exog.	Release time of simultaneous advisory distribution	12.2.6
12.2.6	*Planned distribution position for each aircraft *Release time of simultaneous advisory distribution	12.2.4 12.2.5	Advisory distribution list of times Advisory distribution list of positions	12.1.6 12.2.7
12.2.7	*Advisory distribution list of positions *Time stimulus Correlated position and identification Aircraft not at distribution position	12.2.6 Exog. 6.1.1 6.1.3 6.1.5 12.2.7	Aircraft at distribution position Aircraft not at distribution position	12.1.6 12.2.7
12.3.1	Short-range predicted time-position profile *Stored severe weather data	6.3.2 17.1.8	Identification of endangered aircraft	12.3.2
12.3.2	*Identification of endangered aircraft Stored severe weather data Transmission format	12.3.1 17.1.8 Exog.	Compiled alert message for aircraft	12.3.3
12.3.3	*Compiled alert message for aircraft *No response (from aircraft)	12.3.2 13.3.4	Transmitted message to aircraft	Acft
12.3.4	Pilot's response No response *Transmitted message to aircraft	Acft Acft	Vectoring desired No vectoring desired No response	11.1.1 14.2.1 End 14.2.1 14.3.3



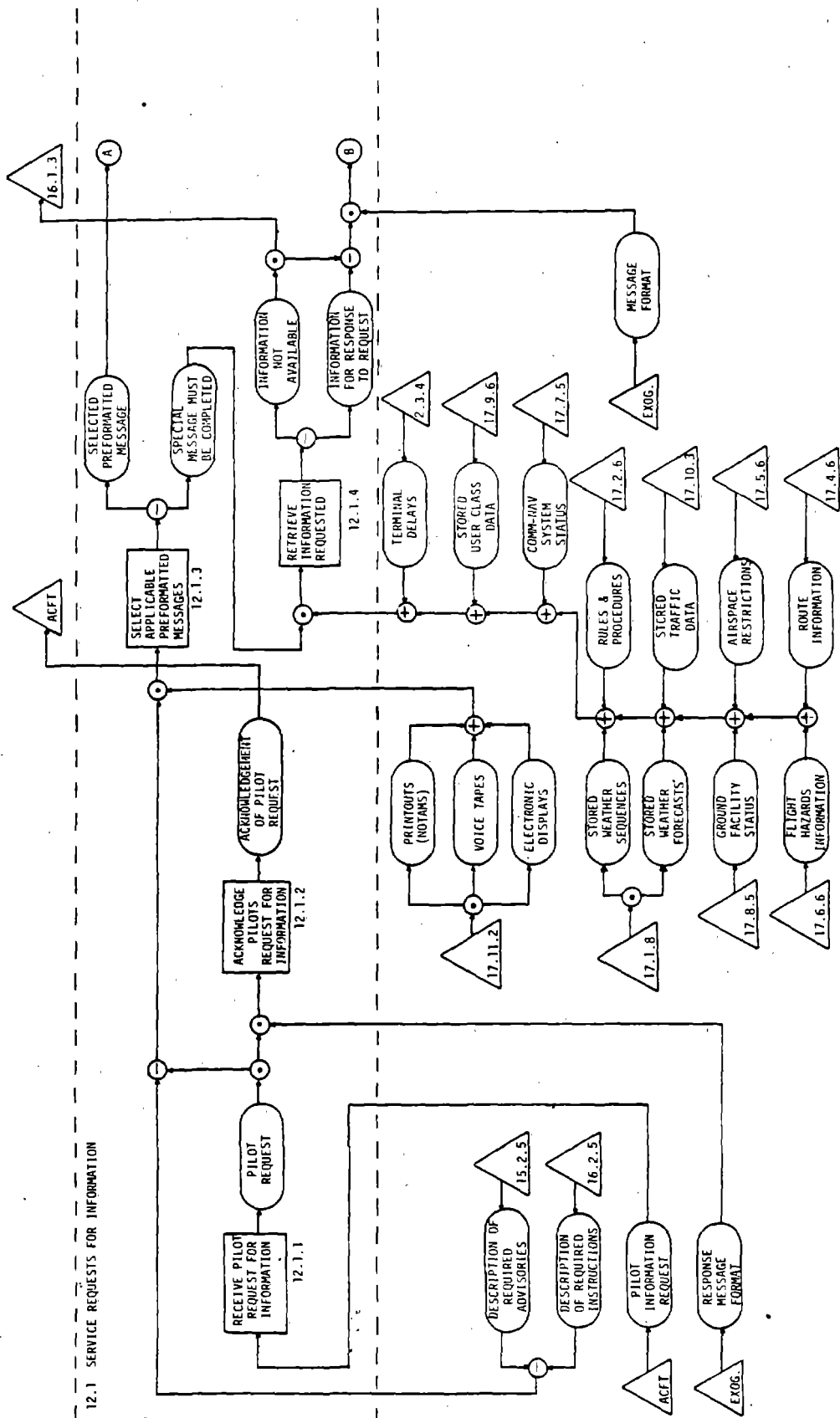
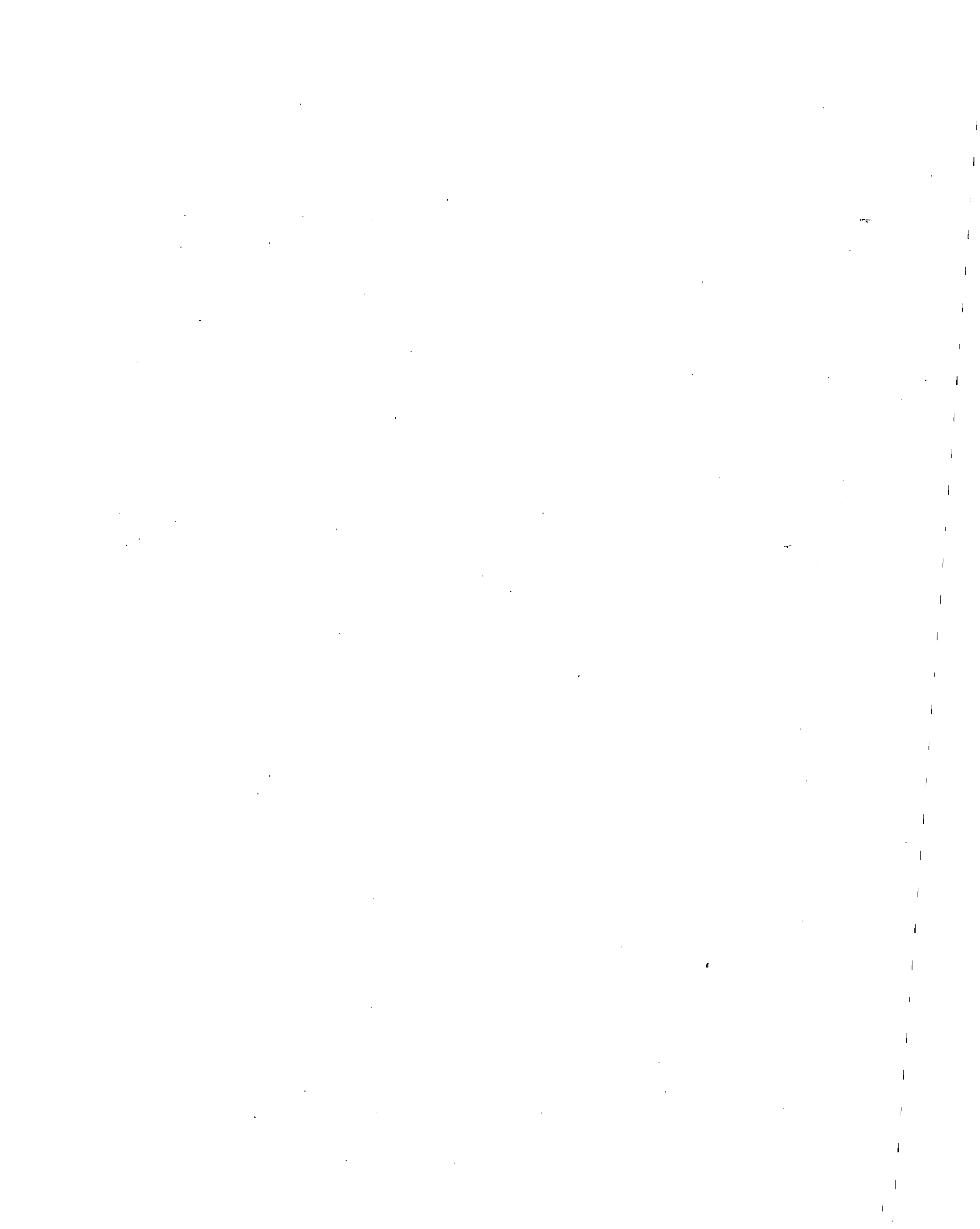


FIGURE 4.12-1. FUNCTION 12.0: PROVIDE FLIGHT ADVISORIES AND INSTRUCTION (SHEET 1 OF 5)

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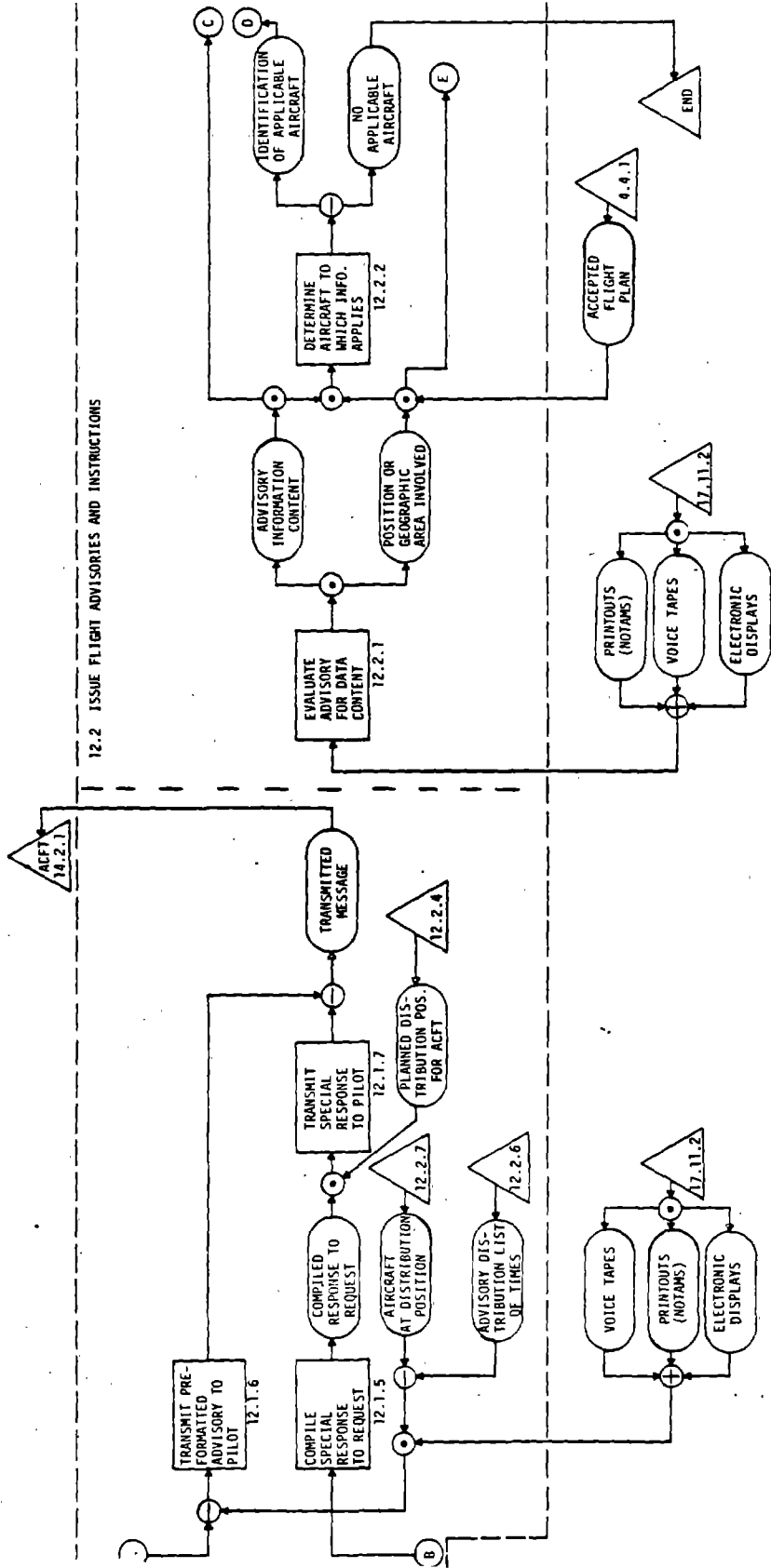


FIGURE 4.12-1. FUNCTION 12.0: PROVIDE FLIGHT ADVISORIES AND INSTRUCTION (SHEET 2 OF 5)





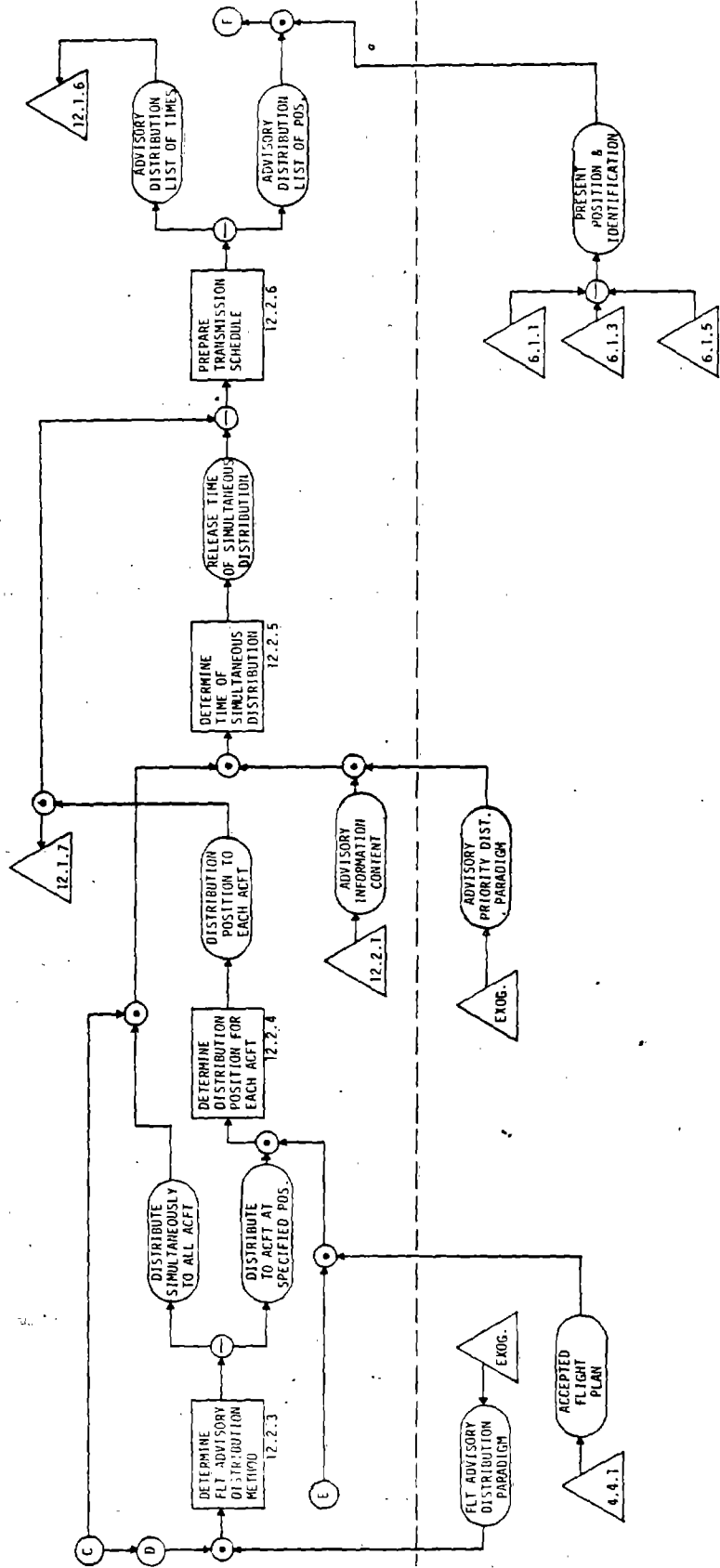
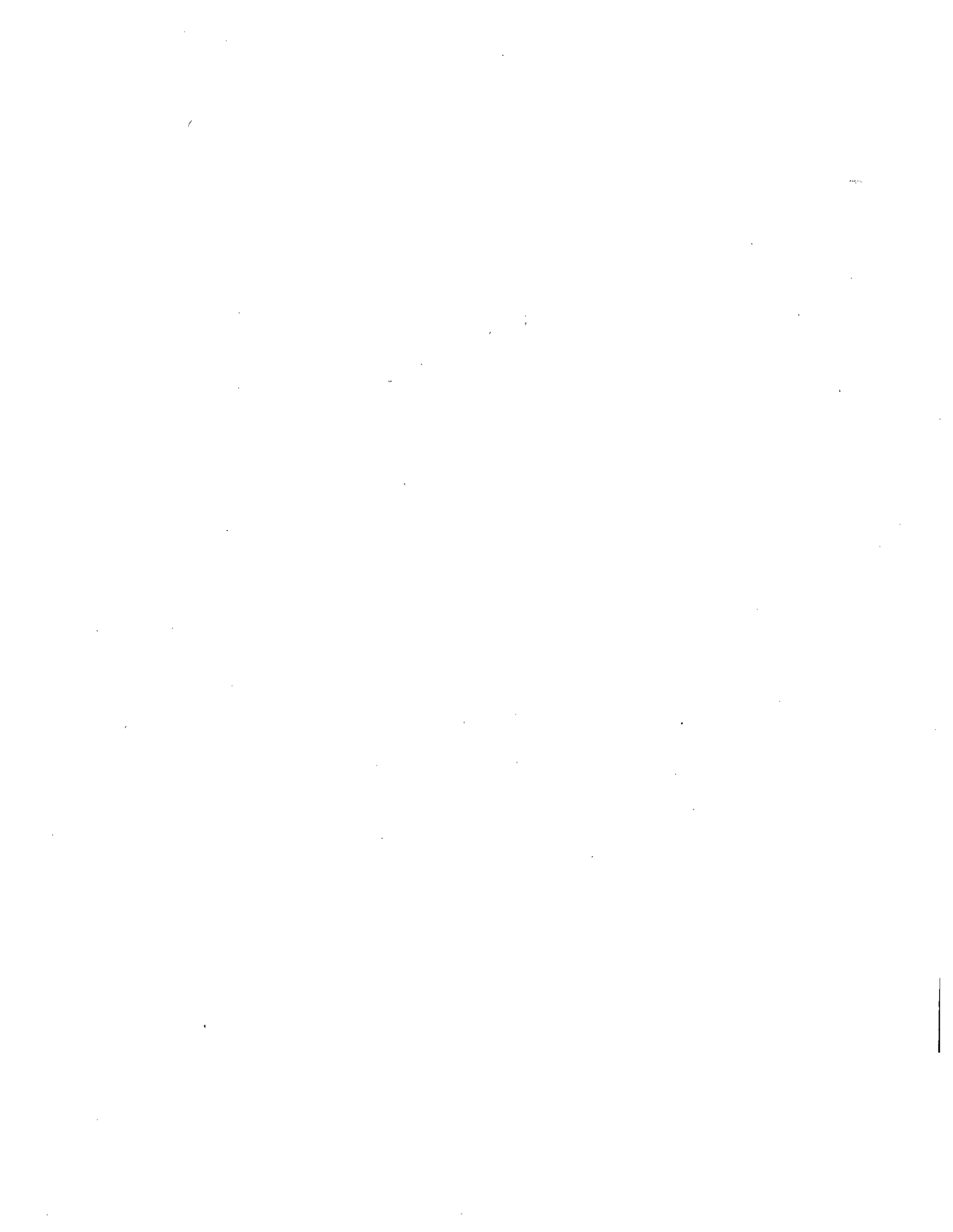


FIGURE 4.12-1. FUNCTION 12.0: PROVIDE FLIGHT ADVISORIES AND INSTRUCTION (SHEET 3 OF 5)



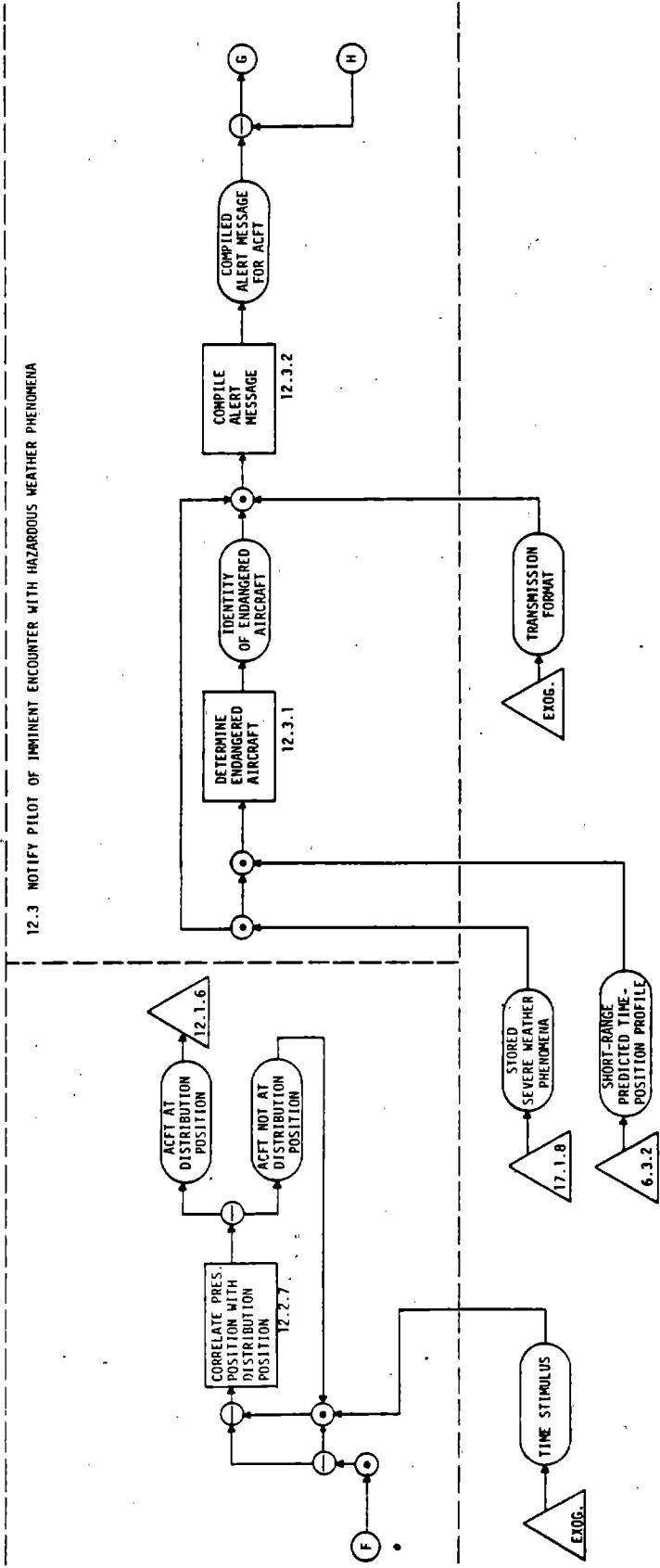


FIGURE 4.12-1. FUNCTION 12.0: PROVIDE FLIGHT ADVISORIES AND INSTRUCTION (SHEET 4 OF 5)



Figure 4.12-55

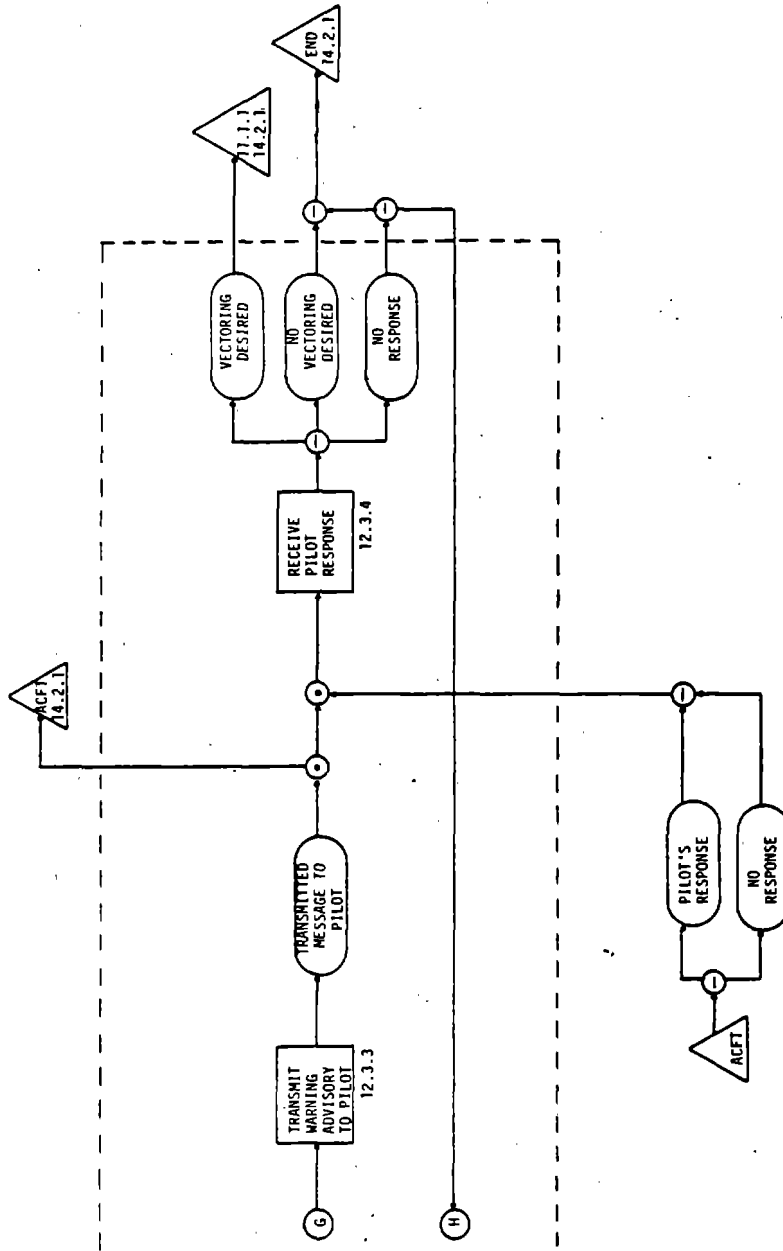
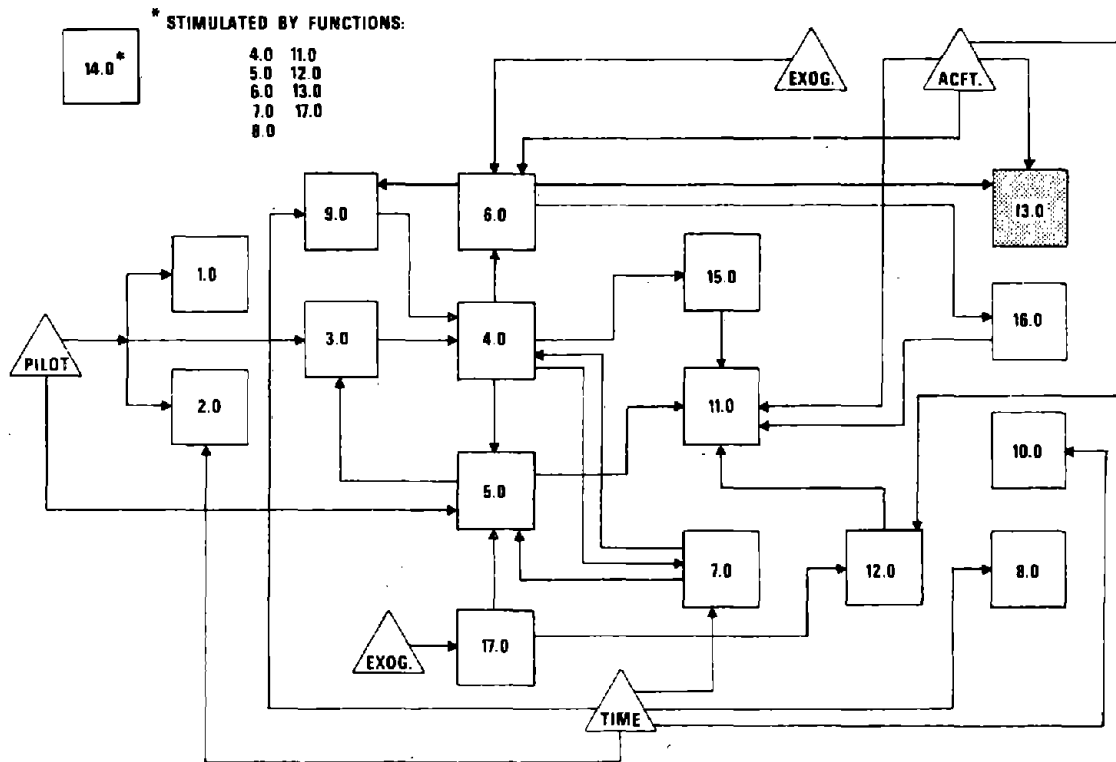


FIGURE 4.12-1. FUNCTION 12.0: PROVIDE FLIGHT ADVISORIES AND INSTRUCTION (SHEET 5 OF 5)



## FUNCTION 13.0: HANDOFF



- 1.0: PROVIDE FLIGHT PLANNING INFORMATION
- 2.0: CONTROL TRAFFIC FLOW
- 3.0: PREPARE FLIGHT PLAN
- 4.0: PROCESS FLIGHT PLAN
- 5.0: ISSUE CLEARANCES AND CLEARANCE CHANGES
- 6.0: MONITOR AIRCRAFT PROGRESS
- 7.0: MAINTAIN CONFORMANCE WITH FLIGHT PLAN
- 8.0: ASSURE SEPARATION OF AIRCRAFT
- 9.0: CONTROL SPACING OF AIRCRAFT
- 10.0: PROVIDE AIRBORNE, LANDING AND GROUND NAVIGATION CAPABILITY
- 11.0: PROVIDE AIRCRAFT GUIDANCE
- 12.0: ISSUE FLIGHT ADVISORIES AND INSTRUCTIONS
- 13.0: HANDOFF
- 14.0: MAINTAIN SYSTEM RECORDS
- 15.0: PROVIDE ANCILLARY AND SPECIAL SERVICES
- 16.0: PROVIDE EMERGENCY SERVICES
- 17.0: MAINTAIN SYSTEM CAPABILITY AND STATUS INFORMATION

13.0 HANDOFF

13.1 Determine Handoff Responsibility Requirements

13.1.1 Correlate aircraft position with jurisdictional boundaries

13.1.2 Determine functions to be transferred

13.1.3 Correlate aircraft position with airspace structure boundaries

13.1.4 Receive pilot's request for transfer of responsibility

13.1.5 Determine acceptability to jurisdictions involved

13.2 Determine Communication Channel Assignment

13.2.1 Determine if communication channel change is required

13.2.2 Determine availability of appropriate channels

13.2.3 Designate channel to be used

13.3 Effect Transfer of Responsibility

13.3.1 Transfer responsibility for control

13.3.2 Compile required information for clearance function



SUBFUNCTION DESCRIPTION

FILE: 13.1

SUBFUNCTION: Determine Handoff Responsibility Requirements

FUNCTION: Handoff

- OUTPUTS:
- (1) No ground-to-air/air-to-ground handoff required
  - (2) Ground-to-ground handoff not required
  - (3) Air-to-ground/ground-to-air handoff required (airspace structure handoff)
  - (4) Air-to-ground/ground-to-air handoff required (pilot's request)
  - (5) Ground-to-ground handoff required
  - (6) Jurisdictions involved
  - (7) Functions to be transferred
  - (8) Handoff acceptable to gaining facility
  - (9) Handoff not acceptable to gaining facility

DESCRIPTION:

Purpose: To identify the aircraft, facilities, functions involved, and type of handoff to be effected

Stimulus: Event-stimulated by pilot's request, or aircraft(s) position in relationship to airspace structure or jurisdictional boundary

- Tasks:
- (1) Correlate aircraft position with jurisdictional boundaries
  - (2) Determine functions to be transferred
  - (3) Correlate aircraft position with airspace structure boundaries
  - (4) Receive pilot's request for transfer of responsibility
  - (5) Determine acceptability to jurisdictions involved

Critical Performance Parameters:

- (1) Timeliness

- (2) Validity
- (3) Capacity
- (4) Utility
- (5) Flexibility
- (6) Availability

Allocation Sensitivities:

- INPUTS:
- (1) From the Aircraft:
    - Pilot's request
  - (2) From Subfunction 17.1, Determine Current and Forecast Weather:
    - Stored weather sequences
    - Stored weather forecasts
  - (3) From Subfunction 17.2, Update Rules and Procedures Information:
    - Stored data base items (current rules and procedures)
  - (4) From Subfunction 17.3, Update Airspace Structure and Jurisdictional Boundary Information:
    - Stored data base items (airspace structure and jurisdictional boundary information)
  - (5) From Subfunction 17.4, Update Route Information:
    - Stored data base items (route information)
  - (6) From Subfunction 17.5, Update Airspace Restriction Information:
    - Stored data base items (airspace restriction information)
  - (7) From Subfunction 17.6, Update Hazards to Flight Information:
    - Stored data base items (hazards to flight information)

- (8) From Subfunction 17.7, Determine Capability and Status of Comm-Nav System:
  - Stored data base item (Comm-Nav system status)
- (9) From Subfunction 4.4, Determine Responsibility for Control and Communication:
  - Accepted flight plan
- (10) From Subfunction 6.1, Determine Present Position:
  - Present aircraft position
- (11) From exogenous source:
  - Time stimulus
- (12) From Subfunction 2.3, Determine and Resolve Capacity Overload Situations:
  - Terminal release quotas
  - Enroute jurisdictional release quotas

TASK DESCRIPTION

FILE: 13.1.1

TASK: Correlate Aircraft Position with Jurisdictional Boundaries

SUBFUNCTION: Determine Handoff Responsibility Requirements

FUNCTION: Handoff

- OUTPUTS:
- (1) Ground-to-ground handoff required
  - (2) Ground-to-ground handoff not required
  - (3) Jurisdictions involved

DESCRIPTION:

Purpose: To correlate the aircraft's position with jurisdictional boundaries and to identify the facilities involved

Stimulus: Time-stimulated

Decisions and Actions:

- (1) Compare aircraft position with jurisdictional boundaries
- (2) Determine facilities involved

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Timeliness
- (2) Validity
- (3) Capacity

Performance Capabilities Required:

- (1) Decision making:
  - Deduction
  - Comparison with standard
- (2) Storing and retrieving information:
  - Selective retrieval/recall

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 6.1.1, Receive/Enter Correlated Position and Identification (or Task 6.1.3 or 6.1.5):
    - Correlated position and identification
  - (2) From Task 17.3.6, Store Data Base Items:
    - Stored data base items (airspace structure and jurisdictional boundary information)

TASK DESCRIPTION

FILE: 13.1.2

TASK: Determine Functions to be Transferred

SUBFUNCTION: Determine Handoff Responsibility Requirements

FUNCTION: Handoff

OUTPUTS: Functions to be transferred

DESCRIPTION:

Purpose: To identify the ATM functions which are to be transferred

Stimulus: Event-stimulated by the request for transfer of functional responsibility by the aircraft or mandatory transfer of responsibility due to the aircraft's position in relation to airspace structure or jurisdictional boundaries

Decisions and Actions:

- (1) Review present allocation of function
- (2) Determine functional changes required by crossing jurisdictional or airspace boundaries
- (3) Evaluate function allocation change requested by pilot relative to rules and procedures

Phase of Flight:

All phases except preflight or postflight

Critical Performance Parameters:

- (1) Timeliness
- (2) Utility

Performance Capability Required:

- (1) Decision making:
  - Deduction
  - Comparison with standard
- (2) Storing and retrieving information:
  - Short-term memory

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 13.1.4, Receive Pilot's Request for Transfer of Responsibility:
    - Air-to-ground/ground-to-air handoff required
  - (2) From Task 13.1.3, Correlate Aircraft Position with Airspace Structure:
    - Air-to-ground/ground-to-air handoff required
  - (3) From Task 4.4.1, Receive and Enter Pilot's Response:
    - Accepted flight plan
  - (4) From Task 13.1.1, Correlate Aircraft Position with Jurisdictional Boundaries:
    - Ground-to-ground handoff required
  - (5) From Task 17.2.6, Store Data Base Items:
    - Stored data base items (rules and procedures)
  - (6) From Task 17.3.6, Store Data Base Items:
    - Stored data base items (airspace structure and jurisdictional boundary information)

TASK DESCRIPTION

FILE: 13.1.3

TASK: Correlate Aircraft Position with Airspace Structure Boundaries

SUBFUNCTION: Determine Handoff Responsibility Requirements

FUNCTION: Handoff

- OUTPUTS:
- (1) Air-to-ground/ground-to-air handoff required
  - (2) No handoff required

DESCRIPTION:

Purpose: To correlate the aircraft(s) position with respect to airspace structure and to determine if an air-to-ground or ground-to-air handoff is required

Stimulus: Time-stimulated

Decisions and Actions:

- (1) Note aircraft(s) present and intended position (usually altitude)
- (2) Compare aircraft(s) present and intended position with airspace structure rules and procedures

Phase of Flight:

All phases except preflight, departure taxi, takeoff, landing, arrival taxi and postflight

Critical Performance Parameters:

- (1) Timeliness
- (2) Validity

Performance Capability Required:

- (1) Storing and retrieving information:
  - Selective retrieval/recall
- (2) Decision making:
  - Comparison with standard
  - Deduction



Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 6.1.1, Receive/Enter Correlated Position and Identification (or Task 6.1.3 or 6.1.5):
    - Correlated position and identification
  - (2) From Task 4.4.1, Receive and Enter Pilot's Response:
    - Accepted flight plan
  - (3) From Task 17.3.6, Store Data Base Items:
    - Stored data base items (airspace structure and jurisdiction boundary information)
  - (4) From Task 17.2.6, Store Data Base Items:
    - Stored data base items (rules and procedures)
  - (5) From exogenous source:
    - Time-stimulus

TASK DESCRIPTION

FILE: 13.1.4

TASK: Receive Pilot's Request for Transfer of Responsibility

SUBFUNCTION: Determine Handoff Responsibility Requirements

FUNCTION: Handoff

OUTPUTS: Air-to-ground/ground-to-air handoff required

DESCRIPTION:

Purpose: To receive the pilot's request for an air-to-ground or ground-to-air handoff and to identify the functions involved

Stimulus: Event-stimulated by receipt of a request from the pilot for transfer of responsibility for ATM function(s)

Decisions and Actions:

- (1) Receive pilot's communication
- (2) Determine type handoff requested
- (3) Determine ATM functions involved

Phase of Flight:

All phases except preflight, departure taxi, arrival taxi, postflight

Critical Performance Parameters:

- (1) Flexibility
- (2) Validity
- (3) Timeliness

Performance Capability Required:

- (1) Monitoring:
  - Watch-keeping
- (2) Information processing:
  - Filtering

- (3) Sensing:
  - Signal recognition
- (4) Interpreting:
  - Association
- (5) Storing and retrieving information:
  - Selective retrieval/recall

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From exogenous source:
    - Pilot's request
  - (2) From Task 17.3.6, Store Data Base Items:
    - Stored data base items (airspace structure and jurisdictional boundary information)
  - (3) From Task 17.2.6, Store Data Base Items:
    - Stored data base items (rules and procedures)

TASK DESCRIPTION

FILE: 13.1.5

TASK: Determine Acceptability to Jurisdictions Involved

SUBFUNCTION: Determine Handoff Responsibility Requirements

FUNCTION: Handoff

OUTPUTS: (1) Acceptable handoff  
(2) Not acceptable handoff

DESCRIPTION:

Purpose: To determine the acceptability to the gaining facility of the proposed handoff

Stimulus: Event-stimulated by the determination that there are functions to be transferred

Decisions and Actions:

Determine acceptability of handoff to insure it is consistent with:

- Weather
- Airspace restrictions
- Route information
- Traffic constraints:
- Ground equipment capability and status
- Rules and procedures
- Flight hazard information

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Timeliness
- (2) Availability
- (3) Validity

Performance Capability Required:

- (1) Decision making:
  - Deduction
  - Comparison of alternatives
  - Selection/choice
- (2) Information processing:
  - Analysis
- (3) Interpreting:
  - Association
- (4) Storing and retrieving information:
  - Selective retrieval/recall

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 13.1.4, Receive Pilot's Request for Transfer of Responsibility:
    - Air-to-ground/ground-to-air handoff required
  - (2) From Task 13.1.1, Correlate Aircraft Position with Jurisdictional Boundary:
    - Ground-to-ground handoff required
    - Jurisdictions involved
  - (3) From Task 17.1.8, Store Weather Information:
    - Stored weather sequences
    - Stored weather forecasts
  - (4) From Task 17.2.6, Store Data Base Items:
    - Stored data base items (rules and procedures)

- (5) From Task 17.3.6, Store Data Base Items:
  - Stored data base items (airspace structure and jurisdictional boundary information)
- (6) From Task 17.7.5, Store Data Base Items:
  - Stored data base items (Comm-Nav system status)
- (7) From Task 17.6.6, Store Data Base Items:
  - Stored data base items (flight hazards information)
- (8) From Task 17.5.6, Store Data Base Items:
  - Stored data base items (airspace restrictions information)
- (9) From Task 13.1.3, Correlate Aircraft Position with Airspace Structure Boundaries:
  - Air-to-ground/ground-to-air handoff required
- (10) From Task 17.4.6, Store Data Base Items:
  - Stored data base items (route information)
- (11) From Task 13.1.2, Determine Functions to be Transferred:
  - Functions to be transferred
- (12) From Task 2.3.5, Formulate Flow Control Directives:
  - Terminal release quotas
  - Enroute jurisdictional release quotas

SUBFUNCTION DESCRIPTION

FILE: 13.2

SUBFUNCTION: Determine Communication Channel Assignment

FUNCTION: Handoff

- OUTPUTS:
- (1) Use present channel
  - (2) New channel assignment

DESCRIPTION:

Purpose: To determine if the communication channel presently in use is appropriate for continued use, or a new channel assignment is required

Stimulus: Event-stimulated by handoff acceptable

- Tasks:
- (1) Determine if communication change is required
  - (2) Determine appropriate channels available
  - (3) Designate channels to be used

Critical Performance Parameters:

- (1) Availability
- (2) Flexibility
- (3) Timeliness
- (4) Capacity

Allocation Sensitivities:

- INPUTS:
- (1) From Subfunction 13.1, Determine Handoff Responsibility Requirement:
    - Handoff acceptable
  - (2) From exogenous source:
    - Assignment paradigm
  - (3) From Subfunction 4.4, Determine Responsibility for Control and Communication:
    - Accepted flight plan

- (4) From Subfunction 17.3, Update Airspace Structure and Jurisdictional Boundary Information:
  - Stored data base items (airspace structure and jurisdictional boundary information)
- (5) From Subfunction 17.7, Determine Capability and Status of Comm-Nav System:
  - Stored data base item (Comm-Nav system)



TASK DESCRIPTION

FILE: 13.2.1

TASK: Determine if Communication Channel Change is Required

SUBFUNCTION: Determine Communication Channel Assignment

FUNCTION: Handoff

- OUTPUTS:
- (1) Use present channel
  - (2) New channel required

DESCRIPTION:

Purpose: To determine if communication channel presently being used is appropriate and acceptable for continued use

Stimulus: Event-stimulated by the determination that a handoff is acceptable

Decisions and Actions:

- (1) Determine channel presently in use
- (2) Determine operability of present channel
- (3) Compare present channel with assignment rules and procedures

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Availability
- (2) Flexibility
- (3) Timeliness

Performance Capability Required:

- (1) Storing and retrieving information:
  - Short-term memory
- (2) Decision making:
  - Comparison with standard
  - Deduction
  - Selection/choice

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 13.1.5, Determine Acceptability to Jurisdictions Involved:
    - Handoff acceptable
  - (2) From Task 17.7.5, Store Data Base Items:
    - Stored data base items (Comm-Nav system status)
  - (3) From Task 17.3.6, Store Data Base Items:
    - Stored data base items (airspace structure and jurisdictional boundary information)
  - (4) From Task 4.4.1, Receive and Enter Pilot's Response:
    - Accepted flight plan
  - (5) From exogenous source:
    - Assignment paradigm

TASK DESCRIPTION

FILE: 13.2.2

TASK: Determine Availability of Appropriate Channels

SUBFUNCTION: Determine Communication Channel Assignment

FUNCTION: Handoff

OUTPUTS: Channels available for assignment

DESCRIPTION:

Purpose: To determine the appropriate communication channels available for assignment

Stimulus: Event-stimulated by the determination that a new channel is required

Decisions and Actions:

- (1) Review available channels
- (2) Note those assigned/not assigned

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Flexibility
- (2) Timeliness
- (3) Capacity

Performance Capability Required:

- (1) Storing and retrieving information:
  - Selective retrieval/recall
- (2) Decision making:
  - Comparison with standard
- (3) Interpreting:
  - Association

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 13.2.1, Determine if Communication Channel Change is Required:
    - New channel required
  - (2) From Task 17.7.5, Store Data Base Items:
    - Stored data base items (Comm-Nav system status)
  - (3) From Task 17.3.6, Store Data Base Items:
    - Stored data base items (airspace structure and jurisdictional boundary information)

TASK DESCRIPTION

FILE: 13.2.3  
TASK: Designate Channel to be Used  
SUBFUNCTION: Determine Communication Channel Assignment  
FUNCTION: Handoff

OUTPUTS: New channel assignment

DESCRIPTION:

Purpose: To designate a new channel to be utilized for air-ground communications

Stimulus: Event-stimulated by the determination that suitable channels are available for assignment (Task 13.2.2)

Decisions and Actions:

Select appropriate communication channel to be utilized from those available for assignment

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Availability
- (2) Flexibility

Performance Capability Required:

Decision making:

- Selection/choice

Allocation Sensitivities:

External Constraints:

INPUTS: (1) From Task 13.2.2, Determine Appropriate Channels Available:  

- Channels available for assignment

(2) From exogenous source:

- Assignment paradigm

SUBFUNCTION DESCRIPTION

FILE: 13.3  
SUBFUNCTION: Effect Transfer of Responsibility  
FUNCTION: Handoff

OUTPUTS: (1) Functions transferred  
(2) Responsible facility  
(3) Communication channel

DESCRIPTION:

Purpose: To transfer responsibility for control

Stimulus: Event-stimulated by the decision that a ground-to-ground, ground-to-air, or air-to-ground handoff is acceptable

Tasks: (1) Transfer responsibility for control  
(2) Compile required information for clearance function

Critical Performance Parameters:

- (1) Accuracy
- (2) Timeliness
- (3) Utility

Allocation Sensitivities:

INPUTS: (1) From Subfunction 13.1, Determine Handoff Responsibility Requirement:

- Ground-to-ground handoff required
- Air-to-ground/ground-to-air handoff required (pilot's request)
- Air-to-ground/ground-to-air handoff required (airspace structure)
- Functions to be transferred
- Jurisdictions involved

- (2) From Subfunction 13.2, Determine Communication Channel Assignment:
- New channel assignment
  - Use present channel



TASK DESCRIPTION

FILE: 13.3.1

TASK: Transfer Responsibility for Control

SUBFUNCTION: Effect Transfer of Responsibility

FUNCTION: Handoff

- OUTPUTS:
- (1) Ground-to-ground transfer
  - (2) Ground-to-air transfer
  - (3) Air-to-ground transfer

DESCRIPTION:

Purpose: To transfer responsibility of ATM functions

Stimulus: Event-stimulated by determination in Task 13.1.5 that a handoff is acceptable

Decisions and Actions:

- (1) Transfer responsibility for ground-to-ground handoff
- (2) Transfer responsibility for ground-to-air handoff
- (3) Transfer responsibility for air-to-ground handoff

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Timeliness
- (2) Utility

Performance Capability Required:

Responding:

- Data transmission

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 13.1.4, Receive Pilot's Request for Transfer of Responsibility:
    - Air-to-ground/ground-to-air handoff required
  - (2) From Task 13.1.3, Correlate Aircraft Position with Airspace Structure Boundaries:
    - Air-to-ground/ground-to-air handoff required
  - (3) From Task 13.1.1, Correlate Aircraft Position with Jurisdictional Boundary:
    - Ground-to-ground handoff required
    - Jurisdictions involved
  - (4) From Task 13.1.5, Determine Acceptability to Gaining Facility:
    - Handoff acceptable

TASK DESCRIPTION

FILE: 13.3.2

TASK: Compile Required Information for Clearance Function

SUBFUNCTION: Effect Transfer of Responsibility

FUNCTION: Handoff

- OUTPUTS:
- (1) Functions transferred
  - (2) Responsible facility
  - (3) Communication channel

DESCRIPTION:

Purpose: To compile the handoff information for the clearance function

Stimulus: Event-stimulated by the transfer of responsibility

Decision and Actions:

- Collect and format the handoff information

Phase of Flight:

All phases except preflight and postflight

Critical Performance Parameters:

- (1) Accuracy
- (2) Timeliness

Performance Capability Required:

- (1) Information processing:
  - Encoding/decoding
- (2) Storing and retrieving information:
  - Selective retrieval/recall

Allocation Sensitivities:

External Constraints:

- INPUTS:
- (1) From Task 13.1.1, Correlate Aircraft Position with Jurisdictional Boundaries:
    - Jurisdiction involved
    - Ground-to-ground handoff required
  - (2) From Task 13.1.3, Correlate Aircraft Position with Airspace Structure Boundaries:
    - Air-to-ground/ground-to-air handoff required
  - (3) From Task 13.1.4, Receive Pilot's Request for Transfer of Responsibility:
    - Air-to-ground/ground-to-air handoff required
  - (4) From Task 13.1.2, Determine Functions to be Transferred:
    - Functions to be transferred
  - (5) From Task 13.2.1, Determine if Communication Channel Change is Required:
    - Use present channel
  - (6) From Task 13.2.3, Designate Channels to be Used:
    - New channel assignment
  - (7) From Task 13.3.1, Transfer Responsibility for Control:
    - Ground-to-ground transfer
    - Ground-to-air transfer
    - Air-to-ground transfer

Table 4.13-I. Flow of Information  
Function 13.0: Handoff

TASK	INPUTS		OUTPUTS	
	IDENTIFICATION	SOURCE	IDENTIFICATION	DESTIN.
13.1.1	*Time stimulus	Exog.	Ground-to-ground handoff required	13.1.2
	Correlated position and identification	6.1.1 6.1.3 6.1.5		13.1.5 13.3.1 13.3.2
13.1.2	Airspace structure and jurisdictional boundary information	17.3.6	Ground-to-ground handoff not required	END
	Accepted flight plan	4.4.1	Jurisdictions involved	13.1.5 13.3.1 13.3.2
13.1.2	*Ground-to-ground handoff required	13.1.1	Functions to be transferred	13.1.5 13.3.2
	*Air-to-ground/ground-to-air handoff required	13.1.3		
	*Air-to-ground/ground-to-air handoff required	13.1.4		
	Rules and procedures	17.2.6		
	Airspace structure and juris. boundary info.	17.3.6		
13.1.3	*Time stimulus	Exog.	Air-to-ground/ground-to-air handoff required	13.1.2
	Accepted flight plan	4.4.1		13.1.5
	Correlated position and identification	6.1.1 6.1.3 6.1.5		13.3.1 13.3.2
	Rules and procedures	17.2.6	No handoff required	END
	Airspace structure and juris. boundary info.	17.3.6		
13.1.4	*Pilot's request	Exog.	Air-to-ground/ground-to-air handoff required	13.1.2
	Rules and procedures	17.2.6		13.1.5
	Airspace structure and juris. boundary info.	17.3.6		13.3.1 13.3.2
13.1.5	Jurisdictions involved	13.1.1	Handoff acceptable	13.2.1 13.3.1
	Ground-to-ground handoff required	13.1.1	Handoff not acceptable	5.2.3

\*Task stimulus

Table 4.13-I. Flow of Information  
Function 13.0: Handoff (Cont'd.)

TASK	INPUTS		OUTPUTS	
	IDENTIFICATION	SOURCE	IDENTIFICATION	DESTIN.
13.1.5 (cont'd)	*Function to be transferred	13.1.2		
	Air-to-ground/ground-to-air handoff required	13.1.3		
	Air-to-ground/ground-to-air handoff required	13.1.4		
	Terminal release quotas	2.3.5		
	Enroute jurisdictional release quotas	2.3.5		
	Stored weather sequences	17.1.8		
	Stored weather forecasts	17.1.8		
	Rules and procedures	17.2.6		
	Airspace structure and juris. boundary info.	17.3.6		
	Route information	17.4.6		
	Airspace restrictions	17.5.6		
	Hazards to flight	17.6.6		
	COMM-NAV system status	17.7.5		
13.2.1	*Handoff acceptable	13.1.5	New channel required	13.2.2
	Accepted flight plan	4.4.1	Use present channel	13.3.2
	Airspace structure and juris. boundary info.	17.3.6		
	COMM-NAV system status	17.7.5		
13.2.2	*New channel required	13.2.1	Channels available for assignment	13.2.3
	Airspace structure and juris. boundary info.	17.3.6		
	COMM-NAV system status	17.7.5		
13.2.3	*Channels available for assignment	13.2.2	New channel assignment	13.3.2
	Assignment paradigm	Exog.		
13.3.1	Ground-to-ground handoff required	13.1.1	Ground-to-ground transfer	13.3.2

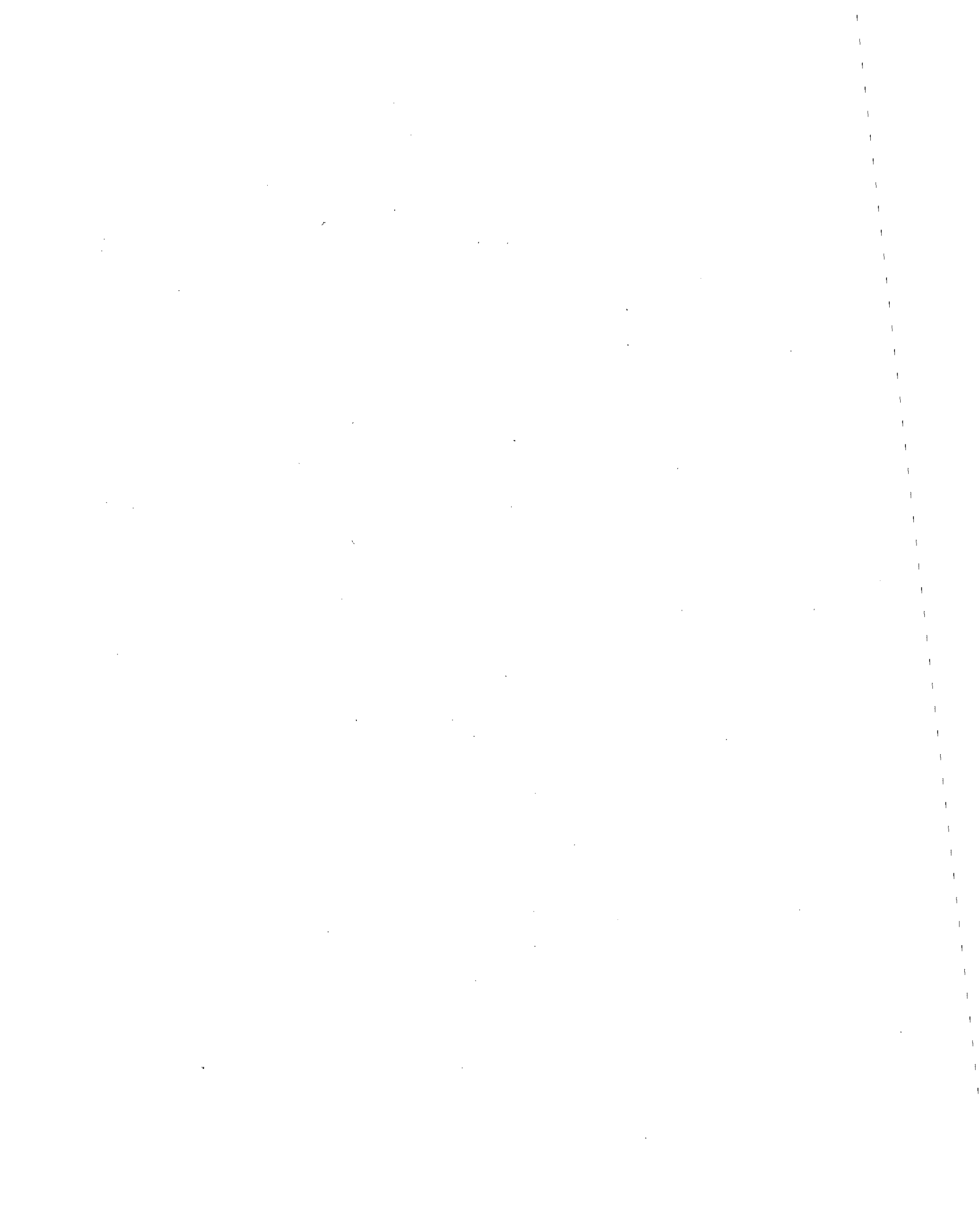
Table 4.13-I. Flow of Information  
Function 13.0: Handoff (Cont'd.)

TASK	INPUTS		OUTPUTS	
	IDENTIFICATION	SOURCE	IDENTIFICATION	DESTIN.
13.3.1 (cont'd)	Air-to-ground/ground-to-air handoff required	13.1.3	Ground-to-air transfer	13.3.2
	Air-to-ground/ground-to-air handoff required	13.1.4	Air-to-ground transfer	13.3.2
	*Handoff acceptable	13.1.5		
13.3.2	Jurisdictions involved	13.1.1	Functions transferred	5.2.4 14.2.1
	Ground-to-ground handoff required	13.1.1	Responsible facility	5.2.4
	Functions to be transferred	13.1.2	Communication channel	5.2.4 14.2.1
	Air-to-ground/ground-to-air handoff required	13.1.3		
	Air-to-ground/ground-to-air handoff required	13.1.4		
	Use present channel	13.2.1		
	New channel assignment	13.2.3		
	*Ground-to-ground transfer	13.3.1		
	*Ground-to-air transfer	13.3.1		
	*Air-to-ground transfer	13.3.1		









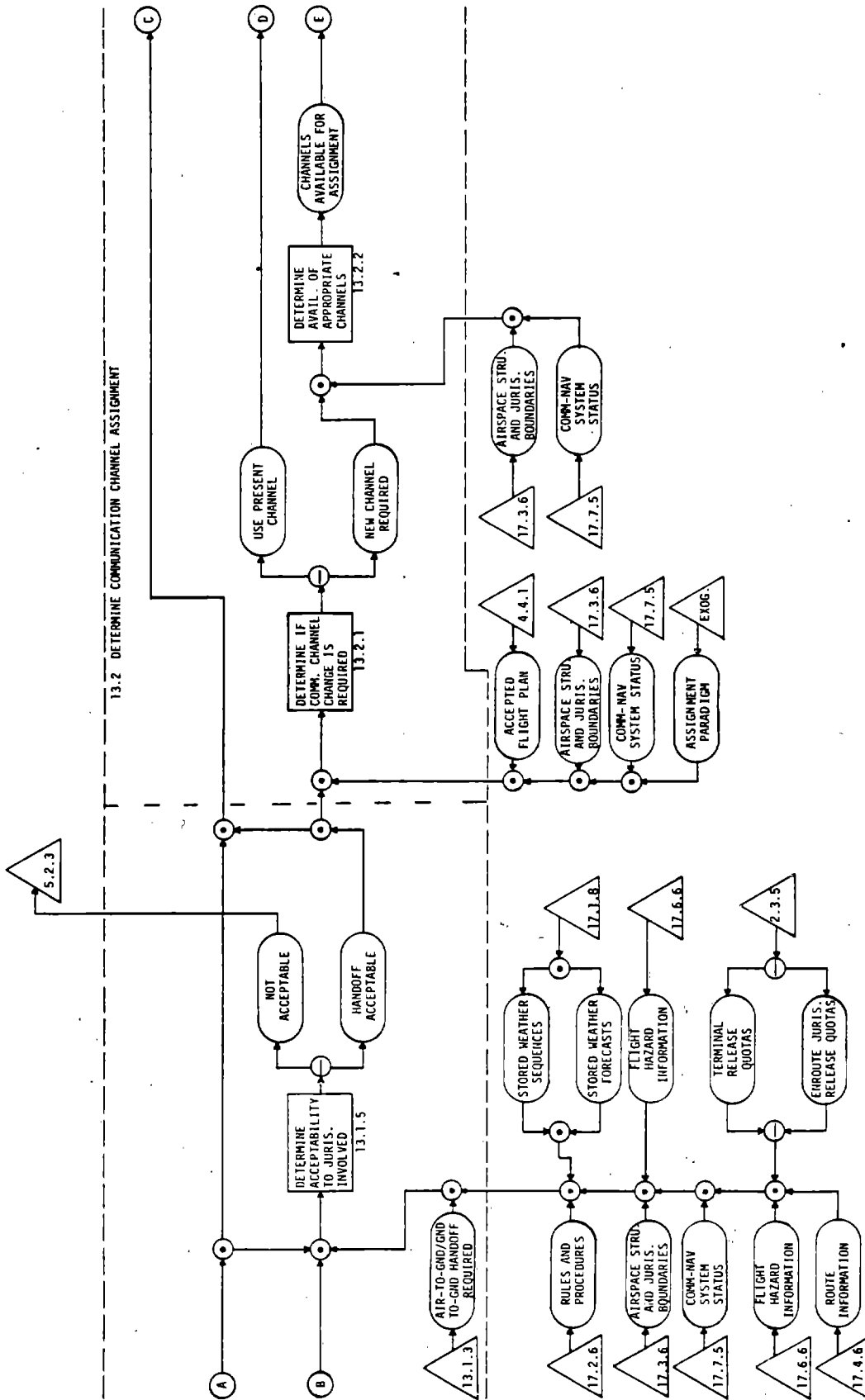


FIGURE 4.13-1. FUNCTION 13.0: DETERMINE HANDOFF RESPONSIBILITY REQUIREMENTS (SHEET 2 OF 3)



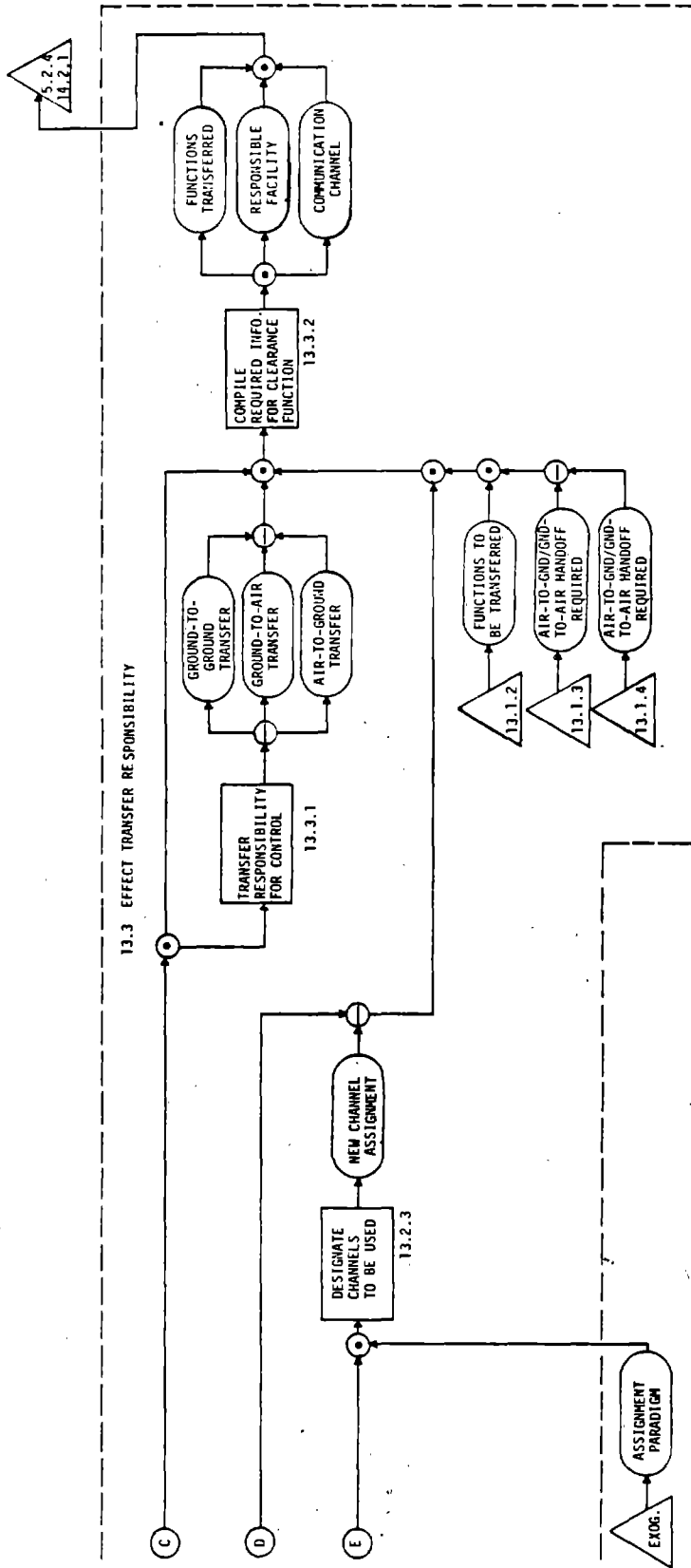


FIGURE 4.13-1. FUNCTION 13.0: DETERMINE HANDOFF RESPONSIBILITY REQUIREMENTS (SHEET 3 OF 3)

