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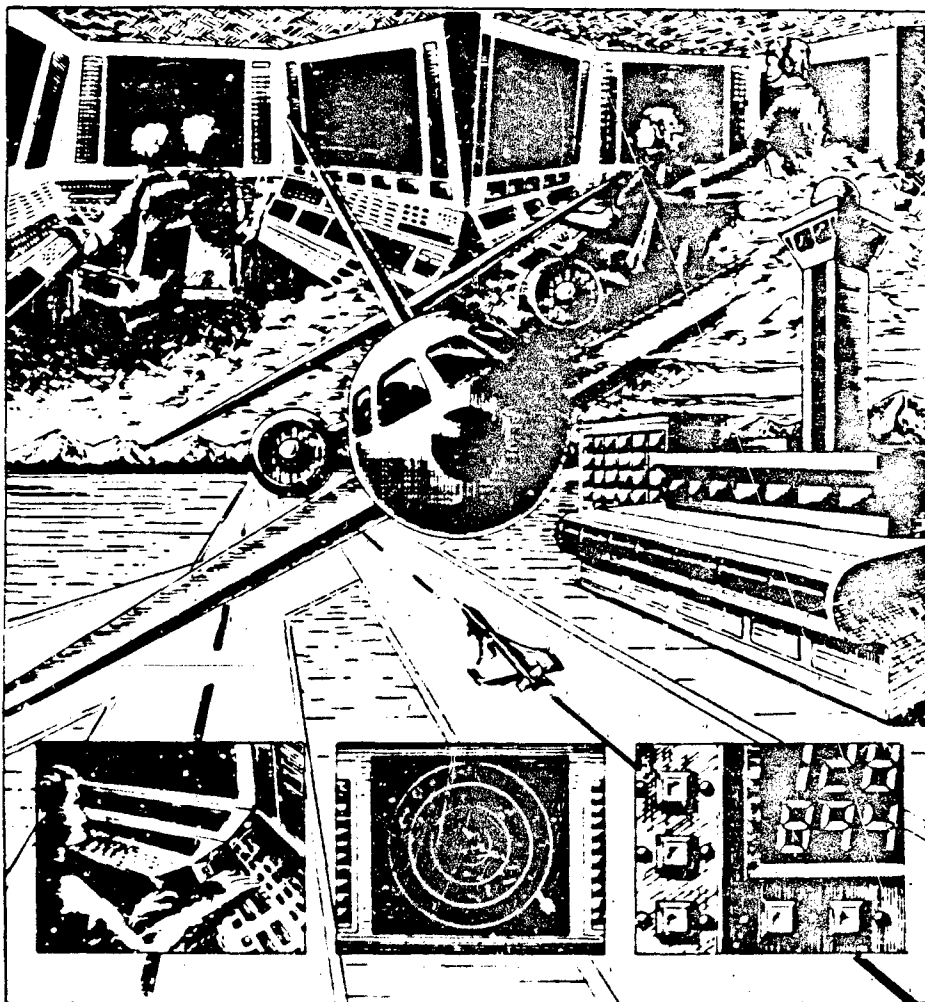
Operations Concept for the Advanced Automation System Man-Machine Interface

DOT/FAA/AP-84/16

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16. Abstract The "Operations Concept for the Advanced Automation System" documents the tasks of controllers at different sector types, controller information processing requirements, and the top-level definition of the controller-machine dialogue. This document forms the basis, therefore, of what will evolve into the controller's "view" of the AAS. A top-down decomposition methodology is employed which identifies AAS events and results in the derivation of controller tasks. These tasks are then characterized in terms of cognitive and perceptual components to derive AAS machine aiding requirements and to structure the controller-machine dialogue definition.			
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FOREWORD

The "Operations Concept for the AAS Man-Machine Interface" is third in a series of eight Computer Technology Associates, Inc. contractual deliverables which will define the role of Sector Suite and the Controller man-machine interface (MMI) within the Advanced Automation System (AAS).

Figure 1-1 illustrates the relationship between this document and the documents which define Sector Suite Man/Machine functional capabilities, and Sector Suite console requirements. Together, these three documents form the core requirements for the AAS man-machine interface.

"En Route/Terminal ATC Operations Concept" (CDRL A001) documents current operations and as such defines the range of events which will influence operations in the Area Control Facility (ACF). "Sector Suite Functional Analysis and Trade Studies (CDRL A004) provides a functional analysis of operational requirements, documents trade studies which recommend functional levels of Controller vs. machine automation, and allocates and derives the functional requirements for the Sector Suite Subsystem. Sector Suite MMI sub-activities identified in CDRL A004 form the basis for the analyses described in the "Operations Concept for the AAS Man-Machine Interface" (CDRL A002). Critical output of CDRL A002 includes a thorough Controller task analysis. This task analysis provides the basis for development of a conceptual user model of Controller-machine interaction. This conceptual user model plus the top-level functional Sector Suite Subsystem requirements are further developed in CDRL A005, "Sector Suite Functional Capabilities and Performance Requirements." This report contains the functional capabilities, performance requirements, and User Interface Language requirements for the Sector Suite Subsystem. The "Draft Sector Suite Console Requirements Specification" (CDRL A003) specifies input and display device requirements, physical characteristics of the Sector Suite console, and environmental requirements. The specifications contained within CDRL A003 are based upon the analysis presented in CDRL A005.

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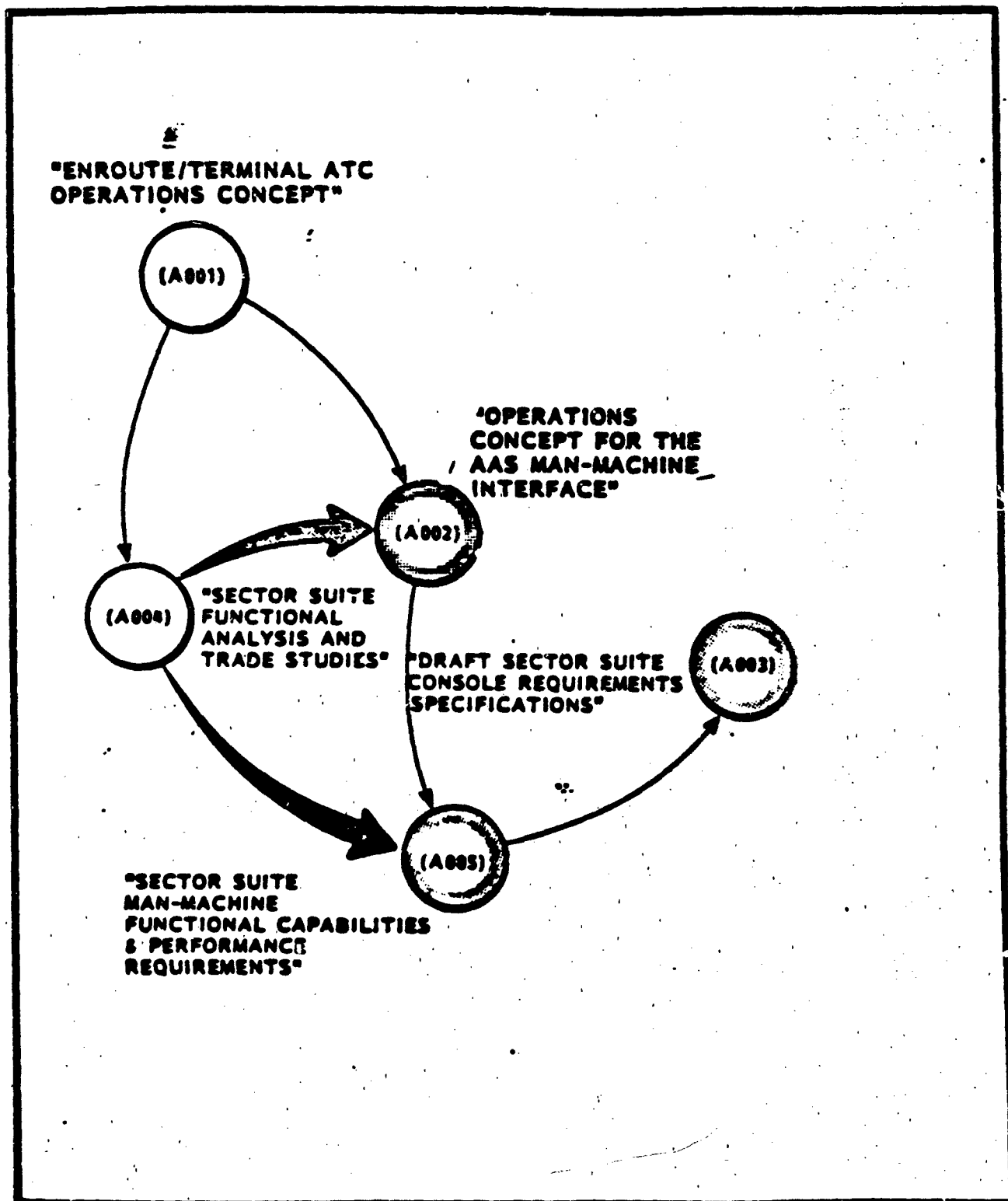


Figure 1-1. Relationship of Documents

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TABLE OF CONTENTS

	Page
Foreword	ii
List of Tables	ix
List of Figures	x
List of Acronyms	xii
Chapter	
1.0 Introduction and Executive Summary	1-1
1.1 Organization of Document Contents and Structure	1-1
1.2 Objectives	1-4
1.3 Scope	1-5
1.4 Assumptions	1-10
1.5 Methodology and Logic for Preparation of This Document	1-11
1.5.1 Controller Information-Processing Task Analysis	1-17
1.5.1.1 Composition Graphs for Information-Processing Tasks	1-17
1.5.1.2 Task Description Language (TDL)	1-17
1.5.2 Characterizations of Controller Information-Processing Tasks	1-21
1.6 References	1-21
2.0 AFC Operations Concept	2-1
2.1 Summary of ACF Operational Employment Concept	2-1
2.2 Facility-Level Description	2-6
2.3 ACF System Elements	2-7
2.4 Operational Descriptions	2-8
2.4.1 ACF Sectorization	2-8
2.4.2 Controller Coordination Philosophy	2-9
2.4.3 ACF Sector-Area Team Philosophy	2-9
2.4.4 Controller Training and Certification	2-9
2.4.5 Real Time ATC Operations	2-10

TABLE OF CONTENTS (continued)

Chapter	Page
2.4.6 ATC Operations Standardization and Transparency	2-11
2.4.7 Operational Availability of ATC Services	2-11
2.5 References	2-12
3.0 Operational Requirements	3-1
3.1 Operational Scenario Overview	3-1
3.2 Scenario Portrayals	3-2
3.3 Air Traffic Controller Activity Analysis	3-31
3.3.1 Controller Activity Identification	3-31
3.3.2 Controller Activity Synthesis	3-31
3.4 Controller Sub-Activity Decomposition	3-32
3.5 References	3-37
4.0 Controller Information-Processing Task Analysis	4-1
4.1 Controller Task Identification and Composition	4-1
4.1.1 Information-Processing Task Composition	4-2
4.1.2 Task Description Language (TDL)	4-7
4.2 Allocation of Information-Processing Tasks to Sector Type	4-12
4.2.1 Sector Type Description	4-12
4.2.2 Allocation of Tasks for Each Sector	4-13
4.3 Task Information Requirements Analysis	4-16
4.3.1 Derived Machine Support Response Times	4-16
4.3.2 Priority Ratings	4-18
4.4 Method for Deriving Coordination Tasks Between Controllers	4-27
4.5 Area Supervisor Tasks and Information Requirements	4-29
4.6 Derived Metering Flow Control Position Tasks and Information Requirements	4-29
4.7 References	4-36

TABLE OF CONTENTS (continued)

Chapter	Page
5.0 Controller Workload Assessment and Definition of Machine Support.....	5-1
5.1 Methods Overview.....	5-2
5.1.1 Procedure.....	5-2
5.1.2 Limitations	5-2
5.2 Automation Level Baseline	5-7
5.2.1 Ratings	5-7
5.2.2 Automation Level Synopsis.....	5-7
5.3 Task Attribute Characterization.....	5-19
5.3.1 Task Attributes	5-19
5.3.1.1 Characteristic Cognitive Strategies	5-20
5.3.2 Information-Processing Task Analysis.....	5-25
5.3.2.1 Information-Processing Task Analysis Synopsis.....	5-25
5.4 Potential Capacity Limitations	5-39
5.5 Definition of Machine Support.....	5-50
5.6 Event Chain Workload Assessment.....	5-64
5.7 References	5-73
 6.0 ACF Crew/Area Team Organization for Real-Time Operations	 6-1
6.1 Definition of Personnel Organization Configuration.....	6-1
6.2 Definition of Controller-to-Controller Interfaces (Crew/Team Factors).....	6-1
6.3 Personnel Organization Models	6-3
6.4 Task Allocation to Functional Controller Positions	6-4
6.5 References	6-10
 7.0 Human Performance Requirements	 7-1
7.1 Journeyman Controller Skill Level Requirements	7-1
7.2 Developmental Controller Training Performance Requirements.....	7-16

TABLE OF CONTENTS (continued)

Chapter	Page
7.3 Sector Deviations from Controller Performance Requirements	7-29
7.4 References	7-30
 8.0 Controller Man-Machine Dialogue Definition	 8-1
8.1 Components of Dialogue Definition	8-1
8.1.1 Task Type	8-1
8.1.2 Characteristic Action Type	8-3
8.1.3 Display Content	8-4
8.1.4 Enhanced Task Statement	8-4
8.1.5 Controller Inference	8-4
8.1.6 Derived Machine Support Response Time	8-4
8.2 DDL Controller Activity Characteristics	8-4
8.2.1 Perform Situation Monitoring	8-4
8.2.2 Resolve Aircraft Conflicts	8-4
8.2.3 Manage Air Traffic Sequences	8-4
8.2.4 Route/Plan Flights	8-5
8.2.5 Assess Weather Impact	8-5
8.2.6 Manage Sector/Position Resources	8-5
8.2.7 Perform Coordination	8-5
8.3 References	8-35

APPENDICES

Appendix A— Identification of Controller Information-Processing Tasks	A-1
Appendix B— Controller Activities, Sub-Activities, and Information-Processing Tasks	B-1
Appendix C— Traceability Matrix	C-1
Appendix D— Glossary of Terms	D-1
Appendix E— Glossary of Controller Task Action Verbs	E-1

LIST OF TABLES

Table	Page
1-1 ACFOF Allocation Summary	1-6
3-1 Normal, Contingency, Degraded, and Crisis Mode Definitions	3-6
3-2 Events Types Categories	3-7
3-3 Additional AAS Event Definitions	3-30
4-1 Information-Processing Task Description	4-8
4-2 TDL-Step 1	4-9
4-3 TDL-Step 2	4-10
4-4 Average "High" Rating Factors for All Sector Types	4-14
4-5 Factor Ratings by Sector Type	4-15
4-6 Task Information Requirements	4-19
4-7 Derived Tasks of Area Supervisors	4-30
4-8 Derived Information Requirements of Area Supervisors	4-32
4-9 Derived Tasks of Metering/Flow Control Positions	4-34
4-10 Derived Information Requirements of Metering/Flow Control Positions	4-35
5-1 Task Automation Levels	5-9
5-2 Cognitive (Intellectual) Attribute Definitions	5-21
5-3 Perceptual (Sensory) Attribute Definitions	5-23
5-4 Characteristic Cognitive Strategies	5-24
5-5 Information-Processing Task Analysis	5-26
5-6 Possible Limitations	5-40
5-7 Machine Aiding Requirements	5-51
6-1 Tasks That Are a Part of Each Functional Controller Position	6-6
7-1 Skill Level Definitions	7-2
7-2 Factors for Measuring Controller Task Performance	7-3
7-3 Journeyman ACF Controller Task Performance Requirements	7-5
7-4 Summary of Controller Skill Level Requirements	7-14
7-5 Summary of Controller Task Performance Measures	7-15
7-6 Trainee Task Performance Requirements	7-17
7-7 Summary of Training Skill Level Requirements	7-26
7-8 Summary of Training Task Performance Measures	7-27
7-9 Sector Types With a Low Frequency of Task Performance	7-29
8-1 AAS Controller DDL	8-6

LIST OF FIGURES

Figure	Page
i-1 Relationship of Documents	iii
1-1 Concept of Operations Decomposition	1-2
1-2 Relationship Between CDRL A004 and CDRL A002	1-3
1-3 Controller Information Processing Model	1-12
1-4 Relationship of ATC Environment, Operations, and Events	1-13/14
1-5 Operations Concept Development Process	1-15/16
1-6 Example of a Controller Activity Decomposition	1-18
1-7 Composition Graph Formalisms	1-19
1-8 Relationship Between Composition Graphs and TDL	1-20
2-1 Consolidation of ATC Facilities into ACF Types	2-2
2-2 ACF Operational Concept	2-3
2-3 ACF Interfaces	2-5
3-1 Scenario Development Illustration	3-3/4
3-2 Event Categories	3-5
3-3 Clearance Request Events (Single Aircraft)	3-9/10
3-4 Flight Status Events (Single Aircraft)	3-11/12
3-5 Conflict Events (Single/Multiple Aircraft)	3-13/14
3-6 Transfer/Share Control Events (Single Aircraft)	3-15/16
3-7 Aircraft System Anomalies Events (Single Aircraft Contingencies)	3-17/18
3-8 Military Unique Operations Events (Special Aircraft Operations)	3-19/20
3-9 Other Special Operations Events (Special Aircraft Operations)	3-21/22
3-10 Traffic Flow Management Events (Air Traffic Control)	3-23/24
3-11 Position Relief Event (Personnel Management)	3-25
3-12 Controller Overload Event (Personnel Management)	3-26
3-13 SIGMET/AIRMET Advisories Event (Weather)	3-27
3-14 Wind Shear, Ceiling Height, and Visibility Reports Events (Weather)	3-28
3-15 Pressure Display/Report Event (Weather)	3-29
3-16 Interrelationship Among Tcp-Level ACF Air Traffic Controller Activities	3-33/34
3-17 Activity/Sub-Activity Decomposition	3-35
3-18 Example of a Controller Activity Decomposition	3-36
4-1 Sub-Activity to Task Decomposition	4-3
4-2 Controller Information Processing Model	4-4
4-3 Component Task Structure for "Clearance Generation"	4-5

4-4	Illustration of Graphing Symbology	4-6
4-5	Example of a Non-functional Decomposition	4-7
4-6	TDL "If-Then" Construct	4-12
4-7	Definition of Response Time Intervals	4-17
4-8	Derivation of Coordination Tasks	4-28
5-1	Task Workload Assessment Process	5-3/4
5-2	Event Chain Controller Workload Assessment Model	5-5/6
5-3	Task Clustering	5-65
5-4	Event Chain #1 Workload Assessment	5-67/68
5-5	Event Chain #2 Workload Assessment	5-69/70
5-6	Event Chain #3 Workload Assessment	5-71/72
6-1	Team Organization	6-2
8-1	Evolution of a Controller Dialogue Definition	8-2

ACRONYMS

AAS	ADVANCED AUTOMATION SYSTEM
A/C	AIRCRAFT (ALSO ACFT)
ACCC	AREA CONTROL COMPUTER COMPLEX
ACF	AREA CONTROL FACILITY
ACFOF	ACF OPERATIONAL FUNCTION
ADIZ	AIR DEFENSE IDENTIFICATION ZONE
AERA	AUTOMATED EN ROUTE AIR TRAFFIC CONTROL
AIRMET	AIRMAN'S METEOROLOGICAL INFORMATION
ALTRV	ALTITUDE RESERVATION
AM	AMENDMENT MESSAGE
A/M	AERONAUTICAL AND METEOROLOGICAL DISPLAY (ALSO A&M)
ARINC	AERONAUTICAL RADIO INCORPORATED
ARTS	AUTOMATED RADAR TERMINAL SYSTEMS
ASE	AND MAY SIMULTANEOUSLY EXECUTE (IN TDL PROCESS)
AT	AIR TRAFFIC
ATC	AIR TRAFFIC CONTROL
ATCT	AIRPORT TRAFFIC CONTROL TOWER
BASOPS	BASE OPERATIONS (MILITARY)
CA	CONFLICT ALERT
CDRL	CONTRACT DELIVERABLE REQUIREMENTS LIST (\ DOCUMENTED TECHNICAL REPORT)
CRT	CATHODE RAY TUBE
CWP	CENTER WEATHER PROCESSOR
DCP	DESIGN COMPETITION PHASE
DDL	DIALOGUE DESCRIPTION LANGUAGE
DFW	DALLAS-FORT WORTH AIRPORT
DOD	DEPARTMENT OF DEFENSE
DOE	DEPARTMENT OF ENERGY
EARTS	EN ROUTE AUTOMATED RADAR TRACKING SYSTEM
FAA	FEDERAL AVIATION ADMINISTRATION
FAD	FUEL ADVISORY DEPARTURE
FDB	FULL DATA BLOCK
FDE	FLIGHT DATA ENTRY
FL	FLIGHT LEVEL
FLIP	FLIGHT INFORMATION PUBLICATION
FP	FLIGHT PLAN
FPCP	FLIGHT PLAN CONFLICT PROBE
FSS	FLIGHT SERVICE STATION
GI	GENERAL INFORMATION MESSAGE (PLAIN TEXT)
GT	GREATER THAN
HW	HARDWARE
ID	IDENTIFICATION (ALSO I.D.)
IFR	INSTRUMENT FLIGHT RULES
ISSS	INITIAL SECTOR SUITE SYSTEM

LAT/LONG	LATITUDE AND LONGITUDE COORDINATES
LCN	LOCAL COMMUNICATIONS NETWORK
LDB	LIMITED DATA BLOCK
LT	LESS THAN
MMI	MAN-MACHINE INTERFACE
MOA	MILITARY OPERATIONS AREA
MPS	MAINTENANCE PROCESSING SYSTEM
MSA	MINIMUM SAFE ALTITUDE
MSAW	MINIMUM SAFE ALTITUDE WARNING
MSG	MESSAGE (ALSO MSSG)
MTR	MILITARY TRAINING ROUTE
NA	NOT APPLICABLE (ALSO N/A)
NADIN	NATIONAL AIRSPACE DATA INTERCHANGE NETWORK
NAS	NATIONAL AIRSPACE SYSTEM
NAVAID	NAVIGATIONAL AID
NOTAM	NOTICE TO AIRMEN
PCA	POSITIVE CONTROL AREA
PERS	PERSON-TO-PERSON (DIRECT VERBAL)
PIDP	PROGRAMMABLE INDICATOR DATA PROCESSOR
PIREP	PILOT WEATHER REPORT
PR	PILOT POSITION REPORT
RMMS	REMOTE MAINTENANCE MONITOR SYSTEM
RNAV	AREA NAVIGATION
SAC	STRATEGIC AIR COMMAND
SIGMET	SIGNIFICANT METEOROLOGICAL INFORMATION
SOP	STANDARD OPERATING PRACTICE
S/S	SECTOR SUITE (CONTROLLER WORKSTATION)
SSRVT	SECTOR SUITE REQUIREMENTS VALIDATION TEAM
SW	SOFTWARE
TAC	TACTICAL AIR COMMAND
TAS	TRUE AIR SPEED
TBD	TO BE DETERMINED
TCA	TERMINAL CONTROL AREA
TDL	TASK DESCRIPTION LANGUAGE
TMS	TRAFFIC MANAGEMENT SYSTEM
TRACON	TERMINAL RADAR APPROACH CONTROL
USAF	US AIR FORCE
VFR	VISUAL FLIGHT RULES
VORTAC	VHF OMNIDIRECTIONAL RANGE/TACTICAL AIR NAVIGATION
VSCS	VOICE SWITCHING AND CONTROL SYSTEM
WX	WEATHER

1.0 INTRODUCTION AND EXECUTIVE SUMMARY

The "Operations Concept for the AAS Man-Machine Interface" documents a concept for ACF operations, the tasks of the Controller at various types of sectors, his information processing requirements, and the definition of his dialogue with the system. As such, these represent the operational requirements for the Advanced Automation System (AAS) Controller man-machine interface (MMI). These requirements are defined from the Controller's point of view. Controller tasks are described in terms of message inputs, outputs, dialogue requirements, and operational performance attributes.

An assessment of Controller workload is provided within the framework of human information-processing tasks and associated performance levels by Controller position. The information-processing tasks are considered to include logical (cognitive) and perceptual components. These components will of necessity have an impact on the subsequent formation of information coding/presentation requirements, interaction techniques, and high-level dialogue descriptions.

This document follows a rigorously structured approach to derive Controller information-processing tasks which fulfill the functional requirements identified in CDRL A004, "Sector Suite Functional Analysis and Trade Studies" (Ref. 5). The analyses presented here build upon the assertions of Ref. 5, to formally record the level of automation, interfaces, and allocation of requirements between Controller and machine for the AAS. This document forms the basis, therefore, of what will evolve into the Controller's "view" of the Advanced Automation System.

The analyses contained here proceed from a top-level view of the Area Control Facility (ACF) through a decomposition of activities, sub-activities, and tasks by sector type (Figure 1-1). Assumptions regarding Controller crew-team organization and the domain of the AAS events (through operational scenarios) feed the process of qualitatively assessing Controller workload.

These assessments ultimately allow for definition of machine aiding requirements (Chapter 5.0), and dialogue definitions (Chapter 8.0).

The baseline functional requirements and level of automation assumed for the AAS have been mapped from CDRL A004 (Ref. 5). As depicted in Figure 1-2, ACF system functions (identified in Ref. 5) are decomposed into Sector Suite operational functions. Each of these Sector Suite functions are analyzed (in Ref. 5) to partition their component processes into fully automated or man-machine pair actions. The Sector Suite operational activities (man-machine pairs) are then further decomposed and allocated into either Sector Suite sub-processes or Controller sub-activities. The set of sub-activities allocated to the Controller MMI, then, forms the functional baseline and assumed level of automation for this document.

1.1 Organization of Document Contents and Structure

Chapters have been organized in this document to provide, first, an overview of the AAS/ACF operational environment, and subsequently, Controller information-processing tasks and their associated workload, human performance requirements, and dialogue definitions.

Chapter 2.0 provides a conceptual description of ACF operations, as they will appear when the AAS becomes operational. A facility-level description is provided along with a definition of operational ACF interfaces. This characterization leads to an overview of how the individual Controller will be employed in carrying out ATC operations in the ACF. Chapter 3.0 defines the AAS event domain through the documentation of scenarios. Events are characterized as a product of the interactions among aircraft, airspace, facilities, surveillance capabilities, and ATC operations. An event, then, is a distinct occurrence which the Controller perceives and responds to in some manner. Through definition of the AAS event set, one can derive the top-level Controller activities and sub-activities which respond to the stated events.

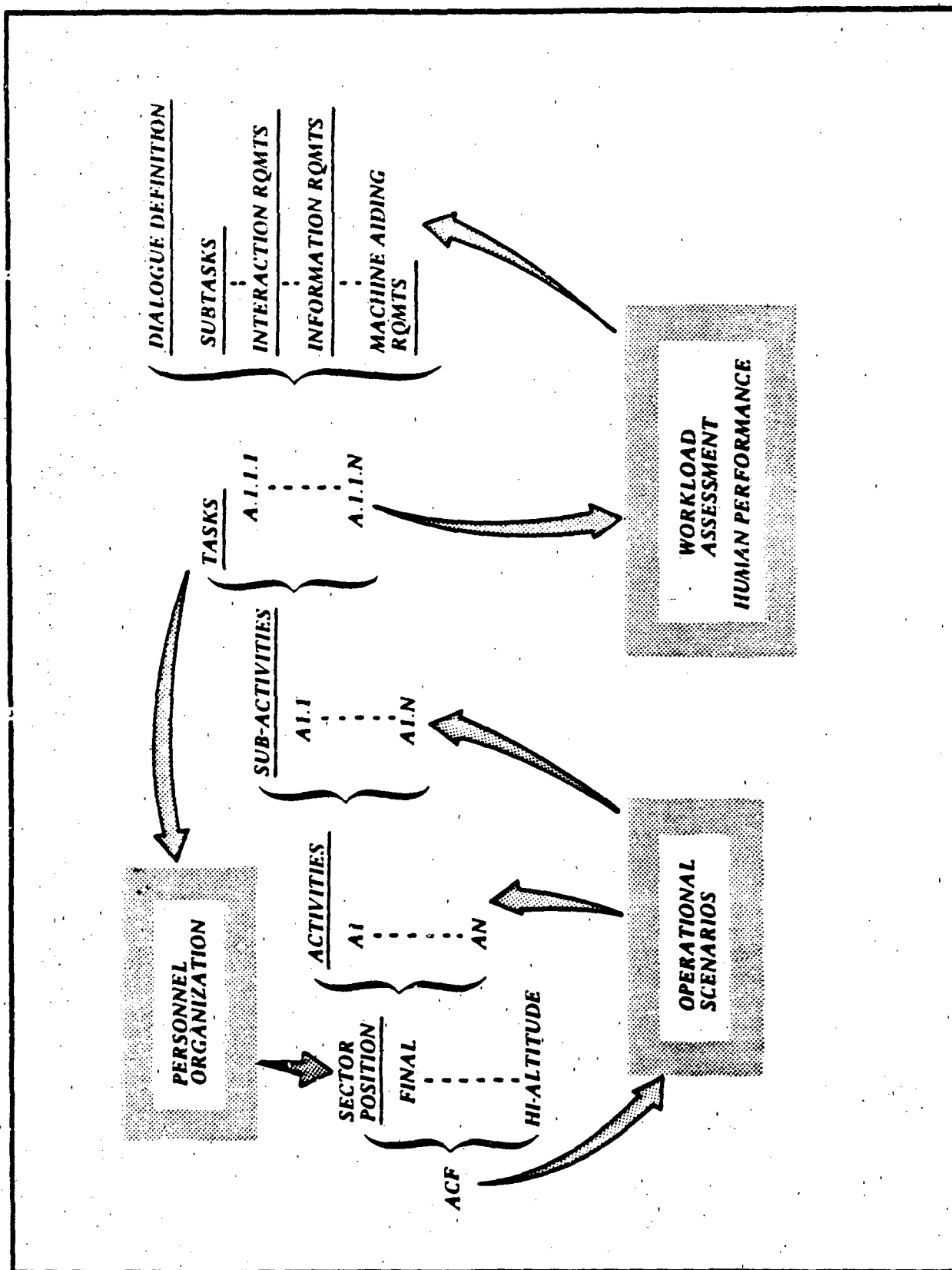


Figure 1-1. Concept of Operations Decomposition

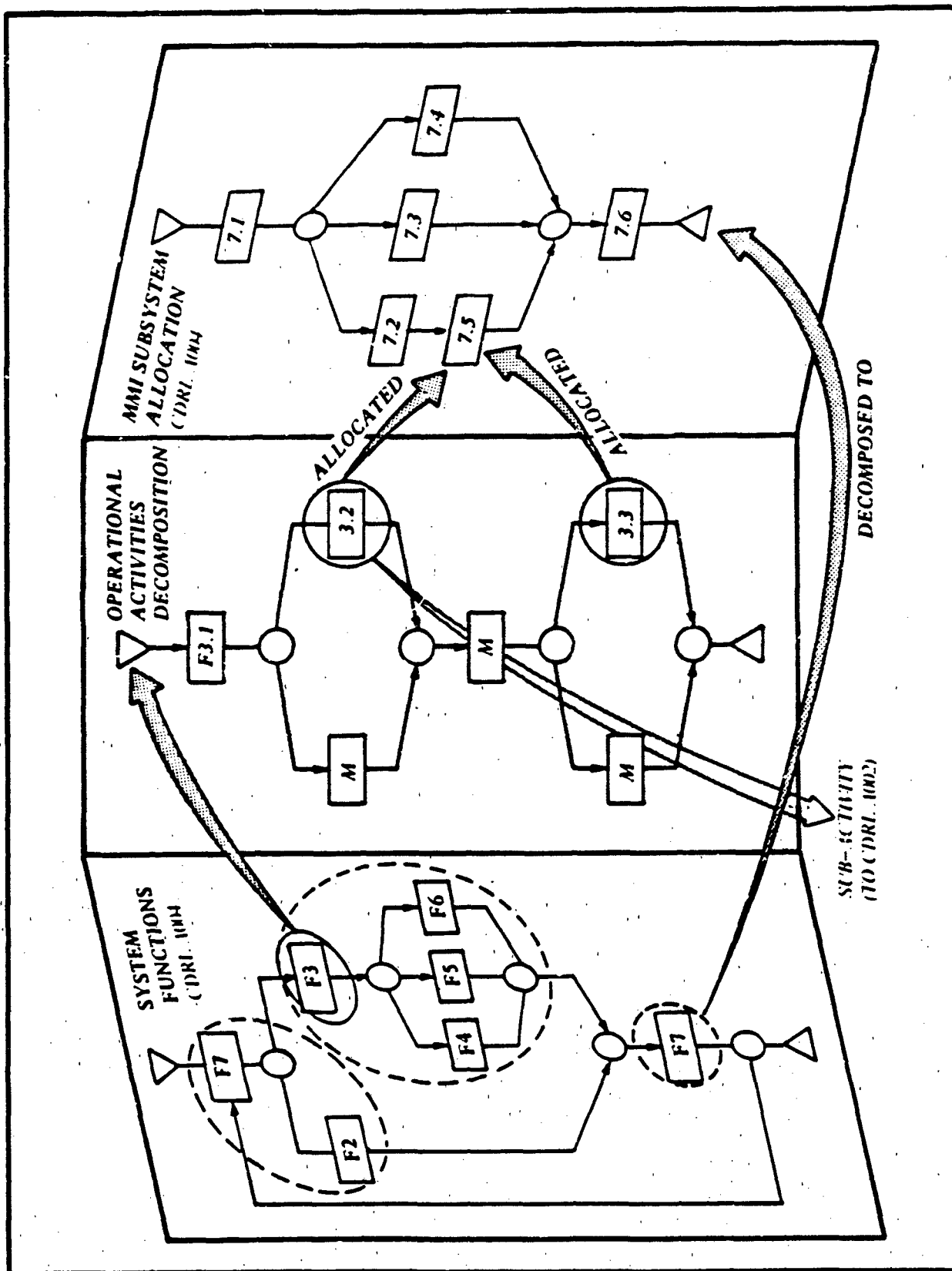


Figure 1-2. Relationship Between CDRL A004 and CDRL A002

Chapter 4.0 provides the reader with the results of the Controller information processing task analysis. Tasks are identified, allocated to sector types, and mapped to information requirements. Interfaces with Supervisory and Metering/Flow Control positions are documented, and the derived information requirements of these positions are listed.

Chapter 5.0 examines the tasks identified in Chapter 4.0 with respect to operational requirements to gauge potential limitations. Particular attention is paid here to machine aiding requirements of the AAS (e.g., information coding and display requirements). A workload assessment model, based on plausible scenarios (event chains), is also provided to characterize AAS Controller workload.

Chapter 6.0 documents the ACF area team organization. This section focuses on the real-time operations in the ACF and the derivation of an organizational model of sector, sector team, and area operations.

Chapter 7.0 presents a definition of task-oriented performance requirements for line Controllers and Controller trainees.

Chapter 8.0 culminates in the development of the model for the Controller's interaction with the system. Controller-machine dialogue definitions are established through an expansion of the task statements contained in Chapter 4.0, to include implied display coding requirements, interaction sequences and techniques, objects and their relationships, and implied display content. The term "man-machine dialogue" denotes the conceptual interaction between Controller at his workstation and the AAS, in terms of data that are input to the system and information displayed by the system. The dialogue is the result of an allocation of tasks to be performed by the Controller (as an information processor) and functions performed by the AAS. The man-machine dialogue forms the user's (i.e., Controller's) view of the man-machine interface. The dialogue definition presented here embodies the results of all preceding analyses (particularly the information-processing task analysis and workload assessments). Chapters 4.0, 5.0,

and 8.0 represent the nucleus of "binding" requirements to be included in a submittal package to prime contractors at DCP award.

Conclusions stemming from this analysis are found in Chapter 9.0. Open issues are identified along with areas requiring further investigation.

1.2 Objectives

This document serves both as a requirements verification tool and a documentation medium for the Sector Suite Requirements Validation Team (SSRVT). It, therefore, provides both a communication channel to describe the Controller view of the AAS MMI and a baseline from which to track Prime Contractor designs, requirements changes, and new evolving concepts of operation.

The AAS is being developed to ensure the safe, orderly, and expeditious flow of traffic throughout the National Airspace System (NAS) up to and beyond the year 2000. The documentation of Controller information-processing tasks in terms of his man-machine dialogue and task performance will ultimately determine the functional, physical, and performance characteristics of Sector Suite. Clearly, the proper implementation of the AAS MMI is critical to the productive use of valuable human resources. The goal of this Operations Concept is to foster an optimum implementation of the Controller-machine interface. This goal is approached through the explicit documentation of an extensive set of analyses which have been subjected to a series of cross validations which ensure consistency and completeness. Controller concurrence is the cornerstone of these analyses, and has been provided through the SSRVT process.

The primary objective of this document is to decompose Controller tasks to the level of detail such that the Controller's job is described in terms of:

- a. sequences of tasks which respond to a given ATC event;

- b. the conceptual dialogue between the Controller and his workstation;
- c. interactions with other Controllers, Pilots, Supervisory, and Metering/Flow Control personnel; and
- d. information needed by the Controller to successfully execute tasks accurately and in a timely fashion.

This primary objective serves the purpose of enabling the prime contractors to understand the ACF Controller's job and to translate these task descriptions into Sector Suite prototypes and design documentation, thus enabling the SSRVT to verify and validate baseline Operational Concepts and to understand the impact of changes to Controller tasks, dialogue definitions, and interaction techniques.

A secondary objective is to characterize Controller tasks in terms of:

- a. human capacity and workload;
- b. machine aids required to maximize Controller performance; and
- c. required Controller training, experience, and skill development.

This secondary objective enables FAA Air Traffic (AT) human resource management personnel to recognize necessary changes in Controller training and skills acquisition policy. It also aids AT management in understanding changes required to maintain and improve work force and organizational effectiveness.

1.3 Scope

This document proceeds from the functional decomposition presented in Ref. 5. (CDRL A004). The set of functions allocated to the "man-machine pair" in that

document defines the essential set of Sector Suite capacities which lead to the derivation of the AAS MMI. Table 1-1 summarizes the baseline function allocation presented in Ref. 5, CDRL A004. The function set baselined in Ref. 5 was predicated by an assumed set of full AAS (including AERA 1) capabilities being "in place" in the ACF. Functional evolution to AERA 2 and 3 and the attendant system transition issues are, therefore, not addressed in this Operations Concept.

The focus of this work is on identifying and characterizing Controller information-processing tasks. Tasks are considered which encompass a range of automated support from highly automated to interactive to primarily manual. In all cases, these tasks are presented from the vantage point of the primary or support Sector Suite Controller. Tasks intrinsic to Metering/Flow Control and Supervisory positions are addressed to the extent that there is a direct interface with the line Controller.

This AAS Operations Concept is further bounded by our current understanding of the ACF concept. This analysis focuses on the functionality represented in the current NAS TRACON and en route centers as it will appear in the AAS. Tower cab operations, with their unique MMI requirements, are not directly represented herein.

This Operations Concept provides the basis for determining training requirements and the establishment of learning objectives and proficiency levels within the AAS environment. It also provides the foundation for deriving the conceptual user model of interaction (i.e., Controller MMI language requirements) which will be further refined in CDRL A005, Sector Suite Man-Machine Functional Capabilities and Performance Requirements (Ref. 6).

¹Swedish, W.J. Evolution of Advanced ATC Automation Functions. McLean, VA: The MITRE Corporation, WP-83W149. March 1983.

TABLE 1-1. ACFOF ALLOCATION SUMMARY

ACF Operational Function	RECOMMENDED ALLOCATION (S = shared) (A = automated)
1. Surveillance Processing 1.1 Initialize Surveillance Parameters 1.2 Receive Sensor Filter Reconfiguration Order 1.3 Determine Sensor Priority 1.4 Pre-Process Sensor Messages 1.5 Pre-Process Weather Messages 1.6 Identify Target Message 1.7 Registration and Collimation Correction 1.8 Filter Target Reports 1.9 Target Coordinate and Time Conversion 1.10 Mode C/S Altitude Pressure Correction 1.11 Count Target Reports 1.12 Process Sensor Status Messages 1.13 Process Sensor Test Messages 1.14 Process Permanent Echo & Search Target Messages 1.15 Process Strobe Messages 1.16 Process Missing Messages 1.17 Distribute Weather Map Messages 1.18 Distribute Target Reports 1.19 Distribute Site Status Report 1.20 Distribute Test Messages/Reports 1.21 Distribute Permanent & Search Target Message 1.22 Distribute Strobe Message 1.23 Distribute Error Report	S A A A A A A A A A A A A A A A A A A A A A A
2. Weather Processing 2.1 Generate Digital Weather Map 2.2 Collect Weather Data Amendments 2.3 Collect Weather Data Requests 2.4 Collect Weather Data 2.5 Collect Weather Messages 2.6 Synthesize Weather Products 2.7 Assess Weather Conditions 2.8 Distribute Weather Products 2.9 Distribute Weather Amendments	A A S S A A S A A
3. Flight Plan Processing 3.1 Collect FP Messages 3.2 Collect Requests for FP Data 3.3 Collect FP Data Changes 3.4 Collect Weather Products 3.5 Perform Route Conversion 3.6 Perform FP Position Extrapolation 3.7 Distribute FP Data 3.8 Assign/Collect Beacon Code	S A S A A A A A

TABLE 1-1. ACFOF ALLOCATION SUMMARY (continued)

ACF Operational Function	RECOMMENDED ALLOCATION (S = shared) (A = automated)
4. Track Processing	
4.1 Collect Track Initiation Request	S
4.2 Collect Filtered Sensor Target Reports	A
4.3 Collect Altimeter Reports	A
4.4 Collect Track/FP Pairing Request	S
4.5 Collect FP Data	A
4.6 Collect Weather Data Which Affects Track Position	A
4.7 Initiate Tracking	A
4.8 Correlate Targets With Tracks	A
4.9 Determine Track Status	A
4.10 Pair Track To Flight Plan	A
4.11 Perform Slant Range Conversion	A
4.12 Calculate Track Positions	A
4.13 Estimate Track Position/Velocity	A
4.14 Collect Track Termination Request	S
4.15 Terminate Track	A
4.16 Suspend Track	A
4.17 Distribute Track Output Data	A
5. Track/FP Association Checking	
5.1 Collect Paired Tracks	A
5.2 Collect Flight Plan Data	A
5.3 Evaluate Track/FP Association	A
5.4 Issue Notice	A
5.5 Update Track Status, Distribute	A
5.6 Coordinate With A/C To Determine Reason For Non-Conformance	S
5.7 Determine Conformance Correction, Distribute	S
6. Separation Assurance Monitoring	
6.1 Collect Track Positions	A
6.2 Collect Weather Products	A
6.3 Collect Non-controlled Aircraft Information	S
6.4 Detect Track/Weather Conflict	A
6.5 Detect MSAW Conflict	A
6.6 Detect Restricted Airspace Conflict	A
6.7 Detect Track/Non-controlled Aircraft Conflict	S
6.8 Provide Aircraft Proximity Report	A
6.9 Issue Probability/Imminence Alert	A
6.10 Generate Options	S
6.11 Detect A/C Conflict	A
7. Clearance/Advisory Generation	
7.1 Collect Clearance Requests	S

TABLE 1-1. ACFOF ALLOCATION SUMMARY (continued)

ACF Operational Function	RECOMMENDED ALLOCATION (S = shared) (A = automated)
7.2 Collect Airspace Restrictions 7.3 Collect Conflict Resolution Options 7.4 Collect Weather Data 7.5 Assess Impact of Clearance Request 7.6 Generate Alternatives, Distribute 7.7 Select An Alternative 7.8 Validate Selected Alternative 7.9 Coordinate Resolution, Approve Clearance 7.10 Approve Clearance Request 7.11 Distribute Clearance, Clearance Rejections, Advisories 7.12 Distribute FP Amendments, Amendment Rejection 7.13 Collect/Distribute FPCP Results Report 7.14 Collect Flow Control Restrictions	S S S S S S S S S S A S S
8. Flow Control 8.1 Collect Weather Product 8.2 Collect FP Data 8.3 Collect Traffic Forecasts 8.4 Collect Flow Control Quota Information 8.5 Collect FAD Information 8.6 Collect Runway Configuration Information 8.7 Collect TMS Restrictions 8.8 Collect Track Position 8.9 Collect Arrival/Departure Information 8.10 Determine If Problem Conditions Exist 8.11 Request Flow Constraints 8.12 Formulate, Coordinate Delay Options 8.13 Synthesize Metering Directives 8.14 Synthesize Flow Control Restrictions 8.15 Distribute Metering Directives 8.16 Distribute Flow Control Restrictions	A A S S A S S A A A S S A A A A
9. Flight Plan Conflict Probe 9.1 Collect FPCP Request 9.2 Collect FP Data 9.3 Collect FP Amendment 9.4 Collect Planned Actions 9.5 Collect Weather Products 9.6 Collect Airspace Constraints 9.7 Collect True Speed Track Position Data 9.8 Evaluate FP/FP Conflict 9.9 Evaluate FP/Weather Conflict 9.10 Evaluate FP/Blocked Airspace Conflict 9.11 Evaluate MSAW Conflict 9.12 Assess Timeliness of Conflict 9.13 Distribute Results	A A A A A A A A A A A A A A

TABLE 1-1. ACFOF ALLOCATION SUMMARY (continued)

ACF Operational Function	RECOMMENDED ALLOCATION (S = shared) (A = automated)
10. Coordination 10.1 Coordinate Surveillance Processing 10.2 Coordinate Weather Data Processing 10.3 Coordinate Flight Plan Data Processing 10.4 Coordinate Track Processing 10.5 Coordinate Track/FP Association Tracking 10.6 Coordinate Separation Assurance Monitoring 10.7 Coordinate Clearance/Advisory Generation 10.8 Coordinate Flow Control 10.9 Coordinate Flight Plan Conflict Probe 10.10 Coordinate Responsibility for Aircraft 10.11 Coordinate Responsibility for Airspace 10.12 Coordinate Users Of Communication Channels	S S S S S S S S S S S S
11. Resource Management 11.1 Perform Local Flow Control 11.2 Maintain System Parameters and Adaptation Data 11.3 Monitor System Performance 11.4 Assess Current and Future Sector Workload 11.5 Reconfigure Sector Boundaries/Responsible Positions	S S A A S
12. Data Entry/Information Display 12.1 Accept/Process Data Inputs 12.2 Distribute Information Outputs 12.3 Manage Data Entry/Information Display Processes 12.4 Provide User Guidance	S S S S
13. Error Detection and Recovery 13.1 Detect Data Source Inconsistencies 13.2 Detect Errors Local To Source 13.3 Detect Human Errors 13.4 Diagnose Error 13.5 Retry Process 13.6 Perform Reconfiguration 13.7 Perform Rollback 13.8 Perform Restart 13.9 Maintain Backup Files 13.10 Perform Checkpointing 13.11 Perform Journaling 13.12 Repair Areas Effected by Error 13.13 Perform Reintegration 13.14 Execute Backup Procedures For Loss Of Functionality	A A A S A S A A A A A A A

1.4 Assumptions

The human information-processing model of the AAS Controller presented here assumes an initial characterization of air traffic Controller activities as being primarily event sensitive or event responsive. Through the identification of the AAS event domain, this assumption drives the top-level activity structure for the AAS Controller. These activities can then be decomposed, according to formal rules of decomposition, to arrive at Controller information-processing tasks. Information-processing tasks may be characterized as being initiated by an event stimulus and which invoke a discernible response. Controller task performance is influenced by global system parameters, i.e., knowledge of ATC procedures, handbooks (7110.65), and memoranda of agreements. Different types of tasks result in behaviors (human performance indices) which are either measured by how accurate or timely a Controller performs a given task, or subjective estimates of expected behavior. Tasks (for analytical reasons) must exhibit a closure condition which represents either transition to other tasks in a sequence of information processing or a response which meets conditions for task closure, such as completion of aircraft maneuver, handoff acceptance of control, or completion of a message entry (see Figure 1-3).

Controller information-processing tasks define the sequence of interactions between man and machine which are triggered either by a previous task or an event, and result in a detectable Controller action. An example of a task is: "Request special use airspace probe." The event stimulus (as shown in Figure 1-3) can be characterized in terms of message input via display or voice. This stimulus causes Controller integration of global system parameters (e.g., separation standards, geography, route structures, current sectorization) and the generation of control responses (e.g., initiate flight plan conflict probe). Characteristics which represent this response can be correlated to the completion of a task and the time and effort (mental load) required to achieve some completion criteria. Supporting this fundamental as-

sumption are the formalisms of functional decomposition, information flow, and state space theory, thoroughly treated by Ref. 1 and Ref. 2.

The set of events for the current NAS has been defined and validated by the SSRVT elsewhere (Ref. 4, CDRL A001). For the purposes of the analysis, it is assumed that the classes of operational events defined in Ref. 4 are invariant to the period when AAS becomes fully operational. In other words, the modes of Controller-machine interaction will markedly differ in the AAS, but the event domain (defined in terms of single and multiple aircraft situations) will be largely the same as in today's system. This conclusion may be drawn since AAS events will be the result of interactions between aircraft, airports, airspace, weather, and the operational environment, just as current NAS events are (see Figure 1-4).

For the purposes of this analysis, we assume that ACFs will not be categorized as either en route or terminal, because functional responsibility will be integrated. Airspace is viewed as being partitioned within an ACF into sectors, and multiple ACFs will exist.

Other specific assumptions are as follows:

- a. The essential MMI component of the AAS resides within the Sector Suite subsystem. The term "subsystem" is used here to denote the Controller workstation, interfaces, and software which implement the Controller MMI functions.
- b. Critical interfacing systems which support Sector Suite operations (see section 2.3, ACF/AAS Interfaces, for more detail) include:
 - Center Weather Processor (CWP)
 - Voice Switching and Control System (VSCS)
 - National Airspace Data Interchange Network (NADIN)

— Mode S Surveillance System

These systems will be implemented prior to AAS/AERA 1 (Ref. 7). The products of these systems will either be configured as a component within the Controller workstation, or provide data which are used by the Controller in performance of his duties. For example, it is assumed that the CWP will provide weather forecasts, SIG-METs, and advisory information which the AAS will provide to the Controller at his workstation.

- c. It is assumed that the AAS will perform in accordance with the accuracy, speed, reliability, and capacity requirements specified in Ref. 7 in all areas, including

- tracking accuracy
- conflict alert
- fault tolerance and allowable levels of system degradation

- d. Major AERA 1 functions will be operational at the time of full AAS. These functions include: flight plan conflict probe, airspace probe, sector workload probe, and trajectory estimation.

- e. This Operations Concept does not directly address the Initial Sector Suite Subsystem (ISSS); however, the ISSS MMI should closely correspond to the requirements defined herein.

1.5 Methodology and Logic for Preparing This Document

Prior to performing the Controller task analysis, the ACF operational employment concept is summarized. This initial ACF characterization forms the basis for subsequent information-processing task analyses. The resulting task decomposition then forms the foundation for the AAS Operations Concept.

Operational requirements specified in

CDRL A004 (Ref. 5) are translated into a set of scenarios which both define the AAS event domain and the relationship between AAS operations and the external environment. Major components of the external environment include airspace, weather, aircraft, airway/airport facilities, and surveillance capabilities (as is the case in today's system).

Airspace is bounded by elements such as the geography, terrain, obstacles, airway route structures, and weather. *Aircraft* is functionally related to airspace in that aircraft navigate through airspace using random routes or the formal airway route structures. Aircraft can be characterized as having Instrument Flight Rule/Visual Flight Rule (IFR/VFR) capabilities and designated as either commercial, general aviation, or military. The term *Airway/Airport Facilities* here is used to denote local government "ground side" facilities (airports, runways) and FAA "air side" facilities (ATC equipment, navigation aids). These facilities are directly related to aircraft and airspace in the sense that aircraft flying published routes rely on navigational aids which may be affected by terrain or man-made obstacles and weather. *Surveillance Capabilities* concern radar coverage of aircraft and weather.

The importance of the relationships among airspace, aircraft, facilities, and surveillance capabilities from the Controller perspective is that events (which trigger Controller actions) may be characterized in terms of these elements. Given the premise that AAS events will be invariant to current NAS events (as defined in Ref. 4, CDRL A001), and an assumed set of capability enhancements to interfacing systems (particularly Mode S data link), the AAS event set is defined in Chapter 3.0 of this document.

The preliminary assertions regarding the ACF Operations Concept and the AAS operational scenarios noted above, along with the functional baseline established in Ref. 5 (CDRL A004), form the starting point for the subsequent analytic process undertaken in this document. The seven analytic steps employed in the development of this Operations Concept are depicted in Figure 1-5.

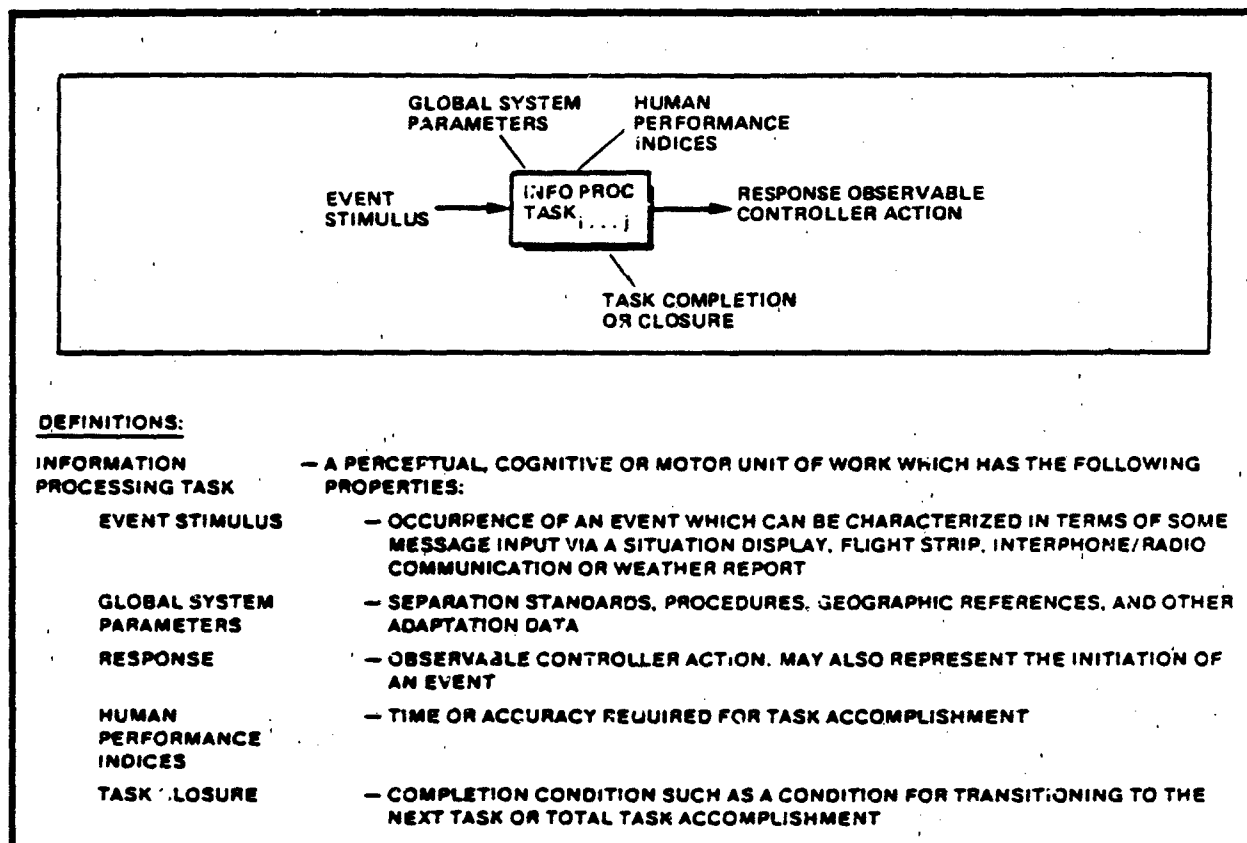


Figure 1-3. Controller Information Processing Model

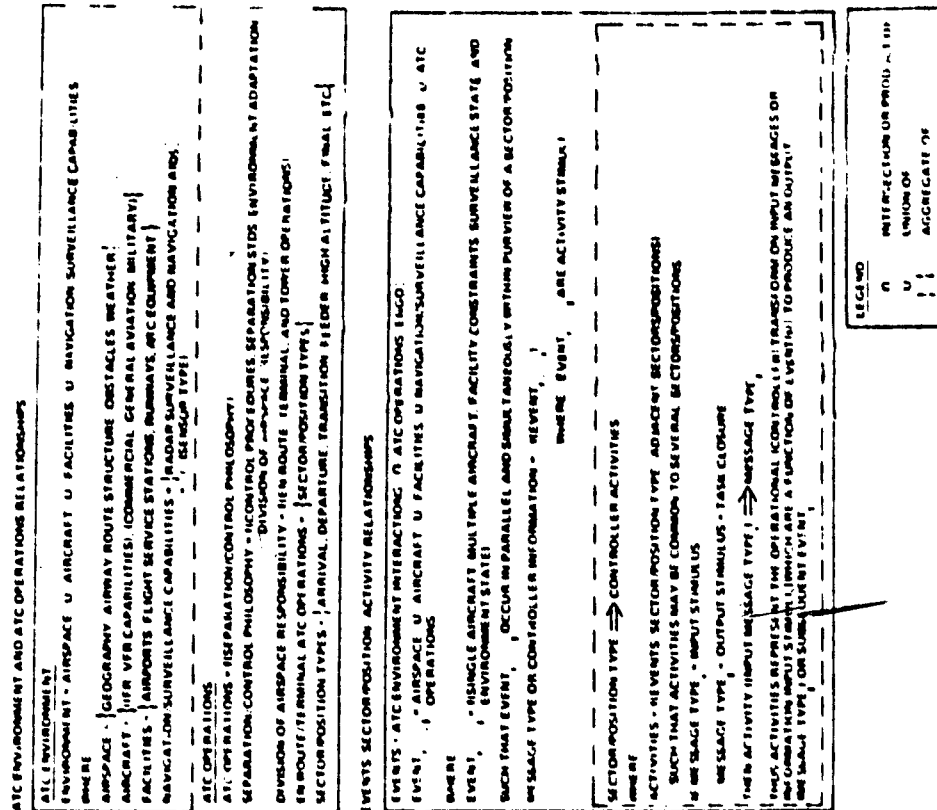
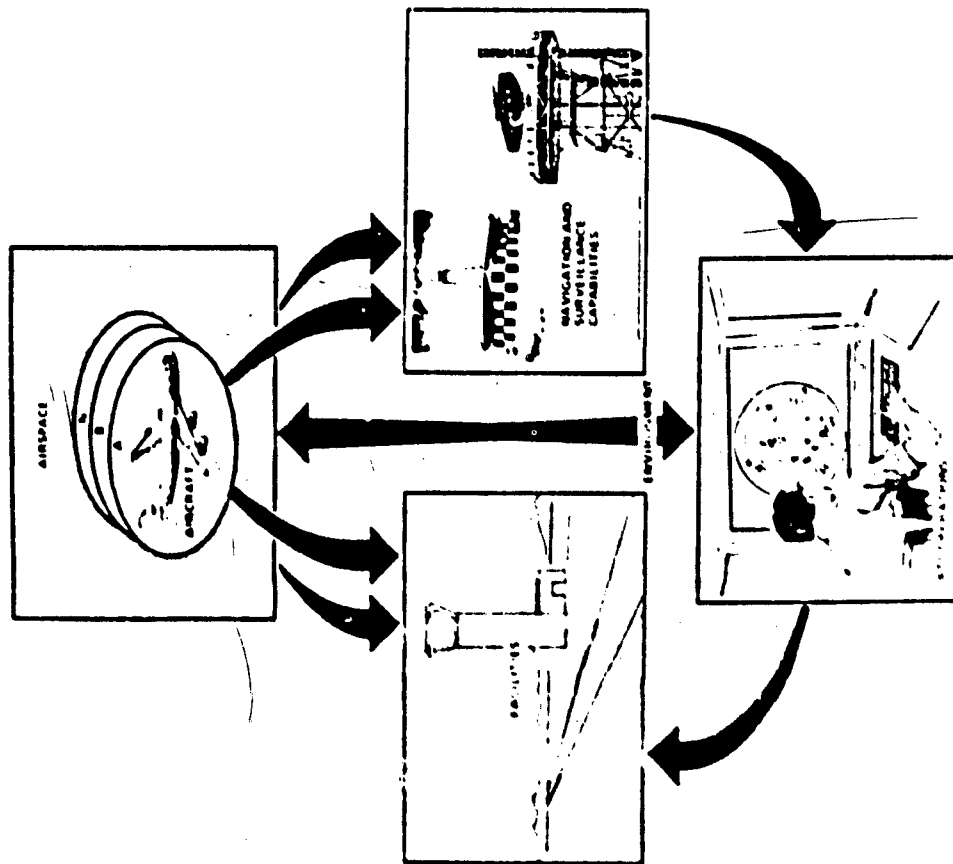


Figure 1-4 Relationship of ATC
Environment Operations and Events

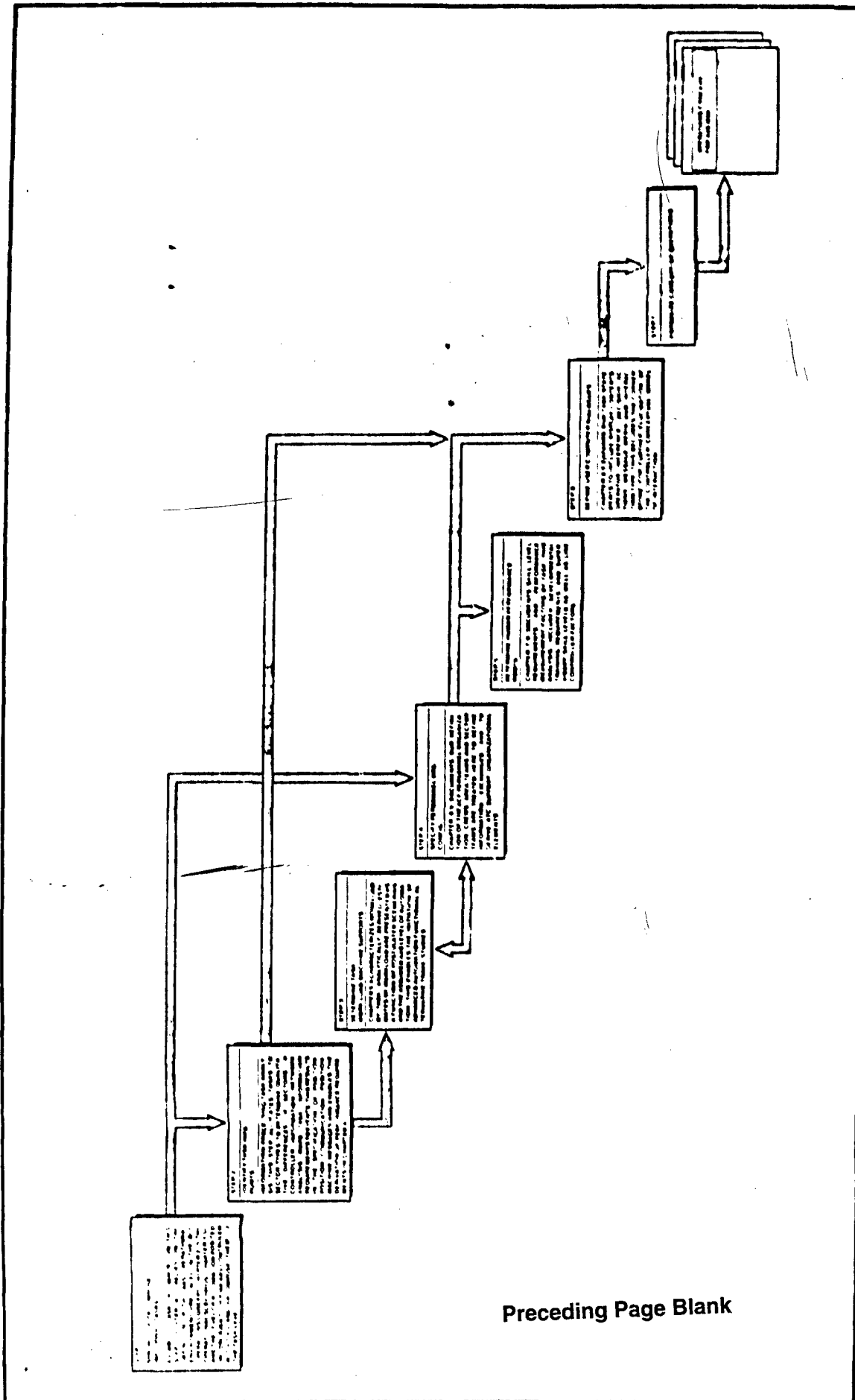


Figure 1.5. Operations Concept Development Process
1-15 / 1-16

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1.5.1 Controller Information-Processing Task Analysis

The first step in the process involves the identification and decomposition of Controller information-processing tasks. The top-level set of Controller activities is structured in terms of accomplishment of the goal of air traffic control, namely, the effective implementation of the separation/control standards. The implementation of those standards by the Controller assures the safe, orderly, and expeditious flow of air traffic in today's system, and remains as the *raison d'être* of the AAS. Division of airspace is intrinsic to this philosophy in that the Controller manages his airspace in accordance with FAA separation standards and procedures. This philosophy transcends a single sector by requiring the formal transfer of aircraft control from sectors within an ACF, between ACFs, and from ACFs to the towers.

Activities represent the top-level functions performed by the Controller-machine pair to implement the above goals. The term "Controller-machine pair" is used in this context to denote the actions a Controller performs at his workstation in response to an event or a series of events. A sequence of activities is, therefore, a subset of an ACF Controller function which is the result of either external events, the coordination among Controllers on a Sector Suite team, or coordination between adjacent sectors.

1.5.1.1 Composition Graphs for Information-Processing Tasks

Given the top-level set of ACF Controller activities, one can perform a logical decomposition into sub-activities and finally, tasks, which preserve consistency, completeness, and transitivity of event stimuli and Controller output responses. The use of composition graphs is illustrated in Figure 1-6. Composition graphs have been selected as a task decomposition tool due to their inherent capability to show the multi-processing nature of the Controller's job. Figure 1-6 illustrates composition graph symbols which define sequential, concurrent, iterative, and decision making (path selection) flow of sub-activities. The

basic composition graph symbology set is also shown in Figure 1-6. Figure 1-7 covers the composition graph formalisms and the rules of functional decomposition.

A composition graph of tasks reflects linkages among the tasks, not a hierarchical arrangement that implies the "level" of the task. The first task is not an "overall task" to be accomplished by performance of the tasks that follow on the graph. Nor is a composition graph a flow chart in the usual sense, though a sense of task sequencing is inherent in the graphic portrayal.

Tasks are stated to a functional level of *what* is accomplished by the Controller. Low-level procedures or precise steps of *how* a task is performed on a given set of equipment are not detailed. Rather, their intent is to reflect what gets done without unduly restricting them to a particular design, display equipment, or specific procedure.

1.5.1.2 Task Description Language (TDL)

The resultant graphical task decomposition is then translated into a tailored version of structured English called Task Description Language (TDL). The TDL ensures logical consistency in the graphical task decomposition and communicates the AAS task structure, both to Controllers and to prime contractor engineering personnel. The TDL provides the same information as the composition graphs, but presents it in a way which forces an analysis of the logical connections among the tasks. This is done by first standardizing the task statement in terms of a set of non-redundant verbs, objects, and qualifiers to ensure consistent use of terminology. A set of logical constructs is then applied to organize the tasks in a logically meaningful way. The use of TDL in conjunction with the graphs serves as a validation tool which ensures that the task analysis is consistent and complete. Figure 1-8 shows the relationship between composition graphs and TDL. Appendix A provides the complete set of graphs and TDL which define the ACF Controller's job. Reference Chapter 4.0 and Appendix A for graphing and TDL definitions.

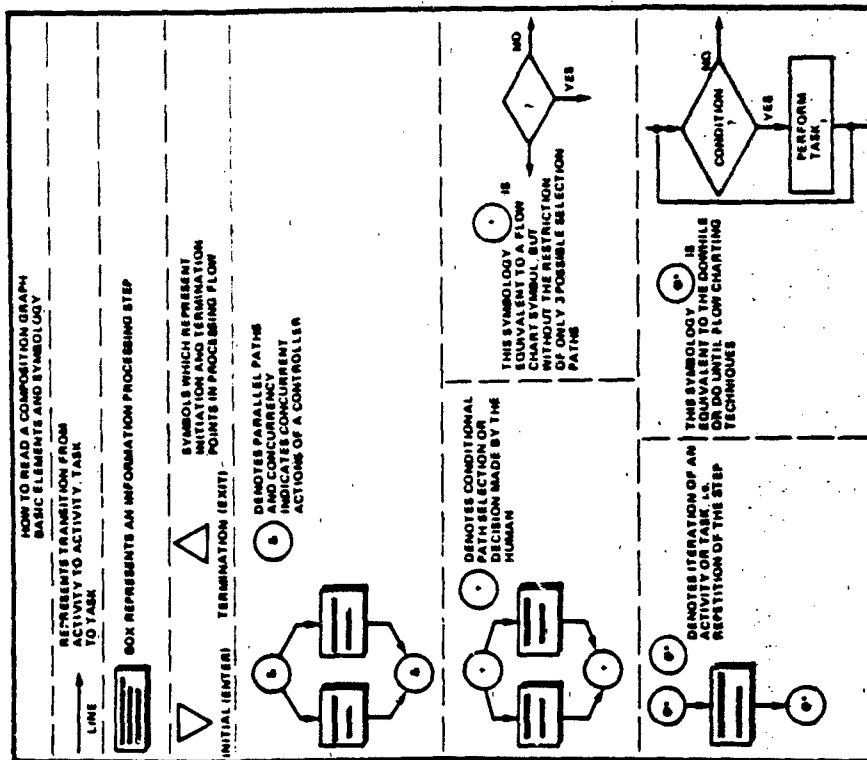


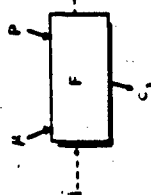
Figure 1-6. Example of Controller Activity Decomposition

FUNCTION: A SYSTEM FUNCTION, F, IS A SIX TUPLE:

$F = (I, O, \mu, D, P, C)$

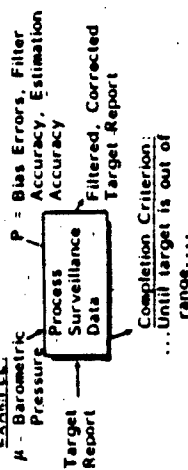
WHERE:

I = AN INPUT SET
O = AN OUTPUT SET
 μ = A SET OF SYSTEM PARAMETERS
D = A DESCRIPTION OF THE TRANSFORMATION FROM INPUTS TO OUTPUTS
D: I → U → O
P = A PERFORMANCE PARAMETER
C = A COMPLETION CONDITION

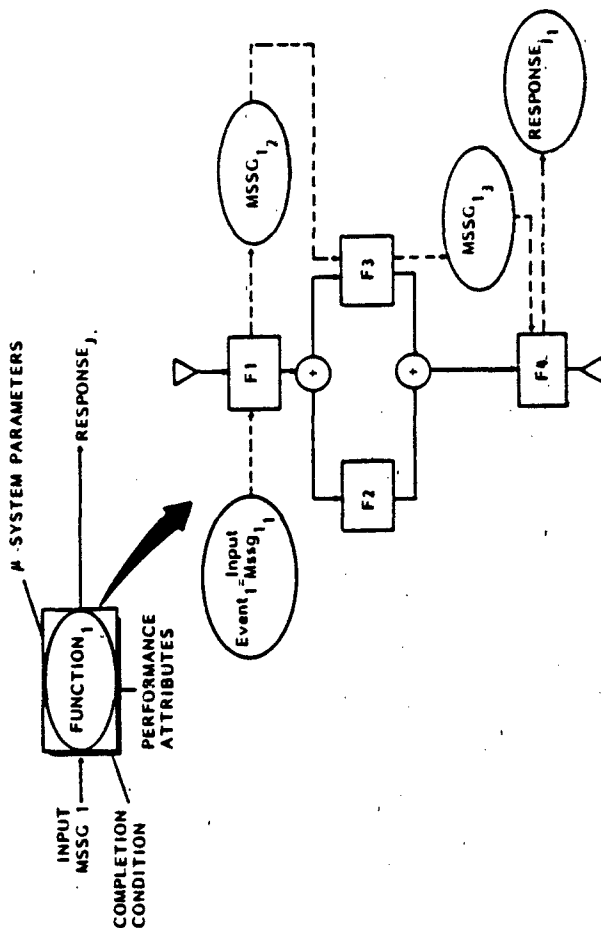


F IS VIEWED AS A BLACK BOX WHICH HAS INPUTS I, AND OUTPUTS O. THE INPUT IS ASSUMED TO CONTAIN ANY RELEVANT ENVIRONMENTAL PARAMETERS, e.g., NO. OF ACTIVE TRACKS. THE SYSTEM FUNCTION IS VIEWED AS INCOMPLETELY DEFINED UNTIL THE SYSTEM PARAMETERS SET μ IS SPECIFIED. THUS F CAN BE VIEWED AS A COMPOSITION OF FUNCTIONS, WHERE THE SELECTION OF A WILL RESULT IN THE SELECTION OF EXACTLY ONE TRANSFORMATION OF INPUTS AND ENVIRONMENT INTO THE FUNCTION SYSTEM OUTPUTS AND PERFORMANCE, P. THE TRANSFORMATION WILL CONTINUE UNTIL A COMPLETION CRITERION, C, IS SATISFIED.

EXAMPLE:



A SYSTEM FUNCTION IS DEFINED AS A REQUIRED TRANSFORMATION OF INPUTS INTO OUTPUTS, AND COMPLETION CRITERIA. THE INPUTS AND OUTPUTS MAY CONTAIN CONCURRENT SUBSEQUENCES OF ELEMENTS. THE COMPLETION CRITERIA IS GENERALLY A SET OF BOOLEAN CONDITIONS ON THE INPUT WHICH DEFINE THE REASONS FOR EXITING THE FUNCTION. TO SUPPORT TOP DOWN PERFORMANCE DECOMPOSITION, WE ATTACH TO THE FUNCTION A SET OF PERFORMANCE INDICES (e.g., ACCURACY, TIMING, ETC.) WHICH MEASURE THE EFFECTIVENESS OF THE TRANSFORMATION.



FUNDAMENTAL CONCEPTS

THE DEFINITION OF DECOMPOSITION TAKES PLACE IN THREE STEPS. FIRST, SEQUENCES OF FUNCTIONS ARE DEFINED IN TERMS OF COMPOSITION GRAPHS. THESE ARE DIRECTED GRAPHS IN WHICH NODES ARE FUNCTIONS, AND EDGES REPRESENT TIME PRECEDENCE RELATIONSHIPS (THE DOTTED LINES REPRESENT INPUT/OUTPUT RELATIONSHIPS BETWEEN FUNCTIONS.) SIMILARLY, SEQUENCES OF INPUTS AND OUTPUTS ARE REPRESENTED AS SCHEMA. THESE ARE DIRECTED GRAPHS WITH ATOMS (GENERIC UNIT OF INPUT/OUTPUT) AND EDGES REPRESENTING POSSIBLE PRECEDENCE. SUCH GRAPHS HAVE SPECIAL NODES TO INDICATE CONCURRENCY, ITERATION, AND REPLICATION OVER AN INDEX SET. THE SECOND STEP IS TO DEFINE A FUNCTION COMPOSITION GRAPH BY SYNTHESIZING THE COMPOSITION GRAPHS AND ITS REFERENCED FUNCTIONS INTO THE CHARACTERISTICS OF A SYSTEM FUNCTION. THIS IS DONE BY COLLECTING THE OVERALL INPUTS AND OUTPUT SEQUENCES, TRANSFORMATION, COMPLETION CRITERIA, AND PERFORMANCE INDICES.

FINALLY, DECOMPOSITION IS DEFINED AS A RELATIONSHIP BETWEEN AN ORIGINAL FUNCTION AND A FUNCTION COMPOSITION IF FOUR CRITERIA ARE SATISFIED:

- 1) INPUT SEQUENCES AND OUTPUT SEQUENCES MUST BE PRESERVED WHERE DEFINED, ALTHOUGH THE FUNCTION COMPOSITION INPUTS AND OUTPUTS MAY ADD MORE DETAIL.
- 2) ANY INVARIANTS OF THE FUNCTION TRANSFORMATIONS MUST BE PRESERVED.
- 3) THE COMPLETION CRITERIA MUST MATCH, IN PARTICULAR THE NUMBER AND TYPE OF EXITS.
- 4) THE PERFORMANCE INDEX OF THE FUNCTION MUST BE COMPUTABLE FROM THOSE OF THE SUBFUNCTIONS OF THE FUNCTION COMPOSITION.

THIS DEFINITION IS TRANSITIVE (I.e., THE DECOMPOSITION OF A DECOMPOSITION IS A LEGAL DECOMPOSITION OF THE ORIGINAL FUNCTION INCORPORATES HIERARCHICAL CONTROL THEORY, GENERALIZED STATE SPACE THEORY, AND CONCURRENT FUNCTIONS.

Figure 1-7. Composition Graph Formalisms

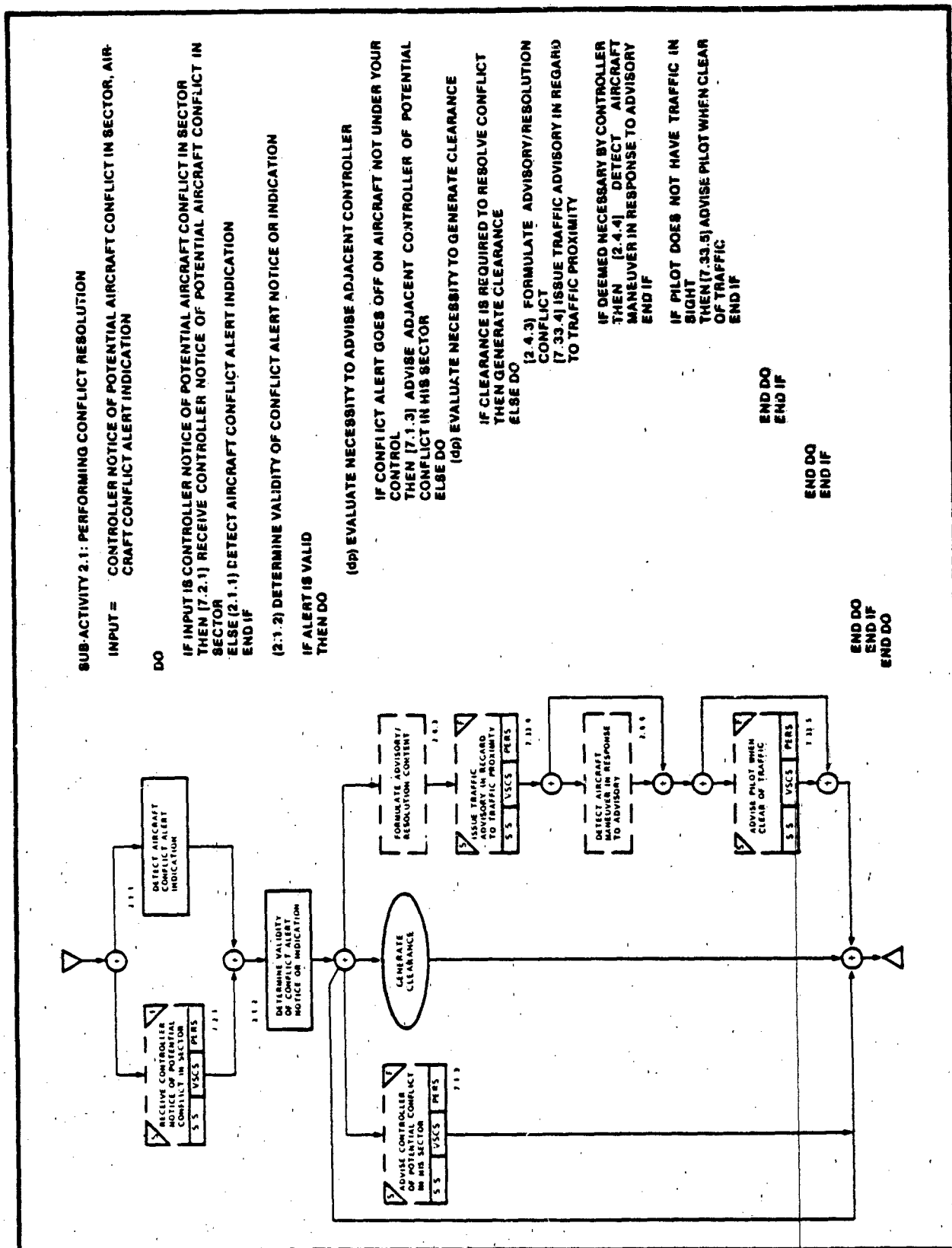


Figure 1-8. Relationship Between Composition Graphs and TDL

1.5.2 Characterizations of Controller Information-Processing Tasks

The subsequent analytic steps depicted in Figure 1-5 rely on Step 1's task decomposition. The level of detail represented in the composition graphs and TDL allows for characterizations of tasks based upon information inputs and Controller output requirements. Tasks are characterized in terms of both ATC complexity factors and sector type (e.g., low altitude arrival, high altitude en route). ATC complexity factors include coordination, traffic density, traffic orientation, traffic separation, sequencing, and time responsiveness.

This initial characterization later feeds operator workload assessments and assumptions made concerning the ACF crew/team organization model. Cognitive and perceptual task attributes are then mapped to workload assessments and potential human capacity limitations to derive machine aiding requirements such as display highlighting, alarms, etc.

Another series of task characterizations in terms of human performance attributes provides the basis for determining journeyman Controller skill level requirements and trainee performance requirements. The Controller-machine dialogue is derived through a logical extension of these task statements and characterizations to determine display content, input interactions, and information presentation/coding strategies (Ref. 9).

Therefore, a direct link is preserved between the event-sensitive Controller information-processing tasks (depicted in composition graph and TDL form) and the input and display requirements of the AAS MMI. This Operations Concept for the AAS Man-Machine Interface, therefore, provides the basis for CDRL A005, Sector Suite Man-Machine Functional Capabilities and Performance Requirements (Ref. 6) and CDRL A003, Draft Sector Suite Console Requirements Specifications (Ref. 3), and so ensures that AAS MMI requirements are in all cases directly derived from and traceable to ACF Controller task requirements.

1.6 References

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2.0 ACF OPERATIONS CONCEPT

The NAS plan (Ref. 3) outlines the objective to consolidate the operations of multiple terminal radar approach control and en route air traffic control facilities (that are located in the same geographic area) into ACF. The co-located facilities will be responsible for performing arrival, departure, and/or en route control of air traffic. A distinction will not be made between en route operations and terminal operations, as the integration of these functions is one of the FAA goals which the AAS supports. However, a distinction is made according to sector types to assure that the unique characteristics of terminal approach control operation are understood and preserved. The concept of ACF operations, including an overview of how the individual Controller will be employed in carrying out these ATC operations, is summarized in this chapter.

2.1 Summary of ACF Operational Employment Concept

The intent of the consolidation of en route and terminal Controller/User Operation facilities into ACFs is to achieve the following mission level ATC goals:

- Integration of functional responsibility for the safe, orderly, expeditious flow of traffic.
- Ensurance of uniformity of concept application throughout the ATC system.
- Increased automation of air traffic separation services and flight data processing.
- Unrestricted operational data interchange.
- Integration of sectors to include control of en route and terminal airspace.
- Increased productivity of Controllers through enhanced automation.
- Reduced overhead staffing.

- Reduced boundaries between approach control and en route functions.
- Reduced need for interfacility transfer of control of aircraft.
- Increased automation to transfer more of Controller workload to machine.

To paraphrase, the overall goal is to improve air traffic control service to users, increase Air Traffic and Airway Facilities personnel effectiveness and productivity, and absorb growth through consolidation of ATC facilities while maximizing the utility of advanced automation.

ACFs will have realigned boundaries based primarily on traffic flows throughout large geographic areas, accommodating arrival, departure, and en route control in one type of facility. All necessary control towers will remain in existence, but radar approach control facilities will be consolidated within the ACF.

Figure 2-1 illustrates an example of the consolidation of facilities and the concept of an ACF. Numerous facilities in the Pacific Northwest (such as Spokane, Washington, Helena, Montana and others) might be combined and relocated in Seattle as one ACF. This facility could be either a Type A, Type B, or Type C ACF, as illustrated in Figure 2-1. A Type B ACF is limited by a ceiling altitude, as shown. Type A airspace is not bounded by a floor or ceiling. Type C airspace is bounded by a floor altitude. Type B and C facilities are designed to respond to unique operational considerations such as air traffic density and traffic flows.

Key to the development and evolution of the ACF Operational Employment Concept is a more efficient Controller-machine interaction. The first step in defining a more operationally effective MMI is to examine the major components of the ACF Operations Concept to determine the roles of the Controllers, and sector and area teams.

Figure 2-2 depicts, in composition graph form, the top-level operational elements of the NAS ATC system. The major

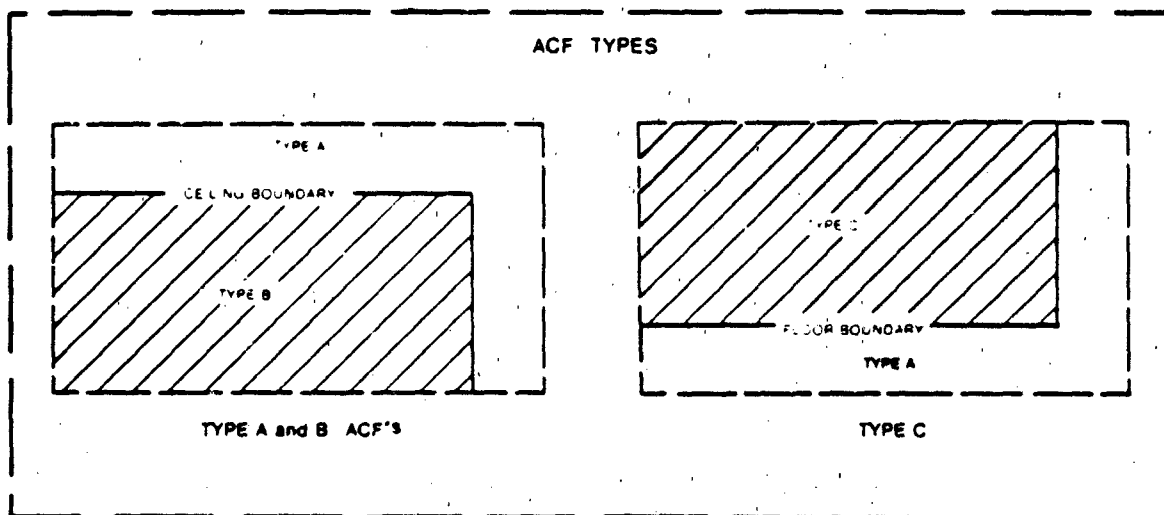
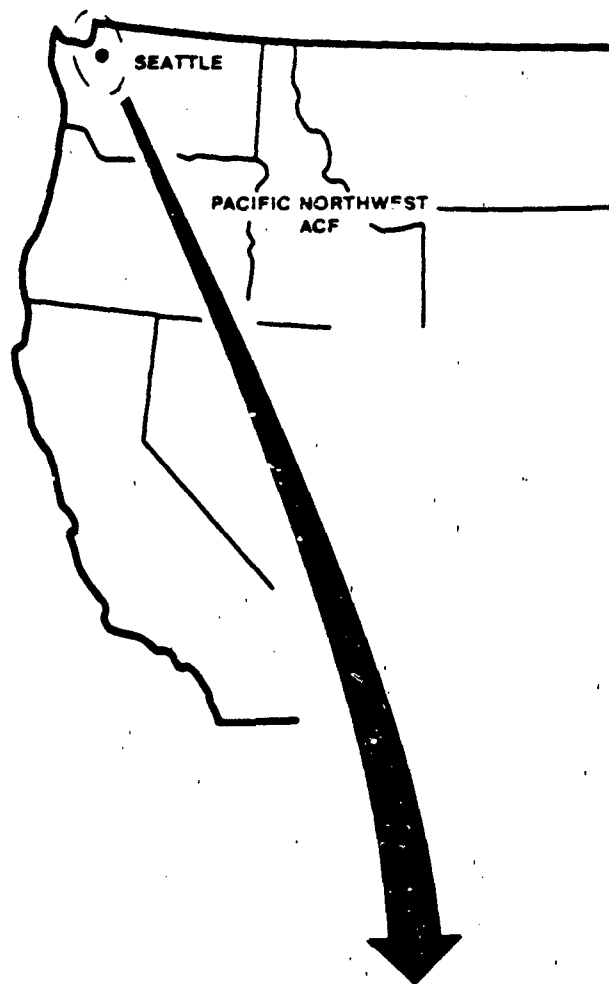


Figure 2-1. Consolidation of ATC Facilities
into ACF Types

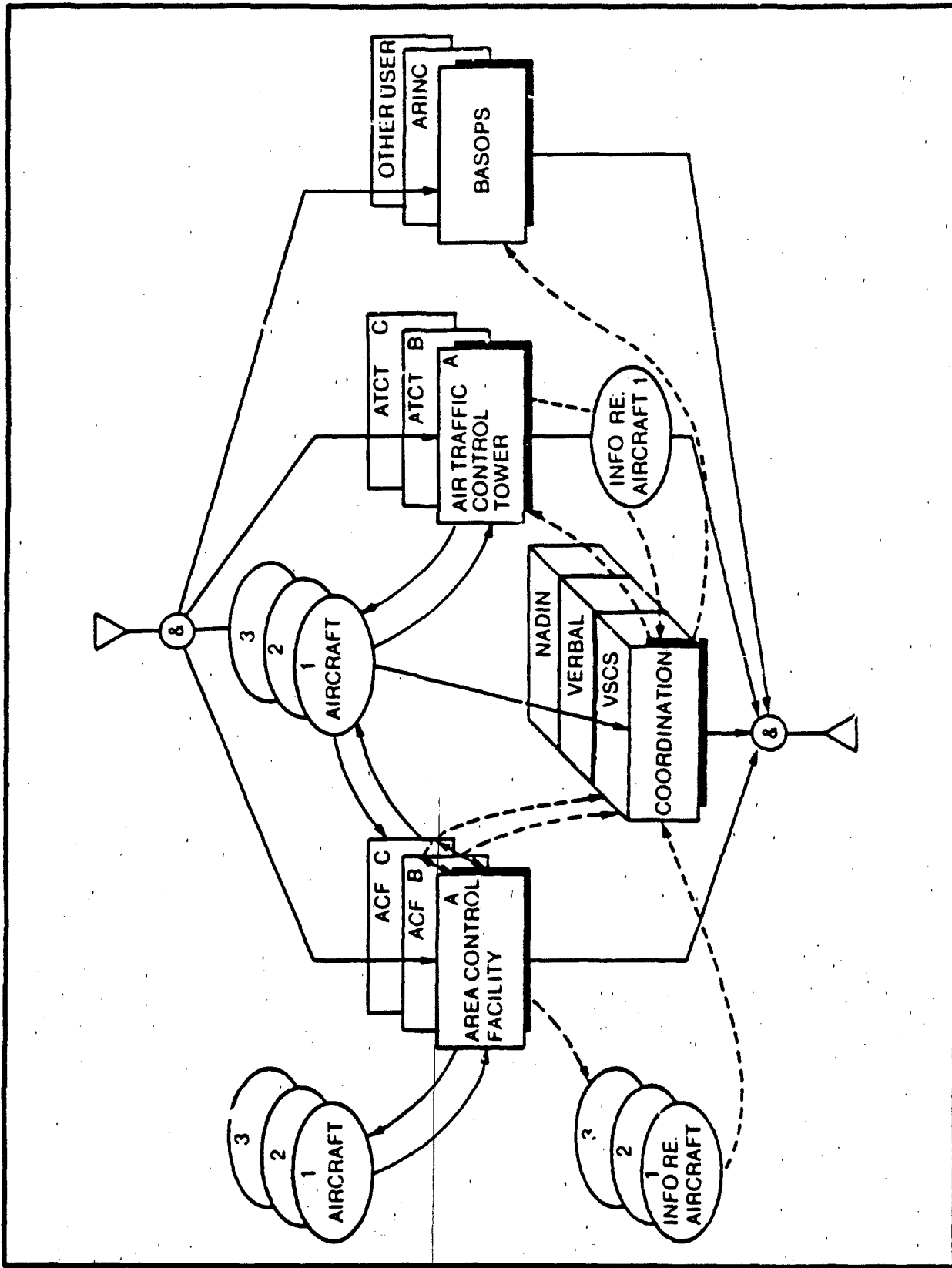


Figure 2-2. ACF Operational Concept

components of the system are the Area Control Facilities (ACFs), the Airport Traffic Control Towers (ATCTs), and other facilities such as BASOPS and ARINC. (See definitions in Appendix D). Figure 2-2 shows an abstract flow of information between/ among ACFs, to and from aircraft, as well as the necessary coordination between ACFs, ATCTs, and other facilities. This shows at a very high level the different types of interfaces with which the Controller is involved, and establishes a basis for a more detailed look at the composition of Controller tasks and dialogue definitions in Chapter 8.0. The solid-arrowed lines in the graph show how the planning and control responsibility for a specific aircraft moves through the system. The dashed-arrowed lines indicate the flow of information through the system. For example, information may be passed from an ACF to an aircraft. This information, as well as information from other ACFs, may be passed along to an appropriate ATCT or other facility after having been coordinated with other incoming information. The coordination of information may be done either by direct voice, i.e. verbally, via NADIN, or via VSCS. The concurrency notation (&) superimposed on this block diagram shows that each of the indicated functional elements operate in parallel with others.

Figure 2-3 depicts ACF interfaces in composition graph form similar to Figure 2-2. This diagram depicts a number of sectors within an ACF and shows the relationship between the flow of information and control external to an ACF and that which is internal to an ACF. Inputs which are external to the ACF, such as flow control, flight plans, flight plan amendments, surveillance data, weather data, aircraft communications, and status information, are transformed by ACF operations and automation functions into clearances, advisories, coordination information, transfer-of-control data (i.e., handoff data), and system status information. These outputs are distributed to entities outside the ACF, such as aircraft, other ACFs, or ATC towers (Ref. 1, CDRL A004). Figure 2-3 illustrates the coordination of weather information and information from an aircraft, and the flow of that information to the appropriate sector suite. This information is then transformed into handoff data (in this example) and passed along to another aircraft.

The information is coordinated either verbally, by NADIN or VSCS, and also through the Sector Suite interface. Finally, in this example the information is coordinated with an ATC tower. This diagram illustrates through the use of concurrency notation that the elements within an ACF may operate within the ACFs themselves, and that elements external to the ACFs may also operate simultaneously.

The ACF will ensure that no degradation or loss of existing services occurs while the system evolves from the current one, which is segregated into terminal and en route facilities, into an integrated one. It is also assumed that services will be improved where deficiencies exist and that, in addition, increasing traffic levels and demands for services will be accommodated.

As stated in Ref. 3 (NAS Plan), these improvements principally consist of:

- Those that will upgrade current systems by adding or expanding safety-related functions or increasing capacity to accommodate demand while newer systems are being developed.
- Those that apply high levels of automation to air traffic control and flight services. The most notable aspects of the systems approach are expanded common, readily available data bases and higher levels of service that result from automating the more routine Controller tasks.
- Those that consolidate facilities. Consolidations will not only allow for the cost-effective introduction of new technology, but will also remove constraints to the orderly flow of traffic and create a more efficient work force. Consolidation is expected to be a major factor in the anticipated increase in productivity.

The planned evolution of the ATC system will improve safety and efficiency, be responsive to user needs, and satisfy increasing demands at minimum cost. The

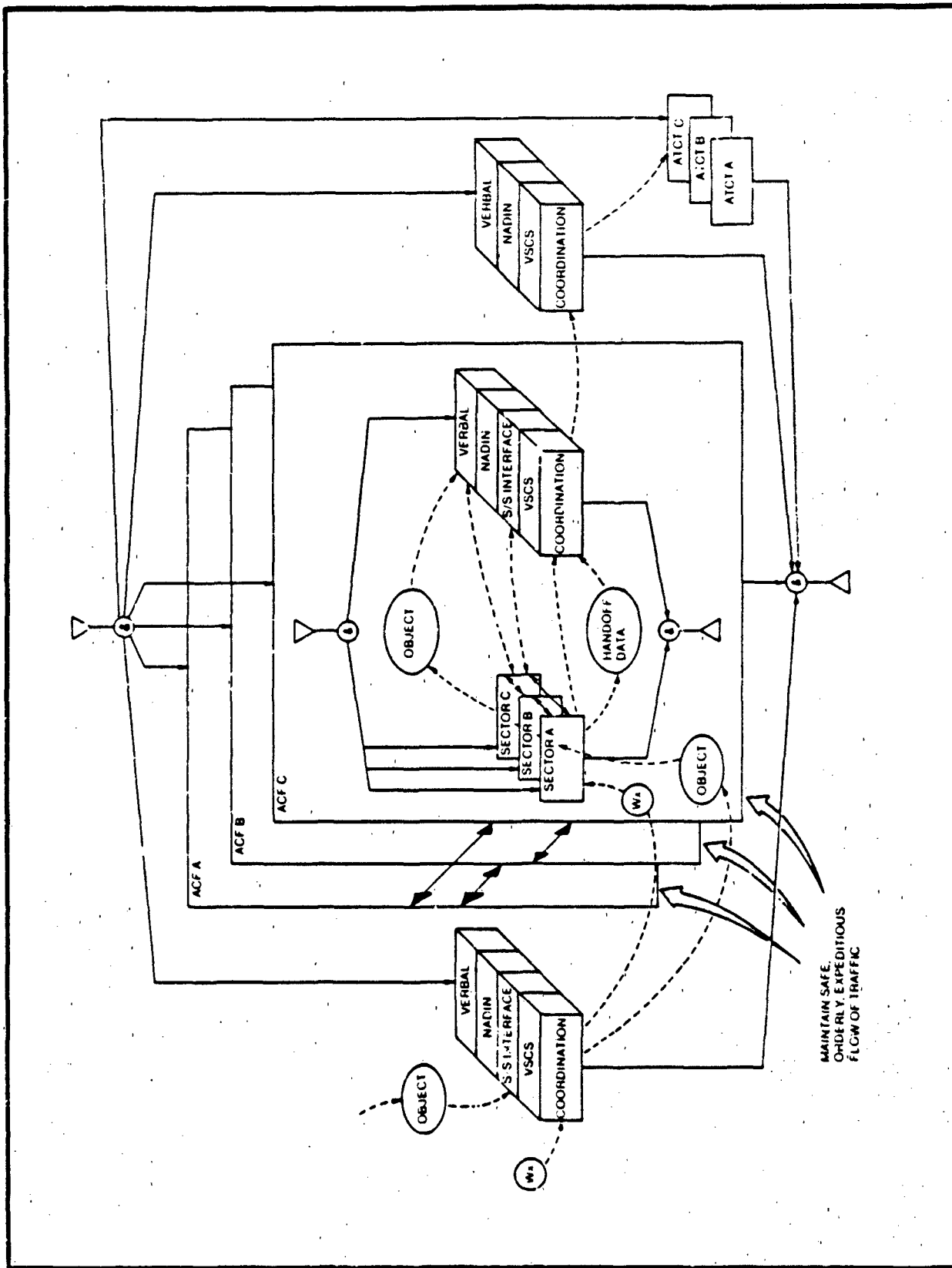


Figure 2-3. ACF Interfaces

impact of these proposed improvements on the performance of the Controller will be addressed in Chapter 5.0, Controller Workload Assessment and Definition of Machine Support.

In summary, Controller productivity will be increased in one area by the creation of a more efficient MMI. Improved automation will allow the transfer of more of the Controller's workload to the machine. For example, improvements to sensor/tracking performance will result in providing more reliable data to the Controllers which may result in greater acceptance of improved separation assurance monitoring functions, strategic flight planning, and other AERA capabilities. Key to productivity will be gaining the Controllers' confidence through demonstrations of improved automation capabilities and providing them with highly reliable information and operational services.

2.2 Facility-Level Description

The major operational functions of the ACF will include the following:

- Surveillance processing
- Weather processing
- Flight data processing
- Tracking
- Association checking
- Conflict probe
- Separation assurance
- Flow control
- Clearance/advisory delivery
- Data entry & display
(MMI processing)

According to the National Airspace System Plan (Ref. 3), en route and terminal facilities will be consolidated into ACFs. This consolidation features the use of common computers and Sector Suites. These major operational elements are treated herein in the development of the operations concept. This operations concept assumes the consolidation of facilities posed in the NAS plan.

Within each ACF, the Advanced Automation System (Ref. 2) will have computer processing divided between common processing equipment and the individual Sec-

tor Suite. In a typical Sector Suite, multiple displays will provide a plan view of the air traffic and weather situation, alphanumeric flight and weather data, and other aeronautical information such as notices to airmen (NOTAMs), and traffic planning data including the ability to probe the system for conflict-free, fuel-efficient flight paths. Sector processing and the failsoft and emergency modes of the AAS will ensure that required surveillance, flight data, and weather information are available at the particular Controller position.

The purpose of the AAS is to provide a total automation system that includes the Controller Sector Suite, new computer software, and new processors to augment the host computers. The AAS will provide the capacity to handle the projected traffic load through the year 2000: increased productivity through introduction of new Sector Suites at the earliest practical time, a high degree of reliability and availability, and the capability for enhancement to perform other functions subsequently introduced into the system. Software functions that are now unique to the terminal air traffic control systems will be incorporated into the new software to support the Area Control Facilities. All remaining elements of the current en route automation hardware and software will be replaced.

The full AAS will make possible the integration of en route and terminal operations in the ACFs. The tower cab tower position consoles will be installed when terminal radar control is operationally integrated into the Area Control Facilities.

Distributed processing will inherently provide high availability and protection from total system failure. Increased operational flexibility can be achieved, since the number of Controller operating positions can be reconfigured to meet changing demand based on day-to-day or hour-to-hour workload requirements. When traffic decreases, Sector Suites and associated communications can be configured into larger operating Sectors; and the total number of operating positions and associated staffing can be reduced.

The advanced functions of the

automated en route air traffic control (AERA) program will be added to the AAS in incremental steps. Direct fuel-efficient route planning and traffic management will be added before strategic planning and full tactical clearance generation. During the latter phases of the NAS plan, weather, and flight information and eventually computer-generated clearance messages, will be transmitted directly to aircraft via data link.

2.3 ACF System Elements

Although the main activities in an ACF are centered around the ACCC, there are other equipments and activities that will also be part of an ACF. Each ACF will also include communications equipment, for example a VSCS, and voice-radio equipment, space and equipment for administrative activities. Each ACF will also include a NADIN Concentrator, a Central Weather Processor (CWP) and a Flight Service Data Processing System. The system elements of major concern with respect to the Operations Concept are the following:

- AAS Area Control Computer Complex (ACCC)

The ACCC is the equipment and software that provides automation support for the control of aircraft in a volume of airspace under the air traffic jurisdiction of an ACF. The equipment and software of all ACCCs shall be identical, varying only in installation quantities and in software adaptation to the operational configuration of the sites.

An ACCC includes computers, computer programs and related documentation, displays, storage devices, input devices, output interconnecting communications, a supporting maintenance subsystem, a training subsystem, and interfaces with other FAA systems. An ACCC does not include communications that are external to the building that houses each ACF, voice communications, or any equipment at surveillance sensor sites.

- Maintenance Processing System (MPS)

Within each ACF is a colocated Maintenance Processor Subsystem (MPS). Each MPS, as part of the FAA's Remote Maintenance Monitoring System (RMMS) will be positioned in a central location for equipment performance monitoring, certification, and control of remotely located FAA Facilities in a given geographic area. The ACF shall send system status, performance, and alarm messages to the MPS on a periodic basis. The MPS will send messages to the ACF requesting that system data be transmitted to the MPS. MPS' will be interconnected to the ACCC and to each other in a nationwide network via NADIN.

- Central Weather Processor (CWP)

Each AAS shall be linked by local communications to obtain digital weather data and weather products and to provide PIREPs collected by ACF Controllers. Three types of messages flow from the AAS to CWP: (1) requests for products and services, (2) PIREPs collected by the sector, and (3) temporary adaptation list changes. In addition to automatically disseminated data, the AAS may send request and reply messages to the CWP for any data not normally stored by the AAS. Temporary additions to the standard list of required weather data may be requested by the AAS.

- Voice Switching and Control Systems (VSCS)

The ACF Sector Suites include the integrated use of the Voice Switching and Control System (VSCS). The VSCS is the primary means for establishing communications in the NAS Air Traffic Control System. Air traffic control communications consist of ground-to-ground links among ATC personnel in the same facility and in different facilities and ground-to-air links between air traffic Controllers and pilots. The VSCS system can select, connect,

and automatically reconfigure ground-to-ground and ground-to-air circuits as needed to meet operational, maintenance, and support communication requirements.

Data exchanged between the AAS and the VSCS will permit control of the voice communications system configuration in response to changes in the ACF configuration. These changes will be made as a result of AAS inputs by supervisory personnel. The AAS shall provide to VSCS the data on the configurations themselves, commands to establish a given configuration, and inquiries about configurations and current system status. The VSCS will provide appropriate status and response information to the ACF.

- National Automated Data Interchange Network (NADIN)

NADIN will be a national data communication network which will serve the various ACF computer complexes and equipment. NADIN will consist of a packet-switched network with sophisticated message routing and interface capabilities to enable transmission over one of several paths and interoperability with a number of different networks. NADIN will control and route messages on the network through two or more national switches. NADIN concentrators to be colocated at selected ACFs will interface to all ACFs and provide access and interface to the network. The NADIN concentrator will perform the total data communications function. It will add the appropriate communication information, format messages received from the ACF, and control the transmission of the messages to the destination facility/equipment.

2.4 Operational Descriptions

This section describes how the Air Traffic Service views operations after the AAS becomes operational at field sites. This section should be viewed as guidance to understanding changes from current to future operations.

2.4.1 ACF Sectorization

ACFs will be formed by combining into a single facility the air traffic control of airspace presently accomplished by several TRACON/TRACAB facilities and the adjoining en route sectors. This will result in reduced coordination between separate facilities and re-aligned sectors which can better accommodate inbound and outbound traffic flows.

This operations concept examines seven types of ACF sectors, i.e., low altitude arrival, low altitude departure, low altitude en route, high altitude en route, oceanic, arrival control, and departure control. These sectors, in certain instances, will be structured to serve more than one purpose. For example, these sectors may in certain traffic conditions be reconfigured (combined or decombined). Equipment outages (e.g., common console preventative maintenance) may result in reconfiguring sectors.

A sector of airspace may be controlled by one to three Controllers operating at a Sector Suite workstation. [Workstations and Controller teams will be configured as a function of sector type, traffic volume, traffic sequences, and interfacility interfaces. Workstations will contain from one to four common consoles comprised of interaction devices, displays and the VSCS panel.]

The number of sectors per ACF will range from 60 to 120 depending on the size and type of facility. During peak traffic periods, sectors may be "decombined" into smaller geographic areas or a lower level of air traffic control specialization (e.g., splitting the arrival control sector to accommodate dual approaches). Slow periods may require the "combining" of sectors, especially during early morning or late evening shift periods. An example of combined sectors may occur when departure sequences are handled by the low altitude Controller, thus consolidating the departure control and low altitude sectors.

This strategy of combining sectors may be feasible given improvements in sensor technology and procedural improvements for handling traffic sequences.

Consolidation will bring about a re-thinking of ACF sector configurations to regulate Controller workload, and, yet improve handling of traffic sequences at primary and secondary (satellite) airports, and provide more fuel efficient flight services.

2.4.2 Controller Coordination Philosophy

Currently verbal Controller coordination between sectors (at other facilities or within the same facility) and pilots is a significant workload demand. The ACCC (within the ACF) will facilitate coordination by providing machine functions which allow:

- automatic handoff of control between sectors
- automatic pointouts
- automatic distribution of weather data such as PIREPs, SIGMETs, forecasts
- automatic posting of flight information for aircraft about to enter sector airspace

In all cases the Controller may override automatic options and explicitly accept handoffs, initiate pointouts, and request full data block or flight plan information, i.e., ultimate responsibility for aircraft separation and control will still lie with the Controller, not the computer.

The system will provide the Controller with the capability to compose and enter messages for automatic routing and display at other Controller (sector) workstations (intra-facility or inter-facility).

VSCS will facilitate coordination with capabilities for conference calling and direct access to remote facilities. It will also permit call forwarding and queuing of incoming calls.

A Controller (at one sector) does considerable coordination with other Controllers to assure smooth and efficient handling of traffic, coordinate delays due to facility restrictions and weather, or resequence inbound/outbound traffic due to

runway changes. This type of coordination must be addressed by the ACCC.

2.4.3 ACF Sector-Area Team Organization Philosophy

The Area Supervisor is the resource manager for the Sector Suite Teams reporting to him. The supervisor will be able to determine sector workload through sector workload probes and cause sectors to be reconfigured (combined or decombined) in response to traffic situations. This becomes an effective way to balance workload and maintain Controller alert levels.

The Area Crew employs the resources of the metering/flow control position to develop strategies for handling area level traffic sequences. Traffic strategy and required coordination will be relayed to the Area Supervisors for implementation.

At the Sector Suite level, the ACCC provides the Controller(s) with machine aids for carrying out supervisory directives to reconfigure the Controller workstation and respond to anomalous situations such as loss of a functional capability or equipment failure.

2.4.4 Controller Training and Certification

Each Controller will be required to gain training and proficiency at several levels i.e.,

Level 1—workstation familiarization and MMI Language proficiency

Level 2—facility MOA's, procedures, etc.

Level 3—Radar, Data Controller, or Handoff position proficiency

Level 4—specific sector position certification

Through the course of their career at an ACF, Controllers will obtain certifications or check outs at various positions and types of Sectors. A full performance level Controller is an individual proficient in master-

ing the concepts and tasks of air traffic control at all positions of an area of specialization.

The ACCC will incorporate a training system composed of computer hardware and software, problem test cases and a training director to enable the trainee to gain proficiency at levels 2, 3, and 4. This hands-on "classroom" training will be supplemented by on-the-job training at the Controller workstation. Level 1 will be provided by embedded capabilities within the ACCC Sector Suite software.

2.4.5 Real-Time ATC Operations

The Controller has been previously described as an event-sensitive information processor (Ref. 4). The Air Traffic Controller has been trained to mentally anticipate potential control problems and yet provide for expeditious traffic flow. He is and will continue to be operationally responsible for the separation of air traffic. During real-time operations, track information will be presented on the situation display. The Controller will be responsible for visually separating targets and/or by mentally preserving the spatial distance between objects. The AAS will provide powerful machine aids such as improved terminal/en route conflict alert, and Minimum Safe Altitude Warning (MSAW), flight plan conflict probe, improved capabilities for display of special list and flight information, and display of current and forecasted weather conditions.

The Controller Team at the Sector Suite workstation will integrate and use this information to not only facilitate the safe and expeditious flow of traffic under their control, but coordinate information between other Sectors (within the ACF) and between other Sectors at other facilities (e.g., ATCT). This coordination will be made possible by voice switching communications, automatic inter-facility message transfer, automatic message transfer (e.g. pointout messages) between workstations, and direct verbal communication.

Sectors affected by low density traffic patterns during off-peak periods may be "combined" to maintain consistent Con-

troller workload. Other Sectors affected by peak traffic conditions may be adjusted in staffing or become "decombined" resulting in sharing of workload. These "Controller resource management" options will be proceduralized and supported by adaptations of sector geography, location of transmitter/receiver sites, sensor coverage, and ATC procedures. Effecting these options will be the responsibility of the Sector Area Supervisor.

In later phases of AAS evolution, operations may evolve to higher levels of automation where the capabilities of the Mode-S data link are used to transmit advisory weather data and clearance information to the pilot. However there will exist a mix of aircraft capabilities which will require the full range of ATC services which include:

- Voice communication of clearance and advisories to aircraft not equipped with Mode-S datalink processors.
- Voice and data link communication to pilots of advisory and flight following information.
- Backup voice communication in event of data link or on-board flight equipment outages.

Eventually the role of the Controller in this era of advanced automation may at some sectors be more monitoring in nature, where the Controller handles exception events. However, certain sector types and conditions (such as weather or airport restrictions) will require the Controller to be an active participant in air traffic control. It is important to recognize that in real-time ATC operations, maintaining Controller alertness, skill levels, and capabilities will be extremely important to the "availability" of services to pilots. Controllers, like pilots, experience boredom yet each must be provided capabilities which respond to operational events such as weather, aircraft anomalies, airport restrictions, changing traffic sequences, etc.

2.4.6 ATC Operations Standardization and Transparency

Standard operating procedures are a necessity in the National Airspace System. These procedures permit the common evaluation of operational performance on an ACF by ACF basis and also facilitate the use of consistent ATC practices among all Controllers.

Many procedures within the Air Traffic Control Handbook, 7110.65 will be modified to reflect use of new computer technology, more reliable and accurate surveillance capabilities/NAVAIDS, improvements in the Controller workstation, and sectorization changes brought about by consolidation. New and old procedures must be embedded in the Advanced Automation Training System. Special attention needs to be focused on the transitioning from old practice to new.

The FAA Air Traffic Service has stipulated that certain ATC operations (performed today) remain transparent to the Controller during the initial phases of full AAS deployment. These include:

- presentation of situation display data (where full data blocks are adapted in the ACF to terminal and en route types of sectors) should remain functionally similar.
- presentation of geographic data and sector adaptation data.
- presentation of airway/route structure data.
- implicit (automated) or explicit (Controller invoked) initiation of handoff.
- preservation of many current operating procedures and MOA's

Different systems (e.g., ARTS-II/III, IIIA and NAS Stage A) have brought about certain practices resulting in use of different target symbology, use of flight information; and mosaic vs. non-mosaic processing of sensor data. The ACF and AAS will bring about standardization of displayed informa-

tion and Controller workstations. However, Controller workstations may be adapted to present standard information displays to a team of 2-3 Controllers or a single Controller. The AAS will also provide the flexibility to tailor the presentation of flight, advisory and display information as a function of Sector Team size, sector type, and limited Controller preferences. For example, tailoring the flight data display would involve sorting and presenting flight data entries by time of arrival over a fix or by call sign (alphabetic order).

The system will provide time sequenced voice and data recording of displayed information and Controller input actions. This will provide for the playback of events to enable reconstruction of incidents, as well as evaluation of standard practice.

2.4.7 Operational Availability of ATC Services

One of the main goals of the AAS is extremely reliable and accurate processing. For the AAS, the overall reliability design goal is to provide full service operation within the response times for the ATC services supported by these operations, 24 hours a day, 7 days a week.

In principle, this philosophy provides for a full range of fault coverage for essential ATC functions, such that if one function fails, other essential services (functions) are not degraded, and if a function does fail, that function is restored using a recovery scheme which informs the Controller. Other essential services continue without degradation. Critical functions such as track processing will be provided levels of protection and fall-back modes such that even the enabling of a fall-back option does not adversely affect the performance of other ATC services.

Response time, equipment, and software failures will inevitably occur and be visible to the Controller. Each Sector Suite workstation and associated support processing will be required to recover within a specified response time. Failure to recover within the specified response time will result in unavailable ACT services.

Hardware and software failures are expected to occur, however, automatic error detection, isolation, and recovery techniques will be provided to preclude full-service interruptions. Specific Controller actions (e.g., switch over to back-up procedures) will be required in the event of:

- individual interaction/display device failures
- Sector Suite failures
- loss and or degradation of ACT functional capability

Attention must also of necessity be paid to failures which occur such as loss of radio aboard aircraft, NAVAID failures, sensor outages, loss of data link, and loss of air-ground communications and inter-facility communications. Appendix A includes the provision for Controller tasks which respond to these events at a functional, i.e., design/architecture independent level.

2.5 References

1. Computer Technology Associates. Sector suite functional analysis and trade studies (FAA Contract DTF AO1-83-Y-10554, CDRL A004). Englewood, CO: Author, November 1983.
2. Federal Aviation Administration. Advanced Automation System, System level specification, Design competition phase (FAA-ER-130-005D), April 1983.
3. Federal Aviation Administration. National Airspace System plan, facilities, equipment and association development, April 1983.

3.0 OPERATIONAL REQUIREMENTS

This chapter proceeds from the description of the ACF Operational Employment Concept presented in Chapter 2.0 to identify the events which define Controller work in the AAS. The analysis of Controller tasks (presented in Chapter 4.0 and Appendix A) is based upon the assumption that Controller actions may be viewed as event-sensitive. Operational requirements are derived as a function of ATC events. Event scenarios permit one to identify the set of top-level Controller activities and the subsequent decomposition of this set into sub-activities. This activity synthesis and sub-activity decomposition is guided by the assumed level of automation documented in Sector Suite Functional Analysis and Trade Studies (Ref. 3, CDRL A004) and the AAS System Level Specification (Ref. 4).

Section 3.1 provides a general overview and describes the scenario development process. Graphical scenario portrayals are included in section 3.2, along with event synopses. In section 3.3, we list environmental, technological, and fiscal factors which will impact AAS design characteristics. The top-level Controller activity synthesis is documented in section 3.4, and the decomposition into sub-activities is shown in section 3.5.

3.1 Operational Scenario Overview

As defined in Chapter 1.0, an event may be characterized as a product of the interactions among aircraft, airspace, facilities, surveillance capabilities, and ATC operations. That is, an event is a distinct occurrence which the Controller perceives and responds to in some manner. To identify tasks, the Controller may be modeled as a multi-tasked information processor. The advantage of using this model as an analysis tool is that, if a comprehensive list of events which the Controller observes is documented, as well as a similarly extensive list of tasks, one may achieve a degree of accuracy in describing the Controller's work. The disadvantage in modeling the Controller as an information processor, whose response to events is to perform tasks, is that the dynamic operational complexity of the Controller's job necessitates a

highly interactive analysis model, the application of which is inherently complex. One event may trigger another event before an appropriate Controller response occurs. In addition, it may not be appropriate for the Controller to outwardly respond immediately. A mental response is difficult to document until the response evolves into an overt one. Therefore, in viewing the Controller as an individual who processes information in response to events, we do not have an exact reproduction of the Controller as in a photograph, but we do have an accurate and extremely useful model which can be used to ultimately characterize MMI requirements.

The purpose of operational scenario development is to capture the events and groups of events which influence what the Controller does on the job. An initial event set, geared towards ATC operations as they occur today, is presented in Ref. 2. This document assumes that AAS events are largely invariant to current system events. That is, the event set presented in this document for the AAS is built upon and very similar to the event set developed in Ref. 2, (CDRL A001) for the current ATC operations events, as well as those presented in Ref. 1 and 5.

Scenario development goes through an evolutionary process which is integral to the development of the Operations Concept. The following types of scenarios and their relationship to the overall scenario development are illustrated in Figure 3-1:

- 1) Function Thread Analysis for a specific event;
- 2) Situation-specific scenario portrayals which do not lend themselves to a time-phased sequence;
- 3) Sequences of events which are combinations of potential and highly probable occurrences.

Type 1: Function Thread Analysis, is handled in detail in Ref. 3 (Sector Suite Functional Analysis and Trade Studies). In that document, an event as described in Ref. 2 (En Route/Terminal ATC Operations Concept) is mapped to the ACF Operational

Functions. A composition graph of the ACF Operational Functions is annotated to indicate the data flows affected by (or triggered by) a particular event. An event/function "thread" is traced for each event. The scenarios developed in Ref. 3 are used to validate the functional breakdown of the ACF prior to performing the Man-Machine level of automation trade studies.

Type 2: Situation-specific scenario portrayals, are presented in this chapter. This type of scenario builds upon Type 1 in that it assumes that the functional breakdown of the ACF as performed in Ref. 3 is valid. The scenarios developed herein are strictly from the Controller's point of view and are based upon the assumption that the appropriate functions have been allocated to the machine.

The classification of events in terms of aircraft vs. AAS events is shown in Figure 3-2. Within the aircraft-related events are the Single Aircraft, Single Aircraft Contingency, and Multiple Aircraft categories. Within the AAS-related events are the ATC and ACF facilities categories. Each category is then broken down into types.

For the purposes of discussion and ease in reference, these events are grouped roughly according to the functional genesis as a specified group of events. For example, the single aircraft category will progress through several clearance request types of events. This grouping of events is intended primarily to provide an organization which may be readily reviewed for completeness.

Figures 3-3 through 3-15 follow this grouping description in portraying a synopsis of most of these events and provides event descriptions. This simplified representation of the AAS event scenario illustrates the character of events derived in each category of Figure 3-2, as they occur within the flow of the AAS operational environment. Table 3-3 defines additional AAS events not covered in Figures 3-3 through 3-15.

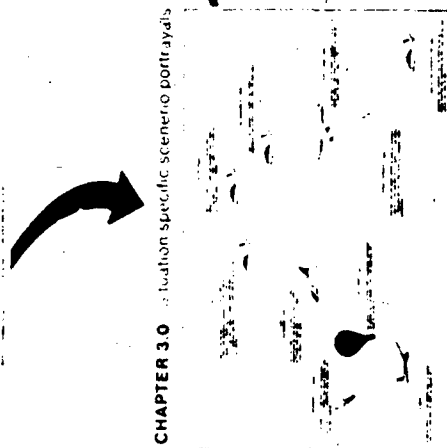
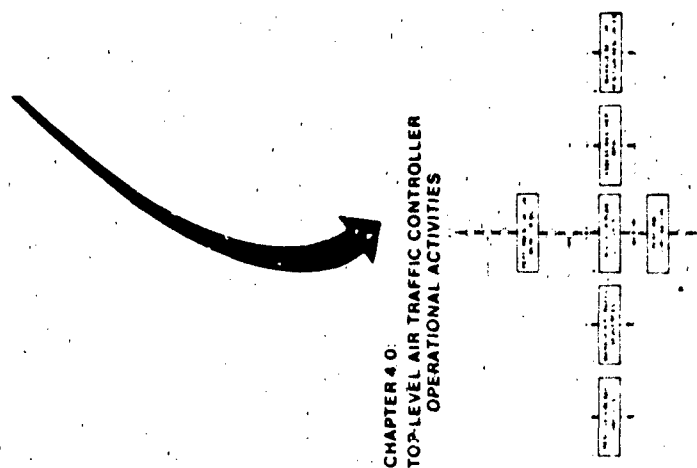
The scope of this scenario development includes events spanning normal, contingency, degraded, and crisis modes of operations as defined in Table 3-1. Table

3-2 lists the entire event set in terms of the classification set forth in Figure 3-2 and annotates them with respect to the definitions in Table 3-1. Event Numbers listed in Table 3-2 were arbitrarily assigned in the order they were associated with Sub-Activities. The first digit of the primarily associated Sub-Activity Number corresponds to the first digit of the event number.

Type 3: Sequences of events, are developed in Chapter 5.0 of this document. The Chapter 5.0 development of scenarios is more conventional in that it associates a timeline with the actual tasks which a Controller performs, and traces a thread from task to task with respect to this timeline. The event chains employed in Chapter 5.0 are the culmination of the other two types of scenarios. They rely upon the data flow presented in Ref. 3, (CDRL A004) as being valid, as well as the Type 1 scenarios. Also, they rely upon the validity of the events and the Type 2 scenarios as established in Chapter 3.0 to construct the Controller workload profile.

3.2 Scenario Portrayals

This section defines the events contained in Table 3-2 and sequences them into scenario portrayals. Figures 3-3 through 3-15 provide these portrayals. Table 3-3 lists the definitions of 9 additional events which are not depicted in Figures 3-3 through 3-15.



CHAPTER 5.0: Sequences of events (event chains)

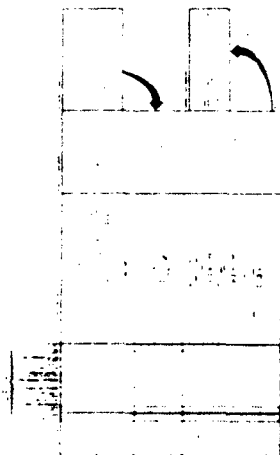


**Figure 3.1. Scenario Development
Illustration**
3.3 / 3.4

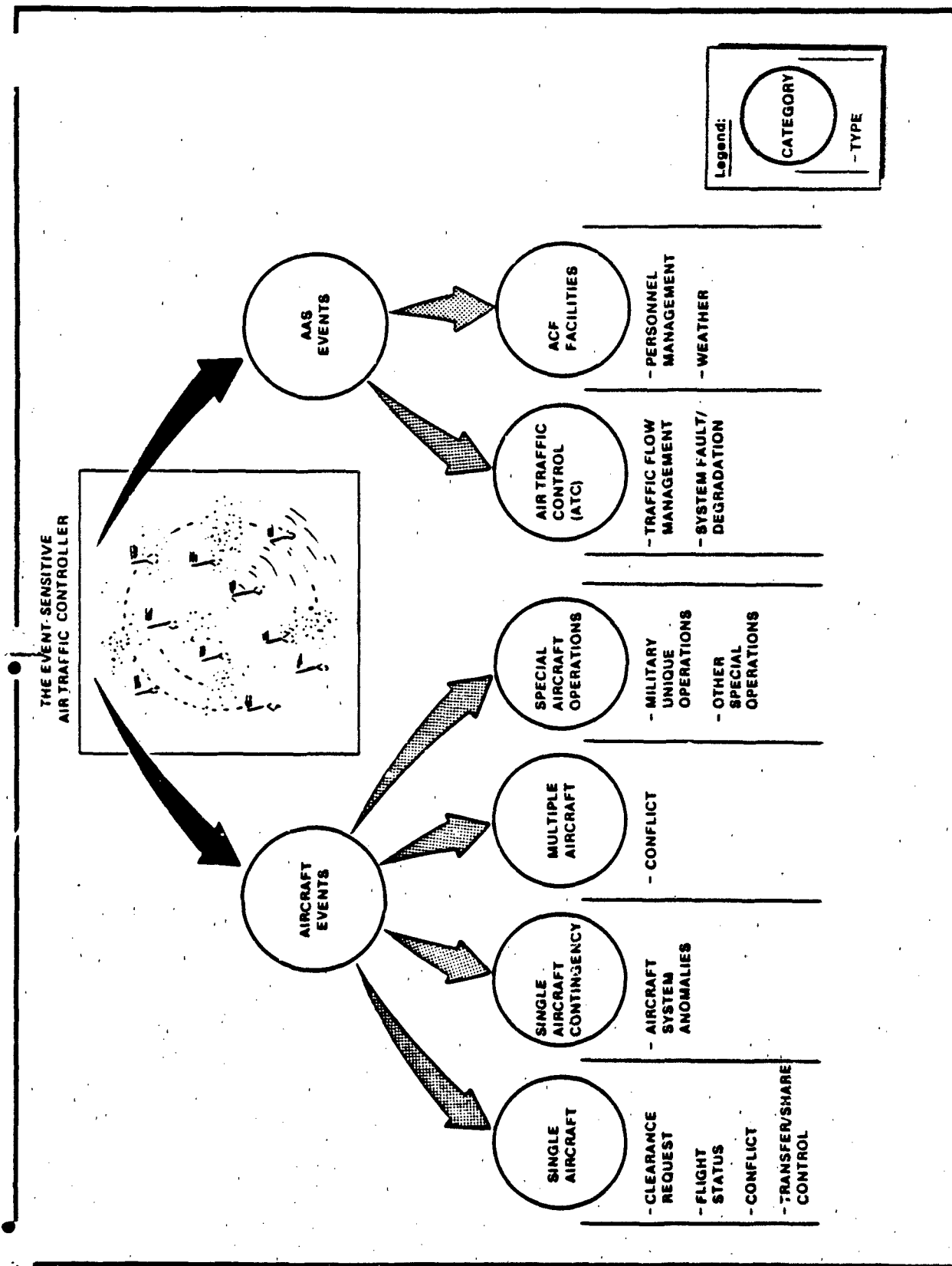


Figure 3-2. Event Categories

TABLE 3-1. NORMAL, CONTINGENCY, DEGRADED, AND CRISIS MODE DEFINITIONS

NORMAL, CONTINGENCY, DEGRADED, AND CRISIS MODE DEFINITIONS
Normal—Other than below. Contingency—An event that may occur, but that is not likely. Procedures written in letters of agreement to take over other airspace. ATCT failure, single console or suite failure—either results in reconfiguration of sector. Degraded—Reduced Services. Loss of one radar site, loss of a communication item (VSCS, NADIN, etc.), Controller shortage, loss of computer power utilization, etc. Results in potential and severe flow control restrictions, rerouting of aircraft, elimination of some terminal/radar services, elimination of advisory services, etc. Crisis—Unstable condition, potential safety hazard. Loss of all radar, loss of power, loss of computer, loss of all communication. Results in partitioning of airspace to other facilities, reduction of traffic to safe level, manual operation of ATC services, etc.

TABLE 3-2. EVENTS/TYPES/CATEGORIES

EVENT NO.	EVENT	TYPE	CATEGORY	MODE*
4.19	Amended Altitude/Route/Destination	Clearance Request	Single Aircraft	N
4.1	Clearance Delivery	Clearance Request	Single Aircraft	N
1.3	Flight Following	Clearance Request	Single Aircraft	N
4.2	VFR TCA	Clearance Request	Single Aircraft	N
3.2	Entering/Leaving Hold	Flight Status	Single Aircraft	N
4.18	Filed Flight Plan	Flight Status	Single Aircraft	N
1.2	Initial Contact	Flight Status	Single Aircraft	N
1.4	Object Enters Airspace	Flight Status	Single Aircraft	N
4.4	Overdue Aircraft	Flight Status	Single Aircraft	N
5.1	PIREP	Flight Status	Single Aircraft	N
3.5	Flight Plan Deviation	Flight Status	Single Aircraft	N
3.8	Observed Clearance Request	Flight Status	Single Aircraft	N
2.3	Impending Airspace Conflict	Conflict	Single Aircraft	N
2.2	Minimum Safe Altitude Conflict	Conflict	Single Aircraft	N
7.2	Aircraft to Edge of Sector	Transfer/Share Control	Single Aircraft	N
6.1	Airspace Release	Transfer/Share Control	Single Aircraft	N
7.3	Handoff Receipt	Transfer/Share Control	Single Aircraft	N
7.1	Pointout Receipt	Transfer/Share Control	Single Aircraft	N
4.5	Aircraft Emergency	Aircraft System Anomalies	Single Aircraft Contingencies	CY
4.6	Medical	Aircraft System Anomalies	Single Aircraft Contingencies	CY
4.3	No Radio	Aircraft System Anomalies	Single Aircraft Contingencies	CY
2.1	Aircraft-Aircraft Conflict	Conflict	Multiple Aircraft	N
2.4	Caution Alert	Conflict	Multiple Aircraft	N
2.20	Flight Plan Conflict	Conflict	Multiple Aircraft	N
2.5	Refueling, Exercise, Air Show	Conflict	Multiple Aircraft	N
4.13	Above FL 600	Military Unique Operations	Special Aircraft Operations	N
4.11	Interceptor Flight	Military Unique Operations	Special Aircraft Operations	N
4.17	Military Training Route	Military Unique Operations	Special Aircraft Operations	N
3.10	Balloon, Glider	Other Special Operations	Special Aircraft Operations	N
4.8	Bomb Threat	Other Special Operations	Special Aircraft Operations	N
4.12	DOE Flight (e.g., Hazardous Cargo)	Other Special Operations	Special Aircraft Operations	N
4.15	Experimental Flight	Other Special Operations	Special Aircraft Operations	N
4.9	Fuel Dumping, Jettison	Other Special Operations	Special Aircraft Operations	CY
4.7	Hijack	Other Special Operations	Special Aircraft Operations	CY
4.16	Law Enforcement	Other Special Operations	Special Aircraft Operations	N

* N— Normal
C— Crisis
CY—Contingency
D— Degraded

TABLE 3-2. EVENTS/TYPES/CATEGORIES (continued)

EVENT NO.	EVENT	TYPE	CATEGORY	MODE*
4.14	Lifeguard Mission	Other Special Operations	Special Aircraft Operations	N
3.7	Restricted, Warning, 'Hot' MOA	Other Special Operations	Special Aircraft Operations	N
4.10	Special Interest Flight	Other Special Operations	Special Aircraft Operations	N
3.6	ALTRV, Airspace Reservation	Traffic/Flow Management	ATC	N
3.4	Change Flow Pattern	Traffic/Flow Management	ATC	N
3.1	Flow Management Required	Traffic/Flow Management	ATC	N
3.3	Runway Configuration Change	Traffic/Flow Management	ATC	N
3.9	Sequencing Required	Traffic/Flow Management	ATC	N
6.7	ACCC Failure	System Fault/Degradation	ATC	C
6.9	Communication Failure	System Fault/Degradation	ATC	C
6.2	Facility Closure	System Fault/Degradation	ATC	CY
6.4	Transient Computer Fault	System Fault/Degradation	ATC	CY
6.12	Flight Plan Data Base Failure	System Fault/Degradation	ATC	C
6.8	NAVAID Failure	System Fault/Degradation	ATC	CY
6.6	Sector Suite Failure	System Fault/Degradation	ATC	CY
6.11	Sensor Failure	System Fault/Degradation	ATC	D
6.5	Unreliable Communications	System Fault/Degradation	ATC	D
6.3	Position Relief	Personnel Management	ACF Facilities	N
6.10	Controller Overload	Personnel Management	ACF Facilities	CY
5.5	Ceiling Height Report	Weather	ACF Facilities	N
5.2	Severe Weather	Weather	ACF Facilities	N
5.7	Pressure Display/Report	Weather	ACF Facilities	N
5.3	SIGMET/AIRMET Advisory	Weather	ACF Facilities	N
5.6	Visibility Report	Weather	ATC Facilities	N
5.8	Weather Conflict	Weather	ATC Facilities	N
5.4	Wind Shear Report	Weather	ATC Facilities	N

* N— Normal
 C— Crisis
 CY—Contingency
 D— Degraded

"MOONEY WOULD CLIMB AND MAINTAIN ONE GIVE THOUSANT EXPIDITE CLIMB THROUGH ONE THOUSAND".

MOBILE 100GA. SAW PRESENT POSI-
TION DESTINATION AND ALTITUDE
MOBILE 100GA. SQUAD 333 AND
IDENT WHAT TYPE AIRCRAFT ARE
YOU?
MOBILE 100GA. RADAR CONTACT
ON FLIGHT MILES SOUTH OF PUEBLO
ALTITUDE 2802

WOODWARD LOGS TRAFFIC AND LOGGING
ACTIVITY

MODE 5 DATA LINK

CLIMATE DELIVERY

[illegible]

UNITED STATES DEPARTMENT OF JUSTICE
FEDERAL BUREAU OF INVESTIGATION
WASHINGTON, D. C. 20535

RIGHT FOLLOWING

AND BE GRANTED OWNED BY THE CITY OF WASHINGTON FROM AN AIC FACILITY OF A WORKING CLASS. THE FACILITY MUST HAVE HAD TO PROVIDE A LIGHT FOLLOWING

[illegible]

AND IN TOTALIGHT PHOTO

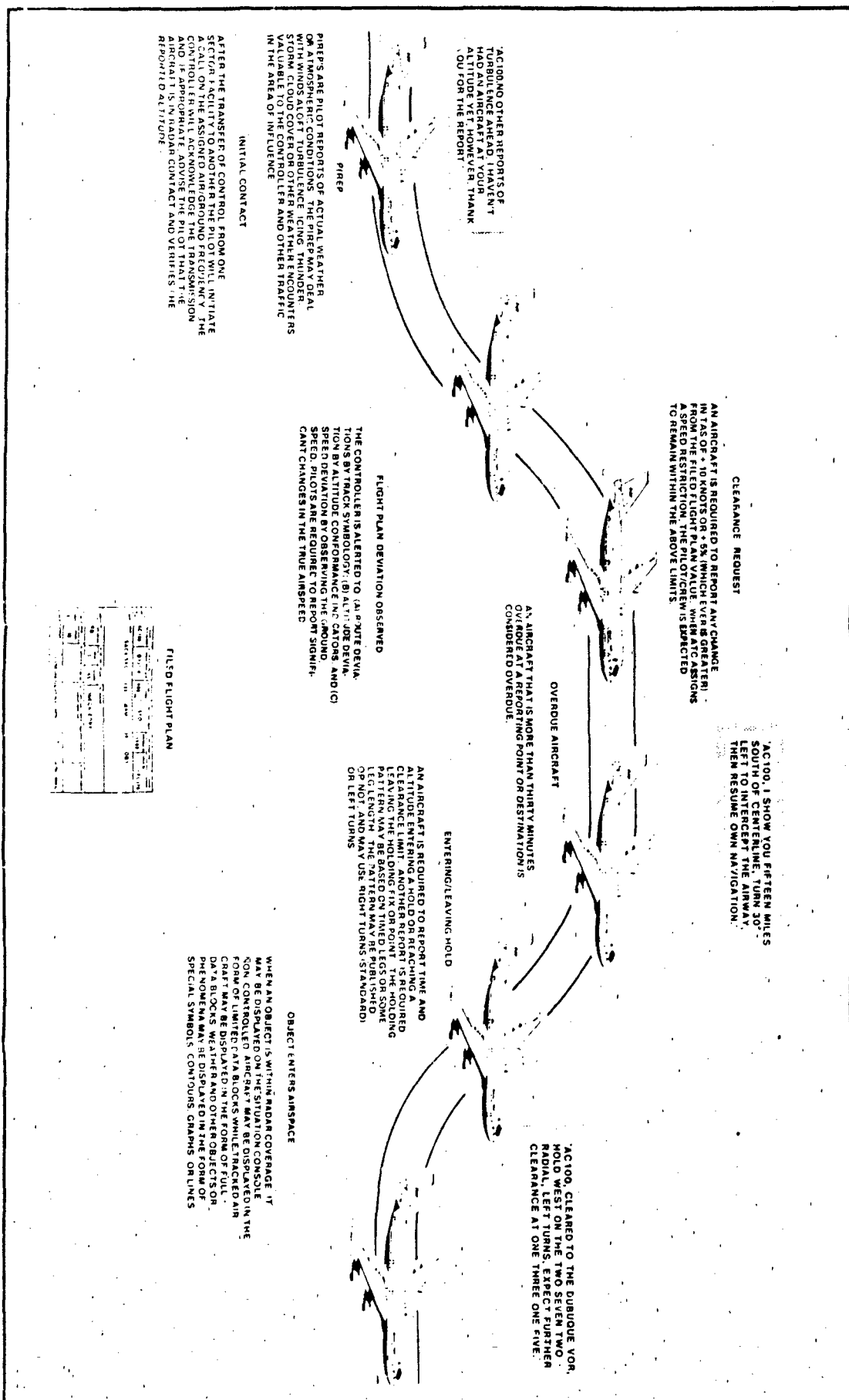


Figure 3-4. Flight Status Events (Single Aircraft)

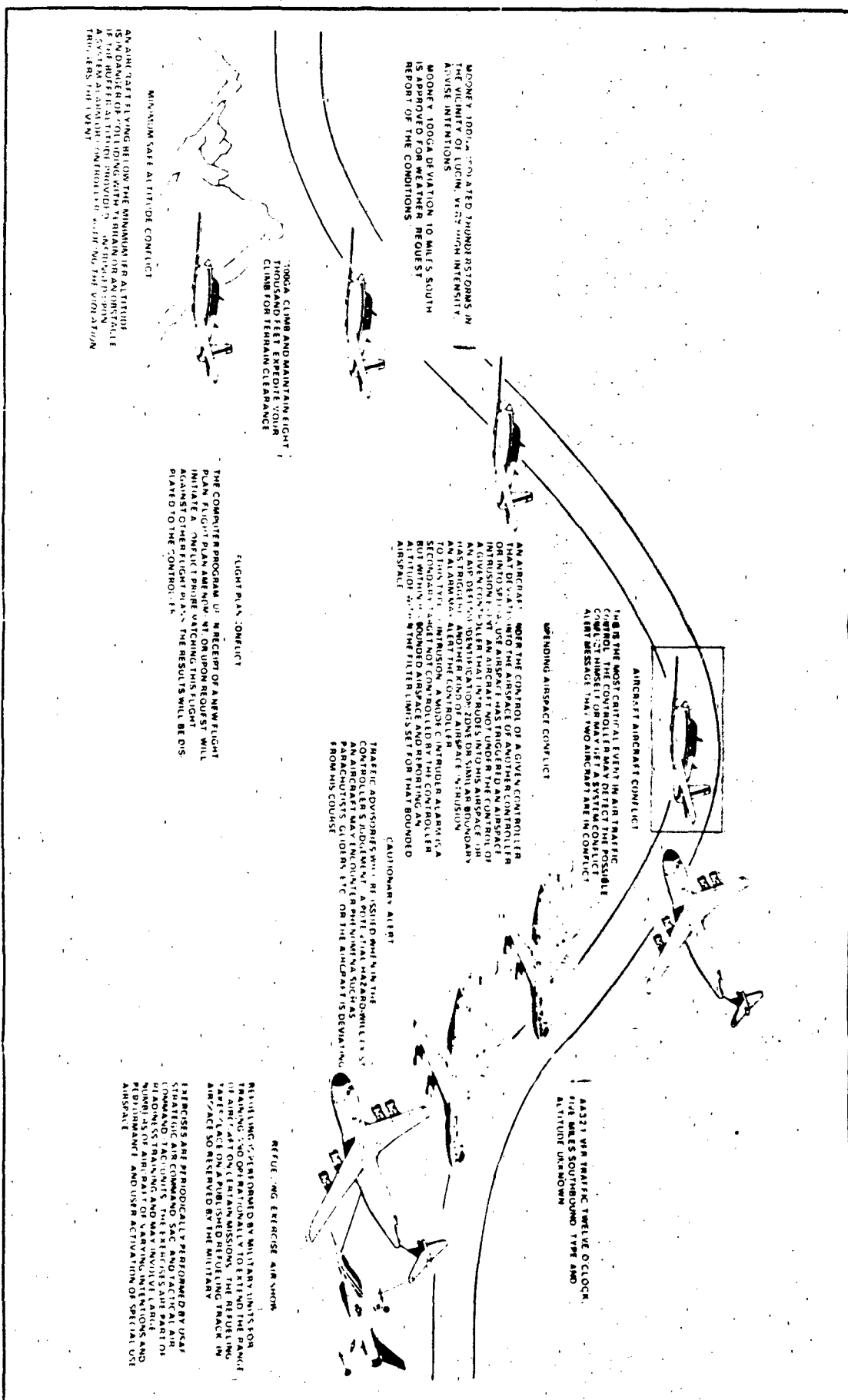


Figure 3.5 Conflict Events
(Single Multiple Aircraft)

POINTOUT RECEIPT

POINTOUT RECEIPT

WHEN ONE CONTROLLER WANTS TO USE A SMALL SECTION OF AIRSPACE WHICH BELONGS TO ANOTHER CONTROLLER THE ORIGINATING CONTROLLER WILL POINT OUT THE AIRCRAFT TO THE ADJACENT CONTROLLER. THE RECEIVING CONTROLLER WILL ACKNOWLEDGE THE POINTOUT AND DETERMINE IF TRANSFER OF CONTROL IS REQUIRED.

ACTIO CONTACT OAKLAND ACF
NOV ON-1336 TRAFFIC TWO
O'CLOCK 1MILES SOUTHBOUND
AOC 9 AT 7000 OVER

HANDOFF RECEIPT

AS AN AIRCRAFT PROGRESSES THROUGH THE SYSTEM IT WILL BE HANDED OFF FROM ONE SECTOR TO THE NEXT SECTOR. THE RECEIVING CONTROLLER WILL ACKNOWLEDGE ALL HAND OFFS EITHER VERBALLY OR THROUGH THE ENTRY OF COMPUTER MESSAGES.

AIRCRAFT TO EDGE OF SECTION

A HAND-OFF IS INITIATED WHEN AN AIRCRAFT
CROSSES A CONTROLLER'S POSITION-BOUNDARY
AND THE CONTROLLER ASSIGNS THE HAND-OFF
TO ANOTHER CONTROLLER. FIRST, THE CONTROLLER
ASSIGNS THE HAND-OFF TO ANOTHER CONTROLLER
TO ASSUME FREQUENCY CHANGE TO THE CONTROLLING
CONTROLLER. THE POSITION TO POSITION HAND-OFF
IS PERFORMED WITH VARYING LEVELS OF AUTOMATION
DEPENDENT UPON THE TWO SYSTEMS INVOLVED IN THE
HAND-OFF. HAND-OFF TO CONTROLLER WITH NO
AUTOMATION IS ACCOMPLISHED BY USE OF INTERPHONE

Figure 3-6. Transfer/Share Control Event (Single Aircraft)

J-15/3-1E

AL 100: HEPLY NOT RECHVED
IF YOU HEAR ME IDENTIFY

NO RADIO
SPECIAL FOR BLANKS ABOVE WHEN AN AIRCRAFT HAS
COMMUNICATION PROBLEMS. IT IS POSSIBLE TO HAVE
ONLY A TRANSMITTER OR RECEIVER FAILURE ON THE
AIRCRAFT PERMITTING THE PILOT CREW TO STILL HEAR
OR TALK. THE PILOT CREW SHOULD SQUARE BEACON CODE 7000
WHEN THEY HAVE A COMPLETE COMMUNICATIONS FAILURE IS AT
HAND.

AL 100 DO YOU WISH TO
DECLARE AN EMERGENCY?
AL 100 DO YOU WISH A FLVBY
OF THE TOWER OR ANY SPECIAL
EQUIPMENT STANDING BY?

MEDICAL

AN AIRCRAFT MAY BE IN DISTRESS WITH A MEDICAL
EMERGENCY. THE PILOT MAY DECLARE AN
EMERGENCY FOR REASONS OF PASSENGER
PROBLEMS, INCAPACITATION, DISORIENTATION
OR OTHER MEDICAL PROBLEMS. THE PILOT
ABILITY TO PERFORM THEIR DUTIES.

AIRCRAFT EMERGENCY

AN AIRCRAFT WILL REPORT AN EMERGENCY UNDER
CIRCUMSTANCES SUCH AS: A CRITICAL SYSTEM
FAILURE, CRITICAL SYSTEM FAILURE OR OTHER PROBLEMS THAT
THE PILOT OR CONTROLLER DEEMS AN EMERGENCY.
THE COMPUTER PROGRAM WOULD 'X' OUT THE
ALTITUDE ASSUMING IT IS ERRONEOUS WHEN IT
SENSES AN EXTREMELY RAPID DESCENT.

Figure 3-7. Aircraft System Anomalies
Events (Single Aircraft Contingencies)
3-17/3-18

INTERCEPTION FLIGHTS

THE MILITARY MAY DESIRE TO INTERCEPT AIRCRAFT FOR INTRUDING INTO SENSITIVE PROHIBITED AREAS AIR DEFENSE IDENTIFICATION ZONES ADJACENT OR OTHER SENSITIVE AIRSPACE

ABOVE FL 600

THE MILITARY MAY OPERATE AIRCRAFT ABOVE THE POSITIVE CONTROL AREA (PCA). THESE OPERATIONS ABOVE FLIGHT LEVEL 600 (60 000 FEET PRESSURE ALTITUDE) ONLY INVOLVE CERTAIN PCRAFT AND REQUIRE CLASSIFIED (SECURITY) PROCEDURES.

MILITARY TRAINING ROUTES

MILITARY TRAINING ROUTES (MTR) ARE DESIGNATED ROUTES FOR TRAINING IN NAVIGATION AND WEAPONS DELIVERY. BOTH VTR AND IF ROUTES EXIST, AND ARE PUBLISHED IN OOD FLIGHT INFORMATION PUBLICATIONS (IFIP). THE ROUTES ENCOMPASS MANY ALTITUDES AND INVOLVE HIGH PERFORMANCE FLIGHT PROFILES.

Figure 3-8. Military Unique Operation Events (Special Aircraft Operations)

3-19/3-20

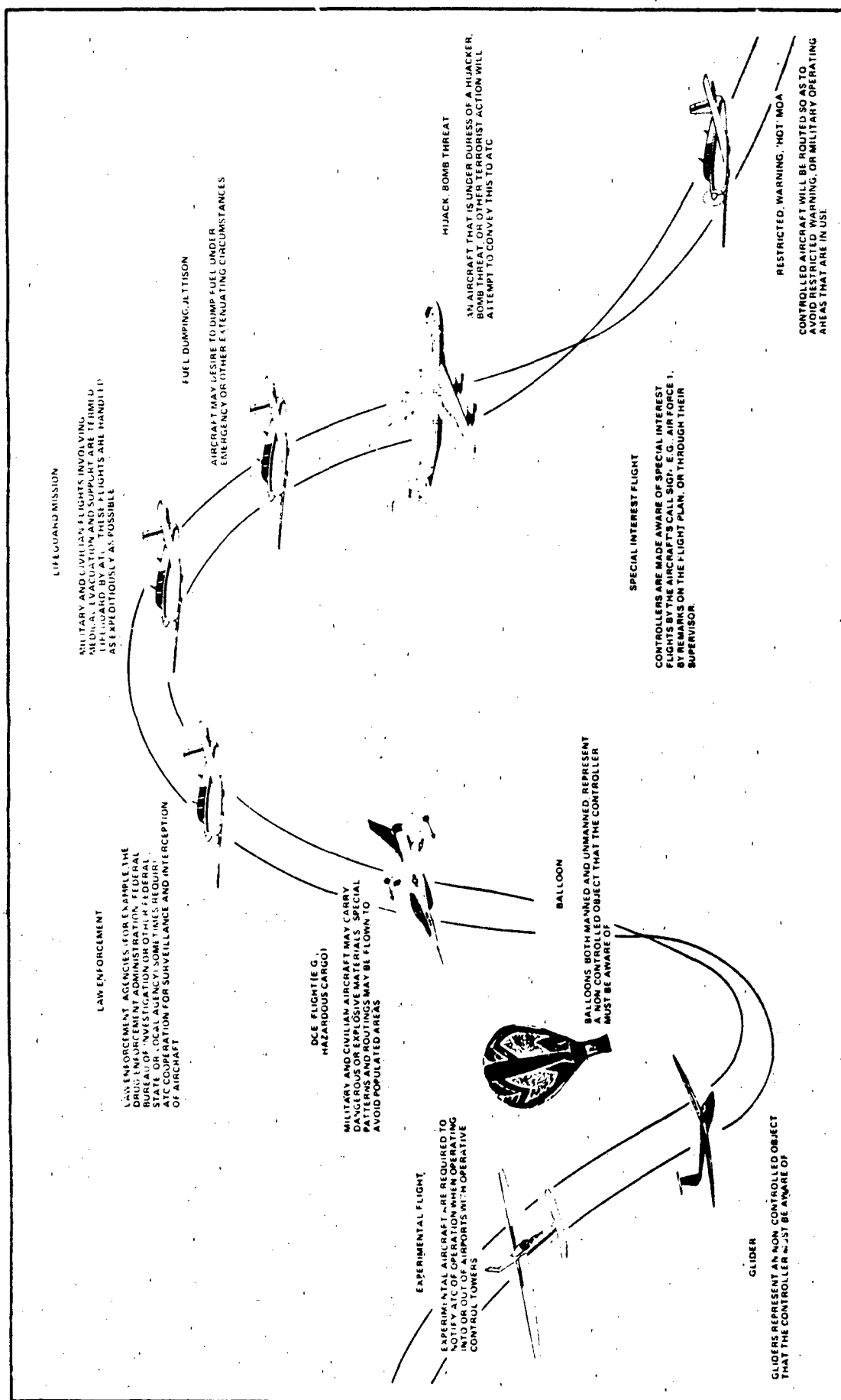


Figure 3-9. Other Special Operations Events (Special Aircraft Operations)

3-21/3-22

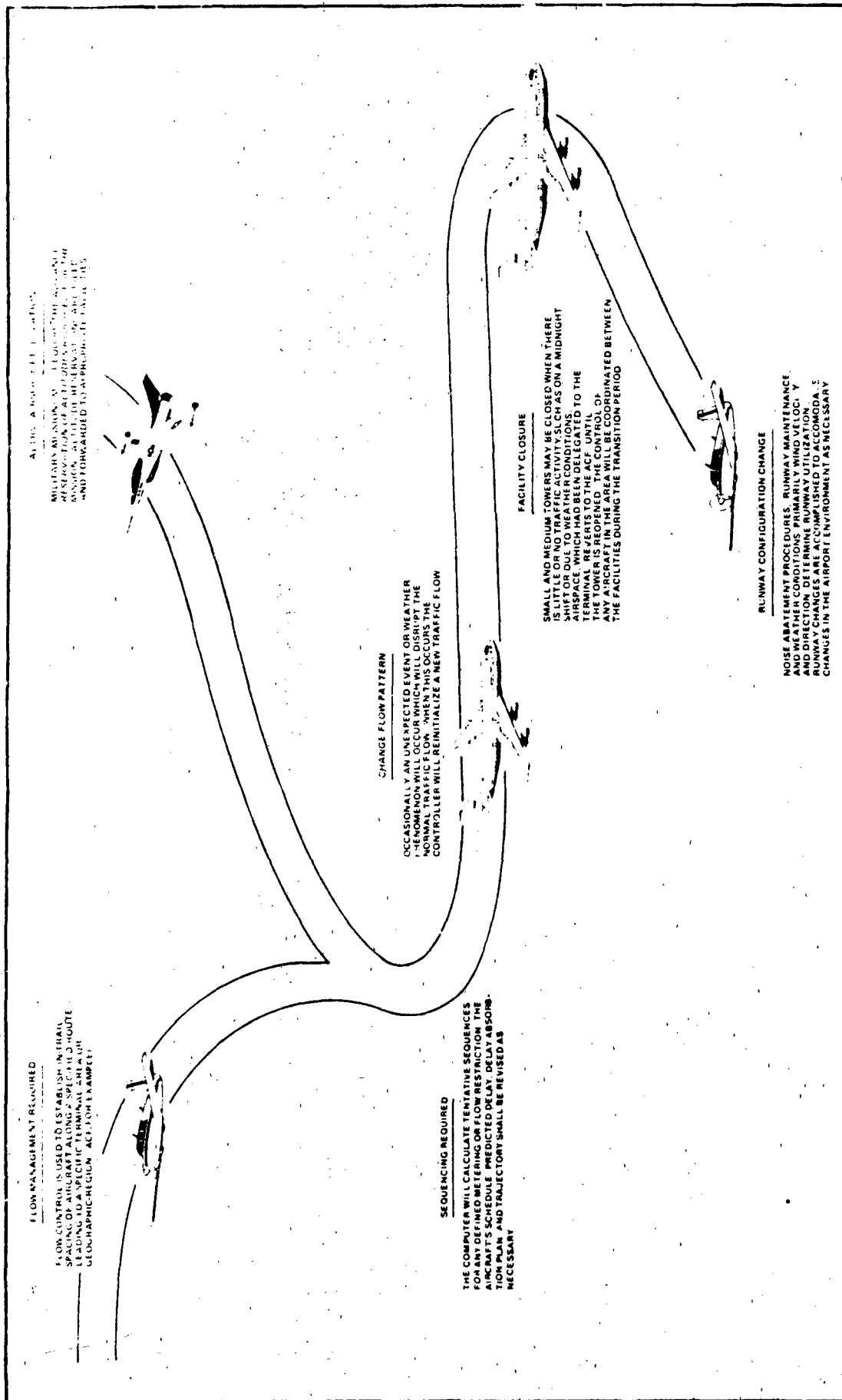


Figure 3-10. Traffic Flow Management Events (Air Traffic Control)

3-23/3-24

POSITION RELIEF

PRIOR TO ASSUMING CONTROL RESPONSIBILITY AT A POSITION/SECTOR THE CONTROLLER WILL RECEIVE A DETAILED BRIEFING, BASED ON POSITION CHECKLIST, ON THE TRAFFIC SITUATION AND ALL SPECIAL ITEMS AFFECTING THE POSITION/SECTOR.

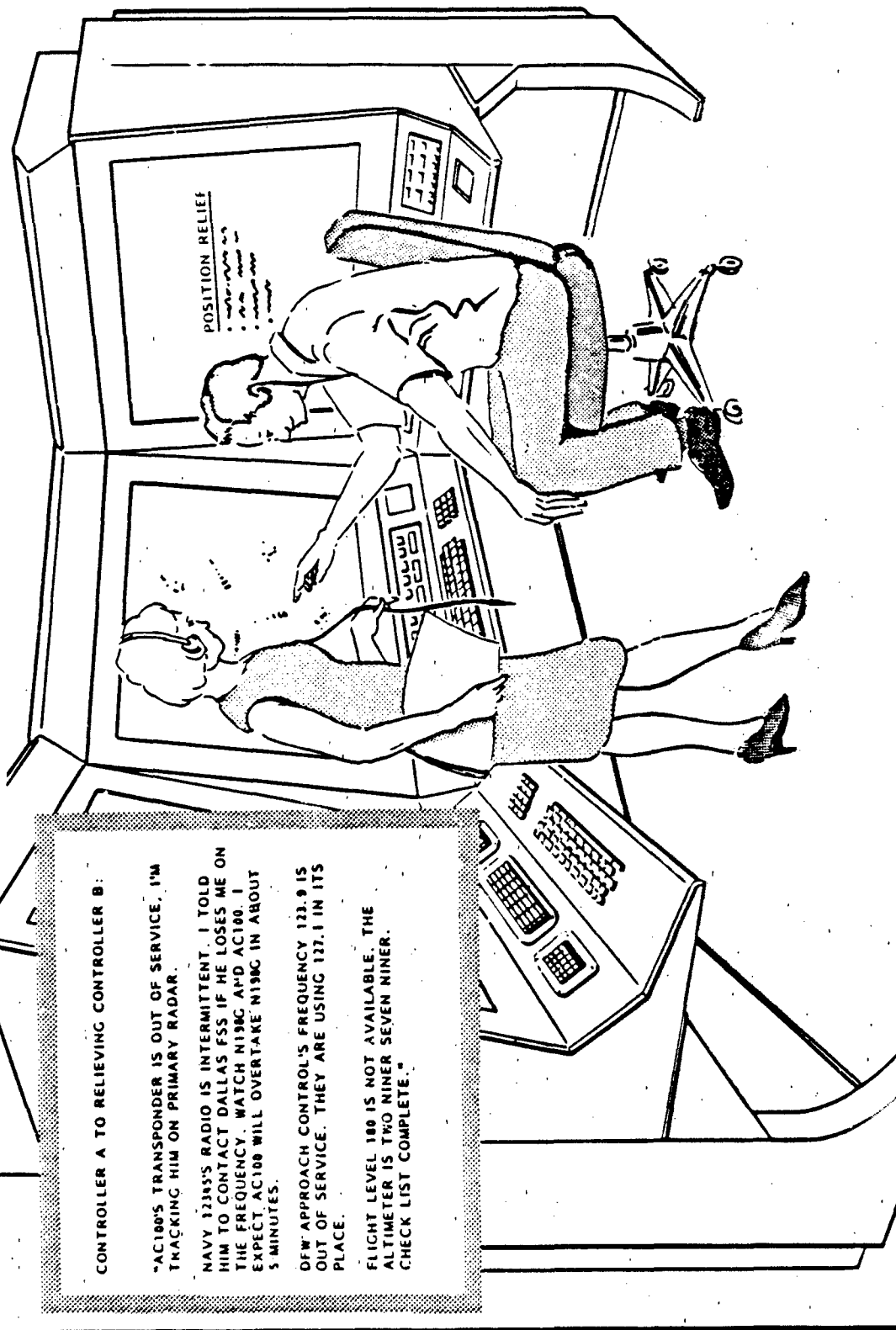


Figure 3-11. Position Relief Event
(Personnel Management)

IMPENDING CONTROLLER OVERLOAD

ON OCCASION THE TRAFFIC ACTIVITY OR COMPLEXITY WILL REACH A POINT WHERE THE CONTROLLER WILL BECOME OVERLOADED WITH EITHER EVENTS OR INPUTS. THE AAS WILL CALCULATE WORKLOAD MEASURES FOR EACH SECTOR, COMPARE THE PREDICTED MEASURE WITH ACCEPTABLE LIMITS, AND PRESENT THE RESULTS TO THE SUPERVISOR. IF AN OVERLOAD IS PREDICTED, THE SUPERVISOR MAY ASSIGN ANOTHER CONTROLLER TO ACT AS A COORDINATOR OR HANDOFF CONTROLLER, OR PROVIDE FOR RESECTORIZATION. THE CONTROLLER MAY ALSO DIRECTLY REQUEST ASSISTANCE FROM THE SUPERVISOR.

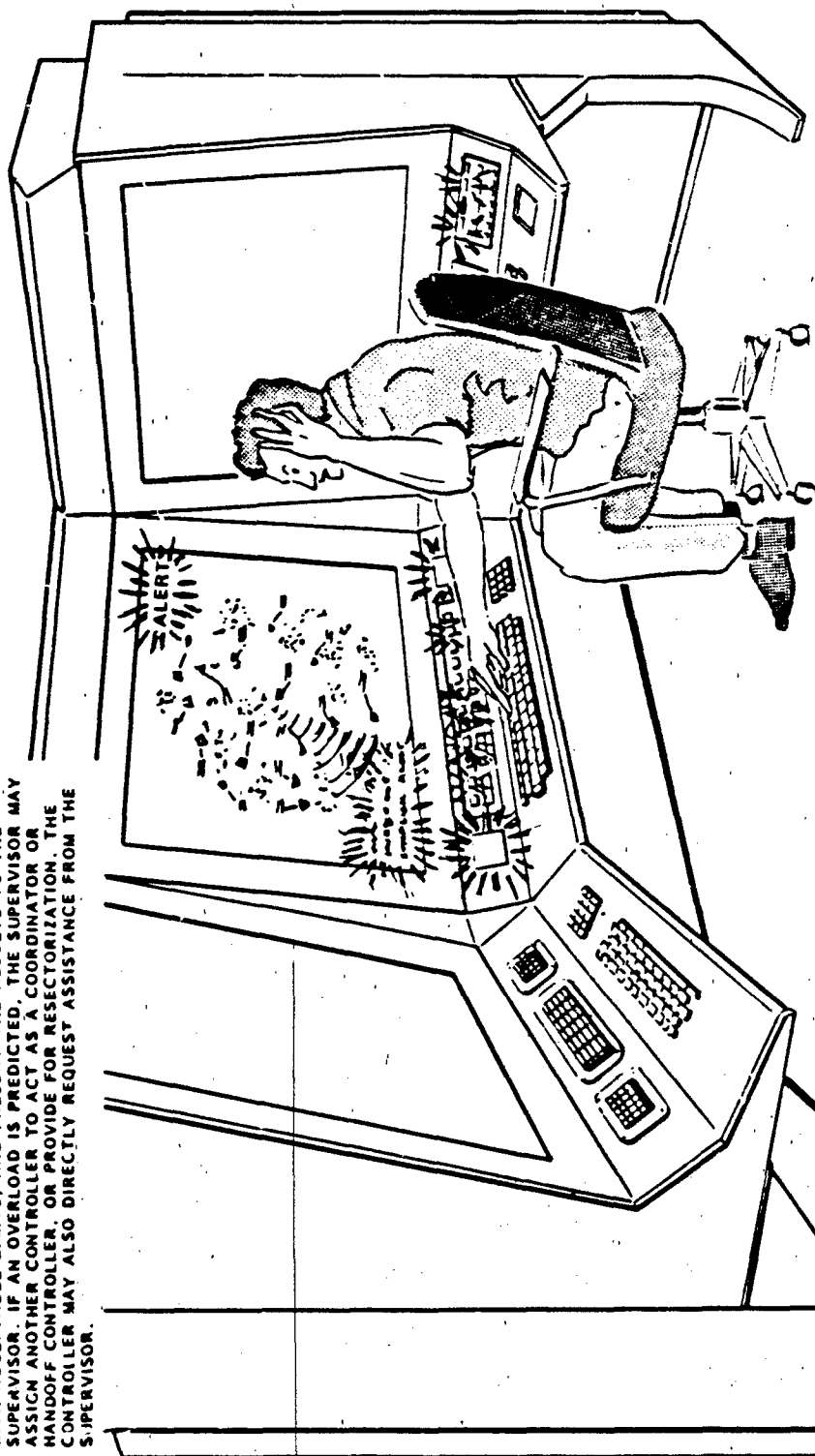


Figure 3-12. Controller Overload Event
(Personnel Management)

SIGMET/AIRMET ADVISORIES

SIGNIFICANT METEOROLOGICAL (SIGMET) OR AIRMAN'S METEOROLOGICAL INFORMATION (AIRMET) CONCERNS WEATHER SIGNIFICANT TO AIRCRAFT. AIRMET IS GENERALLY OF LESS SEVERITY THAN SIGMET, AND IS MORE PERTINENT TO LIGHT AIRCRAFT BECAUSE OF LACK OF EQUIPMENT, INSTRUMENTATION, OR PILOT QUALIFICATION.

"AL100, BE ADVISED THAT REPORTS OF HEAVY TURBULENCE HAVE BEEN REPORTED FROM COLORADO SPRINGS TO DENVER AT FLIGHT LEVEL 310 TO FLIGHT LEVEL 370".

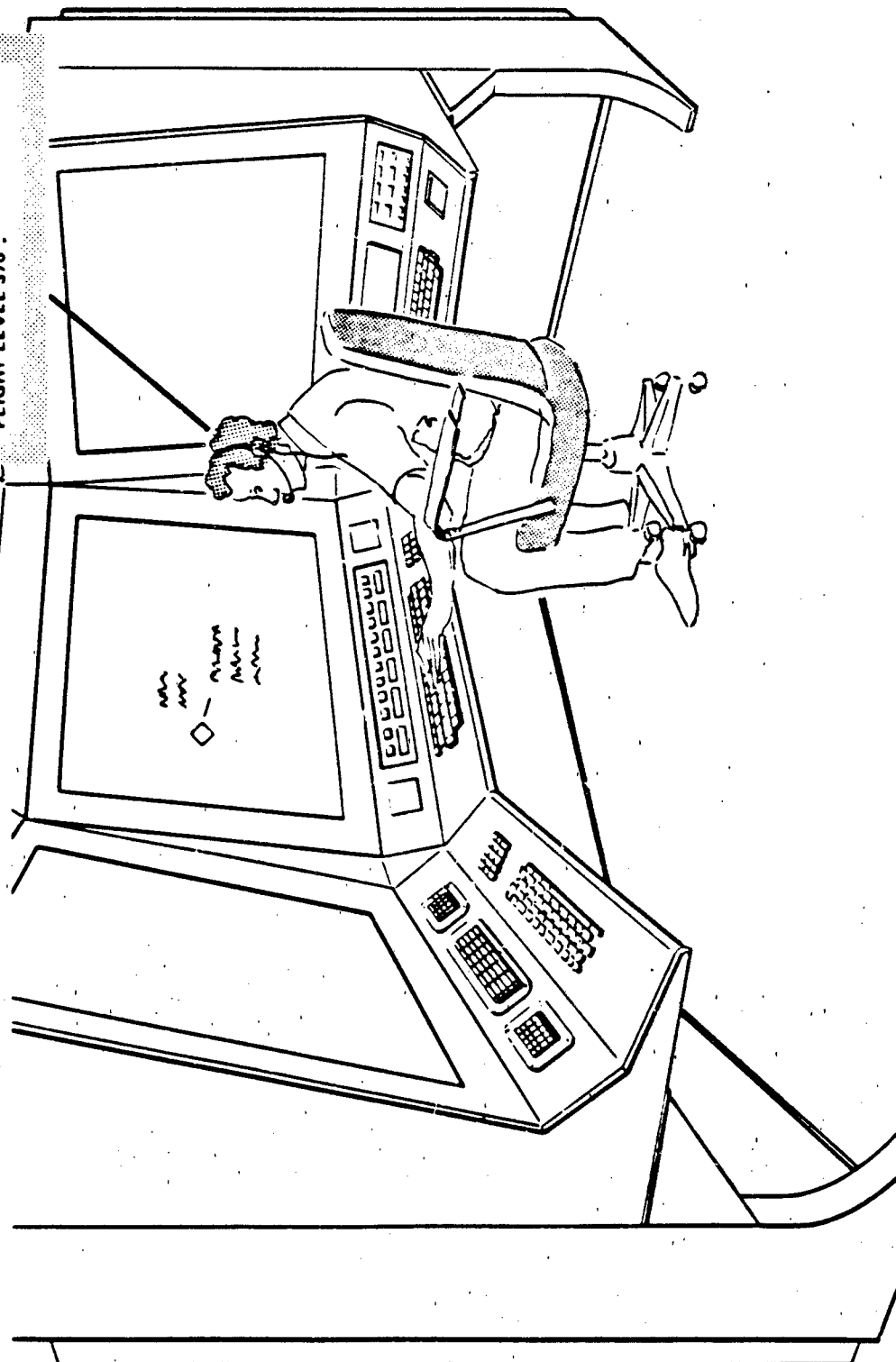
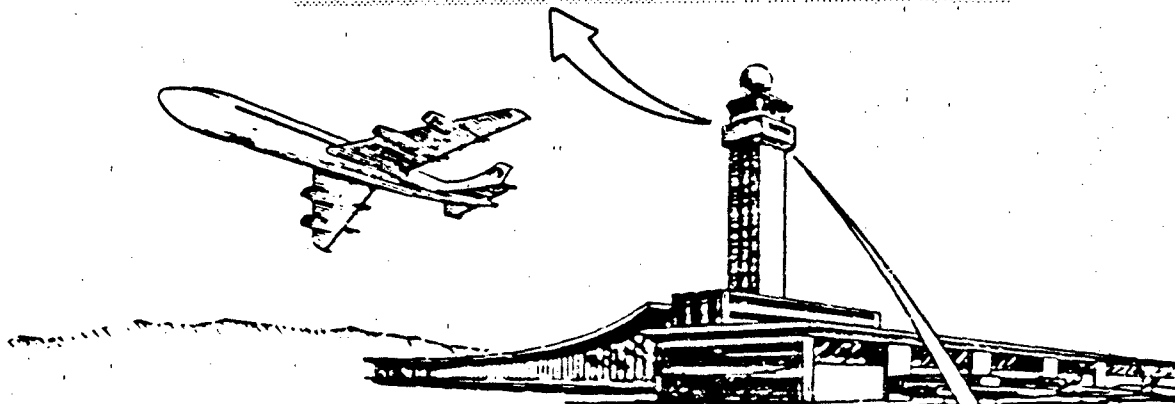


Figure 3-13. SIGMET/AIRMET Advisories Event (Weather)

WIND SHEAR REPORT

AT MAJOR AIRPORTS INSTRUMENTS TO MEASURE WIND SHEAR HAVE BEEN INSTALLED ON THE RUNWAYS. DATA FROM THESE SENSORS ARE DISPLAYED IN THE TOWER FOR USE BY CONTROLLERS AND ARE RELAYED TO THE PILOT.

"WIND SHEAR ALERTS ALL QUADRANTS, CENTERFIELD WIND, TWO ONE ZERO AT ONE FOUR, WEST BOUNDARY WIND, ONE FOUR ZERO AT TWO TWO."



CEILING HEIGHT/VISIBILITY REPORT

A REPORT IS TAKEN BY EITHER NATIONAL WEATHER SERVICE PERSONNEL, OR BY CERTIFIED TOWER PERSONNEL TO DETERMINE THE HEIGHT OF THE CEILING OR FORWARD VISIBILITY. THE CEILING AND VISIBILITY REPORTS DETERMINE WHETHER VFR OR IFR CONDITIONS EXIST.

"N1983, CLEARED TO EXIT FINDLAY CONTROL ZONE, 5 MILES WEST OF FINDLAY AIRPORT. FINDLAY AIRPORT HAS 300 FOOT OVERCAST WITH ONE & ONE HALF MILE VISIBILITY WITH BLOWING SNOW."

Figure 3-14. Wind Shear, Ceiling Height, and Visibility Report Events (Weather)

PRESSURE DISPLAY/REPORT

THE ALTIMETER REPORT, BASED UPON BAROMETRIC PRESSURE, IS CONTINUOUSLY TAKEN AND DISPLAYED. THIS REPORT IS RELAYED TO THE PILOTS TO INSURE THEY HAVE THE CORRECT ALTIMETER SETTING.

"N198G, BE ADVISED THAT FLIGHT LEVEL 180 IS NOT AVAILABLE. ALTIMETER SETTING TWO NINER SEVEN NINER."

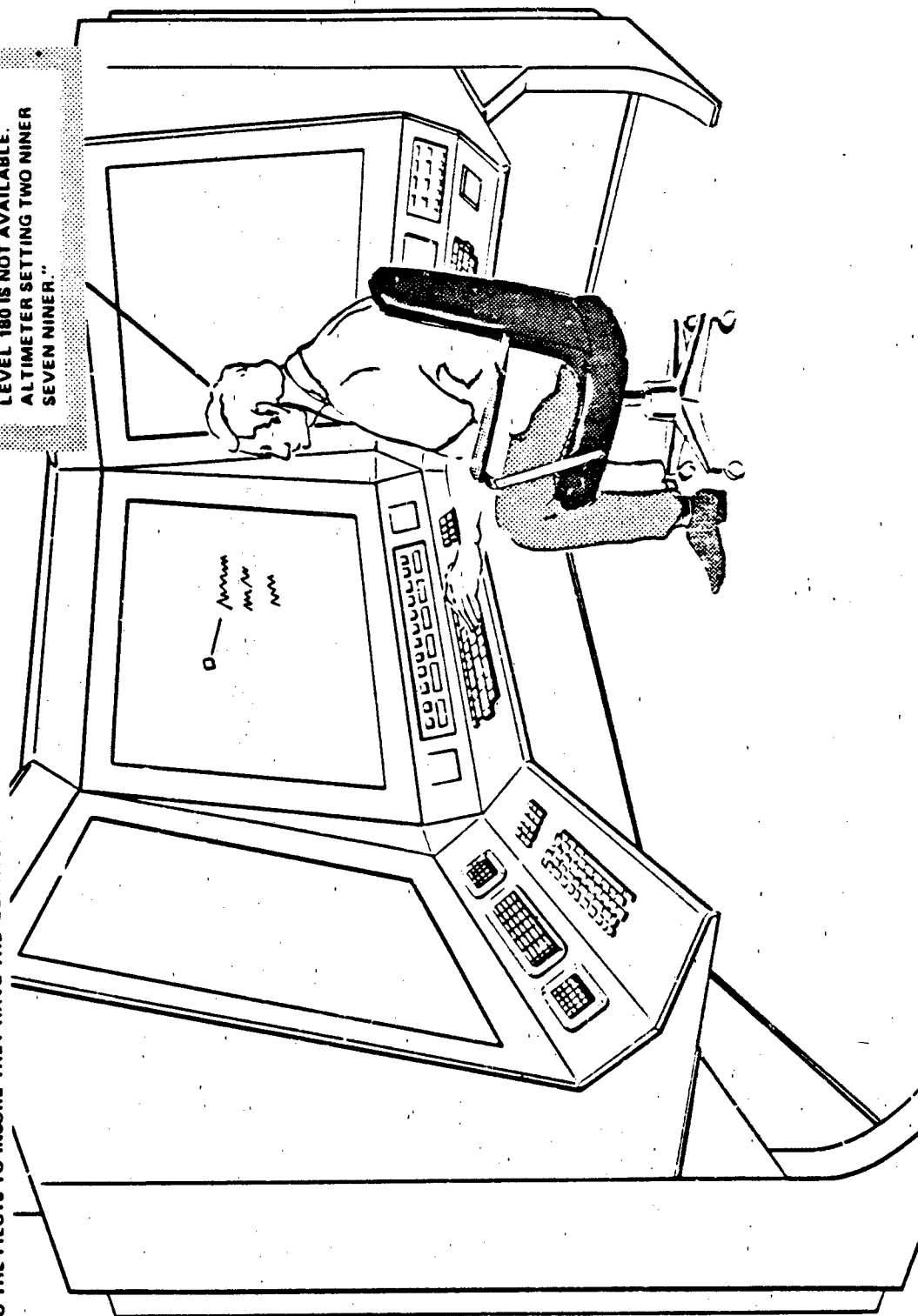


Figure 3-15. Pressure Display/Report Event (Weather)

TABLE 3-3. ADDITIONAL AAS EVENT DEFINITIONS

EVENT	DEFINITION
Weather Conflict	During periods of severe weather, turbulence, or icing, an aircraft may be predicted to encounter this phenomenon. The pilot may request, or the Controller may initiate, a routing which will bypass the weather.
ACCC Failure	Although redundant units are built into the system, it may be possible to experience a complete loss of the computer system. In this event, it may be necessary for an adjacent facility to assume some control jurisdiction.
Communication Failure	A failure in interphone, air-to-ground frequency, or Voice Switching and Control System (VSCS) isolates the Controller from resources, other Controllers, and traffic he is controlling. Isolated or total failures are possible.
Transient Computer Fault	Occasionally an aircraft will enter the airspace of a Controller without a radar handoff due to a system malfunction.
Flight Plan Data Base Failure	Equipment or software malfunction could result in the loss of the flight plan data base. In this unlikely event, all functions are lost except for limited tracking capability.
NAVAID Failure	A failure in a navigation aid may impact landing minima at an airport or may require the rerouting of en route aircraft.
Sector Suite Failure	The failure of one console at a Sector Suite will require the reconfiguration of the consoles. The failure of the entire suite may require the Controller to move to a vacant suite or share a suite with another sector.
Sensor Failure	On occasion a radar system will fail. In this event the software will attempt to provide mosaic radar data from other radar sites. If radar coverage is not available, nonradar separation is applied to aircraft in that area.
Unreliable Communications	If communications with an aircraft are unreliable, the Controller will determine whether it is the aircraft or sector's communications that is at fault. The Controller may switch air/ground frequencies or issue alternate communication path.

3.3 Air Traffic Controller Activity Analysis

The first step in analyzing the air traffic Controller's activities is to establish a set of definitions to be used in this analysis. The following set of definitions is used throughout the remainder of this document and is fundamental to the methodology employed here.

Event—

A distinct occurrence observable from the Controller's perspective which requires the Controller to respond in a cognitive way or perceptual fashion.

Activity—

Top-level sequences of man-machine interactions which respond to a group of closely related events.

Sub-Activity—

Activity decomposition driven by specific events.

Task—

A meaningful unit of work which has the properties of closure, specific human performance attributes, single event stimulus, and multiple response possibilities.

The rationale for employing this set of definitions is based upon the intent to focus upon the Controller's man-machine interface within the ATC environment. This ATC environment is viewed as a system to which an event (or events) is a stimulus. The response to this event stimulus is defined to be an activity. Associated with this activity is a set of system parameters, performance attributes, a closure condition, and a set of possible responses. (See Figure 3-17, Activity/Sub-Activity Decomposition.) That is, the response to this event stimulus or stimuli may be characterized as a sequence of man-machine interactions, or man-machine pairs. These man-machine pairs may then be partitioned in order to ascertain the role of the man, i.e., the Controller, and that of the machine. This document then focuses specifically upon how the Controller's activities may be analyzed

once the appropriate machine allocations have been made.

3.3.1 Controller Activity Identification

As established in Ref. 3, (CDRL A004), the activities in section 3.4 are defined, as well as their specific system parameters and performance requirements. In this manner, a well defined man-machine interface may be characterized as setting the context for analyzing the Controller's role within this environment.

Ref. 3 performs a functional analysis of the Advanced Automation System to determine which functions may be reasonably assigned to a machine (e.g., the host computer, the Sector Suite workstation) and which functions may be allocated to the Controller. The methodology used in determining this allocation is a carefully applied trade study which considers the pros and cons of partitioning each of these functions into man-machine pairs, thereby identifying the man-machine interface. Finally, the functions are allocated to either man or machine. (See Ref. 3 for a thorough treatment of this topic.)

The methodology employed herein is to focus upon the operational activities identified as the Controller portion of the operational functions analyzed in Ref. 3.

3.3.2 Controller Activity Synthesis

As stated in section 3.4, the ATC environment may be characterized in terms of the events which inspire a Controller response. These events may then be grouped according to their relationship with this ATC environment. Correspondingly, the activities associated with these events may be grouped according to this event clustering. The result is the synthesis of activities into the following seven categories:

1. **Perform Situation Monitoring:** This activity implies consideration of all environmental elements.
2. **Resolve Aircraft Conflicts:** This activity considers the potential conflict between aircraft, terrain,

obstacles, and airspace, and includes advisories.

3. **Manage Air Traffic Sequences:** This activity concerns flow control, airspace restrictions, and establishment of arrival/departure patterns.
4. **Route or Plan Flights:** This activity concerns flight plans and amendments and provides for associated clearances. In addition, contingencies and special operations are considered.
5. **Assess Weather Impact:** This activity considers the implication and processing of weather phenomenon on aircraft and air route structures.
6. **Manage Sector/Position Resources:** This activity concerns the setting-up of the Controller workstation, the adjustment to equipment failures, and traffic volume.
7. **Perform Coordination:** This activity provides for the communication and/or coordination among Controllers, Supervisors, Pilots, and others.

The methodology employed throughout the rest of this document relies upon the identification of these seven activities as being a comprehensive categorization of top-level Controller response within the ATC system. Figure 3-16, *Interrelationship Among ACF Top-Level ACF Air Traffic Controller Activities*, depicts the flow of information among Controller activities. Information about the aircraft inspires the "Resolve Aircraft Conflicts," Activity 2.0, which produces conflict coordination information. This information is then passed through the "Perform Coordination," Activity 7.0, which produces airspace information which must be coordinated with similar activities in other ACFs. The picture also shows the coordination which occurs among the sectors before the clearance is issued to the pilot.

3.4 Controller Sub-Activity Decomposition

The seven activities identified in the previous section may be decomposed into sub-activities as illustrated in Fig. 3-17, *Activity/Sub-Activity Decomposition*. At this level, the sub-activities may be distinguished as being driven by specific events. Figure 3-18 is the example of Activity 20, *Resolve Aircraft Conflicts*, which is decomposed into the five sub-activities illustrated in composition graph form on the lower half of the figure. Each of these sub-activities is driven by the event (or in some cases, events) which are printed on the line leading into the sub-activity. The 77 sub-activities resulting from this decomposition are shown in Appendix A.

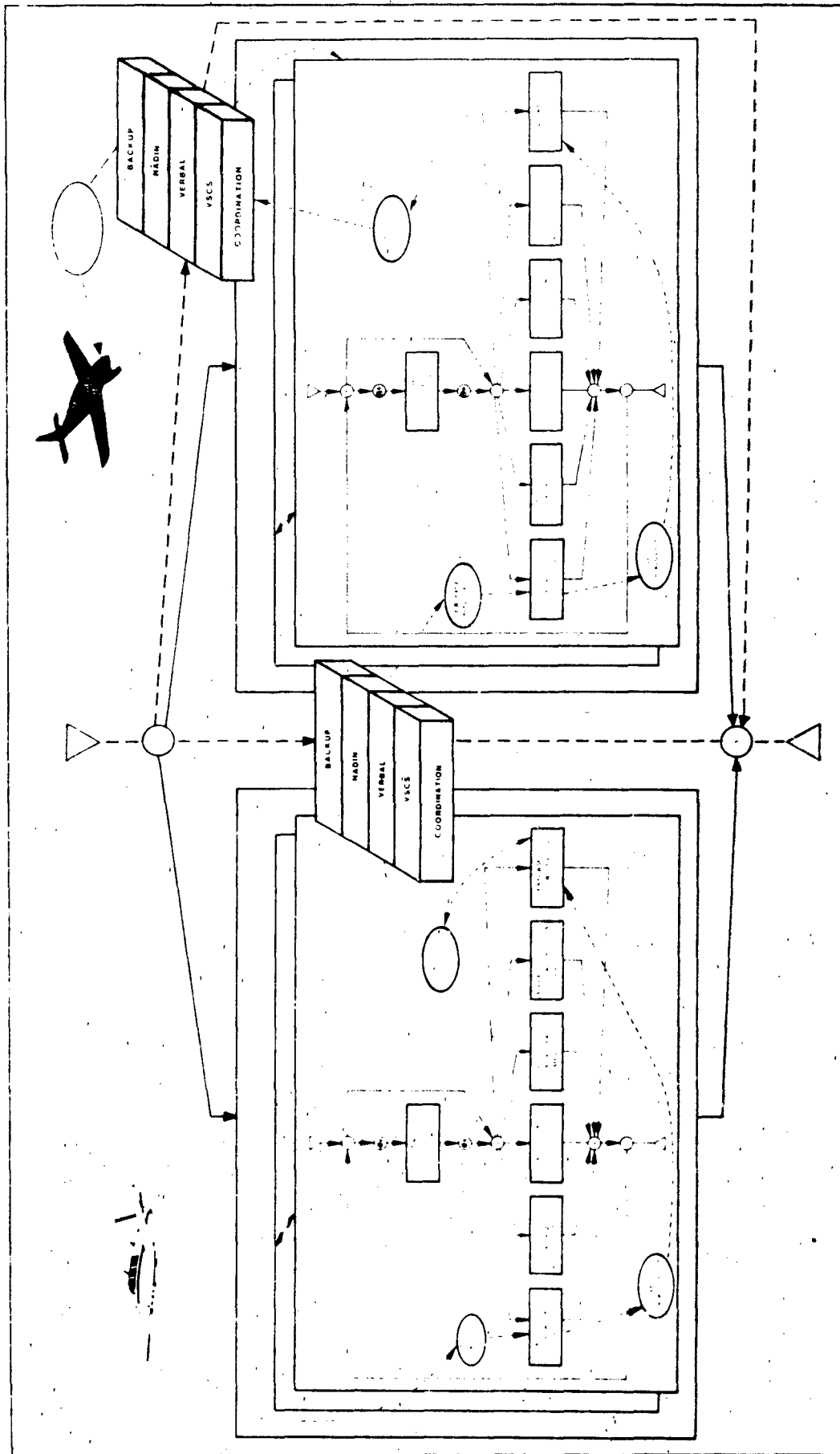


Figure 3-16. Interrelationship among Top-Level ACF Air Traffic Controller Activities

3-11 / 3-14

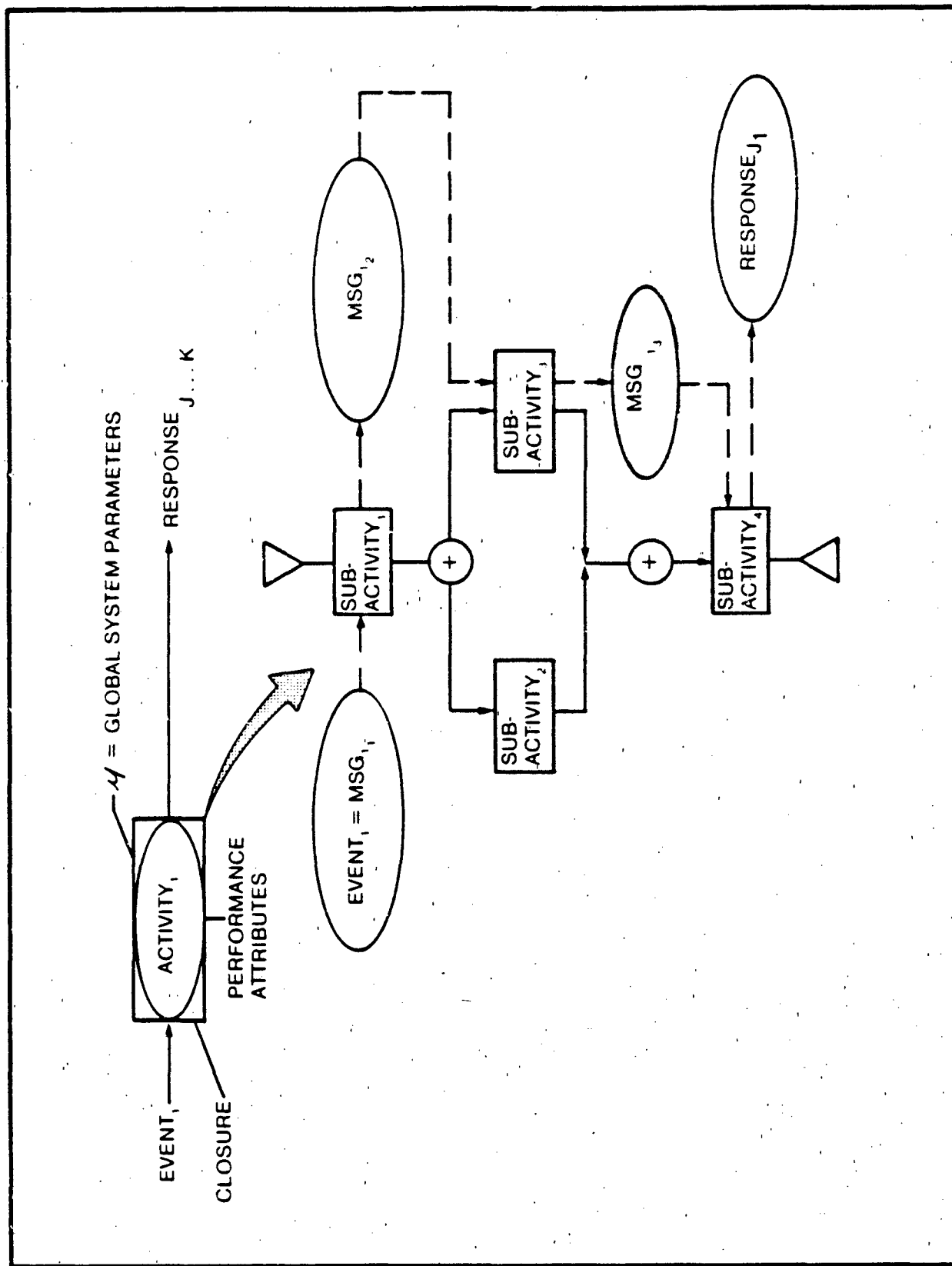
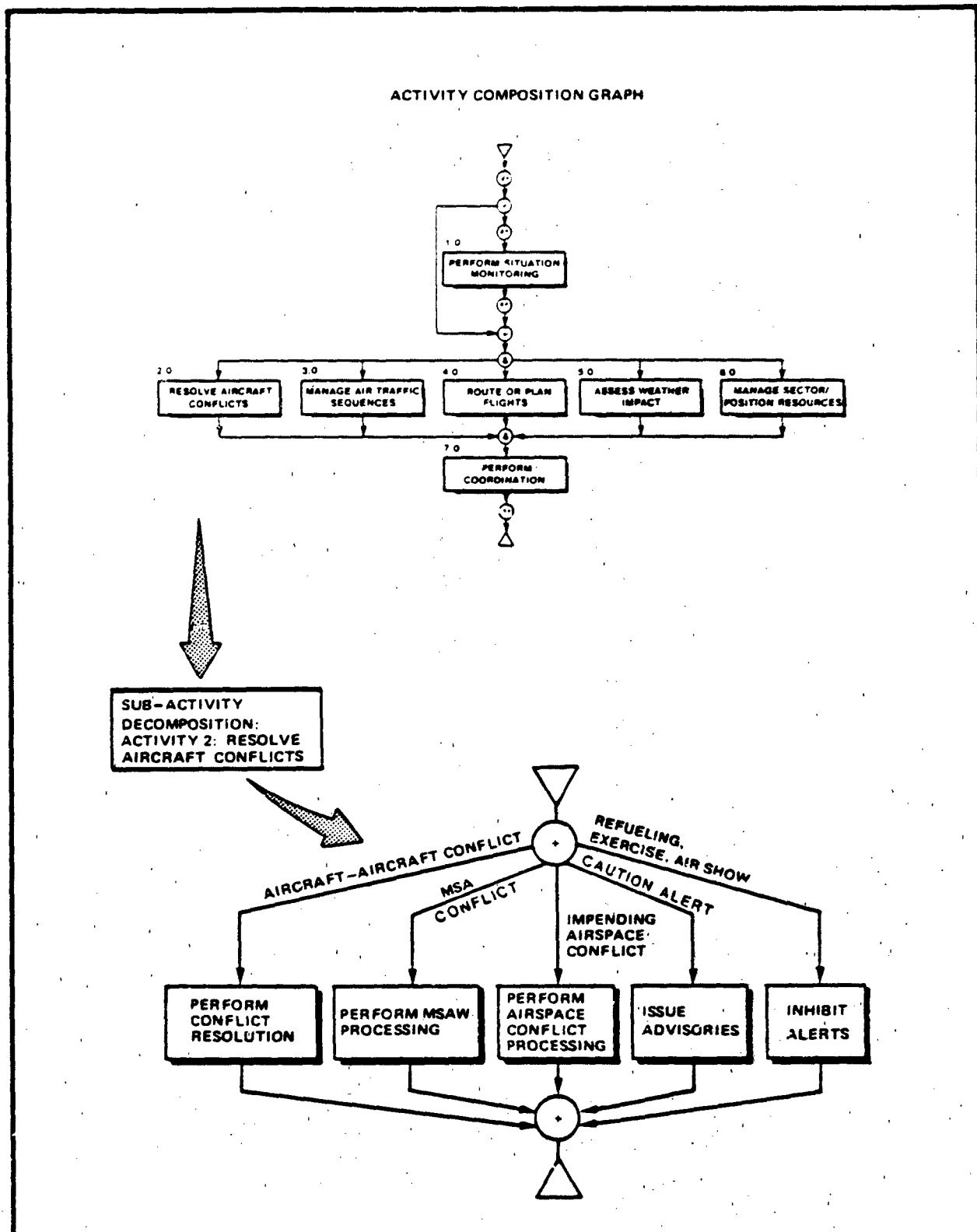


Figure 3-17. Activity/Sub-Activity Decomposition



3.6 References

1. Celio, J.C. Controller task descriptions. (Working Paper WP-81 W00504). McLean, VA: The MITRE Corporation, September 1981.
2. Computer Technology Associates, Inc. En route/terminal ATC operations concept (Contract No. DTF A01-83-Y-10554, CDRL A001). Englewood, CO: Author, October 1983.
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4. Federal Aviation Administration. Advanced Automation System, System level specification, Design competition phase. (FAA-ER-130-005D), April 1983.
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CONTROLLER INFORMATION-PROCESSING TASK ANALYSIS

CHAPTER 4.0

4.0 CONTROLLER INFORMATION-PROCESSING TASK ANALYSIS

The model of the Controller as an event-sensitive information processor has been validated with respect to the current ATC operational environment in CDRL A001, En Route/Terminal Operations Concept (Ref. 1). See also SSRVT minutes (Ref. 3). Reference 1 (CDRL A001) uses this model and the information processing task analysis methodology to define a complete set of Controller tasks. The set of events defined in Ref. 1 is assumed to remain virtually invariant from the current operations to the operations in the Advanced Automation System. Therefore, this set of events is used as the starting point in the analysis presented herein. As stated in Chapter 3.0, these events inspire responses by the Controller which are defined here as activities. The activities are decomposed into sub-activities which may be grouped with respect to specific events. (See Figure 4-1, Sub-Activity To Task Decomposition.) Chapter 4.0 decomposes these sub-activities into information-processing tasks, where tasks are cognitive and/or perceptual units of work. Additionally, tasks are defined as having the following properties (see Figure 4-2).

Event Stimulus—

Occurrence of an event which can be characterized in terms of some message input via a display, interphone/radio communication, or coordination.

Global System Parameters—

Knowledge, standards, procedures, geographic references, and other adaptation data.

Response—

Discernible user action. May also represent the initiation of an event or task.

Human Performance Indices—

Time, effort, accuracy, etc. required for task accomplishment.

Task Closure—

Completion condition, such as a transition to next task or task accomplishment.

The preceding analysis of current en route and terminal ATC operations identified and graphed 236 Controller tasks (Ref. 1, CDRL A001). Chapter 4.0 of the present document identifies 262 Controller tasks, distributed throughout 77 sub-activities. Their composition graphs and the associated TDL are contained in Appendix A.

4.1 Controller Task Identification and Composition

Tasks are the meaningful units of work activity performed by a Controller in accomplishing a sub-activity. Each task can be viewed as unit of work effort, typically being performed to completion. Together in a composition graph they can illustrate different routes and sequences by which a sub-activity is accomplished.

Controller tasks are characterized primarily as perceptual and/or cognitive, or combinations thereof. There is ongoing use of short-term memory, recognition of spatial patterns and trajectories, and pre-learned procedures and standards. In actuality, the Controller may perform multiple tasks almost simultaneously, with some being interrupted when higher priority matters require immediate attention. The composition graphs may not individually depict all this interaction, but as a set they portray sub-activity action to its conclusion.

Since much of Controller action terminates in the generation and issuance of a clearance to a pilot, the graphs employ a shorthand notation for this reoccurring set of tasks. The component task structure of this notation is given in Figure 4-3. It can be noted that this represents a portion of the composition graph for Sub-Activity 4.1, Planning and Issuing Clearances. Through inclusion of the "Generate Clearance" task cluster in applicable sub-activity graphs, the closure of sub-activity performance is preserved in response to events.

Appendix A contains composition graphs for each of 77 sub-activities, of which 42 constitute coordination and communication among Controllers. The importance of these coordination efforts cannot be overemphasized. They constitute a

significant and important aspect of the Controller job and remain critical to the successful accomplishment of air traffic control in the AAS.

4.1.1 Information-Processing Task Composition

As with the composition graphs for activities and sub-activities in Chapter 3.0, the task/sub-activity composition graphs employ the same symbology to show decision points, possible parallel actions, and actions that may be repeated or may be ongoing for a time. These symbols are:

- + Path selection (or decision point)
- & Parallel paths or tasks
- @* Task repetition or iteration

Triangles are used to note the entry and exit points to the task flow or sequence within a sub-activity. Each symbol appears at the start of that sub-activity action, and is repeated at the end of that action to show where it concludes.

Tasks are numbered only once. This usually occurs arbitrarily in relation to the primary sub-activity to which it pertains or the graph in which it first occurs. All Controller coordination and communication tasks are numbered within Activity 7.0. When a task is cited in a graph other than the one in which it was originally numbered, that task is enclosed in a box of dashed lines, rather than a solid-line box.

Coordination and communication task boxes also contain information on the media used in performing those tasks. Media categories are noted along the bottom of the task box, abbreviated as S/S, VSCS, and PERS. These abbreviations correspond to Sector Suite Workstation, Voice Switching and Control System, and Direct Person-to-Person. More than one of these boxes may be shaded if the Controller has communication options available. S/S media includes data link as a communication tool. Again, shading indicates the relevance of a category requirement. These categories are further detailed in section 4.4. Figure 4-4 illustrates the use of these symbols and shadings in Sub-Activity 3.1, Responding to

Flow Constraints. Connecting lines and arrows reflect the possible flows of task performance. Note in Figure 4-4 the use of dashed boxes where tasks from other sub-activities (in this case coordination and communication) have been invoked, to ensure a complete portrayal of a sub-activity's response to a given event.

When either the Area Supervisor or the Flow Control/Metering position is or may be involved with the Controller in a coordination task, that involvement is noted by shading in the upper left corner of the box for Area Supervisor (S) and in the upper right corner for Flow Control/Metering (F).

Sub-activities in Activity 7.0 are somewhat unique in that they may not lead to completion of effort in response to an event. Instead, with receipt of information, such as electronic mail, that information at times merely gets stored (remembered), or perhaps placed on an electronic scratch pad for later use as it may be needed. Similarly, some information gets transmitted for someone else's use. The Controller is able to construct notes; some to be transmitted, some to stay only in the sector to assist Controller memory.

Pointouts and transfer of control (hand-offs) are considered as coordination, and their tasks appear only within Activity 7.0 graphs in Appendix A.

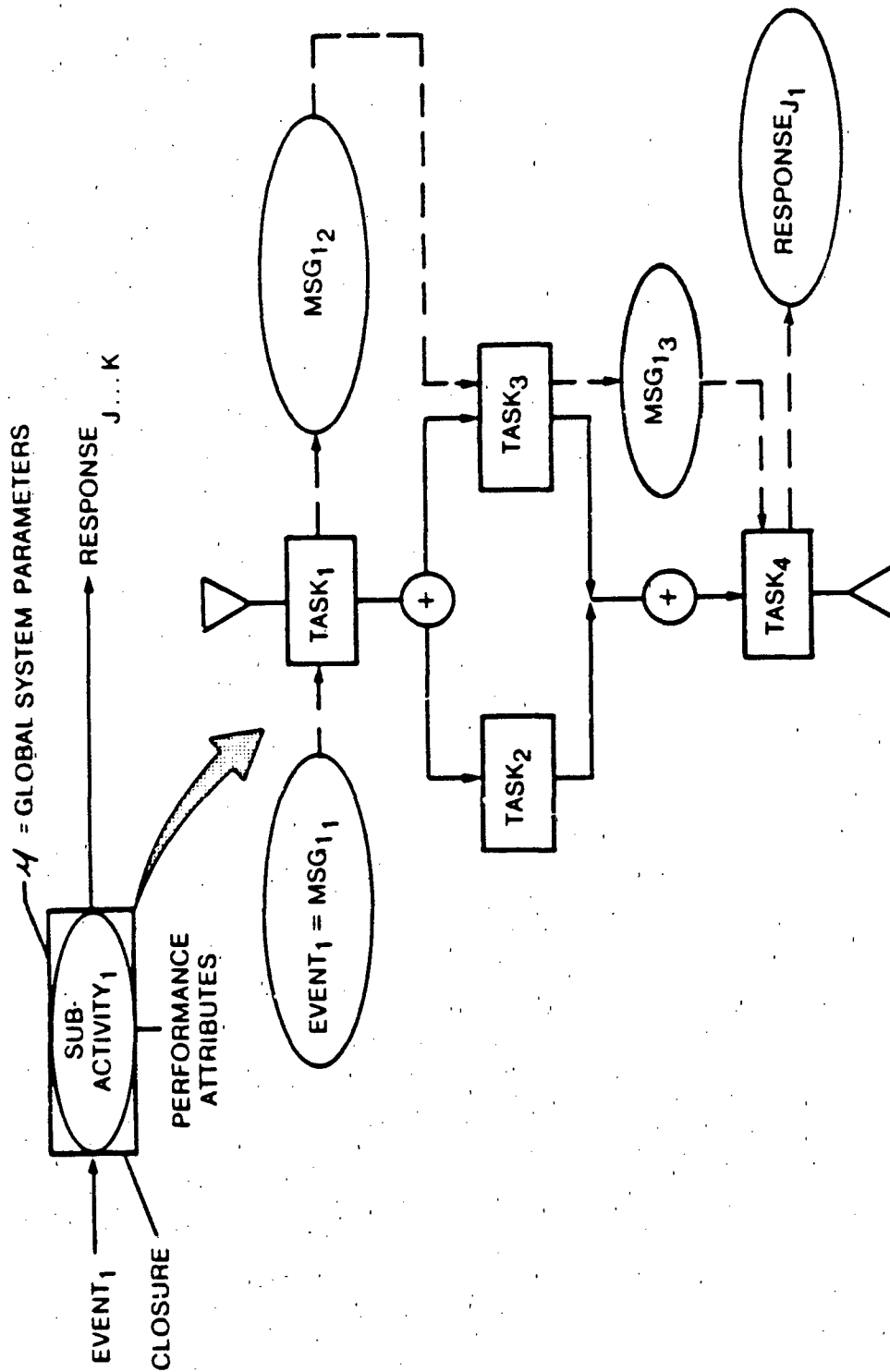


Figure 4-1. Sub-Activity to Task Decomposition

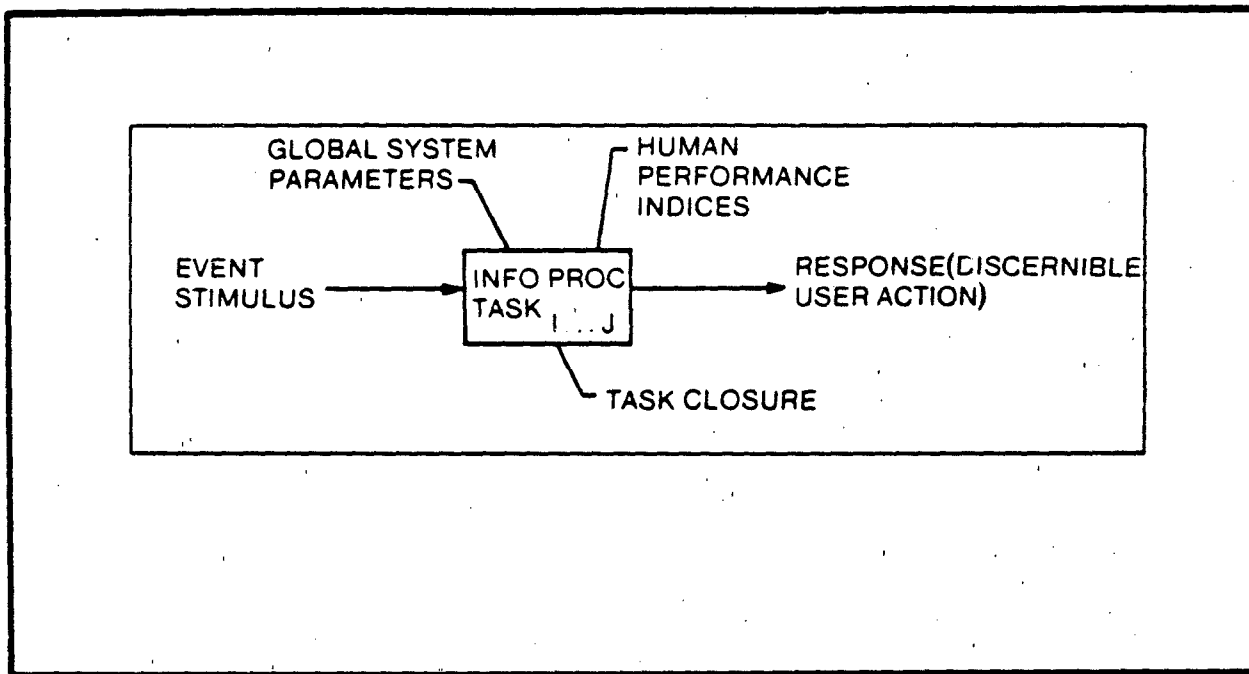


Figure 4-2. Controller Information Processing Model

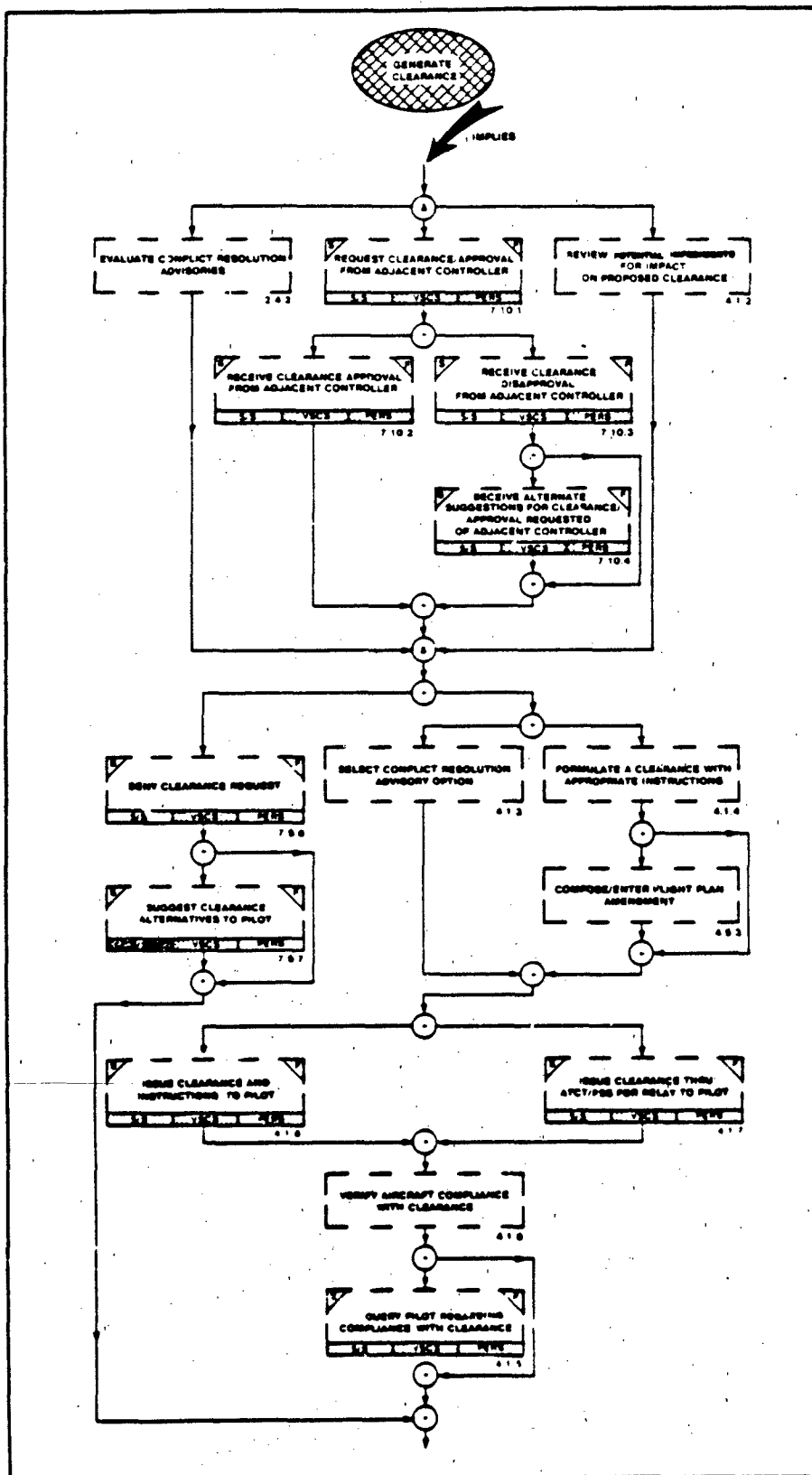


Figure 4-3. Component Task Structure for "Clearance Generation"

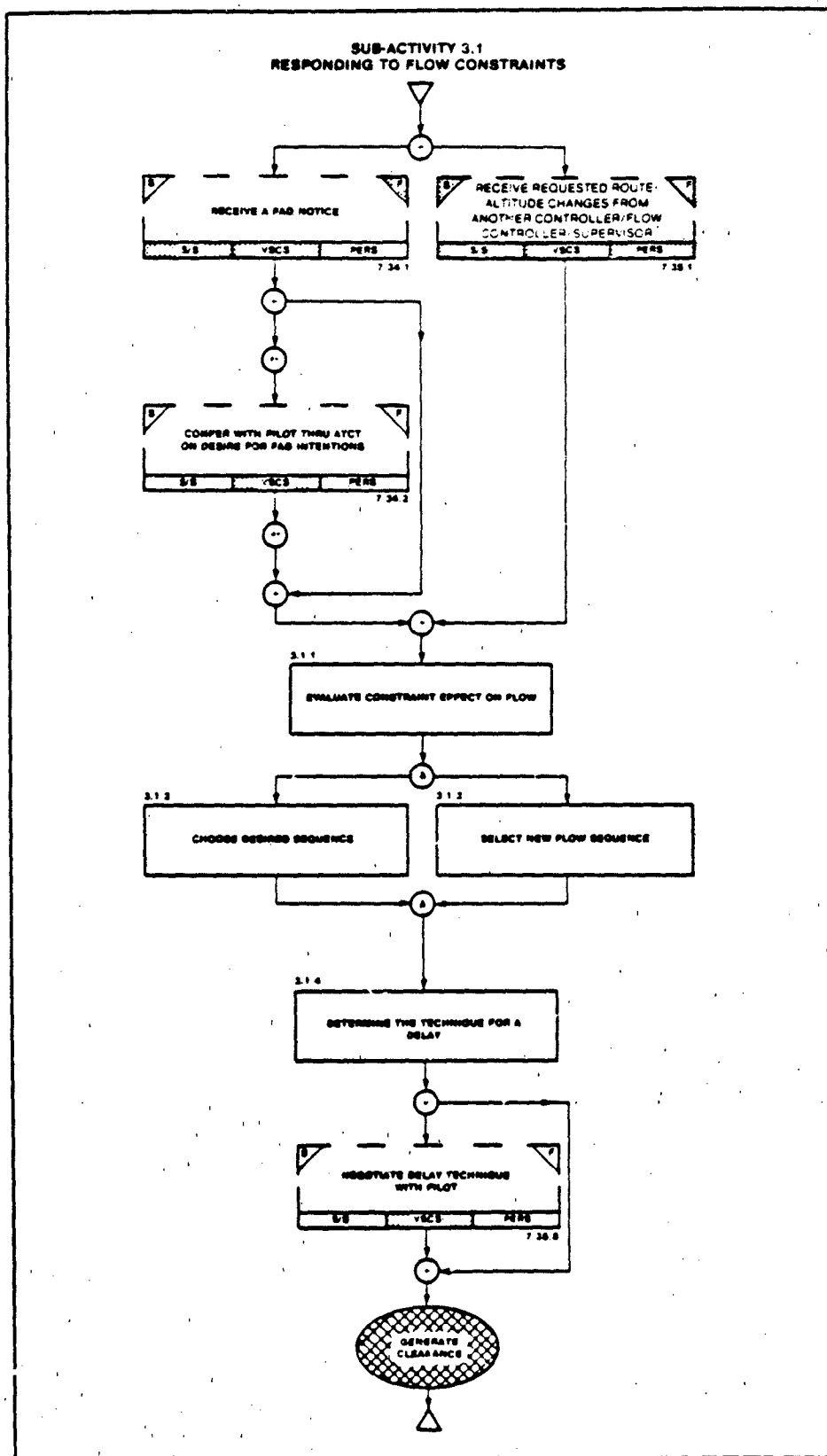


Figure 4-4. Illustration of Graphing Symbology

1.2 Task Description Language (TDL)

The purpose in applying a rigorously defined Task Description Language scheme is to portray the information in the composition graphs in a different manner. In so doing, the composition graphs may be checked for consistency and the TDL may be used as a way to convey the task analysis to the engineer and computer scientist. To carry out this validation process, the architecture for the TDL is established by imposing logical constructs on the task statements in a manner which neither adds nor subtracts any information contained in the composition graphs. To construct the TDL, the sub-activity is treated as a mathematical function. That is, it is a process which has a unique output for a given set of inputs. This approach lends itself to an immediate check of the composition graphs simply by looking at the pattern of the graph. For example, examine the following graph with regard to the pattern the tasks make as they are grouped:

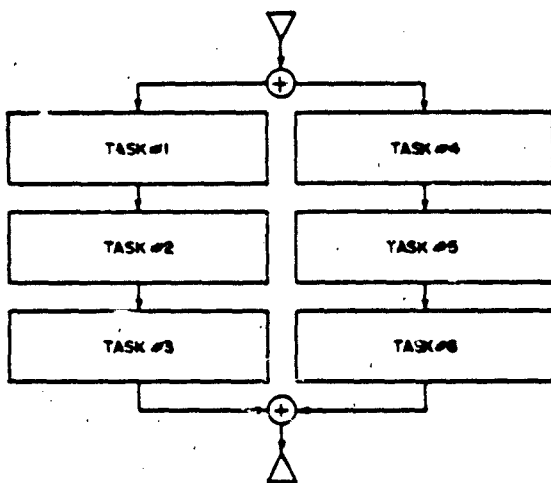


Figure 4-5. Example of a Non-functional Decomposition

This is clearly not a functional breakdown. There is not a well-defined input task or tasks, it looks as if two distinct processes are being carried out, and there certainly is not a unique output.

Application of TDL to this composition graph would be impossible without reorganizing the graph and therefore it may be con-

cluded that the graph is not functionally sound.

In addition to pointing out the possible lack of functionality in a sub-activity composition graph, the TDL imposes a logic for the decomposition of tasks which may not occur in the process of graphing the tasks. First of all, the task statement itself is analyzed in terms of its components (see Table 4-1). By viewing the task statement in a parsed form, i.e., verb, object, and qualifier, a standard may be applied which forces consistency in describing the task. For example, this assures that two different or unassociated verbs are not used to describe the same action. This application of a standard provides another means of validating the task statement, as well as ease in entering these statements into a strictly-defined data base. This eliminates duplication of terminology and allows for the validation of the content of the task statement.

Once the task statement has been defined and standardized in a rigorous manner, Step 1 of the TDL process may be applied (see Table 4-2). That is, for a given sub-activity, specify the input. This will be crucial in the application of TDL in that there must be an "input task" which explicitly processes this input.

The second step in the TDL process is to apply the logical constructs which are defined in Table 4-3 to the task statements in the composition graphs. These particular constructs were chosen primarily for the sake of simplicity. However, they are basically in keeping with the standard structured English constructs which are applied in any program design language or pseudo-code application. The exception is the use of the term ASE (And May Simultaneously Execute) which corresponds to the "&" in the composition graphs and indicates that simultaneous execution of a task is possible.

The third and final step in the TDL process is to build the TDL using the standardized task statements which are in the data base and the logical constructs which have been identified.

TABLE 4-1. INFORMATION-PROCESSING TASK DESCRIPTION

<u>Concise, But Specific, Statement of a Purposeful Job Action of a Controller</u>					
	ACTION VERB	+	ITEM ACTED UPON	+	MODIFIERS TO CLARIFY
E.G.,	Check		• Things (Controls, etc.)		• Purpose/Objective (Why)
	Compare				• Means/Media (How, Which Way)
	Determine.		• Data/Concepts		• Scope of Situation
Verbs	Estimate		• People		(Range, Restrictions)
	Identify				• Conditions (Where, When)
	Inform				
	Judge				
EXAMPLES:					
Determine Descent Time or Point.					
Assess Situation For Potential Violation of Separation Standards.					
(Implies Required Knowledge, Training, Experience in Regard To Separation Standards)					

TABLE 4-2. TDL-STEP 1

SUB-ACTIVITY 2.1: PERFORMING CONFLICT RESOLUTION

Specify Tasks Which Contain Inputs

Input Tasks:

- 2.1.1 Detect Aircraft Conflict Alert Indication
- 2.1.2 Determine Validity of Conflict Alert Notice or Indication

Input:

Input Must Check Against Approved Glossary of AAS Terms/Definitions for Messages.

TABLE 4-3. TDL - STEP 2

SUB-ACTIVITY 2.1: PERFORMING CONFLICT RESOLUTION

Apply logical constructs:

Subjunctive - Indicates possible or conditional path selection

IF
THEN
ELSE
END IF
ELSE EXIT

Repetitions/Passes - Indicates at least one pass through

DO
END DO
DO WHILE, DO UNTIL

Concurrency - Indicates simultaneous execution is possible

ASE (AND MAY SIMULTANEOUSLY EXECUTE)

During this step of the process, errors may be exposed in the composition graph, such as a missing exit path or an illogical grouping of tasks. The composition graphs may then be iterated upon until they are functionally sound and the TDL may be finalized. The following nine rules are consistently applied in the development of the TDL. These rules always apply and may be carried out automatically with the aid of a syntax checker.

TDL Rules:

- 1) Define inputs to entire sub-activity process.
- 2) All sub-activities are encased by:

```
DO
END DO
```

If iteration needs to be displayed, e.g., @*, encase the sub-activity by:

```
DO WHILE (condition exists)
END DO
```

or

```
DO UNTIL (something happens,
e.g., time = t)
END DO
```

whichever is appropriate.

- 3) If there is more than one input and the input tasks are joined by a +, handle each input separately.

With an IF clause

```
IF input is 1.
THEN (Task No. 1) Task 1
ELSE
  IF input is 2
  THEN (Task No. 2) Task 2
  ELSE (Task No. 3) Task 3
  END IF
END IF
```

This example illustrates the case of three input tasks. This requires two IF clauses, because there is no choice in processing the third input task. That is, if the input tasks were not numbers 1 and 2, it *must* be number 3 or one

would not be in the sub-activity. So, in general, if there are n input tasks joined by a +, there are $(n-1)$ IF clauses.

- 4) If the input tasks are joined by an &, then apply the following construction:

```
IF necessary
THEN (Task #1) Task 1
END IF
```

ASE

```
IF necessary
THEN (Task #2) Task 2
END IF
```

This implies that the tasks will be done simultaneously only when deemed necessary. The parameter for assigning necessity has yet to be established. There will be as many IF clauses as there are input tasks.

- 5) If there is only one input task, no construction is required other than the starting DO which encases the entire sub-activity.
- 6) If there is more than one task or construct to "do" within an IF clause, put a:

```
THEN DO (Task #1) Task 1
        (Task #2) Task 2
END DO
```

If there is only one task to "do", then the THEN is sufficient.

- 7) Similar to item 6) above, if there is more than one task which follows the ELSE, then use an:

```
ELSE DO
  (Task #1) Task 1
  (Task #2) Task 2
END DO
```

- 8) In general, after the input has been processed, a decision point will be reached, signified by a (dp). This decision point is implicit within the tasks and called out for the sake of clarity in the TDL. The only time the (dp) is not

used is in the initial processing of input, where the decision is clear and in the go-around clause (see item 9)) where the (dp) would be cumbersome rather than clarifying. The (dp) phrase usually takes the form of evaluating the necessity to do something if an active decision is required by the Controller, or determining the requirements which go into deciding which path to take. The (dp) statement is in either case followed by an IF clause. Parameters for implementing these (dp)s have not yet been determined.

- 9) The construction which indicates that a task may or may not be done in the composition graphs has the following form:

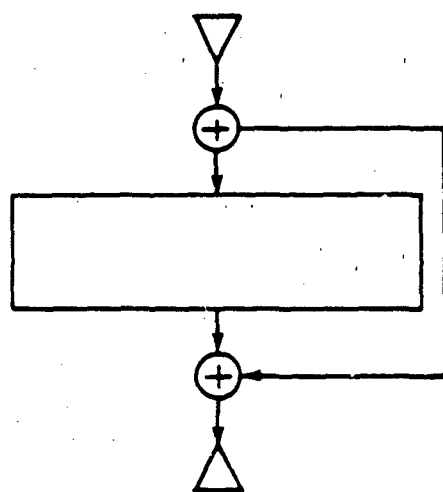


Figure 4-6.
TDL "If-Then" Construct

This is mirrored in the TDL by the

```
IF necessary
THEN (Task #) Task
END IF
```

clause.

To be more explicit, one would have to precede this clause with a (dp), but in the case of this construction only, it is omitted because of the additional clarity. It must be noted that a decision point does exist.

4.2 Allocation of Information Processing Tasks to Sector Type

4.2.1 Sector Type Description

Many factors can potentially impact Controller tasks at a given sector type. Of these, eight factors were identified which significantly impact sector complexity and ultimately, workload. These factors are: (1) coordination; (2) traffic density or volume; (3) arrival oriented traffic; (4) departure oriented traffic; (5) en route oriented traffic; (6) aircraft separation; (7) sequencing; and (8) time responsiveness.

Sector types were defined as low altitude arrival; low altitude departure; low altitude en route; high altitude en route; oceanic; arrival control; and departure control. These were assumed to be the principal types of sectors, recognizing a few others may occur in certain instances and that a given sector may be structured to serve more than one of these purposes.

The eight factors were applied against each of the seven principal types of sectors for each task. The level of factor influence on Controller task-by-task workload was judged as high, medium, low, or not applicable. A high rating was assigned if the factor was highly associated with the specified task in the specified sector in a majority of situations; a medium rating was assigned for average association; and a low rating was assigned for a minor association. Each position/sector may be affected by unique control procedures generated by environmental or geographical constraints. The procedures may create substantial differences in the same type of sectors within the same facility. No effort is made to account for these control procedures since they may be as varied as the number of sectors involved. Control procedures are identified here only as an alert that sector types with similar names may be very dissimilar in control practices. The intent of this analysis is both to identify the impact of sector complexity factors on Controller tasks, and to surface differences between sector types in overall Controller workload.

4.2.2 Allocation of Tasks for Each Sector

Of the levels of factor influence on Controller workload (high, medium, low, or not applicable) as applied to the sector types, coordination was the highest rated factor. Coordination received the most "high" ratings for all tasks within all sector types. See Table 4-4 for average "high" rated factors for all sector types. Traffic density and time responsiveness, were well ahead of the other factors. Although different sector types were examined to determine if the type of sector influenced the results of applying the factor ratings, coordination, traffic density, and time responsiveness were always the most significant factors in Controller activities regardless of sector type. No meaningful differences could be detected between the arrival, en route, or departure oriented traffic with respect to factor influence. See Table 4-5 for factor ratings by sector types.

TABLE 4-4. AVERAGE "HIGH" RATING FACTORS FOR ALL SECTOR TYPES

*AVERAGE RATING/ALL SECTOR TYPES

<u>Factor</u>	<u>No. of "High" Ratings*</u>
Coordination	173
Traffic Density	128
Time Responsiveness	119
En Route Traffic	114
Sequencing	113
Aircraft Spacing	113
Arrival Traffic	111
Departure Traffic	110

*Possible 264 (high, medium, low, or not applicable.)

TABLE 4-5. FACTOR RATINGS BY SECTOR TYPE

Factor	Factor Rating	Sector Type						
		Low Altitude Arrival	Low Altitude Departure	Low Altitude En Route	High Altitude En Route	Oceanic	Arrival Control	Departure Control
Arrival Oriented Traffic	High	116	105	122	119	94	115	105
	Med.	28	35	28	25	37	28	34
	Low	44	48	38	42	49	45	49
	N/A	73	73	73	75	81	73	73
Departure Oriented Traffic	High	101	120	119	117	93	101	120
	Med.	33	33	32	27	37	32	33
	Low	55	36	38	43	51	56	36
	N/A	72	72	72	74	80	72	72
En Route Oriented Traffic	High	112	118	121	117	102	110	116
	Med.	29	29	29	25	30	24	28
	Low	47	41	38	44	48	54	44
	N/A	73	73	73	75	81	73	73
Aircraft Spacing	High	114	115	116	116	102	116	115
	Med.	22	23	25	20	25	20	23
	Low	71	69	66	69	74	71	69
	N/A	54	54	54	56	60	54	54
Sequencing	High	115	114	113	113	103	117	114
	Med.	41	40	44	40	40	39	40
	Low	58	60	57	59	63	58	60
	N/A	47	47	47	49	55	47	47
Time Responsiveness	High	121	119	120	120	110	121	119
	Med.	89	95	94	88	80	88	95
	Low	43	39	39	43	51	44	39
	N/A	8	8	8	10	20	8	8
Coordination	High	176	176	176	175	160	176	176
	Med.	36	42	43	37	33	34	42
	Low	42	36	35	40	48	44	36
	N/A	7	7	7	9	20	7	7
Traffic Density	High	129	134	133	129	112	128	133
	Med.	29	34	35	28	33	29	34
	Low	55	45	45	54	58	56	46
	N/A	48	48	48	50	58	48	48

4.3 Task Information Requirements Analysis

Task information requirements result from associating Controller tasks with either position-to-position communication messages, position-to-network communication messages, or position-to-machine communication messages. These requirements are summarized in Table 4-6. Position-to-network messages include Controller to Controller/Supervisor/Metering/Flow Controller, or Pilot. Position-to-machine messages include Controller entered messages which are required to update the machine data base or machine output messages such as data blocks, flight data, weather, or status information. The message network represents the coordination or communications between Controllers and others. The network may be accomplished by VSCS, by the computer, and, if appropriate, data link. In addition, performance requirements are listed where message receipt/transmission is involved in the task. Performance requirements pertaining to data link transmissions are not specified.

Of the task information requirements, the messages required between position to position generally involve pointouts, transfer of control or handoff, airspace action, or clearances. Messages requiring computer input by the Controller generally involve multiple positions or sectors, or the use of display information by the entering position.

Messages which require action on the part of the receiving Controller such as handoff, pointout, etc., are noted. The performance requirement for these messages represents the response time after the computer verifies that the message is acceptable and can be processed to conclusion. As an example, currently a handoff message must be properly formatted, be identified to the proper sector, the sector or facility must be on line and has acknowledged receipt of the handoff message, and displayed on the originator display within the allotted time. Performance requirements concerning visual or verbal action are not specified in Table 4-6.

4.3.1 Derived Machine Support Response Times

The AAS System Level Specification (Ref. 2) states ACCC response times in terms of mean, 99th percentile, and maximum responses for six priority classes of messages. Responses to local message inputs are defined in terms of the following events:

- t_0 — the time of device key depression or touch-entry activation.
- t_p — the time of exhibit of a symbol or a menu-select in the display preview area.
- t_e — the time at which an enter-input action is taken.
- t_r — the time at which the input device is ready for the entry of another message.
- t_a — the time at which the results of message validation are output.
- t_d — the time at which the output(s) that result from the processing of an accepted message is displayed or transmitted to the appropriate destination(s). The destination of the output message resulting from the input can be entering position, another local destination, or a remote destination. For a local destination, t_d will be the display time; for a remote destination, t_d will be the start of transmission time.

From the event-times, four response-time intervals are defined for local message inputs. Figure 4-7 shows the relationship of these intervals.

Display or Preview Area response time is defined to be $(t_p - t_0)$.

Release of Input Device response time is defined to be $(t_r - t_e)$.

Message Accept response time is defined to be $(t_a - t_0)$.

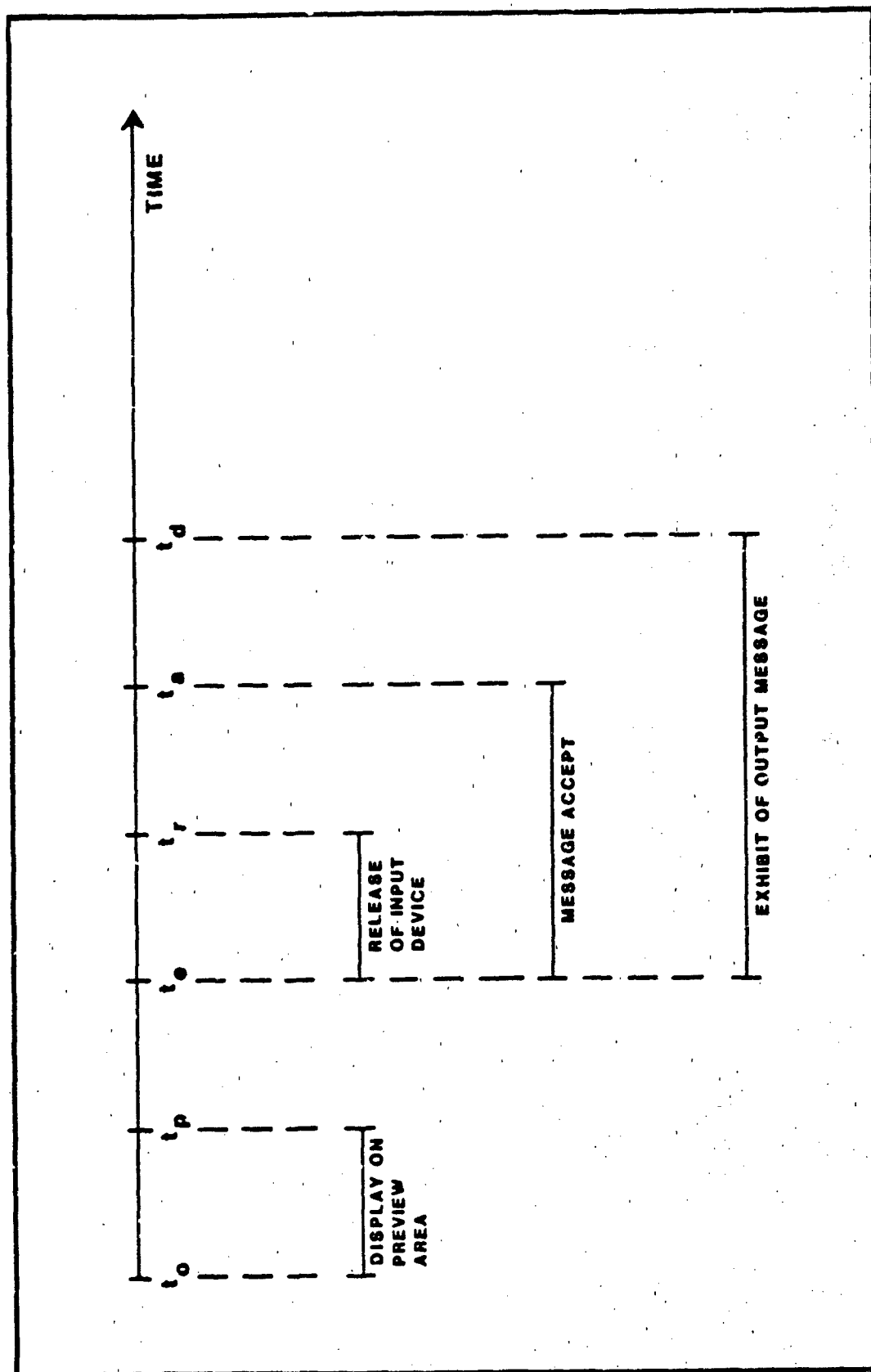


Figure 4-7. Definition of Response Time Intervals
(Taken from Ref. 2)

Exhibit of the Output Message response time is defined to be $(t_d - t_e)$.

From the Controller's point of view, two entries are accounted for in the above model. The first, t_o , corresponds to choosing an option set, e.g., a menu of alternatives or function set. The second, t_e represents the explicit "enter" for the chosen command. Several levels of feedback are also presented. $T_o - t_o$ represents lexical feedback, similar to input echoing. $T_a - t_e$ represents syntactic feedback, e.g., format checking, error message display. $T_d - t_e$ is the period of semantic feedback, e.g., display of results or acknowledgement that a message has been successfully transmitted.

The derived machine support response times listed in Table 4-6 represent the Controller's expectations for the period of $t_d - t_e$. These performance requirements are derived in accordance with the events (traced to sub-activities) listed in Table 4-6. That is, derived machine support response times are listed which are meaningful with respect to Controller acceptance, and the "real-world" events to which they map.

The time periods listed in Table 4-6 represent completed system processing time, including display time at subsequent Sector Suites or interfaced systems (i.e., $t_d - t_e$). Performance times are maximum times under peak conditions. It is assumed that *lexical* feedback (e.g., character echoing) will be provided to the Controller virtually instantaneously, (≤ 0.5 sec.), and that *syntactic* feedback (format checks, error messages) will be provided in less than 2 seconds in all cases.

4.3.2 Priority Ratings

Associated with the performance requirement for each task is a Controller assessment of the high, medium, low priority assignment for the task. High priority tasks are generally associated with potential conflicts, aircraft deviations, clearances, transfer of control and pointouts, and failure mode detection. Information-gathering tasks, i.e., trial amendments, probes, etc., which support higher priority tasks and safety-related items, such as weather, were generally rated as medium priority. House-

keeping functions, and ancillary tasks such as searching for overdue aircraft, were assigned a low priority. Thus, the priority assignment provides additional information relating to performance requirements and can be used to differentiate tasks with identical requirements.

TABLE 4-6. TASK INFORMATION REQUIREMENTS

SUBACTIVITY NO	EVENT NO	EVENT	TASK NO	POSITION/POSITION ACTION	POSITION/MACHINE ACTION	NETWORK	DEVELOP MACHINE SUPPORT RESPONSE TIMES	PRIORITY RATINGS
1.1	1.1	(MUST ALL EVENTS, OBJECT ENTRIES, AIRSPACE)	1.1.1	NA	VISUAL		REFRESH RATE	H
1.1	1.2		1.1.2	NA	VISUAL		1 SECOND	L
1.1	1.3		1.1.3	NA	VELOCITY VECTOR		1 SECOND	M
1.1	1.4		1.1.4	NA	FLIGHT NOTE		1 SECOND	L
1.2	1.5	(NO SPECIFIC EVENT)	1.1.5	NA	ANGLE BEARING		1 SECOND	L
1.2	1.6		1.1.6	NA	FORCE FULL DATA		1 SECOND	M
1.2	1.7		1.1.7	NA	BLACK/WHITE LOOK		1 SECOND	L
1.2	1.8		1.1.8	NA	FLIGHT SORT		1 SECOND	M
1.3	1.9	(NO SPECIFIC EVENT)	1.2.1	NA	SPECIAL LIST SORT		5 SECONDS	M
1.3	2.0		1.2.2	NA	VISUAL		5 SECONDS	M
1.3	2.1		1.3.1	NA	VISUAL		2 SECONDS	M
1.3	2.2		1.3.2	NA	MENTAL		2 SECONDS	M
1.4	2.3	INITIAL CONTACT	1.3.3	NA	FLIGHT DATA ENTRY		2 SECONDS	M
1.4	2.4		1.3.4	NA	DISPLAY DATA ENTRY		2 SECONDS	M
1.4	2.5		1.3.5	NA	FLIGHT DATA ENTRY		5 SECONDS	M
1.4	2.6		1.3.6	NA	TRIAL DEPARTURE TIME		1 SECOND	M
1.5	2.7	FLIGHT FOLLOWING	1.4.1	NA	DEPARTURE		1/2 SECOND	H
1.5	2.8		1.4.2	NA	TRACK START		1/2 SECOND	H
1.5	2.9		1.4.3	NA	VISUAL		1/2 SECOND	H
1.5	3.0		1.5.1	NA	MENTAL		1/2 SECOND	H
2.1	3.1	AIRCRAFT AIRCRAFT CONFLICT	1.5.2	NA	DATA BLOCK OFFSET		2 SECONDS	L
2.1	3.2		1.6.1	NA	CONTROL NOTE		5 SECONDS	L
2.1	3.3		1.6.2	NA	DELETE FDB/FDE		5 SECONDS	L
2.1	3.4		1.6.3	NA	DELETE FDB/FDE		5 SECONDS	L
2.2	3.5	MINIMUM SAFE ALTITUDE CONFLICT	1.6.4	NA	SUSPEND FDB/FDE		5 SECONDS	L
2.2	3.6		1.6.5	NA	SUSPEND FDB/FDE		5 SECONDS	L
2.2	3.7		1.6.6	NA	SUSPEND FDB		1 SECOND	M
2.2	3.8		1.6.7	NA	SUSPEND FDB		1 SECOND	M
2.3	3.9	IMENDING AIRSPACE CONFLICT	1.6.8	NA	SUSPEND FDB		2 SECONDS	L
2.3	4.0		1.6.9	NA	SUSPEND FDB		2 SECONDS	L
2.4	4.1	CAUTION ALERT	2.1.1	NA	VISUAL		1 SECOND	H
2.4	4.2		2.1.2	NA	MENTAL		1 SECOND	H
2.4	4.3		2.2.1	NA	VISUAL		1 SECOND	H
2.4	4.4		2.2.2	NA	MENTAL		1 SECOND	H
2.5	4.5	FUELING/ENGINE/ AIR SHOW	2.3.1	NA	MENTAL		1 SECOND	H
2.5	4.6		2.3.2	NA	MENTAL		1 SECOND	H
2.5	4.7		2.4.1	NA	VISUAL		1 SECOND	H
2.5	4.8		2.4.2	NA	MENTAL		1 SECOND	H
2.6	4.9	FUELING/ENGINE/ AIR SHOW	2.4.3	NA	FORMULATE ADVISORY		1 SECOND	H
2.6	5.0		2.4.4	NA	RESOLUTION		1 SECOND	H
2.6	5.1		2.5.1	NA	VISUAL		1 SECOND	H
2.6	5.2		2.5.2	NA	MENTAL		1 SECOND	H
2.7	5.3	FUELING/ENGINE/ AIR SHOW	2.5.3	NA	SUSPEND CA		2 SECONDS	L
2.7	5.4		2.5.4	NA	SUSPEND CA		2 SECONDS	L
2.7	5.5		2.5.5	NA	SUSPEND CA		2 SECONDS	L
2.7	5.6		2.5.6	NA	SUSPEND CA		2 SECONDS	L
2.8	5.7	FUELING/ENGINE/ AIR SHOW	2.5.7	NA	NSAM ALERT		2 SECONDS	L
2.8	5.8		2.5.8	NA	NSAM ALERT		2 SECONDS	L
2.8	5.9		2.5.9	NA	NSAM ALERT		2 SECONDS	L
2.8	6.0		2.5.10	NA	RESTORE NSAM/CA		2 SECONDS	L
3.1	6.1	FLIGHT MANAGEMENT REQUIRED	3.1.1	NA	MENTAL		1 SECOND	H
3.1	6.2		3.1.2	NA	MENTAL		1 SECOND	H

TABLE 4-6. TASK INFORMATION REQUIREMENTS (continued)

SUBACTIVITY NO	EVENT NO	EVENT	TASK NO	POSITION/POSITION ACTION	PL ACTION/MACHINE ACTION	NETWORK	DELIVERED MACHINE SUPPORT RESPONSE TIMES	PRIORITY RATINGS
3.2	3.2	ENTERING/LEAVING HOLD	3.1.1	NA	FIVE SEQUENCE MENTAL		1 SECOND	M
	3.3	ROUTE CONFIGURATION CHANGE	3.1.4	NA				
	3.4	CHANGE FLOW PATTERN						
	3.5	FLIGHT PLAN DEVIATION OBSERVED	3.2.1	NA	FREE TRACK, ALTITUDE NON CONFORMANCE VISUAL		REFRESH RATE	M
	3.6		3.2.2	NA				
3.3	3.6	ALTITUDE AIRSPACE RESERVATION	3.3.1	NA	FLIGHT PLAN CONFLICT PROBE		5 SECONDS	M
	3.7	MILITARY TRAINING	3.3.2	NA	MODIFY SPECIAL USE AIRSPACE		2 SECONDS	M
	3.8	RESTRICTED	3.3.3	NA	MENTAL			
	3.9	MAINTAINING, NOT N/A	3.3.4	NA	MENTAL			
	3.10		3.3.5	NA	CLEARANCE VISUAL			
3.4	3.8	CLIMB	3.4.1	NA	CALCULATE DESCENT		1 SECOND	M
	3.9	ENTERING/LEAVING HOLD	3.4.2	NA	TIME POINT			
	3.10	ROUTE CONFIGURATION CHANGE	3.4.3	NA	RANGE BLANKING READOUT		1 SECOND	M
	3.11							
	3.12							
3.5	3.13	CHANGE FLOW PATTERN						
	3.14	FLIGHT PLAN CONFLICT						
	3.15	ENTERING/LEAVING HOLD						
	3.16	ROUTE CONFIGURATION CHANGE						
	3.17							
3.6	3.18	BALLOON, CLIMB	3.6.1	NA	VISUAL		5 SECONDS	M
	3.19		3.6.2	NA	ELECTRONIC MEMORANDA		REFRESH RATE	M
	3.20		3.6.3	NA	TRACK START, REPOSITION			
	3.21		3.6.4	NA	TRIAL FLIGHT, LAW AGREEMENT		2 SECONDS	M
	3.22		3.6.5	NA	VISUAL		1 SECOND	M
3.7	3.23	CLEARANCE REQUEST	3.7.1	NA	SELECT			
	3.24	FLIGHT PLAN	3.7.2	NA	RESOLUTION			
	3.25	CONFLICT	3.7.3	NA	MENTAL			
	3.26	CLEARANCE DELIVERY	3.7.4	NA	MENTAL			
	3.27		3.7.5	NA	MESSAGE TRANSMISSION			
3.8	3.28	OVERSUE AIRCRAFT	3.8.1	NA	NA	PILOT		
	3.29	BOMB THREAT	3.8.2	NA	VERBAL	CONTROLLER, PSS		
	3.30	NO RADIO	3.8.3	NA				
	3.31	FUEL DROPPING	3.8.4	NA				
	3.32	JETTISON	3.8.5	NA				
3.9	3.33	MECHANICAL	3.9.1	NA				
	3.34	AIRCRAFT ENGINE	3.9.2	NA				
	3.35	HIJACK	3.9.3	NA				
	3.36	INTERCEPTOR FLIGHT	3.9.4	NA				
	3.37		3.9.5	NA				

TABLE 4-6. TASK INFORMATION REQUIREMENTS (continued)

SUBACTIVITY NO	EVENT NO	EVENT	TASK NO	POSITION/POSITION ACTION	POSITION/MACHINE ACTION	NETWORK	DEVELOP MACHINE SUPPORT RESPONSE TIME S	PRIORITY RATINGS
4.4	4.15	EXERCISE/INITIAL FLIGHT	4.4.1	NA	FLIGHT PLAN		5 SECONDS	L
	4.17	MILITARY TRAINING	4.4.2	NA	ALERT			
	4.18	AD-VE FLIGHT	4.4.3	NA	FLIGHT PLAN		3 SECONDS	M L
	4.19	UNDEVELOPED MISSION	4.4.4	NA	FLIGHT PLAN		1/2 SECONDS	
	4.20	SPECIAL INTEREST	4.4.5	NA	ALERT			
4.5	4.12	DOE FLIGHT (DO)	4.5.1	NA	FLIGHT PLAN		5 SECONDS	M
	4.16	AD-VE FLIGHT (AD-VE)	4.5.2	NA	TRANSFORM		1 SECOND	L
	4.18	FLIGHT PLAN	4.5.3	NA	TRANSFORM		5 SECONDS	M
	4.19	AD-VE FLIGHT	4.5.4	NA	TRANSFORM			
	4.20	FLIGHT PLAN	4.5.5	NA	TRANSFORM			
5.1	5.1	PIREP	5.1.1	NA	REQUEST NO	PILOT METEOROLOGIST	5 SECONDS	M L
	5.2	SECRET/ALERT	5.1.2	VERBAL	NO SHIFTING		5 SECONDS	H
	5.3	AD-VE FLIGHT	5.1.3	VERBAL	PIREP		5 SECONDS	H
	5.4	WEATHER REPORT	5.1.4	VERBAL	MENTAL		5 SECONDS	H
	5.5	WEATHER REPORT	5.1.5	VERBAL	MENTAL		10 SECONDS	M
5.2	5.1	PIREP	5.1.1	NA	REQUEST NO		5 SECONDS	H
	5.2	SECRET/ALERT	5.1.2	VERBAL	NO SHIFTING		5 SECONDS	H
	5.3	AD-VE FLIGHT	5.1.3	VERBAL	PIREP			
	5.4	WEATHER REPORT	5.1.4	VERBAL	MENTAL			
	5.5	WEATHER REPORT	5.1.5	VERBAL	MENTAL			
6.1	6.1	PIREP	6.1.1	NA	REQUEST NO		5 SECONDS	H
	6.2	SECRET/ALERT	6.1.2	VERBAL	NO SHIFTING		5 SECONDS	H
	6.3	AD-VE FLIGHT	6.1.3	VERBAL	PIREP			
	6.4	WEATHER REPORT	6.1.4	VERBAL	MENTAL			
	6.5	WEATHER REPORT	6.1.5	VERBAL	MENTAL			
6.2	6.1	PIREP	6.2.1	NA	REQUEST NO		5 SECONDS	H
	6.2	SECRET/ALERT	6.2.2	VERBAL	NO SHIFTING		5 SECONDS	H
	6.3	AD-VE FLIGHT	6.2.3	VERBAL	PIREP			
	6.4	WEATHER REPORT	6.2.4	VERBAL	MENTAL			
	6.5	WEATHER REPORT	6.2.5	VERBAL	MENTAL			
6.3	6.1	PIREP	6.3.1	NA	REQUEST NO		5 SECONDS	H
	6.2	SECRET/ALERT	6.3.2	VERBAL	NO SHIFTING		5 SECONDS	H
	6.3	AD-VE FLIGHT	6.3.3	VERBAL	PIREP			
	6.4	WEATHER REPORT	6.3.4	VERBAL	MENTAL			
	6.5	WEATHER REPORT	6.3.5	VERBAL	MENTAL			
6.4	6.1	PIREP	6.4.1	NA	REQUEST NO		5 SECONDS	H
	6.2	SECRET/ALERT	6.4.2	VERBAL	NO SHIFTING		5 SECONDS	H
	6.3	AD-VE FLIGHT	6.4.3	VERBAL	PIREP			
	6.4	WEATHER REPORT	6.4.4	VERBAL	MENTAL			
	6.5	WEATHER REPORT	6.4.5	VERBAL	MENTAL			
6.5	6.1	PIREP	6.5.1	NA	REQUEST NO		5 SECONDS	H
	6.2	SECRET/ALERT	6.5.2	VERBAL	NO SHIFTING		5 SECONDS	H
	6.3	AD-VE FLIGHT	6.5.3	VERBAL	PIREP			
	6.4	WEATHER REPORT	6.5.4	VERBAL	MENTAL			
	6.5	WEATHER REPORT	6.5.5	VERBAL	MENTAL			
6.6	6.1	PIREP	6.6.1	NA	REQUEST NO		5 SECONDS	H
	6.2	SECRET/ALERT	6.6.2	VERBAL	NO SHIFTING		5 SECONDS	H
	6.3	AD-VE FLIGHT	6.6.3	VERBAL	PIREP			
	6.4	WEATHER REPORT	6.6.4	VERBAL	MENTAL			
	6.5	WEATHER REPORT	6.6.5	VERBAL	MENTAL			
6.7	6.1	PIREP	6.7.1	NA	REQUEST NO		5 SECONDS	H
	6.2	SECRET/ALERT	6.7.2	VERBAL	NO SHIFTING		5 SECONDS	H
	6.3	AD-VE FLIGHT	6.7.3	VERBAL	PIREP			
	6.4	WEATHER REPORT	6.7.4	VERBAL	MENTAL			
	6.5	WEATHER REPORT	6.7.5	VERBAL	MENTAL			
6.8	6.1	PIREP	6.8.1	NA	REQUEST NO		5 SECONDS	H
	6.2	SECRET/ALERT	6.8.2	VERBAL	NO SHIFTING		5 SECONDS	H
	6.3	AD-VE FLIGHT	6.8.3	VERBAL	PIREP			
	6.4	WEATHER REPORT	6.8.4	VERBAL	MENTAL			
	6.5	WEATHER REPORT	6.8.5	VERBAL	MENTAL			

TABLE 4-2. JACK INFORMATION REQUIREMENTS (continued)

SUBACTIVITY NO	EVENT NO	EVENT	TASK NO	POSITION/POSITION ACTION	POSITION/MACHINE ACTION	NETWORK	DELIVERED MACHINE SUPPORT RESPONSE TIMES	PRIORITY RATINGS
0.1	0.1	COMMUNICATION FAILURE	0.1.1 0.1.2 0.1.3	VERBAL NA NA	NA TBD TBD	CONTROLLER CONTROLLER/ PILOT		M
0.2	0.10	CONTROLLER OVERLOAD	0.2.1 0.2.2	NA VERBAL	MANUAL SECTOR WORKLOAD DISTRIBUTION	CONTROLLER/ SUPERVISOR SUPERVISOR	1/2 SECOND 5 SECONDS	M M
0.3	0.11	SENSOR FAILURE	0.3.1 0.3.2	ATC MAIL NA NA	VISUAL REPOSITION/ TRACK START	REFRESH RATE REFRESH RATE		M M
0.4	0.12	FLIGHT PLAN DATA BASE FAILURE	0.4.1 0.4.2 0.4.3 0.4.4 0.4.5	NA NA NA NA NA	VISUAL VISUAL/MENTAL FILE AMENDMENT FLIGHT PLAN FILE SEQUENCE		1 SECOND 2 SECONDS 2 SECONDS 2 SECONDS	M M M M
0.5	0.5	UNRELIABLE COMMUNICATIONS	0.5.1	NA	VERBAL	PILOT CONTROLLER		M
0.6	0.6	AIRPORT AIRCRAFT CONFLICT	0.6.1 0.6.2 0.6.3 0.6.4	VERBAL ATC MAIL VERBAL VERBAL	NA NA NA NA	CONTROLLER/ SUPERVISOR CONTROLLER CONTROLLER	2 SECONDS	M
0.7	0.7	IMENDING AIRSPACE CONFLICT	0.7.1 0.7.2 0.7.3 0.7.4	VERBAL VERBAL VERBAL VERBAL	NA NA NA NA	CONTROLLER CONTROLLER CONTROLLER CONTROLLER	1 SECONDS	M
0.8	0.8	FLIGHT PLAN OBSERVED	0.8.1 0.8.2 0.8.3 0.8.4	VERBAL VERBAL VERBAL VERBAL	NA NA NA NA	CONTROLLER CONTROLLER CONTROLLER CONTROLLER	1 SECONDS 1 SECONDS 1 SECONDS 1 SECONDS	M M M M
0.9	0.9	MINIMUM SAFE ALTITUDE CONFLICT	0.9.1 0.9.2 0.9.3 0.9.4	VERBAL VERBAL VERBAL VERBAL	NA NA NA NA	CONTROLLER CONTROLLER CONTROLLER CONTROLLER	1 SECONDS 1 SECONDS 1 SECONDS 1 SECONDS	M M M M
1.0	1.0	IMENDING AIRSPACE CONFLICT	1.0.1 1.0.2 1.0.3 1.0.4	VERBAL VERBAL VERBAL VERBAL	NA NA NA NA	CONTROLLER CONTROLLER CONTROLLER CONTROLLER	1 SECONDS 1 SECONDS 1 SECONDS 1 SECONDS	M M M M
1.1	1.1	AIRCRAFT TO EDGE OF SECTOR	1.1.1 1.1.2 1.1.3 1.1.4	POINTOUT NA FORCE FILE VERBAL, VISUAL VERBAL, VISUAL	NA POINTOUT	CONTROLLER CONTROLLER CONTROLLER CONTROLLER	1 SECONDS 1 SECONDS 1 SECONDS 1 SECONDS	M M M M
1.2	1.2	AIRCRAFT TO EDGE OF SECTOR	1.2.1 1.2.2 1.2.3 1.2.4	VERBAL VERBAL VERBAL VERBAL	NA NA NA NA	CONTROLLER CONTROLLER CONTROLLER CONTROLLER	1 SECONDS 1 SECONDS 1 SECONDS 1 SECONDS	M M M M
1.3	1.3	AIRCRAFT TO EDGE OF SECTOR	1.3.1 1.3.2 1.3.3 1.3.4	VERBAL VERBAL VERBAL VERBAL	NA NA NA NA	CONTROLLER CONTROLLER CONTROLLER CONTROLLER	1 SECONDS 1 SECONDS 1 SECONDS 1 SECONDS	M M M M
1.4	1.4	AIRCRAFT TO EDGE OF SECTOR	1.4.1 1.4.2 1.4.3 1.4.4	VERBAL VERBAL VERBAL VERBAL	NA NA NA NA	CONTROLLER CONTROLLER CONTROLLER CONTROLLER	1 SECONDS 1 SECONDS 1 SECONDS 1 SECONDS	M M M M
1.5	1.5	AIRCRAFT TO EDGE OF SECTOR	1.5.1 1.5.2 1.5.3 1.5.4	VERBAL VERBAL VERBAL VERBAL	NA NA NA NA	CONTROLLER CONTROLLER CONTROLLER CONTROLLER	1 SECONDS 1 SECONDS 1 SECONDS 1 SECONDS	M M M M
1.6	1.6	AIRCRAFT TO EDGE OF SECTOR	1.6.1 1.6.2 1.6.3 1.6.4	VERBAL VERBAL VERBAL VERBAL	NA NA NA NA	CONTROLLER CONTROLLER CONTROLLER CONTROLLER	1 SECONDS 1 SECONDS 1 SECONDS 1 SECONDS	M M M M
1.7	1.7	AIRCRAFT TO EDGE OF SECTOR	1.7.1 1.7.2 1.7.3 1.7.4	VERBAL VERBAL VERBAL VERBAL	NA NA NA NA	CONTROLLER CONTROLLER CONTROLLER CONTROLLER	1 SECONDS 1 SECONDS 1 SECONDS 1 SECONDS	M M M M
1.8	1.8	AIRCRAFT TO EDGE OF SECTOR	1.8.1 1.8.2 1.8.3 1.8.4	VERBAL VERBAL VERBAL VERBAL	NA NA NA NA	CONTROLLER CONTROLLER CONTROLLER CONTROLLER	1 SECONDS 1 SECONDS 1 SECONDS 1 SECONDS	M M M M
1.9	1.9	ALTITUDE AIRSPACE RESERVATION	1.9.1 1.9.2 1.9.3 1.9.4	VERBAL VERBAL VERBAL VERBAL	NA NA NA NA	CONTROLLER SUPERVISOR CONTROLLER SUPERVISOR	2 SECONDS 2 SECONDS	M M
2.0	2.0	IMENDING AIRSPACE CONFLICT	2.0.1 2.0.2 2.0.3 2.0.4	VERBAL VERBAL VERBAL VERBAL	NA NA NA NA	CONTROLLER SUPERVISOR CONTROLLER SUPERVISOR	2 SECONDS 2 SECONDS	M M
2.1	2.1	RESTRICTED MILITARY TRAINING	2.1.1 2.1.2 2.1.3 2.1.4	ATC MAIL ATC MAIL	ATC MAIL ATC MAIL	CONTROLLER PILOT	2 SECONDS 2 SECONDS	M M

TABLE 4-6. TASK INFORMATION REQUIREMENTS (continued)

SIGNAL UNIT	EVENT NO	EVENT	TASK NO	POSITION/POSITION ACTION	POSITION/MACHINE ACTION	MESSAGE	DEVELOPMENTAL MACHINE SUPPORT RESPONSE TIMES	PRIORITY RATINGS
2 0	0 1	ROUTE CAPTIVE ALERT	2 1 1	VISUAL, VERBAL	NA	CONTROLLER	1 SEC ONDS	L
2 0	0 2	ALTERNATE AIRPORT DESIGNATION	2 1 2	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	0 3	ALTERNATE AIRPORT DESIGNATION	2 1 3	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	0 4	ALTERNATE AIRPORT DESIGNATION	2 1 4	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	0 5	ALTERNATE AIRPORT DESIGNATION	2 1 5	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	0 6	ALTERNATE AIRPORT DESIGNATION	2 1 6	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	0 7	ALTERNATE AIRPORT DESIGNATION	2 1 7	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	0 8	ALTERNATE AIRPORT DESIGNATION	2 1 8	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	0 9	ALTERNATE AIRPORT DESIGNATION	2 1 9	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	1 0	ALTERNATE AIRPORT DESIGNATION	2 1 10	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	1 1	ALTERNATE AIRPORT DESIGNATION	2 1 11	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	1 2	ALTERNATE AIRPORT DESIGNATION	2 1 12	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	1 3	ALTERNATE AIRPORT DESIGNATION	2 1 13	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	1 4	ALTERNATE AIRPORT DESIGNATION	2 1 14	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	1 5	ALTERNATE AIRPORT DESIGNATION	2 1 15	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	1 6	ALTERNATE AIRPORT DESIGNATION	2 1 16	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	1 7	ALTERNATE AIRPORT DESIGNATION	2 1 17	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	1 8	ALTERNATE AIRPORT DESIGNATION	2 1 18	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	1 9	ALTERNATE AIRPORT DESIGNATION	2 1 19	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	2 0	ALTERNATE AIRPORT DESIGNATION	2 1 20	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	2 1	ALTERNATE AIRPORT DESIGNATION	2 1 21	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	2 2	ALTERNATE AIRPORT DESIGNATION	2 1 22	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	2 3	ALTERNATE AIRPORT DESIGNATION	2 1 23	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	2 4	ALTERNATE AIRPORT DESIGNATION	2 1 24	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	2 5	ALTERNATE AIRPORT DESIGNATION	2 1 25	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	2 6	ALTERNATE AIRPORT DESIGNATION	2 1 26	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	2 7	ALTERNATE AIRPORT DESIGNATION	2 1 27	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	2 8	ALTERNATE AIRPORT DESIGNATION	2 1 28	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	2 9	ALTERNATE AIRPORT DESIGNATION	2 1 29	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	3 0	ALTERNATE AIRPORT DESIGNATION	2 1 30	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	3 1	ALTERNATE AIRPORT DESIGNATION	2 1 31	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	3 2	ALTERNATE AIRPORT DESIGNATION	2 1 32	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	3 3	ALTERNATE AIRPORT DESIGNATION	2 1 33	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	3 4	ALTERNATE AIRPORT DESIGNATION	2 1 34	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	3 5	ALTERNATE AIRPORT DESIGNATION	2 1 35	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	3 6	ALTERNATE AIRPORT DESIGNATION	2 1 36	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	3 7	ALTERNATE AIRPORT DESIGNATION	2 1 37	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	3 8	ALTERNATE AIRPORT DESIGNATION	2 1 38	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	3 9	ALTERNATE AIRPORT DESIGNATION	2 1 39	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	4 0	ALTERNATE AIRPORT DESIGNATION	2 1 40	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	4 1	ALTERNATE AIRPORT DESIGNATION	2 1 41	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	4 2	ALTERNATE AIRPORT DESIGNATION	2 1 42	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	4 3	ALTERNATE AIRPORT DESIGNATION	2 1 43	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	4 4	ALTERNATE AIRPORT DESIGNATION	2 1 44	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	4 5	ALTERNATE AIRPORT DESIGNATION	2 1 45	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	4 6	ALTERNATE AIRPORT DESIGNATION	2 1 46	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	4 7	ALTERNATE AIRPORT DESIGNATION	2 1 47	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	4 8	ALTERNATE AIRPORT DESIGNATION	2 1 48	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	4 9	ALTERNATE AIRPORT DESIGNATION	2 1 49	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	5 0	ALTERNATE AIRPORT DESIGNATION	2 1 50	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	5 1	ALTERNATE AIRPORT DESIGNATION	2 1 51	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	5 2	ALTERNATE AIRPORT DESIGNATION	2 1 52	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	5 3	ALTERNATE AIRPORT DESIGNATION	2 1 53	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	5 4	ALTERNATE AIRPORT DESIGNATION	2 1 54	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	5 5	ALTERNATE AIRPORT DESIGNATION	2 1 55	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	5 6	ALTERNATE AIRPORT DESIGNATION	2 1 56	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	5 7	ALTERNATE AIRPORT DESIGNATION	2 1 57	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	5 8	ALTERNATE AIRPORT DESIGNATION	2 1 58	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	5 9	ALTERNATE AIRPORT DESIGNATION	2 1 59	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	6 0	ALTERNATE AIRPORT DESIGNATION	2 1 60	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	6 1	ALTERNATE AIRPORT DESIGNATION	2 1 61	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	6 2	ALTERNATE AIRPORT DESIGNATION	2 1 62	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	6 3	ALTERNATE AIRPORT DESIGNATION	2 1 63	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	6 4	ALTERNATE AIRPORT DESIGNATION	2 1 64	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	6 5	ALTERNATE AIRPORT DESIGNATION	2 1 65	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	6 6	ALTERNATE AIRPORT DESIGNATION	2 1 66	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	6 7	ALTERNATE AIRPORT DESIGNATION	2 1 67	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	6 8	ALTERNATE AIRPORT DESIGNATION	2 1 68	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	6 9	ALTERNATE AIRPORT DESIGNATION	2 1 69	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	7 0	ALTERNATE AIRPORT DESIGNATION	2 1 70	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	7 1	ALTERNATE AIRPORT DESIGNATION	2 1 71	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	7 2	ALTERNATE AIRPORT DESIGNATION	2 1 72	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	7 3	ALTERNATE AIRPORT DESIGNATION	2 1 73	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	7 4	ALTERNATE AIRPORT DESIGNATION	2 1 74	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	7 5	ALTERNATE AIRPORT DESIGNATION	2 1 75	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	7 6	ALTERNATE AIRPORT DESIGNATION	2 1 76	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	7 7	ALTERNATE AIRPORT DESIGNATION	2 1 77	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	7 8	ALTERNATE AIRPORT DESIGNATION	2 1 78	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	7 9	ALTERNATE AIRPORT DESIGNATION	2 1 79	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	8 0	ALTERNATE AIRPORT DESIGNATION	2 1 80	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	8 1	ALTERNATE AIRPORT DESIGNATION	2 1 81	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	8 2	ALTERNATE AIRPORT DESIGNATION	2 1 82	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	8 3	ALTERNATE AIRPORT DESIGNATION	2 1 83	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	8 4	ALTERNATE AIRPORT DESIGNATION	2 1 84	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	8 5	ALTERNATE AIRPORT DESIGNATION	2 1 85	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	8 6	ALTERNATE AIRPORT DESIGNATION	2 1 86	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	8 7	ALTERNATE AIRPORT DESIGNATION	2 1 87	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	8 8	ALTERNATE AIRPORT DESIGNATION	2 1 88	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	8 9	ALTERNATE AIRPORT DESIGNATION	2 1 89	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	9 0	ALTERNATE AIRPORT DESIGNATION	2 1 90	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	9 1	ALTERNATE AIRPORT DESIGNATION	2 1 91	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	9 2	ALTERNATE AIRPORT DESIGNATION	2 1 92	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	9 3	ALTERNATE AIRPORT DESIGNATION	2 1 93	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	9 4	ALTERNATE AIRPORT DESIGNATION	2 1 94	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	9 5	ALTERNATE AIRPORT DESIGNATION	2 1 95	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	9 6	ALTERNATE AIRPORT DESIGNATION	2 1 96	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	9 7	ALTERNATE AIRPORT DESIGNATION	2 1 97	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	9 8	ALTERNATE AIRPORT DESIGNATION	2 1 98	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M
2 0	9 9	ALTERNATE AIRPORT DESIGNATION	2 1 99	VISUAL, VERBAL	NA	CONTROLLER	2 SEC ONDS	M
2 0	1 0 0	ALTERNATE AIRPORT DESIGNATION	2 1 100	VISUAL, VERBAL	NA	SUPERVISOR	2 SEC ONDS	M

TABLE 4-6. TASK INFORMATION REQUIREMENTS (continued)

SUBCIVITY NO.	EVENT NO.	EVENT	TASK NO.	POSITION/POSITION ACTION	POSITION/MACHINE ACTION	NETWORK	THRU/DUP/D MACHINE SUPPORT RESPONSE TIMES	PRIORITY RATINGS
7.15	6.9	SECTOR SUITE FAILURE	7.15.1	VERBAL	ATC MAIL	CONTROLLED	1 SEC 0010	M
	6.9	SECTOR SUITE FAILURE	7.15.2	VERBAL	ATC MAIL	CONTROLLED	1 SEC 0010	M
	6.9	SECTOR SUITE FAILURE	7.15.3	VERBAL	MA	CONTROLLED	1 SEC 0010	M
7.16	5.5	AIRPORT AIRCRAFT CONFLICT	7.16.1	VERBAL	MA	CONTROLLED	5 SEC 0010	M
	5.5	AIRPORT AIRCRAFT CONFLICT	7.16.2	ATC MAIL	MA	CONTROLLED	5 SEC 0010	M
7.17	5.6	VISIBILITY REPORT	7.17.1	VISUAL, VERBAL	MA	CONTROLLED/SUPERVISOR/RETROLOGIST	5 SEC 0010	M
	5.6	VISIBILITY REPORT	7.17.2	VISUAL, VERBAL	MA	CONTROLLED	5 SEC 0010	M
	5.6	VISIBILITY REPORT	7.17.3	VISUAL, VERBAL	MA	CONTROLLED	5 SEC 0010	M
	5.6	VISIBILITY REPORT	7.17.4	VISUAL, VERBAL	MA	CONTROLLED	5 SEC 0010	M
	5.6	VISIBILITY REPORT	7.17.5	MA	ATC MAIL	CONTROLLED	5 SEC 0010	M
	5.6	VISIBILITY REPORT	7.17.6	VERBAL, ATC MAIL	ATC MAIL	CONTROLLED	5 SEC 0010	M
	5.6	VISIBILITY REPORT	7.17.7	VERBAL, ATC MAIL	MA	CONTROLLED	5 SEC 0010	M
	5.6	VISIBILITY REPORT	7.17.8	VERBAL, ATC MAIL	MA	CONTROLLED	5 SEC 0010	M
	5.6	VISIBILITY REPORT	7.17.9	ATC MAIL	MA	CONTROLLED	5 SEC 0010	M
	5.6	VISIBILITY REPORT	7.17.10	ATC MAIL	MA	CONTROLLED	5 SEC 0010	M
7.18	6.9	COMMUNICATION FAILURE	7.18.1	VERBAL	ATC MAIL	CONTROLLED	5 SEC 0010	M
	6.9	COMMUNICATION FAILURE	7.18.2	VERBAL	COMMUNICATION STATUS NOTICE	CONTROLLED	5 SEC 0010	M
	6.9	COMMUNICATION FAILURE	7.18.3	VERBAL	COMMUNICATION STATUS NOTICE	CONTROLLED	5 SEC 0010	M
	6.9	COMMUNICATION FAILURE	7.18.4	VERBAL	COMMUNICATION STATUS NOTICE	CONTROLLED	5 SEC 0010	M
	6.9	COMMUNICATION FAILURE	7.18.5	VERBAL	COMMUNICATION STATUS NOTICE	CONTROLLED	5 SEC 0010	M
7.19	6.9	COMMUNICATION FAILURE	7.19.1	VERBAL	ATC MAIL	CONTROLLED	5 SEC 0010	M
	6.9	COMMUNICATION FAILURE	7.19.2	VERBAL	COMMUNICATION STATUS NOTICE	CONTROLLED	5 SEC 0010	M
	6.9	COMMUNICATION FAILURE	7.19.3	VERBAL	COMMUNICATION STATUS NOTICE	CONTROLLED	5 SEC 0010	M
	6.9	COMMUNICATION FAILURE	7.19.4	VERBAL	COMMUNICATION STATUS NOTICE	CONTROLLED	5 SEC 0010	M
7.20	6.9	NAVIGATIONAL FAILURE	7.20.1	VERBAL	ATC MAIL	CONTROLLED/SUPERVISOR/PILOT	5 SEC 0010	L
	6.9	NAVIGATIONAL FAILURE	7.20.2	VISUAL, VERBAL	SUBSTITUTE ROUTE	CONTROLLED/SUPERVISOR/PILOT	5 SEC 0010	L
	6.9	NAVIGATIONAL FAILURE	7.20.3	VISUAL, VERBAL	SUBSTITUTE ROUTE	CONTROLLED/SUPERVISOR/PILOT	5 SEC 0010	L
	6.9	NAVIGATIONAL FAILURE	7.20.4	VERBAL	ATC MAIL	CONTROLLED/SUPERVISOR/PILOT	5 SEC 0010	L
	6.9	NAVIGATIONAL FAILURE	7.20.5	VERBAL	SUBSTITUTE ROUTE	CONTROLLED/SUPERVISOR/PILOT	5 SEC 0010	L
	6.9	NAVIGATIONAL FAILURE	7.20.6	VERBAL	SUBSTITUTE ROUTE	CONTROLLED/SUPERVISOR/PILOT	5 SEC 0010	L
	6.9	NAVIGATIONAL FAILURE	7.20.7	VERBAL	SUBSTITUTE ROUTE	CONTROLLED/SUPERVISOR/PILOT	5 SEC 0010	L
7.21	6.9	NAVIGATIONAL FAILURE	7.21.1	VERBAL	ATC MAIL	CONTROLLED/SUPERVISOR/PILOT	5 SEC 0010	L
	6.9	NAVIGATIONAL FAILURE	7.21.2	VERBAL	SUBSTITUTE ROUTE	CONTROLLED/SUPERVISOR/PILOT	5 SEC 0010	L
	6.9	NAVIGATIONAL FAILURE	7.21.3	VERBAL	SUBSTITUTE ROUTE	CONTROLLED/SUPERVISOR/PILOT	5 SEC 0010	L
	6.9	NAVIGATIONAL FAILURE	7.21.4	VERBAL	SUBSTITUTE ROUTE	CONTROLLED/SUPERVISOR/PILOT	5 SEC 0010	L
	6.9	NAVIGATIONAL FAILURE	7.21.5	VERBAL	SUBSTITUTE ROUTE	CONTROLLED/SUPERVISOR/PILOT	5 SEC 0010	L
7.22	6.9	NAVIGATIONAL FAILURE	7.22.1	VERBAL	ATC MAIL	CONTROLLED/SUPERVISOR/PILOT	5 SEC 0010	L
	6.9	NAVIGATIONAL FAILURE	7.22.2	VERBAL	SUBSTITUTE ROUTE	CONTROLLED/SUPERVISOR/PILOT	5 SEC 0010	L
	6.9	NAVIGATIONAL FAILURE	7.22.3	VERBAL	SUBSTITUTE ROUTE	CONTROLLED/SUPERVISOR/PILOT	5 SEC 0010	L
	6.9	NAVIGATIONAL FAILURE	7.22.4	VERBAL	SUBSTITUTE ROUTE	CONTROLLED/SUPERVISOR/PILOT	5 SEC 0010	L
	6.9	NAVIGATIONAL FAILURE	7.22.5	VERBAL	SUBSTITUTE ROUTE	CONTROLLED/SUPERVISOR/PILOT	5 SEC 0010	L
7.23	6.9	NAVIGATIONAL FAILURE	7.23.1	VISUAL, VERBAL	SYSTEM STATUS LIST	CONTROLLED	2 SEC 0010	M
	6.9	NAVIGATIONAL FAILURE	7.23.2	VISUAL, VERBAL	SYSTEM STATUS LIST	CONTROLLED	2 SEC 0010	M
	6.9	NAVIGATIONAL FAILURE	7.23.3	VISUAL, VERBAL	SYSTEM STATUS LIST	CONTROLLED	2 SEC 0010	M
	6.9	NAVIGATIONAL FAILURE	7.23.4	VISUAL, VERBAL	SYSTEM STATUS LIST	CONTROLLED	2 SEC 0010	M
	6.9	NAVIGATIONAL FAILURE	7.23.5	VISUAL, VERBAL	SYSTEM STATUS LIST	CONTROLLED	2 SEC 0010	M
7.24	6.9	NAVIGATIONAL FAILURE	7.24.1	VISUAL, VERBAL	SYSTEM STATUS LIST	CONTROLLED	2 SEC 0010	M
	6.9	NAVIGATIONAL FAILURE	7.24.2	VISUAL, VERBAL	SYSTEM STATUS LIST	CONTROLLED	2 SEC 0010	M
	6.9	NAVIGATIONAL FAILURE	7.24.3	VISUAL, VERBAL	SYSTEM STATUS LIST	CONTROLLED	2 SEC 0010	M
	6.9	NAVIGATIONAL FAILURE	7.24.4	VISUAL, VERBAL	SYSTEM STATUS LIST	CONTROLLED	2 SEC 0010	M
	6.9	NAVIGATIONAL FAILURE	7.24.5	VISUAL, VERBAL	SYSTEM STATUS LIST	CONTROLLED	2 SEC 0010	M
7.25	6.9	NAVIGATIONAL FAILURE	7.25.1	VISUAL, VERBAL	SYSTEM STATUS LIST	CONTROLLED	2 SEC 0010	M
	6.9	NAVIGATIONAL FAILURE	7.25.2	VISUAL, VERBAL	SYSTEM STATUS LIST	CONTROLLED	2 SEC 0010	M
	6.9	NAVIGATIONAL FAILURE	7.25.3	VISUAL, VERBAL	SYSTEM STATUS LIST	CONTROLLED	2 SEC 0010	M
	6.9	NAVIGATIONAL FAILURE	7.25.4	VISUAL, VERBAL	SYSTEM STATUS LIST	CONTROLLED	2 SEC 0010	M
	6.9	NAVIGATIONAL FAILURE	7.25.5	VISUAL, VERBAL	SYSTEM STATUS LIST	CONTROLLED	2 SEC 0010	M

TABLE 4-6. TASK INFORMATION REQUIREMENTS (continued)

SUBACTIVITY (NO.)	EVENT NO.	EVENT	TASK NO.	POSITION/POSITION ACTION	POSITION/MACHINE ACTION	NETWORK	DERIVED MACHINE SUPPORT RESPONSE TIME S	PRIORITY RATINGS
7 26	0 7	MILITARY AIRCRAFT IDENTIFICATION FULL DUMPING	7 26 1	VERBAL	ATC MAIL	PERSONNEL CONTROLLER/ SUPERVISOR	2 SECONDS	M
	0 8	OVERAGE AIRCRAFT	7 26 1	VERBAL	ATC MAIL	CONTROLLER/ SUPERVISOR	3 SECONDS	M
	0 9	RETRAILING EXERCISE AID SHOT	7 27 1	VERBAL	POSITION RELIEF CHECKLIST	CONTROLLER	3 SECONDS	M
	0 10	POSITION RELIEF	7 28 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M
7 27	0 11	LIGHTHOUSE MISSING LAW ENFORCEMENT	7 28 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M
	0 12	SPECIAL INTEREST FLIGHT	7 29 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M
	0 13	HAZARDOUS (LAW)	7 29 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M
	0 14	MILITARY TRAINING	7 29 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M
7 28	0 15	HAZARDOUS (LAW)	7 29 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M
	0 16	HAZARDOUS (LAW)	7 29 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M
	0 17	HAZARDOUS (LAW)	7 29 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M
	0 18	HAZARDOUS (LAW)	7 29 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M
7 29	0 19	HAZARDOUS (LAW)	7 29 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M
	0 20	HAZARDOUS (LAW)	7 29 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M
	0 21	HAZARDOUS (LAW)	7 29 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M
	0 22	HAZARDOUS (LAW)	7 29 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M
7 30	0 23	HAZARDOUS (LAW)	7 29 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M
	0 24	HAZARDOUS (LAW)	7 29 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M
	0 25	HAZARDOUS (LAW)	7 29 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M
	0 26	HAZARDOUS (LAW)	7 29 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M
7 31	0 27	HAZARDOUS (LAW)	7 29 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M
	0 28	HAZARDOUS (LAW)	7 29 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M
	0 29	HAZARDOUS (LAW)	7 29 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M
	0 30	HAZARDOUS (LAW)	7 29 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M
7 32	0 31	HAZARDOUS (LAW)	7 29 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M
	0 32	HAZARDOUS (LAW)	7 29 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M
	0 33	HAZARDOUS (LAW)	7 29 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M
	0 34	HAZARDOUS (LAW)	7 29 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M
7 33	0 35	HAZARDOUS (LAW)	7 29 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M
	0 36	HAZARDOUS (LAW)	7 29 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M
	0 37	HAZARDOUS (LAW)	7 29 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M
	0 38	HAZARDOUS (LAW)	7 29 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M
7 34	0 39	HAZARDOUS (LAW)	7 29 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M
	0 40	HAZARDOUS (LAW)	7 29 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M
	0 41	HAZARDOUS (LAW)	7 29 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M
	0 42	HAZARDOUS (LAW)	7 29 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M
7 35	0 43	HAZARDOUS (LAW)	7 29 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M
	0 44	HAZARDOUS (LAW)	7 29 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M
	0 45	HAZARDOUS (LAW)	7 29 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M
	0 46	HAZARDOUS (LAW)	7 29 1	VERBAL	ATC MAIL	CONTROLLER	5 SECONDS	M

4.4 Method for Deriving Coordination Tasks Between Controllers

Coordination and communication tasks of Controllers are called out and grouped into Activity 7.0, to focus attention upon this major aspect of the Controller job. This emphasis also encourages a greater attention to the completeness of their listing, than when they are imbedded in the sub-activity context of Activities 1.0-6.0.

Coordination tasks were derived following a multistep process. First, composition graphs were prepared for Activities 1.0-6.0. This effort identified most of the coordination and communication tasks in the context of control operations. These coordination tasks then were removed from that original context and grouped with related coordination tasks. Such grouping permits an examination of the balance available among information receipt and transmittal tasks. For every task transmitting information to another Controller there needs to be a corresponding Controller receipt of such information, and vice versa. The derived coordination tasks were then grouped into sub-activities and structured into composition graphs. This graphing allows further examination of the completeness of task identification.

Finally, the new tasks so identified were fit back into the context of the original composition graphs of Activities 1.0-6.0, as appropriate. There are 138 Controller tasks identified as pertaining to coordination and communication. These include some Controller tasks also involving communication with pilots.

Activity 7.0 contains 42 sub-activities, or groupings of related coordination and communication tasks. The media used for transmitting and receiving information by these tasks is noted by the shading on the lower portion of the task boxes in the composition graphs in Appendix A. Three categories of communication media are cited:

S/S—

Sector Suite (including NADIN, Data Link, Mode S, and all Sector Suite display and functional capability)

VSCS—

Voice Switching and Control System

Pers—

Personal direct voice contact with an individual within hearing distance

Shading of the S/S box implies using the Sector Suite for exchange of information, not using it to do an action other than communication. Figure 4-8 depicts the derivation of coordination tasks.

The direct voice alternative primarily concerns problem-solving conversations, as well as calling another's attention to an oversight. With a Sector Suite team there may be coordination conversations, as between today's R and D Controllers. Further, direct transmittal from/to others on the air traffic control crew is possible, as may occur with the Area Supervisor, Meteorologist, and Metering/Flow Controller.

The coordination and communication tasks of Activity 7 are identified in Appendix A along with the composition graphs and TDL of the other activities.

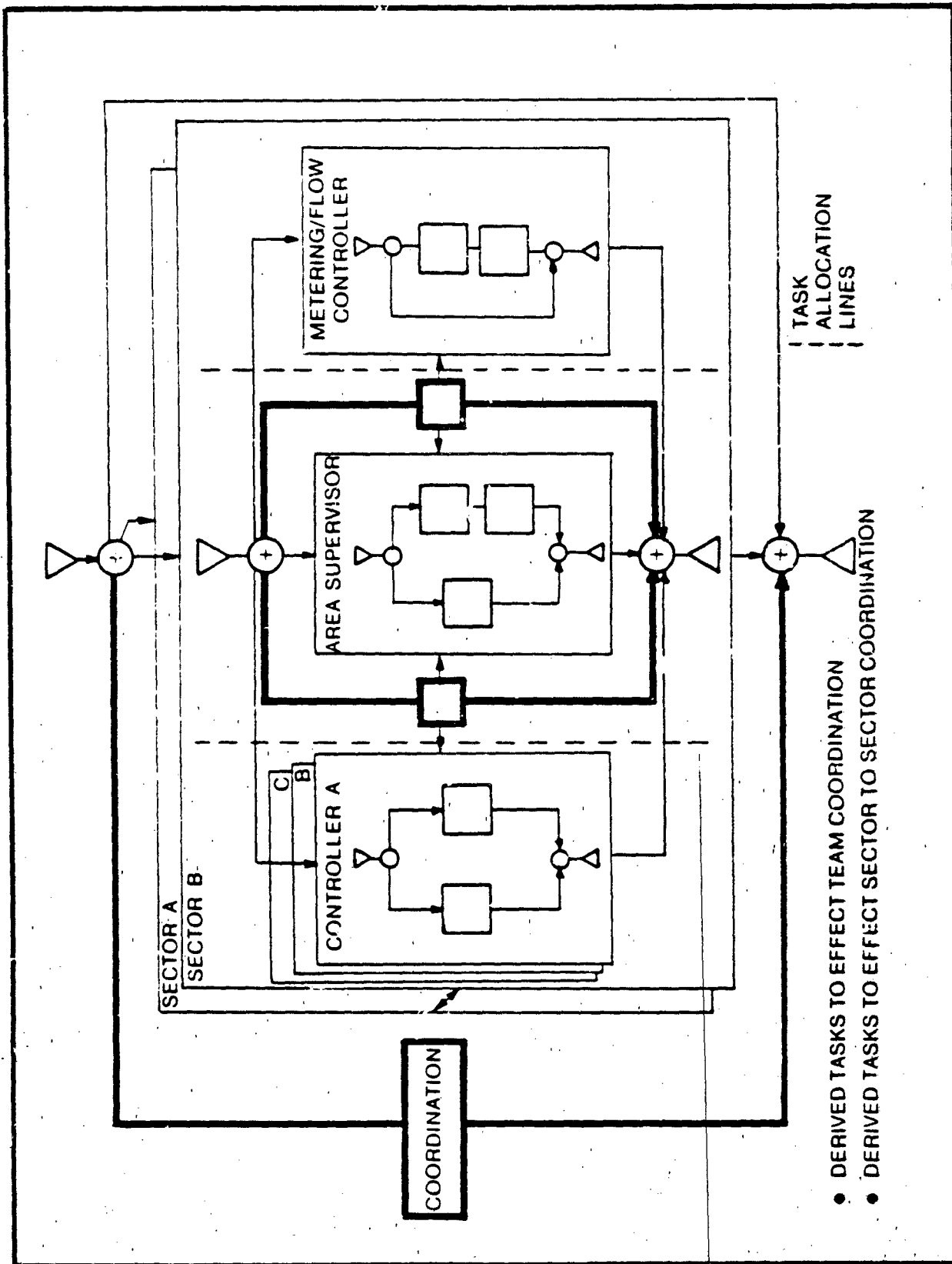


Figure 4-8. Derivation of Coordination Tasks

4.5 Area Supervisor Task and Information Requirements

Derived from the task composition graphs of the air traffic Controllers are 58 tasks to be performed by Area Supervisors. These are directly inferred from the receipt or transmittal of information, as noted in Activity 7.0. Shading in the upper-left of the graph boxes of the composition graphs shown in Appendix A denotes involvement of the Area Supervisor. Thus, if the Area Supervisor may be informed by the Controller, the Supervisors' tasks must reflect receipt of such information. Similarly, their tasks must reflect transmittal of information received by Controllers from their Supervisors.

Table 4-7 lists these derived Area Supervisor tasks involving coordination and communication with Controllers. Table 4-8 lists the information that is transmitted between them. The lower portion of the boxes on the Controller tasks denotes the media by which that information may be transmitted.

These tables certainly do not reflect all Supervisor tasks and information requirements. However, given the validity of the Controller task analysis, these Supervisor tasks become valid in a Supervisor task analysis, and fully characterize the Controller-Supervisor interface.

There are 28 items of information identified as received from Controllers, and 22 items of information obtained from other sources for conveyance to Controllers.

4.6 Derived Metering/Flow Control Position Tasks and Information Requirements

As with Supervisors in the preceding section, tasks and information requirements have been derived from the Controller task analyses for Metering/Flow Control positions. Fifteen such tasks are listed in Table 4-9, along with 11 related information requirements in Table 4-10.

The composition graphs for Controller tasks reflect the involvement of the

Metering/Flow Control position by shading in the upper right corner of the task boxes in Appendix A. Again, the lower portion of those boxes indicates the media by which the information may be transmitted.

TABLE 4-7. DERIVED TASKS OF AREA SUPERVISORS

Related Controller Task	Derived Area Supervisor Tasks
4.2.1	Receive Controller notice of emergency event
6.5.2	Receive Controller notice of reverting to ACCC backup procedures
6.8.2	Receive Controller notice of intra-position exchange/assignment of responsibilities
6.8.3	Receive Controller request for assistance or relief
7.1.1	Receive Controller notice of aircraft flight plan deviation
7.5.1	Notify Controller of airspace restriction/release
	Receive notice of airspace restriction/release
7.5.2	Receive notice of Controller request for release of special use airspace
7.5.3	Receive notice of Controller denied request for release of special use airspace
7.7.1	Notify Controller to take over airspace
7.7.2	Notify Controller to reconfigure the sector
7.7.3	Notify Controller to release airspace
7.9.4	Transmit clearance request to Controller
	Receive clearance request for transmittal to Controller
7.14.1	Receive Controller notice of equipment status
7.15.1	Notify Controller of status of adjacent ACF automation equipment
	Receive notice of status of adjacent ACF automation equipment
7.15.2	Notify Controller of status of a Sector Suite failure
7.17.1	Transmit weather advisory to Controller
7.17.7	Receive weather information from Controller
7.17.8	Receive Controller advice of weather impact on routes/flow
7.18.1	Notify Controller of communication status
7.18.2	Notify Controller of new frequency assignment
7.18.3	Notify Controller of alternate communication path
7.19.1	Receive Controller notice of communication status
7.19.2	Receive Controller notice of new frequency assignment
7.19.3	Receive alternate communication path from Controller
7.20.1	Notify Controller of NAVAID status
	Receive notice of NAVAID status
7.20.2	Notify Controller of substitute routing
	Receive notice of substitute routing
7.20.3	Notify Controller of cancellation of substitute routing
	Receive notice of cancellation of substitute routing
7.21.1	Receive NAVAID status from Controller
7.41.1	Receive notice of Controller request for temporary use of airspace
7.42.2	Receive notice of Controller acceptance of release of airspace for temporary use
7.42.3	Receive notice of Controller denial of request for temporary use of airspace

TABLE 4-7. DERIVED TASKS OF AREA SUPERVISORS (continued)

Related Controller Task	Derived Area Supervisor Tasks
7.22.1	Receive Controller notice of airspace intrusion by a non-controlled object
7.22.2	Notify Controller of airspace intrusion by a non-controlled object
7.23.1	Forward runway use data to Controller
7.24.1	Receive runway use data from Controller
7.25.2	Receive Controller alert of aircraft having flight problems
7.25.3	Receive contingency information from Controller
7.26.1	Notify Controller to inhibit alert function
7.28.1	Notify Controller of special operations
7.29.1	Receive Controller notice of special operations
7.30.1	Inform Controller on loss of radio contact with aircraft
7.30.2	Receive Controller notice of radio/radar search status
7.31.1	Inform Controller on overdue aircraft
7.31.2	Receive Controller notice of status in contacting facilities along route of flight of overdue aircraft
7.35.1	Transmit requested route/altitude changes to Controller
7.35.2	Notify Controller of flow restriction
	Receive notice of flow restriction
7.35.4	Receive Controller request for imposing flow control
7.35.6	Receive requested route/altitude changes from Controller
7.37.3	Receive notice of Controller rejection of a handoff
7.39.1	Notify Controller of radar sensor status
7.40.1	Receive Controller notice of radar sensor status

TABLE 4-8. DERIVED INFORMATION REQUIREMENTS OF AREA SUPERVISORS

Information Received From Controllers
Weather information Impact of weather on routes/flow Occurrence/nature of communication status change Occurrence of new frequency assignment Occurrence/nature of an alternate communication path Occurrence/nature of a NAVAID status change Runway use data Alert of an aircraft having flight difficulties Occurrence/nature of a contingency event Controller request for imposing flow control Occurrence/nature of a radar sensor status change Notice of emergency event occurrence Notice of Controller reverting to ACCC backup procedures Notice of intra-position exchange/assignment of responsibilities Controller request for temporary use of airspace Notice of Controller acceptance of pointout/release of airspace for temporary use Notice of Controller denial of request for assistance or relief Notice of Controller request for temporary use of airspace Notice of Controller request for release of special use airspace Notice of Controller denied request for release of special use airspace Notice of equipment status Notice of airspace intrusion by a non-controlled object Notice of special operations Status of radio/radar search for aircraft without radio contact Status of Controller contact of facilities along route of flight of overdue aircraft Requested route/altitude change Notice of Controller rejection of a handoff Notice of an aircraft flight plan deviation

TABLE 4-8. DERIVED INFORMATION REQUIREMENTS OF AREA SUPERVISORS (continued)

Information Obtained From Other Sources for Conveyance to Controllers
Airspace restriction/release Need for sector takeover of airspace Need for sector release of airspace Need for and nature of a sector reconfiguration Status of adjacent ACF automation equipment Weather information Status of communications Occurrence of new frequency assignment Occurrence/nature of an alternate communication path Occurrence/nature of a NAVAID status change Occurrence/nature of a substitute routing Occurrence of a substitute routing cancellation Runway use data Occurrence/nature of special operations Occurrence of loss of radio contact with an aircraft Occurrence of an overdue aircraft Requested route/altitude change Flow restriction Occurrence/nature of a radar sensor status change Clearance request Notice of airspace intrusion by a non-controlled object Need to inhibit alert function

TABLE 4-9. DERIVED TASKS OF METERING/FLOW CONTROL POSITIONS

Related Controller Task	Derived Flow Control/Metering Tasks
7.17.8	Receive Controller advice of weather impact on routes/flow
7.22.2	Notify Controller of airspace intrusion by a non-controlled object
	Receive notice of airspace intrusion by a non-controlled object
7.23.1	Forward runway use data to Controller
7.24.1	Receive runway use data from Controller
7.28.1	Notify Controller of special operations
	Receive notice of special operations
7.34.1	Inform Controller of FAD notice
7.35.1	Transmit requested route/altitude change to Controller
7.35.2	Notify Controller of flow restriction
	Receive flow restriction
7.35.3	Transmit metering data to Controller
	Receive metering data
7.35.4	Receive Controller request for imposing flow control
7.35.6	Receive requested route/altitude change from Controller

**TABLE 4-10. DERIVED INFORMATION REQUIREMENT OF
METERING/FLOW CONTROL POSITIONS**

Information Received From Controllers

Impact of weather on routes/flow

Runway use data

Requested route/altitude change

Controller request for imposing flow control

Information Obtained From Other Sources for Compliance to Controllers

Occurrence/nature of airspace intrusion by a non-controlled object

Runway use data

Occurrence/nature of special operations

FAD notice

Requested route/altitude change

Flow restriction

Metering data

4.7 References

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**CONTROLLER WORKLOAD ASSESSMENT
AND
DEFINITION OF MACHINE SUPPORT**

CHAPTER 5.0

5.0 CONTROLLER WORKLOAD ASSESSMENT AND DEFINITION OF MACHINE SUPPORT

The pursuit of a reliable and valid index of operator mental workload has been historically enigmatic. The most apparent reason for this concerns the elusive nature of direct cognitive measurements. Mental load can only be assessed in terms of plausible physiological, performance, or judgmental correlates, all of which provide a potentially biased reflection of mental load, rather than mental workload itself. Even given the state of mental measurement as an inexact art-cum-science, the execution of a serviceable workload model is critical to the establishment of user interface and task requirements in any system possessing a significant human component.

Hopkin (Ref. 6) addresses this issue as follows:

"Nevertheless, somehow mental workload should influence task analysis and task synthesis, the grouping of tasks and the study of the interactions between them. In practical terms, the performance of the air traffic Controller must not be degraded unacceptably because he has too much to do; he must not continuously have to make great efforts to cope with his tasks; excessive task demands must not be allowed to impair human well-being, unavoidable haste and pressure from tasks must not lead to dangerous irrecoverable errors. Such considerations do influence the construction of tasks, the division of tasks and the traffic loading of tasks. Perhaps it is possible to continue to make practical progress without being able to define or measure mental workload in any precise way. Certainly it is not practical to shelve the problem of mental workload assessment until definitive measures of workload have been derived, since there is no real sign that such measures are in the offing."

The assessment of operator workload can occur at various stages of system development using diverse methods aimed at evaluating requirements, design concepts, or actual operational systems. Moray (Ref. 9) provides a synopsis of methods employed by experimental psychologists, control engineers, mathematicians, physiologists and applied psychologists in evaluating mental load. An exhaustive compendium of over four hundred citations in this area is provided by Ref. 16.

Efforts concerning evaluation of Controller workload have centered on objective performance measures and/or expert ratings of actual or simulated ATC operations. A series of studies aimed at the establishment and validation of Controller workload models is documented in Robertson et al. (Ref. 12). Here, real-time audio and digital ATC data were collected and analyzed off-line to derive estimates of man-minutes of work in terms of routine, surveillance, and conflict prevention workload. High correlations were found in subsequent model predictions and observer estimates of Controller workload in a variety of sector types and with a range of traffic density. The data presented indicate great potential for the use of this model as an on-line predictor for the existing NAS configuration, but it does not provide a vehicle for workload assessment as a function of automation level or system configuration as must be applied here.

Buckley et al. (Ref. 1) focused on the use of real time simulation to evaluate proposed system changes. This work relied on a factor analytic approach based upon observer ratings, participant ratings, and objective performance indices in two separately collected data sets. Four stable factors emerged which correlated with Controller workload: a confliction factor, an occupancy factor, a communications factor, and a delay factor. While these factors were stable, their weightings varied with the experimental situation. This result underscores the almost universal contention by Controllers that a given element may or may not be important "depending on the situation." Additionally, in examining these data, Buckley et al. (Ref. 1) noted that situations varied markedly with respect to sector

geometry, traffic density, and the interaction of these factors.

Analyses such as reported above are predicted by a system *design* concept being actualized and the availability of a suitable prototyping environment. As such, these approaches are not viable for the requirements specification stage of the AAS development cycle. Wienville and Williges (Ref. 15) suggested a division of workload assessment methods into 28 techniques falling into four major categories: opinion, spare mental capacity, primary task, and physiological measures. Following the taxonomic model posited by Ref. 15, the most appropriate method for AAS Controller workload assessment is an analytic approach which focuses on Controller information processing tasks.

5.1 Methods Overview

The analyses reported in this chapter are structured around a task analytic workload assessment approach, which characterizes the workload factors for each Controller task. The results of these analyses allow the identification of machine aiding requirements on a per-task basis and provide a starting point for advanced automation alternative trade-offs.

5.1.1 Procedure

Figure 5-1 provides a graphic depiction of the methods employed here. We begin with an initial characterization of the baseline level of automation of each task in terms of being primarily machine, shared role, or primarily manual. This characterization provides a roadmap to tasks which may be particularly significant workload contributors (primary manual, shared role) in the AAS environment. Next, we characterize the associated tasks as significantly involving cognitive strategies, and cognitive and perceptual attributes.

The above characterization allows an examination of potential human performance limitations per task. This analysis is intended to be scenario independent and assumes an experienced journeyman Controller as a system operator. Limitations are therefore posited in terms of a given task

under any feasible scenario (or any legitimate combination of input events) conditions for the "typical" Controller. These identified limitations are then examined to derive and document machine aiding requirements. This final step identifies potential task-supportive aids (e.g., variable intensity, alert/alarms, color), their rationale, and the associated task requirements.

In addition to the task-oriented workload assessment described above, a scenario-based assessment technique was developed for this AAS Operations Concept (see Figure 5-2). This approach merges postulated event chains with Sector Suite Automated functions (as described in Ref. 5, CDRL A004) and AAS Controller tasks to provide an explicit analytical picture of the AAS Controller's role in response to events. The automated support provided by Sector Suite, and the workload resulting from the task clusters is shown. By providing a series of situations or event chains ranging from very minimal to very high activity, an operational, situation-based view of the Controller as an event-sensitive information processor is provided for the AAS environment. This characterization for the AAS environment can then be readily compared to current NAS operations as defined in Ref. 4, (CDRL A001).

5.1.2 Limitations

The breadth of applicability of the analytic workload assessment model of the Controller employed here is not intended to be fully comprehensive. As is pointed out by Hopkin in Ref. 5, describing operator workload in terms of task demands obscures differences in proficiency levels between operators. Simply stated, what may be difficult for one operator may be easily accomplished by another. A further limitation is that when tasks are partitioned (as is the case in any task decomposition), the whole, (i.e., job or scenario goal) may not equal the sum of its parts. That is to say that in analyzing the pieces of a whole situation, one does not necessarily get a complete picture. This is the case where significant task interactions are present.

While Controllers with different experience levels will no doubt face different men-

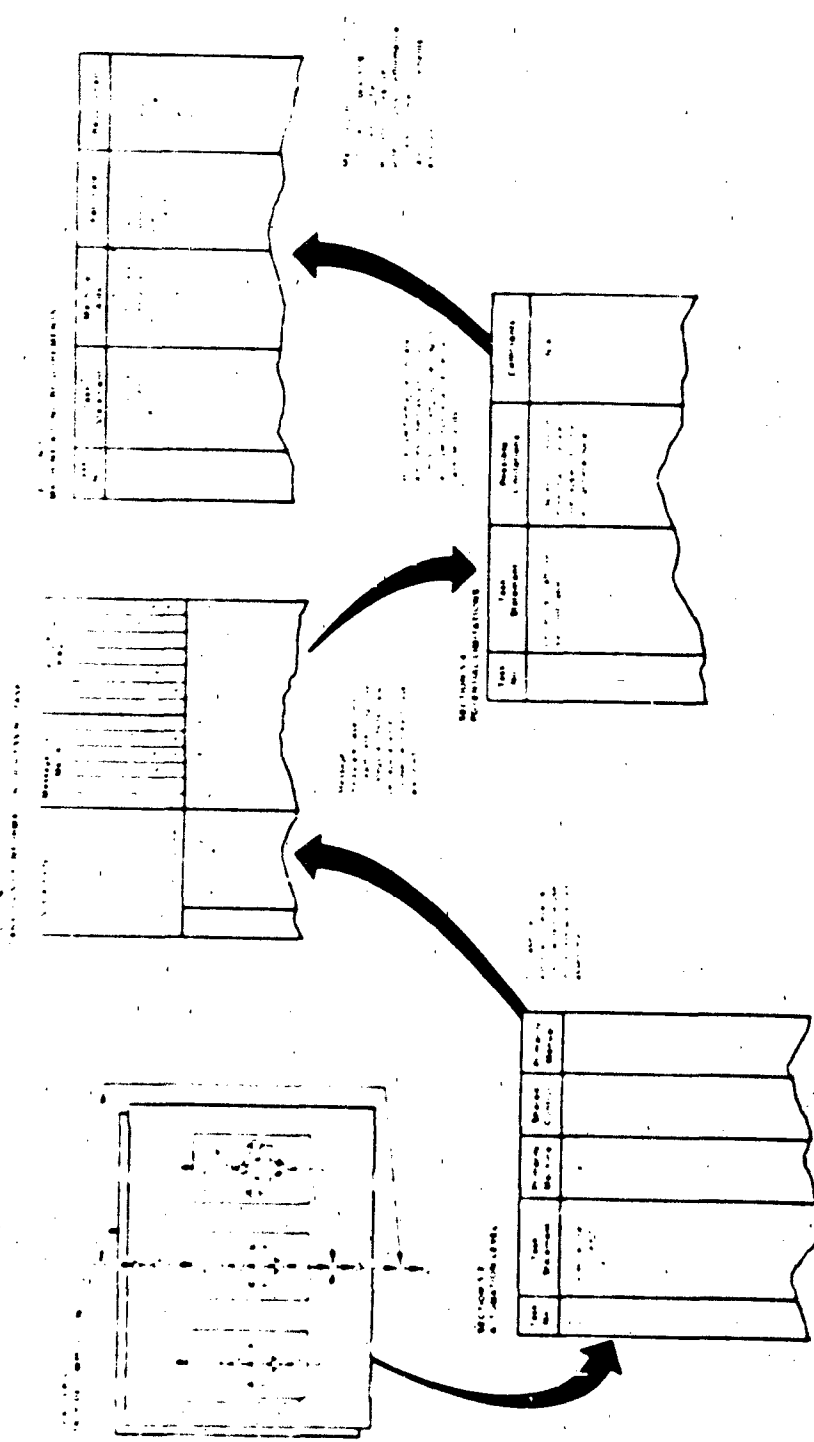


Figure 5: Task Workload Assessment Process

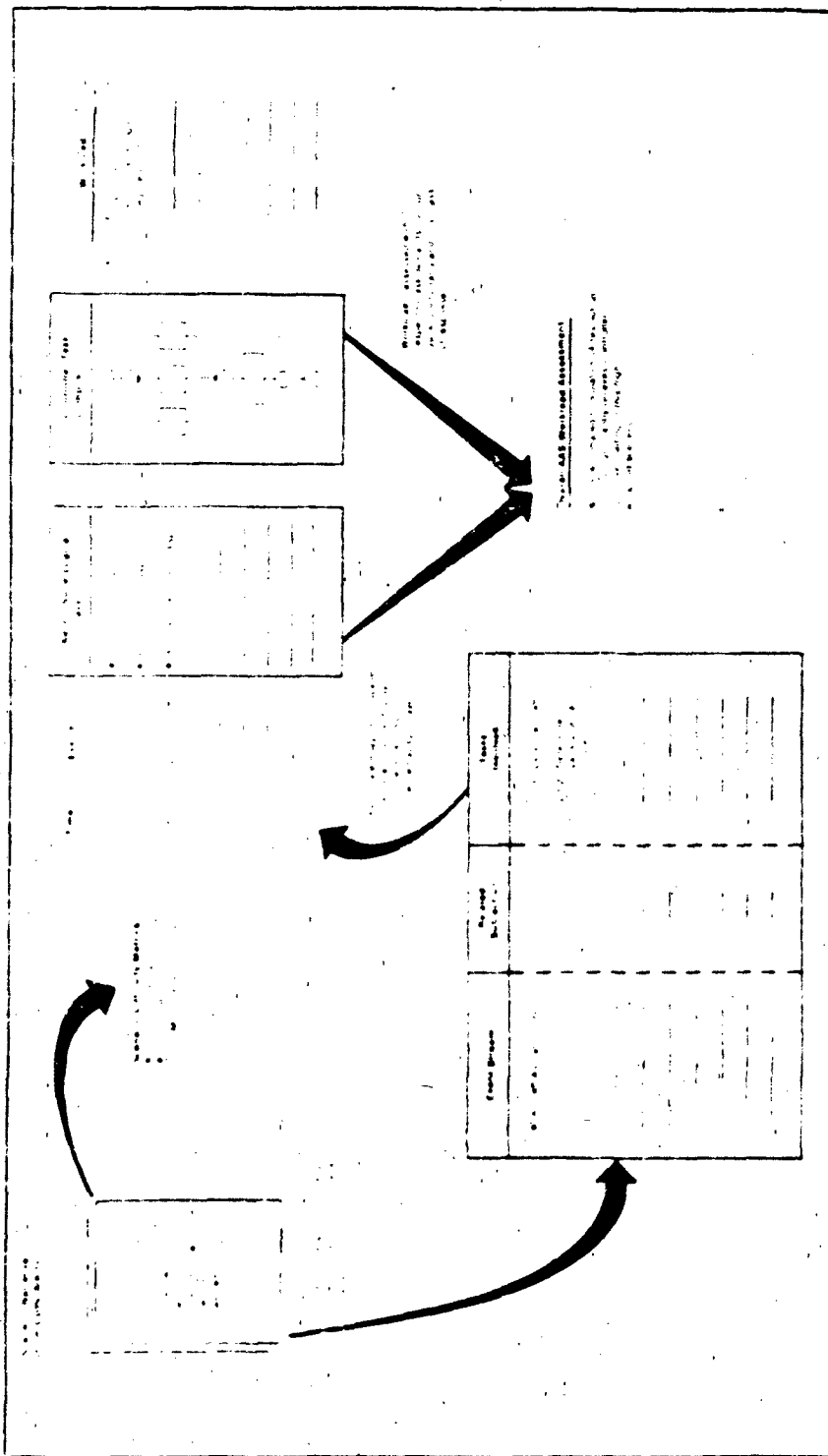


Figure 5.2 Event Chain Controller
Workload Assessment Model

tal workload as a function of the situation, similarly experienced Controllers will perceive similar mental workload in the same situation. The analytic workload model discussed in this chapter therefore uses an experienced journeyman Controller as its focal point. Additionally, task interactions can only be reliably assessed empirically, and so are considered beyond the scope of the baseline established here.

5.2 Automation Level Baseline

Up to this point, we have been referring to Controller tasks as "man-machine pair" actions. While this is true in general, the actual contribution of man or machine varies from task to task. To capture these differences, tasks are categorized in Table 5-1 as primarily machine, man-machine role balanced, or primarily manual.

The ratings in Table 5-1 represent an overall consensus of the SSRVT regarding task automation levels, depicting generally how much machine involvement there is in the human tasks. While judgments clearly may vary from rater to rater on any given task, these data serve to underscore the notion that the level of automation will vary on a per task basis in the AAS. The derived automation level baseline also provides a broad brush indicator of AAS Controller workload, prior to more granular analyses.

Ratings of automation level are not to be taken too literally. All tasks are Controller actions. The ratings show the relative extent of task aiding by the machine. The purpose of Table 5-1 is to lead into the derivation of Controller workload. If a task is primarily manual, then there is a likelihood of significant cognitive workload, and may warrant additional emphasis on aiding by the machine.

5.2.1 Ratings

Tasks are rated as "primarily machine" where significant computational, solution generation, or problem detection functions are automated and the Controller is placed in a reactive mode. For example, in Task 2.2.1, Detect MSAW Indication or Alarm, the machine performs surveillance, trajectory

estimation, and terrain modeling and issues the alarm, while the Controller only reacts to the machine indicator. This task is therefore rated as "primarily machine".

Tasks requiring more balanced inputs from both the Controller and the machine are considered "man-machine role balanced". This occurs where automated aids are provided to a Controller-oriented task, such as providing vector lines or a list of options to resolve a conflict. Task 4.1.3, Select Conflict Resolution Advisory Option, is an example of a man-machine role balanced task in that the machine aids the Controller by narrowing the problem solution space and the Controller makes the final decision on the selected Advisory.

The "primarily manual" category is assigned to tasks which entail Controller action with only supportive or no machine role. Task 1.5.1, Analyze Conditions for Providing Flight Following, is seen as a primarily manual task, for example. Coordination tasks accomplished via VSCS are also considered primarily manual since the Controller must formulate the communication content and verbally articulate messages.

5.2.2 Automation Level Synopsis

Several overall conclusions become apparent upon examining Table 5-1. The most striking is that even given the greatly increased level of automation of AAS, the Controller retains a significant task-level involvement in either a shared role or primarily manual mode. This is particularly the case with coordination tasks.

Coordination tasks represent a special case in that many of them involve dual modes for sending or receiving information. Dual modes of transmission are available for:

- Clearance Approval/Request
- Weather Reports
- NAVAID Status
- Substitute Routing
- Airspace Intrusion
- Runway Use Data
- Pilot/Aircraft Problem
- Aircraft Communication Loss

Contingency Information
Aircraft Emergency
Special Operations
Radar Status
Advisories
Flow Restriction
Metering Data
Requested Route/Altitude Changes
Airspace Release/Takeover
Airspace Restriction
Sector Reconfiguration
Flight Plans/Amendments
Pointouts/Temporary Use of Airspace
Weather Briefings
Issuance of Clearances
Departure Messages
Equipment/Communications Status
Pilot Position Reports
Overdue Aircraft
Flight Following
Transfer of Control

About 75 of the coordination tasks are rated in more than one category (e.g., primarily manual *and* man-machine role balance) to reflect these message transmission modality options. Thus, while traditional speech methods remain available to the Controller, there is the new requirement that these tasks also be capable of accomplishment by means of Sector Suite.

TABLE 5-1. TASK AUTOMATION LEVELS

TASKNO	TASK STATEMENT	PRIMARYLY MACHINE	MACHINE MANUAL	PRIMARYLY MANUAL
1.1.1	REVIEW FLIGHT PLAN DISPLAY FOR PRESENT AND/OR FUTURE AIRCRAFT SEPARATION		X	
1.1.2	REVIEW SITUATION DISPLAY FOR POTENTIAL VIOLATION OF SEPARATION STANDARDS			X
1.1.3	REVIEW FLIGHT PLAN CONFLICT PROBE RESULTS	X		
1.1.4	PROJECT AIRCRAFT FUTURE POSITION/ALTITUDE/PATH			X
1.1.5	READ-OUT RANGE/BEARING/TIME FOR AN AIRCRAFT TO A FIX OR GEOGRAPHIC POINT	X		
1.1.6	FORCE/QUICK-LOOK FULL DATA BLOCK/S TO EXAMINE TRACK INFORMATION ON AIRCRAFT		X	
1.1.7	DETERMINE WHETHER AIRCRAFT WILL BE SEPARATED BY LESS THAN PRESCRIBED MINIMA			X
1.1.8	SELECT FDE SORTING PRIORITY SCHEME			X
1.2.1	OBSERVE DISPLAY OF NEW/CHANGED EQUIPMENT/OPERATIONAL STATUS	X		
1.2.2	OBSERVE DISPLAY OF NEW/CHANGED TRAFFIC FLOW CONTROL MANAGEMENT	X		
1.3.1	SEARCH DISPLAY FOR INACTIVE FLIGHT PLAN ON CLEARANCE REQUEST			X
1.3.2	PROJECT MANUAL FLIGHT PLAN PROBE			X
1.3.3	REQUEST LIMITED/STANDARD FLIGHT PLAN DISPLAY	X		
1.3.4	REQUEST FULL FLIGHT PLAN READOUT	X		
1.3.5	ENTER TRIAL DEPARTURE TIME		X	
1.4.1	ENTER DEPARTURE MESSAGE		X	
1.4.2	START TRACK MANUALLY			X
1.4.3	OBSERVE AUTOMATIC TRACK START	X		
1.5.1	ANALYZE CONDITIONS FOR PROVIDING FLIGHT FOLLOWING			X
1.6.1	OFFSET A DATA BLOCK		X	
1.6.2	UPDATE/REVISE INPUT REMINDER NOTE (ELECTRONIC MEMORANDA)		X	
1.6.3	REMOVE FLIGHT DATA ENTRIES AND FULL DATA BLOCKS FROM ACCC SYSTEM		X	
1.6.4	REMOVE FLIGHT DATA ENTRIES AND FULL DATA BLOCKS FROM INTERNAL ACCC SYSTEM		X	
1.6.5	SUSPEND DISPLAY OF FLIGHT DATA ENTRIES AND FULL DATA BLOCKS		X	
1.6.6	SUSPEND TRACK		X	
1.6.7	DELETE FULL DATA BLOCK FROM OWN DISPLAY		X	
1.6.8	SUPPRESS FULL DATA BLOCK FROM OWN DISPLAY		X	
1.6.9	DELETE FLIGHT DATA ENTRY FROM		X	

TABLE 5-1. TASK AUTOMATION LEVELS (continued)

TASKNO	TASK STATEMENT	PRIMARYLY MACHINE	MACHINE MANUAL	PRIMARYLY MANUAL
2.1.1	A SELECTED DISPLAY DETECT AIRCRAFT CONFLICT ALERT INDICATION	X		
2.1.2	DETERMINE VALIDITY OF CONFLICT ALERT NOTICE OR INDICATION			X
2.2.1	DETECT MSAW INDICATION OR ALARM	X		
2.2.2	DETERMINE VALIDITY OF MSAW NOTICE OR INDICATION			X
2.3.1	DETERMINE NEED FOR AIRSPACE PROXIMITY PROBE			X
2.3.2	DETERMINE VALIDITY OF SPECIAL USE AIRSPACE PROBE RESULTS			X
2.4.1	OBSERVE DISPLAY FOR FIXED OBSTRUCTIONS AND NON-CONTROLLED AIRBORNE OBJECTS THAT MAY INTERFERE WITH AIRCRAFT FLIGHT		X	
2.4.2	EVALUATE CONFLICT RESOLUTION ADVISORIES		X	
2.4.3	FORMULATE ADVISORY/RESOLUTION CONTENT			X
2.4.4	DETECT AIRCRAFT MANEUVER IN RESPONSE TO ADVISORY			X
2.5.1	DETERMINE VALIDITY/APPROPRIATENESS OF USE OF AN ALERT DISPLAY			X
2.5.2	INHIBIT CONFLICT ALERT FOR PAIRED AIRCRAFT		X	
2.5.3	INHIBIT CONFLICT ALERT FOR GROUP SUPPRESSION		X	
2.5.4	INHIBIT CONFLICT ALERT IN SPECIFIED AREA		X	
2.5.5	INHIBIT MSAW FUNCTION IN SPECIFIED AREA		X	
2.5.6	INHIBIT MSAW FUNCTION FOR SPECIFIED AIRCRAFT		X	
2.5.7	RESTORE SPECIFIC ALERT FUNCTION TO NORMAL			X
3.1.1	EVALUATE CONSTRAINT EFFECT ON FLOW			X
3.1.2	CHOOSE DESIRED SEQUENCE			X
3.1.3	SELECT NEW FLOW SEQUENCE			X
3.1.4	DETERMINE THE TECHNIQUE FOR A DELAY			X
3.2.1	PERCEIVE AN ALTITUDE OR ROUTE DEVIATION		X	
3.2.2	OBSERVE AIRCRAFT RESUMING NORMAL FLIGHT PLAN			X
3.2.3	DETERMINE MANEUVER TO ESTABLISH/RESTORE FLIGHT PLAN CONFORMANCE			X
3.3.1	REQUEST AIRSPACE PROXIMITY PROBE		X	
3.3.2	DESIGNATE/DELETE AN AREA IN USE		X	
3.3.3	DETERMINE WHETHER ATC CONTROLS SPECIAL USE AIRSPACE		X	
3.3.4	RESTRICT AIRCRAFT ACTIVITY IN			X

TABLE 5-1. TASK AUTOMATION LEVELS (continued)

TASKNO	TASK STATEMENT	PRIMARILY MACHINE	MACHINE MANUAL	PRIMARILY MANUAL
3.3.5	AREA BY ALTITUDE OR SEGMENT OBSERVE DISPLAY OF AIRSPACE RESTRICTION STATUS CHANGE	X		
3.4.1	DETERMINE DESCENT TIME OR POINT		X	
3.4.2	PROJECT TRAFFIC SEQUENCE TO ESTABLISH/MODIFY APPROACH FLOW TO AIRPORT OR SECTOR			X
3.4.3	OBSERVE RANGE/BEARING BETWEEN AIRCRAFT		X	
3.6.1	OBSERVE AIRSPACE INTRUSION BY A NON-CONTROLLED OBJECT			X
3.6.2	COMPOSE/ENTER REMINDER NOTE OF AIRSPACE INTRUSION		X	
3.6.3	FLIGHT-FOLLOW AN OBSERVED NON-CONTROLLED OBJECT			X
4.1.1	ENTER TRIAL FLIGHT PLAN AMENDMENT	X		
4.1.2	REVIEW POTENTIAL IMPEDIMENTS FOR IMPACT ON PROPOSED CLEARANCE			X
4.1.3	SELECT CONFLICT RESOLUTION ADVISORY OPTION		X	
4.1.4	FORMULATE A CLEARANCE WITH APPROPRIATE INSTRUCTIONS		X	
4.1.5	QUERY PILOT REGARDING COMPLIANCE WITH CLEARANCE		X	X
4.1.6	ISSUE CLEARANCE AND INSTRUCTIONS TO PILOT		X	
4.1.7	ISSUE CLEARANCE THRU ATCT/FSS FOR RELAY TO PILOT		X	
4.1.8	VERIFY AIRCRAFT COMPLIANCE WITH CLEARANCE			X
4.2.1	DECLARE EMERGENCY EVENT AND INVOKE CONTINGENCY PLAN			X
4.3.1	PERCEIVE PRESENCE OF SPECIAL OPERATIONS			X
4.4.1	OBSERVE NEW FLIGHT PLAN ALERT	X		
4.4.2	REVIEW FLIGHT PLAN FOR COMPLETENESS			X
4.4.3	COMPOSE/ENTER FLIGHT PLAN		X	
4.4.4	DELETE NEW FLIGHT PLAN ALERT			X
4.4.5	REVIEW FLIGHT PLAN FOR ERRORS/DATA LIST SEQUENCE			X
4.5.1	RECEIVE FLIGHT PLAN AMENDMENT FROM COMPUTER	X		
4.5.2	HIGHLIGHT FLIGHT PLAN POSTING FOR REMINDER ACTION		X	
4.5.3	COMPOSE/ENTER FLIGHT PLAN AMENDMENT		X	
4.5.4	ENTER PILOT'S POSITION REPORT IN SYSTEM		X	

TABLE 5-1. TASK AUTOMATION LEVELS (continued)

TASKNO	TASK STATEMENT	PRIMARILY MACHINE	MACHINE MANUAL	PRIMARILY MANUAL
4.5.5	DELETE FLIGHT PLAN AMENDMENT HIGHLIGHTING			X
5.1.1	OBSERVE DISPLAY OF WEATHER LINE/INTENSITY/BASE/HEIGHT/MOV EMENT		X	
5.1.2	RECEIVE SIGMET/AIRMET	X		
5.1.3	RECEIVE WEATHER BRIEFING FROM METEOROLOGIST		X	
5.1.4	ENTER PIREP INTO SYSTEM		X	
5.1.5	DETERMINE WHETHER ADJACENT CONTROLLER OR PILOT NEEDS WEATHER ADVISORY		X	
5.1.6	DETERMINE WEATHER IMPACT ON ROUTES/FLOW			X
5.1.7	DETERMINE ALTITUDE/ROUTE CHANGE TO BYPASS SEVERE WEATHER			X
5.2.1	RECEIVE WEATHER SEQUENCE		X	
5.2.2	RECEIVE WEATHER REPORT UPDATE	X		
5.2.3	DETERMINE WHETHER USABLE		X	
5.2.4	FLIGHT LEVEL HAS CHANGED DETERMINE WHETHER RUNWAY CONDITIONS HAVE CHANGED		X	
5.2.5	DETERMINE WHETHER CONTROL ZONE IS IFR/VFR		X	
6.2.1	REVIEW SYSTEM STATUS		X	
6.2.2	REVIEW TRAFFIC STATUS/WEATHER		X	
6.2.3	VERIFY THAT ALL REQUIRED DISPLAY AND COMMUNICATION SWITCHES ARE IN PROPER LOCATION			X
6.2.4	PERFORM LOG-ON SEQUENCE AT DESIGNATED CONSOLE	X		
6.2.5	ADJUST PARAMETERS AND DISPLAY TO PERSONAL PREFERENCE		X	
6.2.6	CHECK DISPLAY FOR PROPER ALIGNMENT, USABILITY, AND SATISFACTORY STATUS			X
6.2.7	SET-UP WORKSTATION ADAPTION PARAMETERS	X		
6.3.1	DETECT NON-ACCEPTANCE OF INPUT DATA		X	
6.4.1	DETECT OCCURRENCE OF SECTOR SUITE FAILURE		X	
6.4.2	OBSERVE SECTOR SUITE DATA BASE RESTORATION COMPLETION MESSAGE	X		
6.5.1	DETECT OCCURRENCE OF ACCC FAILURE	X		
6.5.2	REVERT TO ACCC BACKUP PROCEDURES (TBD)	X		
6.6.1	DETERMINE AIRCRAFT NEEDING SUBSTITUTE ROUTING		X	
6.6.2	MONITOR STATUS OF QUESTIONABLE		X	

TABLE 5-1. TASK AUTOMATION LEVELS (continued)

TASKNO	TASK STATEMENT	PRIMARILY MACHINE	MACHINE MANUAL	PRIMARILY MANUAL
6.6.3	NAVAID OBSERVE SUBSTITUTE ROUTING ON DISPLAY	X		
6.7.1	DETERMINE COMMUNICATION FAULT		X	
6.7.2	ADJUST COMMUNICATION STRATEGY		X	
6.7.3	SWITCH TO BACKUP RADIO FREQUENCY		X	
6.8.1	DETERMINE IMPENDING CONTROLLER OVERLOAD		X	
6.8.2	EXCHANGE/ASSIGN INTRA-POSITION RESPONSIBILITIES		X	
6.8.3	REQUEST ASSISTANCE OR RELIEF		X	
6.9.1	PERCEIVE TRACKING FAULT OR TRANSPONDER FAILURE		X	
6.9.2	REPOSITION/UPDATE/REASSOCIATE DATA BLOCKS		X	
6.10.1	OBSERVE MESSAGE ON LOSS OF DATA BASE	X		
6.10.2	DETECT FAILURE TO UPDATE FLIGHT PLAN DATA BASE		X	
6.10.3	ENTER DISPLAY AMENDMENT MESSAGE ON CONSOLE		X	
6.10.4	ENTER FLIGHT PLAN ON CONSOLE		X	
6.10.5	RESEQUENCE FLIGHT PLAN ON CONSOLE		X	
6.11.1	DETECT UNRELIABLE VSCS COMMUNICATION		X	
7.1.1	ADVISE CONTROLLER/SUPERVISOR OF AIRCRAFT FLIGHT PLAN DEVIATION		X	
7.1.2	ADVISE CONTROLLER OF RESULTS OF FLIGHT PLAN CONFLICT PROBE		X	
7.1.3	ADVISE CONTROLLER OF POTENTIAL CONFLICT IN HIS SECTOR		X	
7.1.4	ADVISE CONTROLLER OF POTENTIAL MSAW IN HIS SECTOR		X	
7.2.1	RECEIVE CONTROLLER NOTICE OF POTENTIAL AIRCRAFT CONFLICT IN SECTOR		X	
7.2.2	RECEIVE CONTROLLER NOTICE OF POTENTIAL MSAW IN SECTOR		X	
7.2.3	RECEIVE CONTROLLER NOTICE OF AIRCRAFT FLIGHT PLAN DEVIATION		X	
7.2.4	RECEIVE CONTROLLER NOTICE ON RESULTS OF FLIGHT PLAN CONFLICT PROBE		X	
7.3.1	ISSUE POINTOUT		X	
7.3.2	OBSERVE AUTOMATIC INITIATION OF POINTOUT TO ANOTHER CONTROLLER	X		
7.3.3	DIRECT FLIGHT DATA DISPLAY TO ADJACENT CONTROLLER	X		
7.3.4	RECEIVE ACCEPTANCE OF POINTOUT		X	
7.3.5	RECEIVE REJECTION OF POINTOUT		X	
7.4.1	RECEIVE CONTROLLER INITIATED POINTOUT		X	
7.4.2	ACCEPT POINTOUT		X	

TABLE 5-1. TASK AUTOMATION LEVELS (continued)

TASKNO	TASK STATEMENT	PRIMARILY MACHINE	MACHINE MANUAL	PRIMARILY MANUAL
7.4.3	REJECT POINTOUT		X	
7.4.4	SUPPRESS FULL DATA BLOCK AFTER POINTOUT		X	X
7.5.1	RECEIVE NOTICE OF AIRSPACE RESTRICTION/RELEASE FROM CONTROLLER/SUPERVISOR		X	X
7.5.2	REQUEST RELEASE OF SPECIAL USE AIRSPACE		X	
7.5.3	RECEIVE DENIAL OF REQUEST FOR RELEASE OF SPECIAL USE AIRSPACE		X	
7.6.1	ADVISE CONTROLLER OF AIRSPACE RESTRICTION IMPOSED		X	X
7.6.2	ISSUE ADVISORY IN REGARD TO RESTRICTED AIRSPACE PROXIMITY		X	
7.7.1	RECEIVE NOTICE TO TAKE OVER AIRSPACE		X	X
7.7.2	RECEIVE NOTICE TO RECONFIGURE SECTOR		X	X
7.7.3	RECEIVE NOTICE TO RELEASE AIRSPACE		X	X
7.8.1	RECEIVE FLIGHT PLAN FROM PILOT		X	
7.8.2	RECEIVE FLIGHT PLAN VERBALLY FORWARDED			X
7.8.3	QUERY PILOT ABOUT FLIGHT PLAN		X	
7.8.4	QUERY THE RELAYER OF A FLIGHT PLAN		X	
7.9.1	RECEIVE CONTROLLER NOTICE ON REQUESTED CLEARANCE OF AIRCRAFT LEAVING HIS SECTOR		X	
7.9.2	DENY CLEARANCE REQUEST FROM CONTROLLER		X	
7.9.3	SUGGEST ALTERNATE TO CLEARANCE REQUEST FROM CONTROLLER			X
7.9.4	RECEIVE CLEARANCE REQUEST FROM ATCT/FSS/PILOT/SUPERVISOR		X	X
7.9.5	RECEIVE CONTROLLER REQUEST FOR CLEARANCE/APPROVAL		X	X
7.9.6	DENY CLEARANCE REQUEST		X	
7.9.7	SUGGEST CLEARANCE ALTERNATIVES TO PILOT		X	
7.9.8	ACKNOWLEDGE DATA LINK CLEARANCE REQUEST	X		
7.9.9	APPROVE CLEARANCE REQUEST FROM CONTROLLER		X	X
7.9.10	FORWARD CLEARANCE REQUEST TO ADJACENT CONTROLLER		X	X
7.10.1	REQUEST CLEARANCE/APPROVAL FROM ADJACENT CONTROLLER		X	X
7.10.2	RECEIVE CLEARANCE APPROVAL/CLEARANCE RESTRICTIONS FROM ADJACENT CONTROLLER		X	X
7.10.3	RECEIVE CLEARANCE DISAPPROVAL/ DENIAL FROM ADJACENT CONTROLLER		X	X

TABLE 5-1. TASK AUTOMATION LEVELS (continued)

TASKNO	TASK STATEMENT	PRIMARILY MACHINE	MACHINE MANUAL	PRIMARILY MANUAL
7.10.4	RECEIVE ALTERNATE SUGGESTION FOR CLEARANCE/APPROVAL REQUESTED OF ADJACENT CONTROLLER			X
7.11.1	FORWARD FLIGHT PLAN AMENDMENT VERBALLY			X
7.11.2	RECEIVE CONTROLLER ADVICE OF UNABLE FLIGHT PLAN AMENDMENT		X	
7.12.1	RECEIVE FLIGHT PLAN AMENDMENT VERBALLY FORWARDED			X
7.12.2	ADVISE CONTROLLER UNABLE FLIGHT PLAN AMENDMENT		X	
7.13.1	RECEIVE DEPARTURE MESSAGE FROM CONTROLLER/FSS/PILOT		X	
7.14.1	ISSUE NOTICE OF EQUIPMENT STATUS TO ADJACENT CONTROLLER/PILOT/SUPERVISOR		X	
7.14.2	TERMINATE RADAR SERVICE TO AIRCRAFT		X	
7.14.3	REQUEST PILOT POSITION REPORTS		X	
7.14.4	RECEIVE PILOT'S POSITION REPORT		X	
7.14.5	FORWARD FLIGHT PLAN VERBALLY			X
7.14.6	DELETE PILOT POSITION REPORTS		X	
7.14.7	CONFIRM COMPUTER ACTION DURING TRANSITION STAGES		X	
7.15.1	RECEIVE NOTICE OF STATUS OF ADJACENT ACF AUTOMATION EQUIPMENT	X	X	
7.15.2	RECEIVE STATUS OF SECTOR SUITE FAILURE FROM CONTROLLER/SUPERVISOR		X	
7.15.3	RECEIVE CONFIRMATION OF COMPUTER ACTION DURING TRANSITION STAGES		X	
7.16.1	COMPOSE/ENTER REQUESTED ROUTE/ALTITUDE CHANGE		X	
7.17.1	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER/SUPERVISOR/ METEOROLOGIST		X	X
7.17.2	RECEIVE REVISION/CANCELLATION TO PREVIOUS WEATHER REPORT		X	X
7.17.3	RECEIVE WIND SHEAR REPORT	X		X
7.17.4	RECEIVE PIREP ON WEATHER	X		X
7.17.5	SELECT WEATHER/ADVISORY/UPDATE FOR DATA LINK TRANSMISSION TO PILOT	X		
7.17.6	ISSUE WEATHER/ADVISORY/UPDATE TO PILOT/ADJACENT CONTROLLER		X	
7.17.7	FORWARD WEATHER INFORMATION TO SUPERVISOR/METEOROLOGIST		X	X
7.17.8	ADVISE SUPERVISOR/FLOW CONTROLLER OF WEATHER IMPACT ON ROUTES/FLOW		X	
7.17.9	RECEIVE CONTROLLER REQUEST FOR WEATHER INFORMATION		X	X
7.17.10	REQUEST WEATHER INFORMATION		X	X
7.18.1	RECEIVE NOTICE OF COMMUNICATION STATUS		X	

TABLE 5-1. TASK AUTOMATION LEVELS (continued)

TASKNO	TASK STATEMENT	PRIMARILY MACHINE	MACHINE MANUAL	PRIMARILY MANUAL
7.18.2	RECEIVE NEW FREQUENCY ASSIGNMENT		X	
7.18.3	RECEIVE NOTICE OF ALTERNATE COMMUNICATION PATH		X	
7.19.1	FORWARD NOTICE OF COMMUNICATION STATUS		X	
7.19.2	FORWARD NEW FREQUENCY ASSIGNMENT TO ADJACENT CONTROLLER/SUPERVISOR		X	
7.19.3	FORWARD ALTERNATE COMMUNICATION PATH		X	
7.20.1	RECEIVE NOTICE OF NAVAID STATUS FROM ADJACENT CONTROLLER/FSS/SUPERVISOR/PILOT		X	X
7.20.2	RECEIVE SUBSTITUTE ROUTING		X	X
7.20.3	RECEIVE CANCELLATION OF SUBSTITUTE ROUTING		X	X
7.21.1	FORWARD NAVAID STATUS TO ADJACENT CONTROLLER/SUPERVISOR/PILOT		X	X
7.21.2	FORWARD SUBSTITUTE ROUTING		X	X
7.21.3	CANCEL PREVIOUS SUBSTITUTE ROUTING		X	X
7.22.1	FORWARD NOTICE OF AIRSPACE INTRUSION BY A NON-CONTROLLED OBJECT		X	X
7.22.2	RECEIVE NOTICE OF AIRSPACE INTRUSION BY A NON-CONTROLLED OBJECT		X	X
7.22.3	ISSUE ADVISORY IN REGARD TO A NON-CONTROLLED OBJECT		X	
7.22.4	ADVISE PILOT WHEN CLEAR OF NON-CONTROLLED OBJECT		X	
7.23.1	RECEIVE RUNWAY USE DATA		X	X
7.24.1	FORWARD RUNWAY USE DATA		X	X
7.25.1	DETECT A PILOT OR AIRCRAFT PROBLEM (E.G., HYPOXIA)			X
7.25.2	ALERT DESIGNATED PERSONNEL OF AIRCRAFT HAVING FLIGHT PROBLEMS		X	X
7.25.3	FORWARD CONTINGENCY INFORMATION TO SUPERVISOR/ADJACENT CONTROLLER		X	X
7.26.1	RECEIVE SUPERVISOR NOTICE TO INHIBIT ALERT		X	X
7.27.1	BRIEF RELIEVING CONTROLLER		X	X
7.28.1	RECEIVE NOTICE OF SPECIAL OPERATIONS		X	X
7.29.1	FORWARD NOTICE OF SPECIAL OPERATIONS TO ADJACENT CONTROLLER/SUPERVISOR		X	X
7.30.1	RECEIVE INFORMATION ON LOSS OF RADIO CONTACT WITH AIRCRAFT		X	X
7.30.2	CONDUCT RADIO/RADAR SEARCH FOR AIRCRAFT WITHOUT RADIO CONTACT		X	X
7.30.3	ATTEMPT ESTABLISHMENT OF COMMUNICATIONS USING TRANSPONDER/RADAR EQUIPMENT		X	X
7.31.1	RECEIVE INFORMATION ON OVERDUE AIRCRAFT		X	X
7.31.2	CONTACT FACILITY ALONG ROUTE		X	X

TABLE 5-1. TASK AUTOMATION LEVELS (continued)

TASK NO	TASK STATEMENT	PRIMARYLY MACHINE	MACHINE MANUAL	PRIMARYLY MANUAL
	OF FLIGHT TO SECURE INFORMATION ON OVERDUE AIRCRAFT			
7.31.3	CONDUCT RADIO/RADAR SEARCH FOR OVERDUE AIRCRAFT		X	X
7.32.1	EXPLORE WHETHER OTHERS ARE RECEIVING AN AIRCRAFT'S TRANSMISSIONS		X	X
7.32.2	ISSUE ALTERNATE COMMUNICATION FOR AIR/GROUND TRANSMISSION		X	X
7.33.1	RECEIVE PILOT/ADJACENT CONTROLLER REQUEST FOR FLIGHT FOLLOWING		X	X
7.33.2	DENY FLIGHT FOLLOWING REQUEST		X	X
7.33.3	REQUEST ASSIGN BEACON CODE TO AIRCRAFT		X	X
7.33.4	ISSUE TRAFFIC ADVISORY IN REGARD TO TRAFFIC PROXIMITY		X	X
7.33.5	ADVISE PILOT WHEN CLEAR OF TRAFFIC		X	X
7.34.1	RECEIVE A FAD NOTICE		X	X
7.34.2	CONFER WITH PILOT THRU ATCT ON DESIRE FOR FAD INTENTIONS		X	X
7.35.1	RECEIVE REQUESTED ROUTE/ALTITUDE CHANGES FROM ANOTHER CONTROLLER/FLOW CONTROLLER/SUPERVISOR		X	X
7.35.2	RECEIVE A FLOW RESTRICTION		X	X
7.35.3	RECEIVE METERING DATA FROM FLOW CONTROLLER		X	X
7.35.4	REQUEST FLOW CONTROL BE IMPOSED		X	X
7.35.5	NEGOTIATE DELAY TECHNIQUE WITH PILOT		X	X
7.35.6	FORWARD REQUESTED ROUTE/ALTITUDE CHANGES TO ADJACENT CONTROLLER/FLOW CONTROLLER/SUPERVISOR		X	X
7.36.1	ISSUE ADVISORY IN REGARD TO FLIGHT PLAN DEVIATION		X	X
7.37.1	RECEIVE/OBSERVE HANDOFF		X	X
7.37.2	ACCEPT VERBAL HANDOFF/START TRACK		X	X
7.37.3	REJECT HANDOFF	X	X	
7.37.4	ACCEPT AUTOMATIC HANDOFF	X		
7.37.5	VERIFY COMMUNICATIONS WITH PILOT ON TRANSFER OF CONTROL OR DEPARTURE		X	X
7.37.6	VERIFY AIRCRAFT ALTITUDE WITH PILOT ON TRANSFER OF CONTROL OR DEPARTURE	X		X
7.37.7	CONFIRM DATA LINK COMMUNICATIONS	X		

TABLE 5-1. TASK AUTOMATION LEVELS (continued)

TASKNO	TASK STATEMENT	PRIMARILY MACHINE	MACHINE MANUAL	PRIMARILY MANUAL
7.38.1	INITIATE HANDOFF	X	X	X
7.38.2	OBSERVE AUTOMATIC INITIATION OF HANDOFF		X	
7.38.3	RETRACT HANDOFF		X	X
7.38.4	RECEIVE HANDOFF ACCEPTANCE		X	X
7.38.5	CONFER ON TRANSFER OF CONTROL WITH OTHER CONTROLLER			X
7.38.6	ISSUE CHANGE OF FREQUENCY TO PILOT		X	X
7.39.1	RECEIVE NOTICE OF RADAR SENSOR STATUS FROM ADJACENT CONTROLLER/SUPERVISOR		X	X
7.40.1	FORWARD NOTICE OF RADAR SENSOR STATUS TO ADJACENT CONTROLLER/SUPERVISOR		X	X
7.41.1	REQUEST TEMPORARY USE OF AIRSPACE		X	
7.41.2	RECEIVE RELEASE/USE OF AIRSPACE		X	
7.41.3	RECEIVE REJECTION OF USE OF AIRSPACE		X	
7.42.1	RECEIVE CONTROLLER REQUEST FOR TEMPORARY USE OF AIRSPACE		X	
7.42.2	FORWARD APPROVAL FOR TEMPORARY USE OF AIRSPACE		X	
7.42.3	FORWARD DENIAL OF TEMPORARY USE OF AIRSPACE		X	
7.42.4	SUPPRESS MAP ASSOCIATED WITH TEMPORARY USE OF AIRSPACE		X	

5.3 Task Attribute Characterization

This section provides a characterization of tasks in terms of key cognitive and perceptual attributes involved in the task. The cognitive and perceptual attributes are related to individual tasks. They describe primary influences on Controller work behavior which characterize Controller task performance. Attributes represent ability requirements, particularly for the complex perceptual and cognitive aspects of information-processing tasks. They point out extensive Controller involvement in the processing of air traffic and control information.

5.3.1 Task Attributes

The key human processes involved in the performance of Controller tasks can be characterized generally as being cognitive and perceptual. These general categories represent one level of description of the human processes occurring in the MMI of command and control systems such as Air Traffic Control.

However, it is useful to apply human process categories at a somewhat more specific level of descriptor. A great many attributes (or work-oriented human behaviors) are available at this next level of human process description. Primary reference sources for compiling these attributes and their definitions are Theologus, Romashko, & Fleishman (Ref. 13); Neeb, Cunningham, & Pass (Ref. 10); Marquardt & McCormick (Ref. 7); and McCormick (Ref. 8). For the present purposes, only those attributes likely to be most meaningful in characterizing the information processing tasks of ACF Controllers are considered.

The cognitive and perceptual attributes are associated with specific Controller tasks to characterize the significant human efforts involved. Such characterizations serve:

- a. To show the nature of human efforts involved in the Controller job and to demonstrate how a position may change its effort

requirements as the job changes to accommodate different equipment, machines, or types of facilities.

- b. To provide a basis for estimating Controller workload under different traffic conditions or when assistance is provided by other Controllers to relieve the workload.

The composite volume and nature of all task attributes involved to a meaningful degree in a particular event scenario yields a useful measure of Controller workload. This measure can then be compared with those derived from different event scenarios or changed task allocations between Controllers and machine components, or between Controller positions at different sizes or types of facilities.

The attribute descriptors of Controller work efforts may also serve several additional purposes, having value in later efforts to:

- a. Reallocate functions between man and machine, perhaps off-loading of manual tasks that do not require uniquely human qualities and capabilities (e.g., to speed the system handling of trivial or repetitive tasks or subtasks).
- b. Validate the component human performance characteristics to be included in an MMI test bed or simulator (e.g., performance fidelity).
- c. Validate the human performance content included in a Controller training program.

Table 5-2 defines the cognitive attributes employed in the information processing task analysis, and Table 5-3 defines the perceptual attributes. These attributes have been primarily derived from Refs. 13, 10, 7, and 8, although four were synthesized by the SSRVT to more fully characterize ATC operations. These four are: C9, Long-Term Memory; C5, Mental Multiplexing;

C10, Recall from Interruption; and P15, Sensory Multiplexing.

with their characteristic cognitive strategies in the information-processing task analysis.

The listing of cognitive and perceptual attributes shown in Tables 5-2 and 5-3 do not include a number of attributes that might be useful in other types of jobs. For example:

- a. Mechanical Ability
- b. Aesthetic Judgment
- c. Memory for Musical Tones
- d. Originality (production of clever or uncommon ideas)

Thus, the selected categories are not fully representative of the entire domain of cognitive and perceptual attributes. Rather, they are intended to focus upon the information handling and processing efforts of Controllers. No attempt is made to account for the large number of simpler perceptual actions (e.g., observing indicator lights) nor any motor actions that also may be involved in the performance of tasks.

5.3.1.1 Characteristic Cognitive Strategies

Each of the cognitive attributes can be viewed as components of an information processing system. Such an information processing system is considered to have five general groupings of attribute categories. These groupings pertain to:

- a. Action Initiation (given some information or event on which to initiate action).
- b. Adaptive Processes (to aid in handling the information to be processed at a particular time).
- c. Knowledge Base (to aid in effectively processing the information).
- d. Transformation of Input or Data (to convert information to a more usable form).
- e. Reasoning (mentally structuring the information in relation to guidance to yield new information).

Table 5-4 groups the 19 cognitive attributes into the above five categories. In doing so, we allow tasks to be associated

TABLE 5-2. COGNITIVE (INTELLECTUAL) ATTRIBUTE DEFINITIONS

CODE	ATTRIBUTE TITLE(S)	DESCRIPTION	AAS ILLUSTRATION
C1	Sensitivity to Problems (Evaluation)	Recognizing existence of a problem, deficiencies in courses of action or plans, or implications of activities; Evaluating goodness or appropriateness of ideas; Judging which problems are significant; Determining cause and effect relationships. Does not include any of the reasoning necessary for the solution of a problem.	Monitor status; Anticipate problems that could arise; Recognize inconsistencies in the available data, such as might be provided by a student pilot.
C2	Planning Ability (Prioritize/Schedule)	Ordering of events in sequence; Establish priorities.	Determining the urgency of a perceived event; Deferring a task.
C3	Social Intelligence (Interpersonal Communication)	Correctly process behavioral information obtained through personal interaction; Sensitive to personal reactions of others; Teamwork effectiveness.	Negotiation of revised flight plan; Talking to a lost or panicked pilot to a landing site or position reference; Training a new Controller on the job; Mesh with other Controllers.
C4	Screening or Filtering (Overload Accommodation, Selective Attention)	Select inputs on which to focus attention in presence of distracting stimuli or overload of work.	Selecting aircraft trajectories to examine for conflicts.
C5	Mental Multiplexing	Mental flexibility and adaptability (dexterity) in effectively and confidently dealing with diverse and changing situations.	Handling student and general aviation pilots; Translating communications to acquire/assure correct understanding; Change to a different sector; Assume control of different airspace.
C6	Short-Term Memory	Mental storage and selective recall of relevant information within a brief period of time; Retention and selecting the use of procedure-following information.	Entering an aircraft call sign.
C7	Technical Grammar	Form and structure of job words and phrases, including codes and abbreviations.	Formatting a flight plan; Issuing clearance to pilot.
C8	Verbal Comprehension	Meaning of words and associated ideas, and able to use them effectively.	Conversing with foreign pilots; Negotiating flight plan changes.
C9	Long-Term Memory	Mental storage of knowledge over a period of time and selective recall of what is relevant and proper to a current situation.	Remember proper procedural instructions or letters of agreement that are relevant to a seldom occurring situation, such as for an air show or large flight formation.
C10	Recall from Interruption	Ability to recall a deferred or interrupted action when priorities permit, and be able to resume the action.	Discussing separation or traffic sequence with a Controller and being interrupted by another Controller who is on the interphone override, then after coordination with the second Controller is complete, returning to the first Controller without pause.
C11	Expressional Fluency	Rapidly putting ideas into spoken or written words.	Talking to a pilot; Planning clearance instruction.
C12	Numerical Computation (Number Facility)	Rapid and accurate simple arithmetic operations, but not including more complex or reasoning situations. Includes use of quantitative symbols.	Plotting on numbered coordinates; Computing answer to an equation; Chart trends.
C13	Input Transformation/ Translation	Coding.	Convert text to graphics or alphanumeric; Entering a PIREP; Transform pattern information into usable data.

TABLE 5-2. COGNITIVE (INTELLECTUAL) ATTRIBUTE DEFINITIONS (continued)

CODE	ATTRIBUTE TITLE(S)	DESCRIPTION	AAS ILLUSTRATION
C14	Probability Estimation	Translate uncertainty into probability, assigning a subjective probability number regarding the likelihood of an event being true; Express opinion or judgments.	Translate uncertain variables into trends or patterns; Assign a numerical probability to an uncertain stimulus event, representing the Controller's opinion about the state of that event.
C15	Ideational Fluency	Rapidly coming up with creative or imaginative ideas or solutions.	Resolving potential air conflicts.
C16	Deductive Reasoning (Fact Conclusion)	Reach a conclusion that follows logically from the known facts or data; Select from among alternative answers or methods; Following a prescribed rule.	Calculate likely future position of aircraft
C17	Inductive Reasoning	Generating an explanation for a set of specific data or instances, giving structure and meaning to the information; Make generalizations or working hypotheses from specific events; Discern basic differences and relationships among symbols, figures, and figure patterns; Generate a new solution to a problem; Make a knowledgeable assumption even though using insufficient data.	Formulate new requirements to meet stated objectives; Search for new information on the basis of contingencies that have arisen; Checking the adequacy of a proposed aircraft maneuver.
C18	Mathematical Reasoning	Structuring of computational problem prior to solution.	
C19	Probabilistic Calculation	Uses probabilities to estimate optimal courses of action. Does not include the final decision of selecting a course of action.	Assess the risk of a maneuver.

TABLE 5-3. PERCEPTUAL (SENSORY) ATTRIBUTE DEFINITIONS

CODE	ATTRIBUTE TITLE(S)	DESCRIPTION	AAS ILLUSTRATION
P1	Movement Detection	Recognize the physical movement and judge the direction or speed of a visual object.	To help predict delays or conflicts; In observing situation display; In confirming radar contact.
P2	Spatial Scanning (Object Detection)	Rapidly identifying or detecting objects or events displayed in a wide or complicated visual field.	Observing display for new aircraft; Looking for data in a table.
P3	Form Perception (Form Matching)	Perceive pertinent detail in objects or in pictorial or graphic material; Make fine visual comparisons and discriminations among such characteristics as shapes, shading, or line width/lengths.	Discriminating between symbols; Differentiating between two closely adjacent aircraft on the display.
P4	Perceptual Speed	Rapid discriminations of visual details, including verbal or tabular material.	Estimating separations.
P5	Color Discrimination	Perceive similarities or differences in colors or in shades of the same color (or to identify certain colors).	
P6	Image or Pattern Formation (Closure)	See or foresee in the mind an arrangement or composition that suggests or reveals a design or configuration (that is, a complex of parts that function as a whole picture); Have a mental picture of something to be; Perceptually organize a disorganized or ambiguous field into a single perception.	Observe situation display for quality of target-to-clutter display; Conceptualize tactical situation based on time variation presented on display; Form picture of situation by observation of flight data display.
P7	Visual Recognition (Visual Memory, Recognition Memory)	Mental storage and recall of visual forms and patterns, and relate/compare newly perceived visual detail to those forms and patterns.	Applying separation standards to perceived separations.
P8	Far Visual Acuity	Perceive detail at distances beyond normal reading distance.	
P9	Near Visual Acuity	Perceive detail at normal reading distance.	
P10	Recognition of Spatial Patterns (Pattern Recognition)	Perceive spatial patterns and relations among static or dynamic visual inputs. May involve orienting one's self to the position or configuration.	Observing close-in flight paths in terminal area.
P11	Transformation of Spatial Patterns (Spatial Visualizations)	Observing spatial patterns or objects, in two or three dimensions, and mentally transforming them into other spatial patterns; Visualize objects in dimensional or geometric form.	Determining the effect of a proposed aircraft maneuver on other aircraft; Comparing intended time-position profiles for intersection in position/altitude/time.
P12	Depth Perception (Stereoscopic Acuity)	Estimate depth of distances or objects (or judge their physical relationship in actual space).	Observing inflight aircraft from the tower.
P13	Auditory Acuity	Perceive relevant sound cues and discriminate between sounds; Accurately hear difficult speech transmissions against a background of noise, static, or interruption.	
P14	Tactile Discrimination (Touch Sensitivity)	Perceive relevant cues by touch.	
P15	Sensory Multiplexing	Capability of perceiving multiple verbal and visual inputs simultaneously; attuned to a varied situational environment without disturbing the work process.	Listen and acknowledge many different communications, rapidly occurring and overlapping, and hearing the critical information contents (e.g., from pilots and other Controllers).

TABLE 5-4. CHARACTERISTIC COGNITIVE STRATEGIES

<i>Action Initiation</i>	Sensitivity to Problems (Evaluation) Planning Ability (Prioritize/Schedule)
<i>Adaptive Processes</i>	Social Intelligence (Interpersonal Communication) Screening/Filtering (Selective Attention, Overload Accommodation)
<i>Knowledge Base</i>	Short-Term Memory Technical Grammar Verbal Comprehension Long-Term Memory Recall from Interruption
<i>Transformation of Input or Data</i>	Expressional Fluency Numerical Computation (Number Facility) Input Transformation/Translation (Coding) Probability Estimation
<i>Reasoning</i>	Ideational Fluency Deductive Reasoning (Fact Conclusion) Inductive Reasoning (Generalization) Mathematical Reasoning Probabilistic Calculation (Prediction)

5.3.2 Information-Processing Task Analysis

Given the task decomposition presented in Chapter 4.0 and Appendix A and the cognitive/perceptual attribute model discussed in section 5.3.1., and information processing task analysis can be compiled. Table 5-5 presents the results of this analysis. Tasks, characteristic cognitive strategies, and significant cognitive and perceptual attributes involved are listed in Table 5-5.

Cognitive strategy maps to the model presented in Table 5-4. Cognitive strategy values are coded in Table 5-5 as:

- A. Action initiation
- B. Adaptive processes
- C. Knowledge base
- D. Transformation of input or data
- E. Reasoning

Significant cognitive and perceptual attributes involved in each task are coded as in Tables 5-2 and 5-3. Note that some tasks are more mechanical in nature, such that their most significant attribute may involve a motor response¹ (e.g., Task 1.3.3, Request Limited/Standard Flight Plan Display). In cases such as these, no entry is provided under "cognitive strategy", "cognitive attributes," or "perceptual attributes" in Table 5-4.

5.3.2.1 Information-Processing Task Analysis Synopsis

An examination of data in Table 5-5 indicates that the majority of cognitive attributes involved within Activities 1.0 -6.0 concern reasoning and action initiation, while the majority of attributes involved in activity 7.0 concern either adaptive processes or action initiation. Specific frequencies of occurrence are as follows:

		Activity		Total
		1-6	7	
A.	Action initiation	30	39	69
B.	Adaptive processes	6	41	47
C.	Knowledge base	15	17	32
D.	Transformation of input or data	12	9	21
E.	Reasoning	39	24	63

Sixteen of the 19 cognitive attributes were seen as significantly involved in one or more of the tasks. Recall form interruption (C-10) was not cited in any task. This is not surprising since this analysis is scenario independent, and so does not account for attributes such as C-10 which are situation specific. Clearly, "recall form interruption" could be a significant factor in all Controller tasks. Numerical computation (C-12) and mathematical reasoning (C-18) were also not significantly involved in any task.

The perceptual attributes most frequently associated with Controller tasks included:

- P-2 Spatial Scanning
- P-3 Form Perception
- P-6 Image/Pattern Formation
- P-11 Transformation of Spatial Patterns

Perceptual attributes which were not associated with any Controller task were:

- P-8 Far Visual Acuity
- P-9 Near Visual Acuity
- P-12 Depth Perception
- P-13 Auditory Acuity
- P-14 Tactile Discrimination

These attributes are highly dependent upon a system design being in place, and so, could not be associated with tasks at this time.

¹ Motor task attributes (e.g., arm extension, flexion), though relevant to Controller performance, can only be assessed with respect to an established design. Since the purview of this Operations Concept concerns AAS/Sector Suite requirements, independent of any design concept, the assessment of motor task attributes are not addressed.

TABLE 5-5. INFORMATION PROCESSING TASK ANALYSIS

Task No	Task Statement	Action Initiation A	Adaptive B	Knowledge base C	Transformations D	Reasoning E	Cognitive Attribute		Perceptual Attribute	
							No.	Definition	No.	Definition
1.1.1	REVIEW FLIGHT PLAN DISPLAY FOR PRESENT AND/OR FUTURE AIRCRAFT SEPARATION					E	16	Deductive Reasoning	6	Image/Pattern Formation
1.1.2	REVIEW SITUATION DISPLAY FOR POTENTIAL VIOLATION OF SEPARATION STANDARDS		B			E	4 16	Screen/Filter Deductive Reasoning	7 6	Visual Recognition Image/Pattern Formation
1.1.3	REVIEW FLIGHT PLAN CONFLICT PROBE RESULTS					E	16	Deductive Reasoning	7 6	Visual Recognition Image/Pattern Formation
1.1.4	PROJECT AIRCRAFT FUTURE POSITION/ALTITUDE/PATH				C	E	16	Deductive Reasoning	4 11	Perceptual Speed Transform. Spatial Patterns
1.1.5	READ-OUT RANGE/BEARING/TIME FOR AN AIRCRAFT TO A FIX OR GEOGRAPHIC POINT				C		13	Input Transformation		
1.1.6	FORCE/QUICK-LOOK FULL DATA BLOCK/S TO EXAMINE TRACK INFORMATION ON AIRCRAFT				C		13	Input Transformation		
1.1.7	DETERMINE WHETHER AIRCRAFT WILL BE SEPARATED BY LESS THAN PRESCRIBED MINIMA					E	16	Deductive Reasoning	6 7 11	Image/Pattern Formation Visual Recognition Transform. Spatial Patterns
1.1.8	SELECT FDE SORTING PRIORITY SCHEME									
1.2.1	OBSERVE DISPLAY OF NEW/CHANGED EQUIPMENT/OPERATIONAL STATUS	A					1	Sensitivity to Prob.	2	Spatial Scanning
1.2.2	OBSERVE DISPLAY OF NEW/CHANGED TRAFFIC FLOW CONTROL MANAGEMENT								2	Spatial Scanning
1.3.1	SEARCH DISPLAY FOR INACTIVE FLIGHT PLAN ON CLEARANCE REQUEST								2	Spatial Scanning
1.3.2	PROJECT MANUAL FLIGHT PLAN PROBI					E	19	Prob. Calculation	11	Transform. Spatial Patterns
1.3.3	REQUEST LIMITED/STANDARD FLIGHT PLAN DISPLAY									
1.3.4	REQUEST FULL FLIGHT PLAN READOUT									
1.3.5	ENTER TRAIL DEPARTURE TIME									
1.4.1	ENTER DEPARTURE MESSAGE									
1.4.2	START TRACK MANUALLY									
1.4.3	OBSERVE AUTOMATIC TRACK START								2	Spatial Scanning
1.5.1	ANALYZE CONDITIONS FOR PROVIDING FLIGHT FOLLOWING	A	B				2 4	Planning Ability Screen/Filter	2	Spatial Scanning
1.6.1	OFFSET A DATA BLOCK	A		C			1 6	Sensitivity to Prob. Short-Term Memory	1 3	Movement Detection Form Perception

TABLE 5-5. INFORMATION PROCESSING TASK ANALYSIS (continued)

Task No	Task Statement	Action Initiation A	Adaptive B	Knowledge base C	Transformations D	Reasoning E	Cognitive Attribute		Perceptual Attribute	
							No.		No.	
							Definition		Definition	
1.6.2	UPDATE/REVISE INPUT REMINDER NOTE (ELECTRONIC MEMORANDA)					E 7	Technical Grammar			
1.6.3	REMOVE FLIGHT DATA ENTRIES AND FULL DATA BLOCKS FROM ACCC SYSTEM					E 16	Deductive Reasoning			
1.6.4	REMOVE FLIGHT DATA ENTRIES AND FULL DATA BLOCKS FROM INTERNAL ACCC SYSTEM					E 16	Deductive Reasoning			
1.6.5	SUSPEND DISPLAY OF FLIGHT DATA ENTRIES AND FULL DATA BLOCKS					E 16	Deductive Reasoning			
1.6.6	SUSPEND TRACK					E 16	Deductive Reasoning			
1.6.7	DELETE FULL DATA BLOCK FROM OWN DISPLAY					E 16	Deductive Reasoning			
1.6.8	SUPPRESS FULL DATA BLOCK FROM OWN DISPLAY					E 16	Deductive Reasoning			
1.6.9	DELETE FLIGHT DATA ENTRY FROM A SELECTED DISPLAY					E 16	Deductive Reasoning			
2.1.1	DETECT AIRCRAFT CONFLICT ALERT INDICATION								4	Perceptual Speed
									5	Color Discrimination
2.1.2	DETERMINE VALIDITY OF CONFLICT ALERT NOTICE OR INDICATION					E 16	Deductive Reasoning		4	Perceptual Speed
									6	Image/Pattern Formation
2.2.1	DETECT MSAW INDICATION OR ALARM								5	Color Discrimination
2.2.2	DETERMINE VALIDITY OF MSAW NOTICE OR INDICATION					E 16	Deductive Reasoning		4	Perceptual Speed
									6	Image/Pattern Formation
2.3.1	DETERMINE NEED FOR AIRSPACE PROXIMITY PROBE					E 17	Inductive Reasoning		10	Recog. Spatial
									11	Pattern Transform. Spatial Pattern
2.3.2	DETERMINE VALIDITY OF SPECIAL USE AIRSPACE PROBE RESULTS					E 16	Deductive Reasoning		6	Image/Pattern Formation
2.4.1	OBSERVE DISPLAY FOR FIXED OBSTRUCTIONS AND NON-CONTROLLED AIRBORNE OBJECTS THAT MAY INTERFERE WITH AIRCRAFT FLIGHT								3	Form Perception
2.4.2	EVALUATE CONFLICT RESOLUTION ADVISORIES	A				E 15	Sensitivity to Prob. Ideational Fluency		4	Perceptual Speed
						16	Deductive Reasoning		6	Image/Pattern Formation
2.4.3	FORMULATE ADVISORY/RESOLUTION CONTENT				C D	7	Technical Grammar			
						11	Expressional Fluency			
2.4.4	DETECT AIRCRAFT MANEUVER IN RESPONSE TO ADVISORY								11	Transform. Spatial Patterns
2.5.1	DETERMINE VALIDITY/APPROPRIATENESS OF USE OF AN ALERT DISPLAY					E 16	Deductive Reasoning		4	Perceptual Speed
									6	Image/Pattern Formation
2.5.2	INHIBIT CONFLICT ALERT FOR PAIRED AIRCRAFT	A					1	Sensitivity to Prob.		

TABLE 5-5. INFORMATION PROCESSING TASK ANALYSIS (continued)

Task No	Task Statement						Cognitive Attribute		Perceptual Attribute	
		Action Initiation	Adaptive	Knowledge Base	Transformations	Reasoning	No	Definition	No	Definition
		A	B	C	D	E				
2.5.3	INHIBIT CONFLICT ALERT FOR GROUP SUPPRESSION	A					1	Sensitivity to Prob.		
2.5.4	INHIBIT CONFLICT ALERT IN SPECIFIED AREA	A					1	Sensitivity to Prob.		
2.5.5	INHIBIT MSAW FUNCTION IN SPECIFIED AREA	A					1	Sensitivity to Prob.		
2.5.6	INHIBIT MSAW FUNCTION FOR SPECIFIED AIRCRAFT	A					1	Sensitivity to Prob.		
2.5.7	RESTORE SPECIFIC ALERT FUNCTION TO NORMAL	A					1	Sensitivity to Prob.		
3.1.1	EVALUATE CONSTRAINT EFFECT ON FLOW	A					1	Sensitivity to Prob.		
3.1.2	CHOOSE DESIRED SEQUENCE				E		17	Inductive Reasoning	6 11	Image Pattern Formation Transform. Spatial Patterns
3.1.3	SELECT NEW FLOW SEQUENCE	A			D	E	2 14 16	Planning Ability Probability Est. Deductive Reasoning		
3.1.4	DETERMINE THE TECHNIQUE FOR A DELAY	A			D	E	2 11 16	Planning Ability Expressional Fluency Deductive Reasoning		
3.2.1	PERCEIVE AN ALTITUDE OR ROUTE DEVIATION					E	16	Deductive Reasoning	3 7	Form Perception Visual Recognition
3.2.2	OBSERVE AIRCRAFT RESUMING NORMAL FLIGHT PLAN								3 7	Form Perception Visual Recognition
3.2.3	DETERMINE MANEUVER TO ESTABLISH/RESTORE FLIGHT PLAN CONFORMANCE					E	16	Deductive Reasoning	11	Transform. Spatial Patterns
3.3.1	REQUEST AIRSPACE PROXIMITY PROBE									
3.3.2	DESIGNATE/DELETE AN AREA IN USE				C	D	7 13	Technical Grammar Input Transformation	6	Image/Pattern Formation
3.3.3	DETERMINE WHETHER ATC CONTROLS SPECIAL USE AIRSPACE				C		9	Long-Term Memory	3	Form Perception
3.3.4	RESTRICT AIRCRAFT ACTIVITY IN AREA BY ALTITUDE OR SEGMENT					E	15	Ideational Fluency	6 11	Image/Pattern Formation Transform. Spatial Patterns
3.3.5	OBSERVE DISPLAY OF AIRSPACE RESTRICTION STATUS CHANGE									
3.4.1	DETERMINE DESCENT TIME OR POINT	A				E	1 16	Sensitivity to Prob. Deductive Reasoning	1 11	Movement Detection Transform. Spatial Patterns
3.4.2	PROJECT TRAFFIC SEQUENCE TO ESTABLISH/MODIFY APPROACH FLOW TO AIRPORT OR SECTOR				D	E	14 16	Probability Est. Deductive Reasoning	1 4 11	Movement Detection Perceptual Speed Transform. Spatial Patterns
3.4.3	OBSERVE RANGE/BEARING BETWEEN AIRCRAFT				D		14	Probability Est.	3	Form Perception
3.6.1	OBSERVE AIRSPACE INTRUSION BY A NON-CONTROLLED OBJECT								1 3	Movement Detection Form Perception

TABLE 5-5. INFORMATION PROCESSING TASK ANALYSIS (continued)

Task No.	Task Statement	A: Action Initiation	B: Adaptive	C: Knowledge Base	D: Transformations	E: Reasoning	Cognitive Attribute		Perceptual Attribute	
							No.	Definition	No.	Definition
4.3.2	COMPOSE ENTER REMINDER NOTE OF AIRSPACE INTERSECTION									
4.3.3	FLIGHT FOLLOW AN OBSERVE NON-CONTROLLED OBJECT								2 6	Spatial Scanning Image-Pattern Formation
4.3.4	ENTER TRIAL FLIGHT PLAN AMENDMENT									
4.3.5	REVIEW POTENTIAL IMPEDIMENTS FOR IMPACT ON PROPOSED CLEARANCE								3 12	Form Perception Transform. Spatial Patterns
4.3.6	SELECT CONFLICT RESOLUTION ADVISORY OPTION	A			E		1 6	Sensitivity to Prob Deductive Reasoning	6	Image-Pattern Formation
4.3.7	FORMULATE A CLEARANCE WITH APPROPRIATE INSTRUCTIONS	A			E		1 11 15 16	Sensitivity to Prob Expressional Fluency Ideational Fluency Deductive Reasoning	4 6	Perceptual Speed Image-Pattern Formation
4.3.8	QUERY PILOT REGARDING COMPLIANCE WITH CLEARANCE						6	Verbal Comprehension		
4.3.9	ISSUE CLEARANCE AND INSTRUCTIONS TO PILOT						7	Technical Grammar		
4.3.10	ISSUE CLEARANCE THRU AUDIO PSS FOR REPLY TO PILOT						7	Technical Grammar		
4.3.11	VERIFY AIRCRAFT COMPLIANCE WITH CLEARANCE	A					17	Inductive Reasoning	3	Form Perception
4.3.12	DECLARE EMERGENCY EVENT AND ENVOKE CONTINGENCY PLAN	A			E		1 4 9 16	Sensitivity to Prob Verbal Comprehension Long-Term Memory Deductive Reasoning	1 11	Movement Detection Transform. Spatial Patterns
4.3.13	PERCEIVE PRESENCE OF SPECIAL OPERATIONS				E		9 17	Long-Term Memory Inductive Reasoning	1	Spatial Scanning
4.4.1	OBSERVE NEW FLIGHT PLAN ALERT								2	Spatial Scanning
4.4.2	REVIEW FLIGHT PLAN FOR COMPLETENESS	A					1	Sensitivity to Prob	4	Perceptual Speed
4.4.3	COMPOSE ENTER FLIGHT PLAN						7	Technical Grammar		
4.4.4	DELETE NEW FLIGHT PLAN ALERT									
4.4.5	REVIEW FLIGHT PLAN FOR ERRORS DATA LIST SEQUENCE	A					1	Sensitivity to Prob	3	Form Perception
4.5.1	RECEIVE FLIGHT PLAN AMENDMENT FROM COMPUTER								2	Spatial Scanning
4.5.2	HIGHLIGHT FLIGHT PLAN POSTING FOR REMINDER ACTION									
4.5.3	COMPOSE ENTER FLIGHT PLAN AMENDMENT						7	Technical Grammar		
4.5.4	ENTER PILOT'S POSITION REPORT IN SYSTEM						7	Technical Grammar		
4.5.5	DELETE FLIGHT PLAN AMENDMENT HIGHLIGHTING									
4.5.6	RESERVE DISPLAY IF ALARMED									Movement Detection

TABLE 5-5. INFORMATION PROCESSING TASK ANALYSIS (continued)

Task No.	Task Statement	Action Initiation	Adaptive Knowledge base	Transformations	Reasoning	Cognitive Attribute		Perceptual Attribute	
						No.	Definition	No.	Definition
	LINE INTENSITY BASE HEIGHT MOVEMENT							3	Form Perception
5.1.2	RECEIVE SIGMET AIRMET							11	Transform. Spatial Patterns
5.1.3	RECEIVE WEATHER BRIEFING FROM METEOROLOGIST								
5.1.4	ENTER PIREP INTO SYSTEM								
5.1.5	DETERMINE WHETHER ADJACENT CONTROLLER OR PILOT NEEDS WEATHER ADVISORY	A	E			1	Sensitivity to Prob. Social Intelligence	11	Transform. Spatial Patterns
5.1.6	DETERMINE WEATHER IMPACT ON ROUTES/FLW	A		E		16	Sensitivity to Prob. Deductive Reasoning	11	Transform. Spatial Patterns
5.1.7	DETERMINE ALTITUDE ROUTE CHANGE TO BYPASS SEVERE WEATHER			E		17	Inductive Reasoning	11	Transform. Spatial Patterns
5.2.1	RECEIVE WEATHER SEQUENCE								
5.2.2	RECEIVE WEATHER REPORT UPDATE								
5.2.3	DETERMINE WHETHER USABLE FLIGHT LEVEL HAS CHANGED			E		16	Deductive Reasoning		
5.2.4	DETERMINE WHETHER RUNWAY CONDITIONS HAVE CHANGED			E		16	Deductive Reasoning		
5.2.5	DETERMINE WHETHER CONTROL ZONE IS OPEN								Visual Recognition
6.2.1	REVIEW SYSTEM STATUS							2	Spatial Scanning
6.2.2	REVIEW TRAFFIC STATUS-WEATHER	A				1	Sensitivity to Prob. Planning Ability	6	Image/Pattern Formation
6.2.3	VERIFY THAT ALL REQUIRED DISPLAY AND COMMUNICATION SWITCHES ARE IN PROPER LOCATION							2	Spatial Scanning
6.2.4	PERFORM LOG-ON SEQUENCE AT DESIGNATED CONSOLE								
6.2.5	ADJUST PARAMETERS AND DISPLAY TO PERSONAL PREFERENCE			D		13	Input Transformation	7	Visual Recognition
6.2.6	CHECK DISPLAY FOR PROPER ALIGNMENT, USABILITY, AND SATISFACTORY STATUS	A				1	Sensitivity to Prob.	7	Visual Recognition
6.2.7	SET-UP WORKSTATION ADAPTION PARAMETERS			D		13	Input Transformation		
6.3.1	DETECT NON-ACCEPTANCE OF INPUT DATA	A				1	Sensitivity to Prob.		
6.4.1	DETECT OCCURRENCE OF SECTOR SUITE FAILURE	A				1	Sensitivity to Prob.		
6.4.2	OBSERVE SECTOR SUITE DATA BASE RESTORATION COMPLETION MESSAGE								Visual Recognition
6.5.1	DETECT OCCURRENCE OF ACCO FAILURE	A				1	Sensitivity to Prob.		

TABLE 5-5. INFORMATION PROCESSING TASK ANALYSIS (continued)

Task No	Task Statement						Cognitive Attribute		Perceptual Attribute	
		Action Initiation	Adaptive	Knowledge Base	Transformations	Reasoning	No	Definition	No	Definition
		A	B	C	D	E				
6.5.2	REVERT TO ACCO BACKUP PROCEDURES (TBD)			C			3	Long-Term Memory		
6.6.1	DETERMINE AIRCRAFT NEEDING SUBSTITUTE ROUTING			C			3	Long-Term Memory	6	Image/Pattern Formation
6.6.2	MONITOR STATUS OF QUESTIONABLE NAVAID		B				4	Screen/Filter		
6.6.3	OBSERVE SUBSTITUTE ROUTING ON DISPLAY									
6.7.1	DETERMINE COMMUNICATION FAULT					E	16	Deductive Reasoning		
6.7.2	ADJUST COMMUNICATION STRATEGY		B				5	Mental Multiplexing		
6.7.3	SWITCH TO BACKUP RADIO/FREQUENCY									
6.8.1	DETERMINE IMPENDING CONTROLLER OVERLOAD	A	B				2 5	Planning Ability Mental Multiplexing	15	Sensory Multiplexing
6.8.2	EXCHANGE ASSIGN INTRACOMMUNICATION RESPONSIBILITIES									
6.8.3	REQUEST ASSISTANCE OR RELIEF									
6.9.1	PERCEIVE TRACKING FAULT OR TRANSPONDER FAILURE					E	17	Inductive Reasoning	4	Perceptual Speed
6.9.2	REPOSITION/UPDATE/REASSOCIATE DATA BLOCKS								6	Image/Pattern Formation
6.10.1	OBSERVE MESSAGE ON LOSS OF DATA BASE									
6.10.2	DETECT FAILURE TO UPDATE FLIGHT PLAN DATA BASE	A				E	1 16	Sensitivity to Prob. Deductive Reasoning		
6.10.3	ENTER DISPLAY AMENDMENT MESSAGE ON CONSOLE									
6.10.4	ENTER FLIGHT PLAN ON CONSOLE									
6.10.5	RESEQUENCE FLIGHT PLAN ON CONSOLE									
6.11.1	DETECT UNRELIABLE VSCS COMMUNICATION	A					1	Sensitivity to Prob.		
7.1.1	ADVISE CONTROLLER SUPERVISOR OF AIRCRAFT FLIGHT PLAN DEVIATION	A	B				1 2	Sensitivity to Prob. Social Intelligence	1	Movement Detection
7.1.2	ADVISE CONTROLLER OF RESULTS OF FLIGHT PLAN CONFLICT PROBE	A	B				1 3	Sensitivity to Prob. Social Intelligence		
7.1.3	ADVISE CONTROLLER OF POTENTIAL CONFLICT IN HIS SECTOR	A	B				1 3	Sensitivity to Prob. Social Intelligence		
7.1.4	ADVISE CONTROLLER OF POTENTIAL MSAM IN HIS SECTOR	A	B				1 3	Sensitivity to Prob. Social Intelligence		
7.2.1	RECEIVE CONTROLLER NOTICE OF POTENTIAL AIRCRAFT CONFLICT IN SECTOR	A				E	1 15	Planning Ability Ideational Fluency		
7.2.2	RECEIVE CONTROLLER NOTICE OF POTENTIAL MSAM IN SECTOR	A				E	1 15	Planning Ability Ideational Fluency		

TABLE 5-5. INFORMATION PROCESSING TASK ANALYSIS (continued)

Task No	Task Statement	Action Initiation A	Adaptive B	Knowledge base C	Transformations D	Reasoning E	Cognitive Attribute		Perceptual Attribute	
							No.	Definition	No.	Definition
7.2.3	RECEIVE CONTROLLER NOTICE OF AIRCRAFT FLIGHT PLAN DEVIATION	A					1	Sensitivity to Prob.		
							2	Planning Ability		
7.2.4	RECEIVE CONTROLLER NOTICE ON RESULTS OF FLIGHT PLAN CONFLICT PROBE	A					1	Sensitivity to Prob.		
							2	Planning Ability		
7.3.1	ISSUE POINTOUT			C		E	7	Technical Grammar		
							16	Deductive Reasoning		
7.3.2	OBSERVE AUTOMATIC INITIATION OF POINTOUT TO ANOTHER CONTROLLER								7	Visual Recognition
7.3.3	DIRECT FLIGHT DATA DISPLAY TO ADJACENT CONTROLLER			C		E	7	Technical Grammar		
							16	Deductive Reasoning		
7.3.4	RECEIVE ACCEPTANCE OF POINTOUT								3	Form Perception
7.3.5	RECEIVE REJECTION OF POINTOUT				E		17	Inductive Reasoning	3	Form Perception
7.4.1	RECEIVE CONTROLLER INITIATED POINTOUT								2	Spatial Scanning
									3	Form Perception
7.4.2	ACCEPT POINTOUT	A	B			E	2	Planning Ability		
							4	Screen/Filter		
							16	Deductive Reasoning		
7.4.3	REJECT POINTOUT	A	B			E	2	Planning Ability		
							4	Screen/Filter		
							16	Deductive Reasoning		
7.4.4	SUPPRESS FULL DATA BLOCK AFTER POINTOUT					E	16	Deductive Reasoning		
7.5.1	RECEIVE NOTICE OF AIRSPACE RESTRICTION/RELEASE FROM CONTROLLER/SUPERVISOR									
7.5.2	REQUEST RELEASE OF SPECIAL USE AIRSPACE	B	C				3	Social Intelligence		
							7	Technical Grammar		
7.5.3	RECEIVE DENIAL OF REQUEST FOR RELEASE OF SPECIAL USE AIRSPACE									
7.6.1	ADVISE CONTROLLER OF AIRSPACE RESTRICTION IMPOSED	B		D			3	Social Intelligence		
							13	Input Transformation		
7.6.2	ISSUE ADVISORY IN REGARD TO RESTRICTED AIRSPACE PROXIMITY			D	E		11	Expressional Fluency	1	Movement Detection
							16	Deductive Reasoning	3	Form Perception
7.7.1	RECEIVE NOTICE TO TAKE OVER AIRSPACE	B					4	Mental Multiplexing		
7.7.2	RECEIVE NOTICE TO RECONFIGURE SECTOR	B					5	Mental Multiplexing		
7.7.3	RECEIVE NOTICE TO RELEASE AIRSPACE	B					5	Mental Multiplexing		
7.8.1	RECEIVE FLIGHT PLAN FROM PILOT			C			13	Input Transformation		
7.8.2	RECEIVE FLIGHT PLAN VERBALLY FORWARDED			C			13	Input Transformation		
7.9.1	QUERY PILOT ABOUT FLIGHT PLAN	A	B				1	Sensitivity to Prob.		
							3	Social Intelligence		

TABLE 5-5. INFORMATION PROCESSING TASK ANALYSIS (continued)

Task No	Task Statement						Cognitive Attribute		Perceptual Attribute	
		Action Initiation	Adaptive	Knowledge base	Transformations	Reasoning	No.	Definition	No.	Definition
		A	B	C	D	E				
7.9.0	QUERY THE RELATES OF A FLIGHT PLAN	A	B				1 3	Sensitivity to Prob. Social Intelligence		
7.9.1	RECEIVE CONTROLLER NOTICE ON REQUESTED CLEARANCE OF AIRCRAFT LEAVING HIS SECTOR									
7.9.2	DENY CLEARANCE REQUEST FROM CONTROLLER	A	B				1 3 4	Sensitivity to Prob. Social Intelligence Screen/Filter	11	Transform. Spatial Patterns
7.9.3	SUGGEST ALTERNATE TO CLEARANCE REQUEST FROM CONTROLLER	A	B				1 3	Sensitivity to Prob. Social Intelligence	4 11	Perceptual Speed Transform. Spatial Patterns
7.9.4	RECEIVE CLEARANCE REQUEST FROM ATCT/FSS/PILOT/SUPERVISOR								2	Spatial Scanning
7.9.5	RECEIVE CONTROLLER REQUEST FOR CLEARANCE/APPROVAL								2	Spatial Scanning
7.9.6	DENY CLEARANCE REQUEST		B			E	3 16	Social Intelligence Deductive Reasoning		
7.9.7	SUGGEST CLEARANCE ALTERNATIVES TO PILOT	A	B			E	1 3 16	Sensitivity to Prob. Social Intelligence Deductive Reasoning	10 11	Recog. Spatial Patt Transform. Spatial Patterns
7.9.8	ACKNOWLEDGE DATA LINK CLEARANCE REQUEST								2	Spatial Scanning
7.9.9	APPROVE CLEARANCE REQUEST FROM CONTROLLER		B			E	3 16	Social Intelligence Deductive Reasoning		
7.9.10	FORWARD CLEARANCE REQUEST TO ADJACENT CONTROLLER									
7.10.1	REQUEST CLEARANCE/APPROVAL FROM ADJACENT CONTROLLER		B		E		3 11	Social Intelligence Expressional Fluency		
7.10.2	RECEIVE CLEARANCE APPROVAL/CLEARANCE RESTRICTIONS FROM ADJACENT CONTROLLER			C			8	Verbal Comprehension		
7.10.3	RECEIVE CLEARANCE DISAPPROVAL/DENIAL FROM ADJACENT CONTROLLER			C			8	Verbal Comprehension		
7.10.4	RECEIVE ALTERNATE SUGGESTION FOR CLEARANCE/APPROVAL REQUESTED OF ADJACENT CONTROLLER			C			8	Verbal Comprehension		
7.11.1	FORWARD FLIGHT PLAN AMENDMENT VERBALLY			C			7	Technical Grammar		
7.11.2	RECEIVE CONTROLLER ADVICE OF UNABLE FLIGHT PLAN AMENDMENT	A					1	Sensitivity to Prob.		
7.12.1	RECEIVE FLIGHT PLAN AMENDMENT VERBALLY FORWARDED									
7.12.2	ADVISE CONTROLLER UNABLE FLIGHT PLAN AMENDMENT	A	B				1 2 3 5	Sensitivity to Prob. Planning Ability Social Intelligence Mental Multiplexing		
7.13.1	RECEIVE DEPARTURE MESSAGE FROM CONTROLLER/FSS/PILOT									

TABLE 5-5. INFORMATION PROCESSING TASK ANALYSIS (continued)

Task No	Task Statement	Action Initiation	Adaptive	Knowledge Base	Transformations	Reasoning	Cognitive Attribute		Perceptual Attribute	
							No	Definition	No	Definition
7.14.1	ISSUE NOTICE OF EQUIPMENT STATUS TO ADJACENT CONTROLLER/PILOT/SUPERVISOR		B				3	Social Intelligence		
7.14.2	TERMINATE RADAR SERVICE TO AIRCRAFT					E	16 17	Deductive Reasoning Inductive Reasoning	1	Movement Detection
7.14.3	REQUEST PILOT POSITION REPORTS									
7.14.4	RECEIVE PILOT'S POSITION REPORT									
7.14.5	FORWARD FLIGHT PLAN VERBALLY		B				3	Social Intelligence		
7.14.6	DELETE PILOT POSITION REPORTS									
7.14.7	CONFIRM COMPUTER ACTION DURING TRANSITION STAGES		B				3	Social Intelligence		
7.15.1	RECEIVE NOTICE OF STATUS OF ADJACENT ACF AUTOMATION EQUIPMENT									
7.15.2	RECEIVE STATUS OF SECTOR SUITE FAILURE FROM CONTROLLER/SUPERVISOR									
7.15.3	RECEIVE CONFIRMATION OF COMPUTER ACTION DURING TRANSITION STAGES									
7.16.1	COMPOSE/ENTER REQUESTED ROUTE/ALTITUDE CHANGE	A	B				2 4	Planning Ability Screen/Filter		
7.17.1	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER/SUPERVISOR/METEOROLOGIST	A			D		1 13	Sensitivity to Prob. Input Transformation		
7.17.2	RECEIVE REVISION/CANCELLATION TO PREVIOUS WEATHER REPORT									
7.17.3	RECEIVE WIND SHEAR REPORT					E	17	Inductive Reasoning	11	Transform. Spatial Patterns
7.17.4	RECEIVE PIREP ON WEATHER									
7.17.5	SET AT WEATHER/ADVISORY/UPDATE FOR DATA LINK TRANSMISSION TO PILOT	A					1	Sensitivity to Prob.		
7.17.6	ISSUE WEATHER/ADVISORY/UPDATE TO PILOT/ADJACENT CONTROLLER	A					1	Sensitivity to Prob.		
7.17.7	FORWARD WEATHER INFORMATION TO SUPERVISOR/METEOROLOGIST	A					1	Sensitivity to Prob.	3	Form Perception
7.17.8	ADVISE SUPERVISOR/FLOW CONTROLLER OF WEATHER IMPACT ON ROUTES/FLOW	A					1	Sensitivity to Prob.	3	Form Perception
7.17.9	RECEIVE CONTROLLER REQUEST FOR WEATHER INFORMATION									
7.17.10	REQUEST WEATHER INFORMATION									
7.18.1	RECEIVE NOTICE OF COMMUNICATION STATUS									

TABLE 5-5. INFORMATION PROCESSING TASK ANALYSIS (continued)

Task No	Task Statement	Action Initiation A	Adaptive B	Knowledge base C	Transformations D	Reasoning E	Cognitive Attribute		Perceptual Attribute	
							No	Definition	No	Definition
7.18.2	RECEIVE NEW FREQUENCY ASSIGNMENT									
7.18.3	RECEIVE NOTICE OF ALTERNATE COMMUNICATION PATH									
7.19.1	FORWARD NOTICE OF COMMUNICATION STATUS		B				3	Social Intelligence		
7.19.2	FORWARD NEW FREQUENCY ASSIGNMENT TO ADJACENT CONTROLLER/SUPERVISOR	A	B				1 3	Sensitivity to Prob. Social Intelligence		
7.19.3	FORWARD ALTERNATE COMMUNICATION PATH		B				3	Social Intelligence		
7.20.1	RECEIVE NOTICE OF NAVAID STATUS FROM ADJACENT CONTROLLER/FSS/SUPERVISOR/PILOT									
7.20.2	RECEIVE SUBSTITUTE ROUTING									
7.20.3	RECEIVE CANCELLATION OF SUBSTITUTE ROUTING									
7.21.1	FORWARD NAVAID STATUS TO ADJACENT CONTROLLER/SUPERVISOR/PILOT									
7.21.2	FORWARD SUBSTITUTE ROUTING									
7.21.3	CANCEL PREVIOUS SUBSTITUTE ROUTING									
7.22.1	FORWARD NOTICE OF AIRSPACE INTRUSION BY A NON-CONTROLLED OBJECT	A	B				1 3	Sensitivity to Prob. Social Intelligence		
7.22.2	RECEIVE NOTICE OF AIRSPACE INTRUSION BY A NON-CONTROLLED OBJECT									
7.22.3	ISSUE ADVISORY IN REGARD TO A NON-CONTROLLED OBJECT	A					1	Sensitivity to Prob.		
7.22.4	ADVISE PILOT WHEN CLEAR OF NON-CONTROLLED OBJECT				E	16		Deductive Reasoning		
7.23.1	RECEIVE RUNWAY USE DATA									
7.24.1	FORWARD RUNWAY USE DATA									
7.25.1	DETECT A PILOT OR AIRCRAFT PROBLEM (E.G., HYPOXIA)		B		E	3 5 16		Social Intelligence Mental Multiplexing Deductive Reasoning	1 6 15	Movement Detection Image Pattern Formation Sensory Multiplexing
7.25.2	ALERT DESIGNATED PERSONNEL OF AIRCRAFT HAVING FLIGHT PROBLEMS			C		9		Long-Term Memory		
7.25.3	FORWARD CONTINGENCY INFORMATION TO SUPERVISOR/ADJACENT CONTROLLER			C		8		Verbal Comprehension		
7.26.1	RECEIVE SUPERVISOR NOTICE TO INHIBIT ALERT	A					2	Planning Ability		

TABLE 5-5. INFORMATION PROCESSING TASK ANALYSIS (continued)

Task No	Task Statement	Action Initiation A	Adaptive B	Knowledge base C	Transformations D	Reasoning F	Cognitive Attribute		Perceptual Attribute	
							No	Definition	No	Definition
7.27.1	BRIEF RELIEVING CONTROLLER	A	B	C			1 2 3 6	Sensitivity to Prob. Planning Ability Social Intelligence Short-Term Memory	15	Sensory Multiplexing
7.28.1	RECEIVE NOTICE OF SPECIAL OPERATIONS			C			5	Mental Multiplexing		
7.29.1	FORWARD NOTICE OF SPECIAL OPERATIONS TO ADJACENT CONTROLLER/SUPERVISOR		B				3	Social Intelligence		
7.30.1	RECEIVE INFORMATION ON LOSS OF RADIO CONTACT WITH AIRCRAFT	A					1	Sensitivity to Prob.		
7.30.2	CONDUCT RADIO/RADAR SEARCH FOR AIRCRAFT WITHOUT RADIO CONTACT								1 2	Movement Detection Spatial Scanning
7.30.3	ATTEMPT ESTABLISHMENT OF COMMUNICATIONS USING TRANSPONDER/RADAR EQUIPMENT	A					1	Sensitivity to Prob.	2	Spatial Scanning
7.31.1	RECEIVE INFORMATION ON OVERDUE AIRCRAFT									
7.31.2	CONTACT FACILITY ALONG ROUTE OF FLIGHT TO SECURE INFORMATION ON OVERDUE AIRCRAFT	A					1	Sensitivity to Prob.		
7.31.3	CONDUCT RADIO/RADAR SEARCH FOR OVERDUE AIRCRAFT	A					1	Sensitivity to Prob.	2	Spatial Scanning
7.32.1	EXPLORE WHETHER OTHERS ARE RECEIVING AN AIRCRAFT'S TRANSMISSIONS				E	16		Deductive Reasoning		
7.32.2	ISSUE ALTERNATE COMMUNICATION FOR AIR/GROUND TRANSMISSION				E	15		Ideational Fluency		
7.33.1	RECEIVE PILOT/ADJACENT CONTROLLER REQUEST FOR FLIGHT FOLLOWING									
7.33.2	DENY FLIGHT FOLLOWING REQUEST	A					2	Planning Ability		
7.33.3	REQUEST/ASSIGN BEACON CODE TO AIRCRAFT									
7.33.4	ISSUE TRAFFIC ADVISORY IN REGARD TO TRAFFIC PROXIMITY			C	D		7 11	Technical Grammar Expressional Fluency	4 6	Perceptual Speed Image/Pattern Formation
7.33.5	ADVISE PILOT WHEN CLEAR OF TRAFFIC				E	16		Deductive Reasoning	3	Form Perception
7.34.1	RECEIVE A FAD NOTICE									
7.34.2	CONFER WITH PILOT THRU ATCT ON DESIRE FOR FAD INTENTIONS		B				3	Social Intelligence		
7.35.1	RECEIVE REQUESTED ROUTE/ALTITUDE CHANGES FROM ANOTHER CONTROLLER FLOW CONTROLLER/SUPERVISOR									
7.35.2	RECEIVE A FLOW RESTRICTION									
7.35.3	RECEIVE METERING DATA FROM FLOW CONTROLLER									

TABLE 5-5. INFORMATION PROCESSING TASK ANALYSIS (continued)

Task No	Task Statement:	A. Action initiation	B. Adaptive	C. Knowledge base	D. Transformations	E. Reasoning	Cognitive Attribute		Perceptual Attribute	
							No	Definition	No	Definition
7.35.4	REQUEST FLOW CONTROL BE IMPOSED	A	B			E	2 4 17	Planning Ability Screen Filter Inductive Reasoning		
7.35.5	NEGOTIATE DELAY TECHNIQUE WITH PILOT		B				3	Social Intelligence		
7.35.6	FORWARD REQUESTED ROUTE/ALTITUDE CHANGES TO ADJACENT CONTROLLER/FLOW CONTROLLER/SUPERVISOR									
7.36.1	ISSUE ADVISORY IN REGARD TO FLIGHT PLAN DEVIATION		B	C			2 8	Social Intelligence Verbal Comprehension		
7.37.1	RECEIVE/OBSERVE HANDOFF								2	Spatial Scanning
7.37.2	ACCEPT VERBAL HANDOFF/START TRACK								3	Form Perception
7.37.3	REJECT HANDOFF	A				E	1 2 16	Sensitivity to Prob. Planning Ability Deductive Reasoning	1 2	Movement Detection Spatial Scanning
7.37.4	ACCEPT AUTOMATIC HANDOFF									
7.37.5	VERIFY COMMUNICATIONS WITH PILOT ON TRANSFER OF CONTROL OR DEPARTURE									
7.37.6	VERIFY AIRCRAFT ALTITUDE WITH PILOT ON TRANSFER OF CONTROL OR DEPARTURE	A					1	Sensitivity to Prob.	6	Image/Pattern Formation
7.37.7	CONFIRM DATA LINK COMMUNICATIONS								2	Spatial Scanning
7.38.1	INITIATE HANDOFF		B				3	Social Intelligence	7	Visual Recognition
7.38.2	OBSERVE AUTOMATIC INITIATION OF HANDOFF								2	Spatial Scanning
7.38.3	RETRACT HANDOFF		B				3	Social Intelligence		
7.38.4	RECEIVE HANDOFF ACCEPTANCE									
7.38.5	CONFER ON TRANSFER OF CONTROL WITH OTHER CONTROLLER	A	B				1 2 3	Sensitivity to Prob. Planning Ability Social Intelligence		
7.38.6	ISSUE CHANGE OF FREQUENCY TO PILOT				D		11	Expressional Fluency		
7.39.1	RECEIVE NOTICE OF RADAR SENSOR STATUS FROM ADJACENT CONTROLLER/SUPERVISOR									
7.40.1	FORWARD NOTICE OF RADAR SENSOR STATUS TO ADJACENT CONTROLLER/SUPERVISOR									
7.41.1	REQUEST TEMPORARY USE OF AIRSPACE	A			C	E	1 2 14 16	Sensitivity to Prob. Planning Ability Probability Est. Deductive Reasoning	1	Movement Detection
7.41.2	RECEIVE RELEASE/USE OF AIRSPACE								3 6	Form Perception Image/Pattern Formation

TABLE 5-5. INFORMATION PROCESSING TASK ANALYSIS (continued)

Task No.	Task Statement	A Action initiation	B Adaptive	C Knowledge base	D Transformations	E Reasoning	Cognitive Attribute		Perceptual Attribute	
							No.	Definition	No.	Definition
7.41.3	RECEIVE REJECTION OF USE OF AIRSPACE	A					1	Sensitivity to Prob.	3	Form Perception
7.42.1	RECEIVE CONTROLLER REQUEST FOR TEMPORARY USE OF AIRSPACE								1 3	Movement Detection Form Perception
7.42.2	FORWARD APPROVAL FOR TEMPORARY USE OF AIRSPACE					E	16	Deductive Reasoning		
7.42.3	FORWARD DENIAL OF TEMPORARY USE OF AIRSPACE					E	16	Deductive Reasoning		
7.42.4	SUPPRESS MAP ASSOCIATED WITH TEMPORARY USE OF AIRSPACE					E	16	Deductive Reasoning		

5.4 Potential Capacity Limitations

Human performance is bounded by the limitations of the cognitive, perceptual, and motor systems. These limitations clearly vary from individual to individual, but useful generalizations can be drawn in terms of performance limitations according to a diverse set of models ranging from goal oriented behavior (Card, Moran & Newell, Ref. 2), stochastic decision theory (Wallsten, Ref. 14), to motivationally based performance (Nickerson, Ref. 11). Here, we use a task-level applications-oriented view which assumes that human performance can be limited by a set of significant factors including:

Mental Attributes of Capacity

- Short-Term Memory
- Working Memory
- Long-Term Memory
- Cognitive Skills
- Knowledge
- Experience
- Personality/Style
- Stress Profile
- Aptitudes
- Fatigue and Error
- Motivation

Physical Attributes of Capacity

- Motor Skills
- Visual Acuity
- Color Perception
- Hearing Ability
- Fatigue

These and other factors interact with task requirements to significantly affect operator and, ultimately, system performance. Human performance limitations such as these are typically manifested in response time decrements, memory/recall omissions or lags, failure to adhere to standard operating procedures, and the like.

The analysis presented in Table 5-6 examines each task to document potential significant human performance limitations. These limitations are posited independent of scenario constraints or individual differences. The focus is rather on the cognitive and perceptual attributes involved in

each task as documented in section 5.3. In doing so, the foundation for structuring machine aiding requirements (see section 5.5) is established to obviate performance shortfalls identified in Table 5-6.

Note in Table 5-6 that possible limitations are mapped to the task level within Activities 1.0 through 6.0, and to the activity level in Activity 7.0, Perform Coordination. This is due to the fact that all tasks within Activity 7.0 involve receipt or transmittal of information. The inherent similarity of tasks within Activity 7.0, from a human factors point of view, indicates that "possible significant limitations" (and ultimately "machine aiding requirements") be posed in terms of the full aggregate of coordination tasks (represented at the activity level), rather than on a task-by-task basis to avoid redundancy.

TABLE 5-6 POSSIBLE SIGNIFICANT LIMITATIONS

TASK NO.	TASK	POSSIBLE SIGNIFICANT LIMITATIONS
1.1.1	REVIEW FLIGHT PLAN DISPLAY FOR PRESENT AND/OR FUTURE AIRCRAFT SEPARATION	DISPLAY SEARCH TIME WILL INCREASE WITH NUMBER OF ACTIVE FLIGHT PLANS. TOO MUCH FLIGHT PLAN DATA MAY LEAD TO ERRORS OF OMISSION.
1.1.2	REVIEW SITUATION DISPLAY FOR POTENTIAL VIOLATION OF SEPARATION STANDARDS.	REQUIRES KNOWLEDGE OF FLIGHT PLANS AND ABILITY TO EXTRAPOLATE TRAJECTORIES IN TIME. REQUIRES CONTINUOUS VIGILANCE.
1.1.3	REVIEW FLIGHT PLAN CONFLICT PROBE RESULTS	
1.1.4	PROJECT AIRCRAFT FUTURE POSITION/ ALTITUDE/PATH	REQUIRES KNOWLEDGE OF FLIGHT PLAN AND ABILITY TO EXTRAPOLATE TRAJECTORIES IN TIME.
1.1.5	READ-OUT RANGE/ BEARING/TIME FOR AN AIRCRAFT TO A FIX OR GEOGRAPHIC POINT	
1.1.6	FORCE/QUICK LOOK FULL DATA BLOCK/S TO EXAMINE TRACK INFORMATION ON AIRCRAFT	
1.1.7	DETERMINE WHETHER AIRCRAFT WILL BE SEPARATED BY LESS THAN PRESCRIBED MINIMA.	REQUIRES KNOWLEDGE OF FLIGHT PLAN AND ABILITY TO EXTRAPOLATE TRAJECTORIES IN TIME, AND CONTINUOUS VIGILANCE.
1.1.8	SELECT FDE SORTING PRIORITY SCHEME	
1.2.1	OBSERVE DISPLAY OF NEW/CHANGED EQUIPMENT/ OPERATIONAL STATUS	MAY REQUIRE PERIPHERAL PERCEPTION OF INFORMATION, TIME SHARING WITH OTHER VISUAL TASKS.
1.2.2	OBSERVE DISPLAY OF NEW/CHANGED TRAFFIC FLOW CONTROL MANAGEMENT	MAY REQUIRE PERIPHERAL PERCEPTION OF INFORMATION, TIME SHARING WITH OTHER VISUAL TASKS.
1.3.1	SEARCH DISPLAY FOR INACTIVE FLIGHT PLAN ON CLEARANCE REQUEST	MAY REQUIRE EXTENSIVE VISUAL SEARCH IN LARGE DISPLAY FIELD FOR DESIRED FLIGHT PLAN.

TABLE 5-6 POSSIBLE SIGNIFICANT LIMITATIONS (continued)

TASK NO.	TASK	POSSIBLE SIGNIFICANT LIMITATIONS
1.3.2	PROJECT MANUAL FLIGHT PLAN PROBE	REQUIRES COMPREHENSION OF THE TRAFFIC PICTURE, AND ABILITY TO PROJECT CHANGES OVER TIME.
1.3.3	REQUEST LIMITED/ STANDARD FLIGHT/ PLAN DISPLAY	
1.3.4	REQUEST FULL FLIGHT PLAN READOUT	
1.3.5	ENTER TRIAL DEPARTURE TIME	
1.4.1	ENTER DEPARTURE MESSAGE	
1.4.2	START TRACK MANUALLY	REQUIRES ABILITY TO JUDGE CURRENT AND NEAR-TERM WORKLOAD.
1.4.3	OBSERVE AUTOMATIC TRACK START	
1.5.1	ANALYZE CONDITIONS FOR PROVIDING FLIGHT FOLLOWING	
1.6.1	OFFSET A DATA BLOCK	
1.6.2	UPDATE/REVISE INPUT REMINDER NOTE (ELECTRONIC MEMORANDA)	
1.6.3	REMOVE FLIGHT DATA ENTRIES AND FULL DATA BLOCKS FROM ACCC SYSTEM	DATA CANNOT BE RETRIEVED.
1.6.4	REMOVE FLIGHT DATA ENTRIES AND FULL DATA BLOCKS FROM INTERNAL ACCC SYSTEM	DATA CANNOT BE RETRIEVED.
1.6.5	SUSPEND DISPLAY OF	MAY REQUIRE ADDED VIGILANCE.

TABLE 5-5 POSSIBLE SIGNIFICANT LIMITATIONS (continued).

TASK NO	TASK	POSSIBLE SIGNIFICANT LIMITATIONS
	FLIGHT DATA ENTRIES AND FULL DATA BLOCKS	
1.6.6	SUSPEND TRACK	MAY REQUIRE ADDED VIGILANCE.
1.6.7	DELETE FULL DATA BLOCK FROM OWN DISPLAY	MAY REQUIRE ADDED VIGILANCE.
1.6.8	SUPPRESS FULL DATA BLOCK FROM OWN DISPLAY	MAY REQUIRE ADDED VIGILANCE.
1.6.9	DELETE FLIGHT DATA ENTRY FROM A SELECTED DISPLAY	MAY REQUIRE ADDED VIGILANCE.
2.1.1	DETECT AIRCRAFT CONFLICT ALERT INDICATION	DISPLAY CONFUSION IF MORE THAN ONE ALERT WERE TO OVERLAP IN TIME AND LOCATION.
2.1.2	DETERMINE VALIDITY OF CONFLICT ALERT NOTICE OR INDICATION	
2.2.1	DETECT MSAW INDICATION OR ALARM	DISPLAY CONFUSION IF MORE THAN ONE MSAW WERE TO OVERLAP.
2.2.2	DETERMINE VALIDITY OF MSAW NOTICE OR INDICATION	
2.3.1	DETERMINE NEED FOR AIRSPACE PROXIMITY PROBE	REQUIRES MENTAL MAP OF CURRENT SPECIAL USE AIRSPACE CONFIGURATION, ABILITY TO PROJECT FLIGHT PLAN DATA AND TRAJECTORIES OVER TIME.
2.3.2	DETERMINE VALIDITY OF SPECIAL USE AIRSPACE PROBE RESULTS	
2.4.1	OBSERVE DISPLAY FOR FIXED OBSTRUCTIONS AND NON-CONTROLLED AIRCRAFT OBJECTS THAT MAY INTERFERE WITH AIRCRAFT FLIGHT	REQUIRES KNOWLEDGE OF DISPLAY SYMBOLS, TRAFFIC PICTURE, SYMBOL SCALING, SECTOR TOPOGRAPHY.
2.4.2	EVALUATE CONFLICT RESOLUTION ADVISORIES	REQUIRES RAPID ASSESSMENT OF THE TRAFFIC PICTURE, AND HOW OTHERS MAY BE INFLUENCED BY EACH OPTION.

TABLE 5-6 POSSIBLE SIGNIFICANT LIMITATIONS (continued)

TASK NO	TASK	POSSIBLE SIGNIFICANT LIMITATIONS
2.4.3	FORMULATE ADVISORY/RESOLUTION CONTENT	REQUIRES RAPID ASSESSMENT OF THE TRAFFIC PICTURE, AND HOW OTHERS MAY BE INFLUENCED BY EACH OPTION. PRECLUDES CONCENTRATION ON OTHER TASKS.
2.4.4	DETECT AIRCRAFT MANEUVER IN RESPONSE TO ADVISORY	
2.5.1	DETERMINE VALIDITY/APPROPRIATENESS OF USE OF AN ALERT DISPLAY	
2.5.2	INHIBIT CONFLICT ALERT FOR PAIRED AIRCRAFT	MAY REQUIRE ADDED VIGILANCE TO ENSURE SEPARATION.
2.5.3	INHIBIT CONFLICT ALERT FOR GROUP SUPPRESSION	REQUIRES ADDED VIGILANCE TO ENSURE SEPARATION. CONTROLLERS MUST BE AWARE OF CONFLICT ALERT STATUS IF/WHEN SITUATION CHANGES.
2.5.4	INHIBIT CONFLICT ALERT IN SPECIFIED AREA	
2.5.5	INHIBIT MSAW FUNCTION IN SPECIFIED AREA	
2.5.6	INHIBIT MSAW FUNCTION FOR SPECIFIED AIRCRAFT	
2.5.7	RESTORE SPECIFIC ALERT FUNCTION TO NORMAL	
3.1.1	EVALUATE CONSTRAINT EFFECT ON FLOW	REQUIRES KNOWLEDGE OF TRAFFIC PICTURE, ABILITY TO PROJECT NEAR-TERM TRAFFIC SCENARIOS. CONSTRAINT'S EFFECT MUST BE ASSESSED ACCORDING TO ANTICIPATED DURATION AND SEVERITY.
3.1.2	CHOOSE DESIRED SEQUENCE	REQUIRES KNOWLEDGE OF TRAFFIC PICTURE, ABILITY TO PROJECT NEAR-TERM TRAFFIC, AND KNOWLEDGE OF CONSTRAINTS. MUST BE ABLE TO ASSESS CHOICE IN TERMS OF DOWNSTREAM EFFECTS.
3.1.3	SELECT NEW FLOW SEQUENCE	REQUIRES KNOWLEDGE OF TRAFFIC PICTURE, ABILITY TO PROJECT NEAR-TERM TRAFFIC, AND KNOWLEDGE OF CONSTRAINTS. MUST BE ABLE TO ASSESS CHOICE IN TERMS OF DOWNSTREAM EFFECTS.

TABLE 5-6 POSSIBLE SIGNIFICANT LIMITATIONS (continued)

TASK NO	TASK	POSSIBLE SIGNIFICANT LIMITATIONS
3.1.4	DETERMINE THE TECHNIQUE FOR A DELAY	REQUIRES KNOWLEDGE OF TRAFFIC PICTURE, ABILITY TO PROJECT NEAR-TERM TRAFFIC AND KNOWLEDGE OF CONSTRAINTS. MUST BE ABLE TO ASSESS CHOICE IN TERMS OF DOWNSTREAM EFFECTS.
3.2.1	PERCEIVE AN ALTITUDE OR ROUTE DEVIATION	MUST BE ABLE TO CORRELATE CURRENT ALTITUDE/ROUTE WITH ASSIGNED ALTITUDE/ROUTE TO DETECT DEVIATION.
3.2.2	OBSERVE AIRCRAFT RESUMING NORMAL FLIGHT PLAN	MUST BE ABLE TO CORRELATE CURRENT ALTITUDE/ROUTE WITH ASSIGNED ALTITUDE/ROUTE TO DETECT CONFORMANCE.
3.2.3	DETERMINE MANEUVER TO ESTABLISH/RESTORE FLIGHT PLAN CONFORMANCE	REQUIRES RAPID ASSESSMENT OF THE TRAFFIC PICTURE AND HOW ALTERNATE MANEUVERS WILL IMPACT OTHER AIRCRAFT POSITIONS. MUST ASSESS CONFLICT POTENTIAL.
3.3.1	REQUEST AIRSPACE PROXIMITY PROBE	
3.3.2	DESIGNATE/DELETE AN AREA IN USE	REQUIRES CONTROLLER'S "COGNITIVE MAP" TO CORRESPOND TO SITUATION DISPLAY.
3.3.3	DETERMINE WHETHER ATC CONTROLS SPECIAL USE AIRSPACE	
3.3.4	RESTRICT AIRCRAFT ACTIVITY IN AREA BY ALTITUDE OR SEGMENT	
3.3.5	OBSERVE DISPLAY OF AIRSPACE RESTRICTION STATUS CHANGE	MAY REQUIRE PERIPHERAL PERCEPTION OF INFORMATION, TIME SHARING WITH OTHER VISUAL TASKS.
3.4.1	DETERMINE DESCENT TIME OR POINT	REQUIRES ASSESSMENT OF TRAFFIC PICTURE AND HOW ALTERNATE DESCENTS WILL IMPACT OTHER AIRCRAFT POSITIONS. MUST ASSESS CONFLICT POTENTIAL, FLOW, AND DOWNSTREAM EFFECTS.
3.4.2	PROJECT TRAFFIC SEQUENCE TO ESTABLISH/MODIFY APPROACH FLOW TO AIRPORT OR SECTOR	REQUIRES ASSESSMENT OF TRAFFIC PICTURE AND HOW ALTERNATE SEQUENCES WILL IMPACT OTHER AIRCRAFT POSITIONS. MUST ASSESS CONFLICT POTENTIAL, FLOW, AND DOWNSTREAM EFFECTS.
3.4.3	OBSERVE RANGE/ BEARING BETWEEN AIRCRAFT	MAY DISPLAY TOO MUCH DATA/CLUTTER

TABLE 5-6 POSSIBLE SIGNIFICANT LIMITATIONS (continued)

TASK NO	TASK	POSSIBLE SIGNIFICANT LIMITATIONS
3.6.1	OBSERVE AIRSPACE INTRUSION BY A NON-CONTROLLED OBJECT	MAY REQUIRE EXTENSIVE VISUAL SEARCH IN LARGE DISPLAY FIELD. MUST BE ABLE TO RAPIDLY VISUALLY ACQUIRE NON-CONTROLLED (VS. CONTROLLED) OBJECT.
3.6.2	COMPOSE ENTER REMINDER NOTE OF AIRSPACE INTRUSION	
3.6.3	FLIGHT-FOLLOW AN OBSERVED NON-CONTROLLED OBJECT	MUST DIFFERENTIATE OBJECT STATUS (FLIGHT FOLLOWED, NON-CONTROLLED) FROM OTHER CONTROLLED AIRCRAFT.
4.1.1	ENTER TRAIL FLIGHT PLAN AMENDMENT	RIGID FORMATS CAN CONTRIBUTE TO ENTRY ERRORS.
4.1.2	REVIEW POTENTIAL IMPEDIMENTS FOR IMPACT ON PROPOSED CLEARANCE	REQUIRES KNOWLEDGE OF DISPLAY SYMBOLOGY, TRAFFIC PICTURE, SYMBOL SCALING, SECTOR TOPOGRAPHY, SPECIAL USE AIRSPACE. MUST BE ABLE TO PROJECT TRAJECTORIES OVER TIME.
4.1.3	SELECT CONFLICT RESOLUTION ADVISORY OPTION	REQUIRES RAPID ASSESSMENT OF THE TRAFFIC PICTURE, AND HOW OTHERS MAY BE INFLUENCED BY EACH OPTION.
4.1.4	FORMULATE A CLEARANCE WITH APPROPRIATE INSTRUCTIONS	REQUIRES RAPID ASSESSMENT OF THE TRAFFIC PICTURE, AND HOW OTHERS MAY BE INFLUENCED BY EACH OPTION. PRECLUDES CONCENTRATION ON OTHER TASKS.
4.1.5	QUERY PILOT REGARDING COMPLIANCE WITH CLEARANCE	
4.1.6	ISSUE CLEARANCE AND INSTRUCTIONS TO PILOT	
4.1.7	ISSUE CLEARANCE AND INSTRUCTIONS FOR DELAY TO PILOT	
4.1.8	VERIFY AIRCRAFT COMPLIANCE WITH CLEARANCE	
4.2.1	DECLARE EMERGENCY EVENT AND INITIATE CONTINGENCY PLAN	REQUIRES KNOWLEDGE (LONG-TERM MEMORY) OF APPROPRIATE CONTINGENCY PLAN.
4.3.1	PERCEIVE PRESENCE OF SPECIAL OPERATIONS	REQUIRES KNOWLEDGE (LONG-TERM MEMORY) OF SPECIAL OPERATIONS PROCEDURES AND EFFECTS ON FLOW AND SEQUENCING.

TABLE 5-6 POSSIBLE SIGNIFICANT LIMITATIONS (continued)

TASK NO	TASK	POSSIBLE SIGNIFICANT LIMITATIONS
4.4.1	OBSERVE NEW FLIGHT PLAN ALERT	MAY REQUIRE PERIPHERAL PERCEPTION OF INFORMATION, TIME SHARING WITH OTHER VISUAL TASKS.
4.4.2	REVIEW FLIGHT PLAN FOR COMPLETENESS	MUST BE ABLE TO RAPIDLY PERCEIVE MISSING DATA IN A COMPLEX FIELD.
4.4.3	COMPOSE/ENTER FLIGHT PLAN	RIGID FORMATS CAN CONTRIBUTE TO ENTRY ERRORS.
4.4.4	DELETE NEW FLIGHT PLAN ALERT	
4.4.5	REVIEW FLIGHT PLAN FOR ERRORS/DATA LIST SEQUENCE	DISPLAY SEARCH TIME WILL INCREASE WITH NUMBER OF ACTIVE FLIGHT PLANS. TOO MUCH FLIGHT PLAN DATA MAY LEAD TO ERRONEOUS DATA IN A COMPLEX FIELD.
4.5.1	RECEIVE FLIGHT PLAN AMENDMENT FROM COMPUTER	
4.5.2	HIGHLIGHT FLIGHT PLAN POSTING FOR REMINDER ACTION	
4.5.3	COMPOSE/ENTER FLIGHT PLAN AMENDMENT	RIGID FORMATS CAN CONTRIBUTE TO ENTRY ERRORS.
4.5.4	ENTER PILOT'S POSITION REPORT IN SYSTEM	
4.5.5	DELETE FLIGHT PLAN AMENDMENT HIGHLIGHTING	
5.1.1	OBSERVE DISPLAY OF WEATHER LINE/INTENSITY/ BASE/HEIGHT/MOVEMENT	DISPLAY CONFUSION IF INFORMATION DENSITY EXCEEDS PRESCRIBED MAXIMA. MAY OBSCURE OTHER DISPLAYED DATA (E.G., AIRCRAFT POSITIONS, DATA BLOCKS).
5.1.2	RECEIVE SIGHT/AIRNET	
5.1.3	RECEIVE WEATHER BRIEFING FROM METEOROLOGIST	
5.1.4	ENTER PIREP INTO SYSTEM	
5.1.5	DETERMINE WHETHER ADJACENT CONTROLLER OR PILOT NEEDS WEATHER ADVISORY	MUST BE ABLE TO PROJECT WEATHER MOVEMENTS, AND POTENTIAL EFFECTS ON FLOW, TRAFFIC SEQUENCING. MAY REQUIRE KNOWLEDGE OF AIRCRAFT CHARACTERISTICS.

TABLE 5-6 POSSIBLE SIGNIFICANT LIMITATIONS (continued)

TASK NO	TASK	POSSIBLE SIGNIFICANT LIMITATIONS
5.1.6	DETERMINE WEATHER IMPACT ON ROUTES/ FLOW	MUST BE ABLE TO PROJECT WEATHER MOVEMENTS, AND POTENTIAL EFFECTS ON FLOW, TRAFFIC SEQUENCING.
5.1.7	DETERMINE ALTITUDE/ ROUTE CHANGE TO BYPASS SEVERE WEATHER	REQUIRES KNOWLEDGE OF TRAFFIC PICTURE, ABILITY TO PROJECT NEAR-TERM SEQUENCES. MUST BE ABLE TO ASSESS CHOICE IN TERMS OF EFFECTS TO OTHER AIRCRAFT AND DOWNSTREAM FLOWS. MAY REQUIRE KNOWLEDGE OF AIRCRAFT CHARACTERISTICS.
5.2.1	RECEIVE WEATHER SEQUENCE	
5.2.2	RECEIVE WEATHER REPORT UPDATE	
5.2.3	DETERMINE WHETHER USABLE FLIGHT LEVEL HAS CHANGED	
5.2.4	DETERMINE WHETHER RUNWAY CONDITIONS HAVE CHANGED	
5.2.5	DETERMINE WHETHER CONTROL ZONE IS IFR/VER	
6.2.1	REVIEW SYSTEM STATUS	MUST BE ABLE TO RAPIDLY ASSESS ANOMALOUS CONDITIONS.
6.2.2	REVIEW TRAFFIC STATUS/WEATHER	REQUIRES COMPREHENSION OF THE TRAFFIC PICTURE, AND ABILITY TO PROJECT CHANGES OVER TIME.
6.2.3	VERIFY THAT ALL REQUIRED DISPLAY AND COMMUNICATION SWITCHES ARE IN PROPER LOCATION	MUST BE ABLE TO RAPIDLY ASSESS ANOMALOUS CONDITIONS.
6.2.4	PERFORM LOG-ON SEQUENCE AT DESIGNATED CONSOLE	
6.2.5	ADJUST PARAMETERS AND DISPLAY TO PERSONAL PREFERENCE	
6.2.6	CHECK DISPLAY FOR PROPER ALIGNMENT, USABILITY, AND SATISFACTORY STATUS	

TABLE 5-6 POSSIBLE SIGNIFICANT LIMITATIONS (continued)

TASK NO	TASK	POSSIBLE SIGNIFICANT LIMITATIONS
6.2.7	SET-UP WORKSTATION ADAPTION PARAMETERS	
6.3.1	DETECT NON- ACCEPTANCE OF INPUT DATA	
6.4.1	DETECT OCCURRENCE OF SECTOR SUITE FAILURE	
6.4.2	OBSERVE SECTOR SUITE DATA BASE RESTORATION COMPLETION MESSAGE	
6.5.1	DETECT OCCURRENCE OF ACCC FAILURE	
6.5.2	REVERT TO ACCC BACKUP PROCEDURES (TBD)	RARELY OCCURRING, REQUIRING BRINGING UP PROCEDURES FROM LONG-TERM MEMORY.
6.6.1	DETERMINE AIRCRAFT NEEDING SUBSTITUTE ROUTING	REQUIRES KNOWLEDGE OF THE TRAFFIC PICTURE, AND HOW OTHER AIRCRAFT MAY BE AFFECTED BY PLANNED REROUTING.
6.6.2	MONITOR STATUS OF QUESTIONABLE MAVAID	REQUIRES VIGILANCE AND TIME-SHARING WITH OTHER TASKS.
6.6.3	OBSERVE SUBSTITUTE ROUTING ON DISPLAY	MAY REQUIRE PERIPHERAL PERCEPTION OF INFORMATION, TIME SHARING WITH OTHER VISUAL TASKS.
6.7.1	DETERMINE COMMUNICATION FAULT	REQUIRES KNOWLEDGE OF OPERATIONAL FAULT ISOLATION PROCEDURES.
6.7.2	ADJUST COMMUNICATION STRATEGY	REQUIRES KNOWLEDGE OF OPERATIONAL BACKUP PROCEDURES, AVAILABLE OPTIONS.
6.7.3	SWITCH TO BACKUP RADIO/FREQUENCY	
6.8.1	DETERMINE IMPENDING CONTROLLER OVERLOAD	
6.8.2	EXCHANGE/ASSIGN INTRA-POSITION RESPONSIBILITIES	REQUIRES ABILITY TO JUDGE CURRENT AND NEAR-TERM WORKLOAD.
6.8.3	REQUEST ASSISTANCE OR RELIEF	REQUIRES ABILITY TO JUDGE CURRENT AND NEAR-TERM WORKLOAD.

TABLE 5-6 POSSIBLE SIGNIFICANT LIMITATIONS (continued)

TASK NO	TASK	POSSIBLE SIGNIFICANT LIMITATIONS
6.9.1	PERCEIVE TRACKING FAULT OF TRANSPONDER FAILURE	MUST BE ABLE TO RAPIDLY ASSESS ANOMALOUS CONDITIONS.
6.9.2	REPOSITION/UPDATE/ REASSOCIATE DATA BLOCKS	VISUAL ACUITY AND PARALAX PROBLEMS.
6.10.1	OBSERVE MESSAGE ON LOSS OF DATA BASE	MAY REQUIRE PERIPHERAL VISION. TIME SHARING WITH OTHER VISUAL TASKS.
6.10.2	DETECT FAILURE TO UPDATE FLIGHT PLAN DATA BASE	MUST BE ABLE TO RAPIDLY ASSESS ANOMALOUS CONDITIONS.
6.10.3	ENTER DISPLAY AMENDMENT MESSAGE ON CONSOLE	
6.10.4	ENTER FLIGHT PLAN ON CONSOLE	MAY BE TIME-CONSUMING TASK.
6.10.5	RESEQUENCE FLIGHT PLAN ON CONSOLE	
6.11.1	DETECT UNRELIABLE VSCS COMMUNICATION	
7.3	PERFORM COORDINATION*	REQUIRES AURAL ACUITY, VERBAL ARTICU- LATION, AND/OR MESSAGE COMPOSITION. MAY REQUIRE PERIPHERAL VISION. GENERALLY INVOLVES MULTI-TASK TIME SHARING AND COGNITIVE SORTING OF PRIORITIES. MAY INVOLVE FUNCTION/ FREQUENCY SELECTION UNDER TIME STRESS.
	*ACTIVITY 7.3 TRUNCATED TO REFLECT COMMON NATURE OF TASK LIMITATIONS	

5.5 Definition of Machine Support

Machine aids are defined here as useful tools which reduce Controller stress points (both in frequency and in magnitude), maintain alert levels, facilitate training and improve human productivity. Machine aiding of Controller task performance can be used to reduce stress in either overload conditions (by taking over some human functions) or underload conditions (e.g., to aid vigilance performance). Machine aids are, therefore, information-processing tools which aid the interactive user (the Controller) in task accomplishment, problem solving, and decision making. Examples of machine aiding include:

- Vector Lines
- Leader lines
- Intensity
- Zoom
- Variable Character Size
- Variable Window
- Color
- Flashing Data Block
- Rotation (in 2D or 3D space)
- Highlighting (may include flash/blink)
- Sorts
- Distance Scaling, (may include Range Marks) from Selectable Points
- Range/Bearing/Time
- Conflict Probe
- Generation of Clearance
- Advisory Options
- Automatic Flight Data Block Offset
- Procedural Data Base (such as Check-list Call-up)
- Aural Alarm
- Selective Data Deletion/Presentation
- Polygon Inputs (sketch on a screen)
- Format Reference Guide (Menu)
- Alert Indicator

The identification of appropriate machine aiding requirements for Controller tasks is the first step in synthesizing the dialogue definition language (presented in Chapter 8.0) for the AAS MMI. These requirements are summarized in Table 5-7. The machine aiding requirements presented in Table 5-7 map to the information-processing task analysis (section 5.3) and the resultant potential human performance limitations cited in section 5.4. Table 5-7 lists a set of

potentially valuable machine aids for each task, along with selection rationale and the associated qualitative human performance requirements.

TABLE 5-7. MACHINE AIDING REQUIREMENTS

TASK NO	TASK DEFINITION	MACHINE AIDS	NATIONALE	REQUIREMENTS
1.1.1	REVIEW FLIGHT PLAN DISPLAY FOR PRESENT AND/OR FUTURE AIRCRAFT SEPARATION	HIGHLIGHTING. COLOR. SELECTED DATA DEFINITION. CONFLICT PRONE. SORTS	ALLOWS RAPID PORTRAYAL OF RELEVANT DATA TO CONTROLLERS. EXTENDS CONTROLLERS' "LOOK-AHEAD" ABILITY	ABILITY TO RAPIDLY PREDICT SEPARATION BASED ON FP DISPLAY
1.1.2	REVIEW SITUATION DISPLAY FOR POTENTIAL VIOLATION OF SEPARATION STANDARDS	LEAD LINES. RANGE/BEARING/TIME. CONFLICT PRONE	CREATES GRAPHIC DEFINITION OF CONTROLLER'S MENTAL MODEL. EXTENDS CONTROLLERS' "LOOK-AHEAD" ABILITY	ABILITY TO RAPIDLY PREDICT SEPARATION BASED ON FP DISPLAY
1.1.3	REVIEW FLIGHT PLAN CONFLICT PRONE RESULTS	HIGHLIGHTING. INTENSITY. VARIABLE WINDOW	PRESENTS INFORMATION WITHOUT CLUTTERING DISPLAY. UNOBTRUSIVELY CALLS CONTROLLER'S ATTENTION TO RESULTS	ABILITY TO INTEGRATE PRONE RESULTS WITH CONTROLLERS OVERALL TRAFFIC PLAN
1.1.4	PROJECT AIRCRAFT FUTURE POSITION/ALTITUDE/PATH	DISTANCE SCALING. LEAD LINE. RANGE/BEARING/TIME	CREATES GRAPHIC DEFINITION OF CONTROLLER'S MENTAL MODEL. EXTENDS CONTROLLERS' "LOOK-AHEAD" ABILITY	ABILITY TO ACCURATELY PROJECT FUTURE POSITION/ALTITUDE/PATH
1.1.5	READ-OUT RANGE/BEARING/TIME FOR AN AIRCRAFT TO A FIX OR GEOGRAPHIC POINT	DISTANCE SCALING. LEAD LINE. RANGE/BEARING/TIME	CREATES GRAPHIC DEFINITION OF CONTROLLER'S MENTAL MODEL. EXTENDS CONTROLLERS' "LOOK-AHEAD" ABILITY	ABILITY TO ACCURATELY PROJECT FUTURE POSITION/ALTITUDE/PATH
1.1.6	FORCE/QUICK LOOK FULL DATA BLOCK/S TO EXAMINE TRACK INFORMATION ON AIRCRAFT	HIGHLIGHTING. INTENSITY. COLOR	UNOBTRUSIVELY CALLS CONTROLLER'S ATTENTION TO LOCATION OF NEW DATA BLOCK	ABILITY TO RAPIDLY, VISUALLY ACQUIRE NEW DATA BLOCK
1.1.7	DETERMINE WHETHER AIRCRAFT WILL BE SEPARATED BY LESS THAN PRESCRIBED MINIMA	LEAD LINES. RANGE/BEARING/TIME. CONFLICT PRONE	CREATES GRAPHIC DEFINITION OF CONTROLLER'S MENTAL MODEL. EXTENDS CONTROLLERS' "LOOK-AHEAD" ABILITY	ABILITY TO RAPIDLY PROJECT AIRCRAFT POSITIONS AND PREDICT SEPARATION

TABLE 5-7. MACHINE AIDING REQUIREMENTS (continued)

TASA NO.	TASA DEFINITION	MACHINE AIDS	RATIONALE	REQUIREMENTS
1.1.0	SELECT PDE SORTING PRIORITY SCHEME	SORTS	RAPIDLY CREATES DESIRED PDE SORTS BASED ON PARAMETER INPUT	ABILITY TO RAPIDLY UPDATE PDE SORT
1.2.1	OBSERVE DISPLAY OF NEW/CHANGED EQUIPMENT/OPERATIONAL STATUS	COLOR, INTENSITY, VARIABLE WINDOWS, HIGHLIGHTING	UNOBTUSIVELY CALLS CONTROLLER'S ATTENTION TO CONTINGENCY CONDITION	ABILITY TO INTEGRATE NEW STATUS/CONDITION INFO INTO CONTROLLER'S TRAFFIC PLAN
1.2.2	OBSERVE DISPLAY OF NEW/CHANGED TRAFFIC FLOW CONTROL MANAGEMENT	COLOR, INTENSITY, VARIABLE WINDOWS, HIGHLIGHTING	UNOBTUSIVELY CALLS CONTROLLER'S ATTENTION TO TRAFFIC MANAGEMENT DATA	ABILITY TO INTEGRATE NEW STATUS/CONDITION INTO CONTROLLER'S TRAFFIC PLAN
1.3.1	SEARCH DISPLAY FOR INACTIVE FLIGHT PLAN ON CLEARANCE REQUEST	COLOR, HIGHLIGHTING, INTENSITY	UNOBTUSIVELY CALLS CONTROLLER'S ATTENTION TO LOCATION OF INACTIVE FLIGHT PLAN	ABILITY TO RAPIDLY, VISUALLY ACQUIRE INACTIVE FLIGHT PLAN
1.3.2	PROJECT MANUAL FLIGHT PLAN PROBE	LEAD LINES, RANGE/BEARING/TIME, DISTANCE SCALING	CREATES GRAPHIC DEFLECTION OF CONTROLLER'S MENTAL MODEL, EXTENDS CONTROLLER'S "LOOK-AHEAD" ABILITY	ABILITY TO ACCURATELY PROJECT FUTURE POSITION/ALTITUDE/PATH
1.3.3	REQUEST LIMITED/STANDARD FLIGHT PLAN DISPLAY			
1.3.4	REQUEST FULL FLIGHT PLAN REABOUT			
1.3.5	ENTER TRIAL DEPARTURE TIME			
1.4.1	ENTER DEPARTURE MESSAGE			
1.4.2	START TRACK MANUALLY			
1.4.3	OBSERVE AUTOMATIC TRACK START			

TABLE 5-7. MACHINE AIDING REQUIREMENTS (continued)

TASK NO	TASK DESCRIPTION	MACHINE AIDS	RATIONALE	REQUIREMENTS
1.5.1	ANALYZE CONDITIONS FOR PROVIDING FLIGHT FOLLOWING	SORTS	PROVIDES EXPECTED FLIGHT COUNT OVER TIME/AREA OF INTEREST	ABILITY TO ASSESS CURRENT 'D AND NEAR-TERM WORKLOAD
1.6.1	OFFSET A DATA BLOCK	AUTOMATIC FLIGHT DATA BLOCK OFFSET	MINIMIZES USED FOR THIS "HOUSEKEEPING" TASK	
1.6.2	UPDATE/REVISE INPUT REMINDER NOTE (ELECTRONIC MEMORANDA)	NOTE FIELD	REMINDER NOTES	
1.6.3	REMOVE FLIGHT DATA ENTRIES AND FULL DATA BLOCKS FROM ACCC SYSTEM			MAINTENANCE OF CURRENCY OF DATA BASE
1.6.4	REMOVE FLIGHT DATA ENTRIES AND FULL DATA BLOCKS FROM INTERNAL ACCC SYSTEM			MAINTENANCE OF CURRENCY OF DATA BASE
1.6.5	SUSPEND DISPLAY OF FLIGHT DATA ENTRIES AND FULL DATA BLOCKS		REDUCES CLUTTER	
1.6.6	SUSPEND TRACK		REDUCES CLUTTER ON DISPLAY	PARAMETER TO RESTORE DISPLAY
1.6.7	DELETE FULL DATA BLOCK FROM ONH DISPLAY		REDUCES CLUTTER ON DISPLAY	
1.6.8	SUPPRESS FULL DATA BLOCK FROM ONH DISPLAY		REDUCES CLUTTER ON DISPLAY	PARAMETER TO RESTORE DISPLAY
1.6.9	DELETE FLIGHT DATA ENTRY FROM A SELECTED DISPLAY		REDUCES CLUTTER ON DISPLAY	

TABLE 5-7. MACHINE AIDING REQUIREMENTS (continued)

TASK NO	TASK DEFINITION	MACHINE AIDS	RATIONALE	REQUIREMENT
2.1.1	DETECT AIRCRAFT CONFLICT ALERT INDICATION	COLOR, HIGHLIGHTING, INTENSITY, AURAL ALARM, AUTOMATIC FLIGHT DATA BLOCK OFFSET	CALLS IMMEDIATE ATTENTION TO CON- FLICT. ADDS CLARITY OF VISUAL DISPLAY	RAPID VISUAL DETECTION/ ENCODING OF CONFLICT
2.1.2	DETERMINE VALIDITY OF CONFLICT ALERT NOTICE OR INDICATION			
2.2.1	DETECT MSAM INDICATION OR ALARM	COLOR, HIGHLIGHTING, INTENSITY, AURAL ALARM	CALLS IMMEDIATE ATTENTION TO MSAM	RAPID VISUAL DETECTION/ ENCODING OF MSAM
2.2.2	DETERMINE VALIDITY OF MSAM NOTICE OR INDICATION			
2.3.1	DETERMINE WTD FOR AIRCRAFT PROXIMITY PROBE	POLYGON INPUT, HIGH- LIGHTING, LPAD LINES, RANGE/BEARING/TIME	CREATES GRAPHIC OPIC- TION OF CONTROLLER'S MENTAL MAP OF SPECIAL USE AIRSPACE	ABILITY TO PROJECT TRAJECTORY INTO SPECIAL USE AIRSPACE
2.3.2	DETERMINE VALIDITY OF SPECIAL USE AIRCRAFT PROBE RESULTS			
2.4.1	OBSERVE DISPLAY FOR FIXED OBSTRUCTIONS AND NON-CONTROLLED AIRBORNE OBJECTS THAT MAY INTERFERE WITH AIRCRAFT FLIGHT	SELECTIVE DATA DELETION/PRESERVATION, VARIABLE WINDOW, ZOOM	ALLOWS INTEGRATION OF ADDITIONAL SPATIAL DATA OVER AREA OF INTEREST	KNOWLEDGE OF CURRENT OBSTACLES IN AREA OF INTEREST
2.4.2	EVALUATE CONFLICT RESOLUTION ADVISORIES			
2.4.3	FORMULATE ADVISORY/ RESOLUTION CONTENT	CONFLICT PROBE	NARROWS SOLUTION SPACE	ADVISORIES/RESOLUTIONS GENERATED CONFLICT FREE

TABLE 5-7. MACHINE AIDING REQUIREMENTS (continued)

TASK NO.	TASK DEFINITION	MACHINE AIDS	RATIONALE	REQUIREMENTS
2.4.4	DETECT AIRCRAFT MANEUVER IN RESPONSE TO ADVISORY			
2.5.1	DETERMINE VALIDITY/ APPROPRIATENESS OF USE OF AN ALERT DISPLAY			
2.5.2	INHIBIT CONFLICT ALERT FOR PAIRED AIRCRAFT	COLOR. HIGHLIGHTING	INDICATES SPECIAL STATUS TO CONTROLLER	MAINTENANCE OF SEPARATION WITHOUT ALERT FUNCTION
2.5.3	INHIBIT CONFLICT ALERT FOR GROUP SUPPRESSION	COLOR. HIGHLIGHTING	INDICATES SPECIAL STATUS TO CONTROLLER	MAINTENANCE OF SEPARATION WITHOUT ALERT FUNCTION
2.5.4	INHIBIT CONFLICT ALERT IN SPECIFIED AREA	POLYGON INPUT	ALLOWS DIRECT SELECTION OF SPATIAL AREA OF INTEREST	ABILITY TO CONSTRUCT/ SELECT/INDICATE AIRSPACE OF INTEREST
2.5.5	INHIBIT HSAW FUNCTION IN SPECIFIED AREA	POLYGON INPUT	ALLOWS DIRECT SELECTION OF SPATIAL AREA OF INTEREST	ABILITY TO CONSTRUCT/ SELECT/INDICATE AIRSPACE OF INTEREST
2.5.6	INHIBIT HSAW FUNCTION FOR SPECIFIED AIRCRAFT	COLOR. HIGHLIGHTING	INDICATES SPECIAL STATUS TO CONTROLLER	MAINTENANCE OF MINIMUM ALTITUDE WITHOUT ALERT FUNCTION
2.5.7	RESTORE SPECIFIC ALERT FUNCTION TO NORMAL			
3.1.1	EVALUATE CONSTRAINT EFFECT ON FLOW	SORTS	ALLOWS SELECTION OF RELEVANT FLIGHT PLANNING DATA	ABILITY TO PROJECT NEAR-TERM TRAFFIC DENSITY
3.1.2	CHOOSE DESIRED SEQUENCE			
3.1.3	SELECT NEW FLOW SEQUENCE			

TABLE 5-7. MACHINE AIDING REQUIREMENTS (continued)

TASK NO.	TASK DEFINITION	MACHINE AIDS	RATIONALE	REQUIREMENTS
1.1.0	DETERMINE THE TECHNIQUE FOR A DELAY			
1.2.1	PERFORM AN ALTITUDE OR ROUTE DEVIATION	COLOR, BRIGHTENING, INTENSITY	PLACES ADDITIONAL ALTITUDE OR ROUTE TO CONTROLLER	ABILITY TO CORRELATE CURRENT ALTITUDE/ROUTE WITH ASSIGNED ALTITUDE/ROUTE
1.2.2	OBSERVE AIRCRAFT RESUMING NORMAL FLIGHT PLAN			
1.2.3	DETERMINE MANEUVER TO ESTABLISH/RESTORE FLIGHT PLAN CONFORMANCE	HEAD UP/DOWN, RANGE/BEARING/TIME, DISTANCE, SCALING	PROVIDES GRAPHIC PORTRAYAL OF CONTROLLER'S MENTAL MAP, EXTENDS CONTROLLER'S "LOOK-AHEAD" ABILITY	ABILITY TO PROJECT FUTURE TRAJECTORIES AND POSITIONS
1.3.1	REQUEST AIRSPACE PROXIMITY PROBE			
1.3.2	DETERMINE/OBTAIN AN AREA TO USE	POLYGON THICK, COLOR	ALLOWS DIRECT SELECTION OF SPATIAL AREA OF INTEREST	ABILITY TO CONSTRUCT/SELECT/INDICATE AIRSPACE OF INTEREST
1.3.3	DETERMINE WHETHER ATC CONTROLS SPECIAL USE AIRSPACE			
1.3.4	RESTRICT AIRCRAFT ACTIVITY IN AREA BY ALTITUDE OR SEGMENT			
1.3.5	OBSERVE DISPLAY OF AIRSPACE RESTRICTION STATUS CHANGE	COLOR, BRIGHTENING, INTENSITY	UNOBTUSIVELY CALLS CONTROLLER'S ATTENTION TO NOTICE	ABILITY TO RAPIDLY, VISUALLY ACQUIRE NOTICE
1.3.6	DETERMINE IF/WHEN TIME OR POINT	PANEL/BOARDING/TIME, CONFLICT PROBE	CREATES GRAPHIC DEPICTION OF CONTROLLER'S MENTAL MODEL, EXTENDS CONTROLLER'S "LOOK AHEAD" ABILITY	ABILITY TO RAPIDLY PROJECT AIRCRAFT POSITIONS AND ASSESS CONFLICT POTENTIAL

TABLE 5-7: MACHINE AIDING REQUIREMENTS (continued)

TASK NO.	TASK DEFINITION	MACHINE AIDS	NOTES/ROLE	ACQUISITION AIDS
3.0.2	PROJECT TRAFFIC SEQUENCE TO ESTABLISH/VERIFY APPROACH PLANS TO AIRPORT OR SECTOR	RANGE/BEARING/TIME, CONFLICT PROB.	CREATES GRAPHIC DEPICTION OF CONTROLLER'S MENTAL MODEL, EXTENDS EXTENDS CONTROLLER'S "LOOK AHEAD" ABILITY	ABILITY TO RAPIDLY PROJECT AIRCRAFT POSITIONS AND ASSESS CONFLICT POTENTIAL
3.0.3	INSURE MAN-EY/BEARING BETWEEN AIRCRAFT	RANGE/BEARING BETWEEN AIRCRAFT	AIDS IN SEPARATION AND/OR SEQUENCING	FLIGHT PATH PREDICTION
3.0.4	INSURE AIRSPACE INTRUSION BY A NON-CONTROLLED OBJECT	COLOR, HIGH LIGHTING, INTENSITY	AIDS VISUAL ACQUISITION OF NON-CONTROLLED OBJECT	AWAWARENESS OF AIRSPACE INTRUSION
3.0.5	COMBINE/ENTER/RETRIEVE INFO OF AIRSPACE INTRUSION	COLOR, HIGH LIGHTING, INTENSITY	DIFFERENTIATES OBJECT STATUS	AWAWARENESS OF AIRCRAFT SPECIAL STATUS
3.1.1	ENTER TRIAL FLIGHT PLAN AIRCRAFT	SELECTIVE DATA ORIENTATION/ PRESENTATION, VARIABLE MINIMUM, ZOOM	ALLIGNS INTEGRATION OF ADDITIONAL SPATIAL DATA OVER AREA OF INTEREST	KNOWLEDGE OF CURRENT OBSTACLES IN THE AREA OF INTEREST
3.1.2	NOVISE POTENTIAL IMPEDIMENTS FOR IMPACT OR PROPOSED CLEARANCE	CONFLICT PROB., GENERATION OF CLEARANCE/ ADVISORY ACTIONS	HARKING SOLUTION SPACE	GENERATION OF CONFLICT FREE CLEARANCES
3.1.3	FORWHEAT A CLEARANCE WITH APPROPRIATE INSTRUCTIONS			
3.1.4	CHART FLIGHT BEARINGING COMPLETION WITH CLEARANCE			

TABLE 5-7. MACHINE AIDING REQUIREMENTS (continued)

TASA NO.	TASA DESCRIPTION	MACHINE AIDS	RATIONALE	REQUIREMENTS
5.1.6	ISSUE CLEARANCE AND INSTRUCTIONS TO PILOT			
5.1.7	ISSUE CLEARANCE THROUGH ATIS/ISS FOR DELAY TO PILOT			
5.1.8	VERIFY AIRCRAFT COMPLIANCE WITH CLEARANCE			
5.2.1	DECLARE PRIORITY EVENT AND INVOKE CONTINGENCY PLAN	PRIORITY DATA BASE	REFRESHES DETAILS OF LITTLE-USED PROCEDURES	PRECISE CONTINGENCY PROCEDURE RECALL AND EXECUTION
5.3.1	PREDICTIVE PRESENCE OF SPECIAL OPERATIONS	COLOR, HIGHLIGHTING, INTENSITY	UNOBTUSIVELY CALLS CONTROLLER'S ATTENTION TO NEW FLIGHT PLAN	VISUALLY ACQUIRE NEW FLIGHT PLAN ALERT
5.4.1	INSTRUCT NEW FLIGHT PLAN ALERT	HIGHLIGHTING	UNDERSCORES MISSING DATA FIELDS	AWARENESS OF MISSING FLIGHT PLAN DATA
5.4.2	REVIEW FLIGHT PLAN FOR CONSISTENCY	FORMAT REFERENCE GUIDE	RELEVANT STRUCTURE PRESENTED	NEAR ELIMINATE ENTRY ERRORS
5.4.3	COMPOSE/ENTER FLIGHT PLAN	HIGHLIGHTING	ALLOWS RAPID PORTRAVAL OF RELEVANT FLIGHT DATA TO CONTROLLER. UNDERSCORES MISSING DATA FIELDS	ABILITY TO RAPIDLY ASSESS CONFLICTS AND ERRORS IN FLIGHT PLAN
5.4.4	DELETE NEW FLIGHT PLAN ALERT	COLOR, HIGHLIGHTING, INTENSITY	DISCRIMINATES AMENDMENT STATUS	AWARENESS OF AMENDMENT STATUS IN FLIGHT PLAN
5.4.5	REVIEW FLIGHT PLAN FOR ERRORS/ DATA LIST SEQUENCE			
5.5.1	RECEIVE FLIGHT PLAN AMENDMENT FROM COMPUTER			

TABLE 5-7. MACHINE AIDING REQUIREMENTS (continued)

TASK NO.	TASK DEFINITION	MACHINE AIDS	NOTES	REQUIREMENTS
5.1.1	DETERMINE ALTITUDE/ROUTE CHANGE TO BYPASS SEVERE WEATHER			
5.2.1	RECEIVE WEATHER SQUALLS	HIGHLIGHTING.	IMMEDIATELY CALLS CONTROLLER'S ATTENTION TO NEW WEATHER SEQUENCE	VISUALLY ACQUIRE NEW WEATHER SEQUENCE.
5.2.2	RECEIVE WEATHER REPORT UPDATE			
5.2.3	DETERMINE WEATHER USABLE FLIGHTS LEVEL HAS CHANGED			
5.2.4	DETERMINE WEATHER RUMBLE CONDITIONS HAVE CHANGED			
5.2.5	DETERMINE WEATHER CLOUDS LOW IS TOP/VIS			
6.2.1	REVIEW SYSTEM STATUS	HIGHLIGHTING. INTENSITY	CAN BE USED TO FLAG ABNORMAL CONDITIONS	ABILITY TO RAPIDLY DETECT SYSTEM ANOMALIES
6.2.2	REVIEW TRAFFIC STATUS/ALARM			
6.2.3	VERIFY THAT ALL REQUIRED DISPLAY AND COMMUNICATION SWITCHES ARE IN PROPER LOCATION			
6.2.4	PERFORM FOR-ON SEQUENCE AT DESIGNATED CHECKPOINT	UNDELETED FUNCTION ACTIVATION	PROVIDES PROTECTION INDIVIDUALIZATION OF INFORMATION AND ITS DELAYS	MINIMIZE INDIVIDUAL FOR-ON PROCESS

TABLE 5-7 MACHINE AIDING REQUIREMENTS (continued)

TASK NO.	TASK DESCRIPTION	TRAINING AIDS	RATIONALE	REQUIREMENTS
6.2.5	ADJUST PARAMETERS AND DISPLAY TO PERSONAL PREFERENCE	PERSONAL DATA BASE	PROVIDES RECALL OF CURRENT PARAMETER SET	CONTROL OF OPTIMIZATION OF DISPLAY PARAMETER SET
6.2.6	CHECK DISPLAY FOR PROPER ALIGNMENT, USABILITY, AND SATISFACTORY STATUS			
6.2.7	SET UP MONITORING ADJUSTMENT PARAMETERS	VOICE RECOGNITION, ELECTRONIC LOG CARD	PROVIDES IDENTIFICATION OF INDIVIDUALIZED WORK STATION AND DISPLAY PARAMETERS	INDIVIDUAL/PROCESS LOG ON PROCESS
6.3.1	DETECT IMM ACCEPTANCE OF INPUT DATA			
6.4.1	DETECT ACCURACY OF SELECTED SOLUTION			
6.4.2	DETERMINE STATUS OF SOLUTION			
6.5.1	DETECT OCCURRENCE OF ACCIDENT			
6.5.2	REVERT TO ACCEPTED PROCEEDURES (TWO)			
6.6.1	DETERMINE ALTERNATE IDENTIFY SUBSTITUTION ROUTING	GENERATION OF CLARANCE / ADVISORY OPTIONS	NARROWS SOLUTION SPACE	GENERATION OF CONFLICT-FREE CLEARANCES
6.6.2	MONITOR STATUS OF QUESTIONS/ANSWERS			

TABLE 5-7. MACHINE AIDING REQUIREMENTS (continued)

TA's NO.	TAG's DEFINITION	MACHINE AIDS	RATIONALE	REQUIREMENTS
6.6.3	OBSERVE SUBSTITUTE ROUTING ON DISPLAY	COLOR, HIGHLIGHTING, PROCEDURAL DATA BASE	CLEARLY DENOTES SUBSTITUTE ROUTE ON OTHER TABULAR LIST OR OTHER APPROPRIATE DISPLAY	RAPID VISUAL ACQUISITION/INTEGRATION OF SUBSTITUTE ROUTING
6.7.1	DETERMINE COMMUNICATION FAULT	HIGHLIGHTING	DIRECT CONTROLLER ATTENTION TO FAULT ISOLATION	RAPIDLY ASSESS LOCATION/ NATURE OF FAULT
6.7.2	ADJUST COMMUNICATION STRATEGY	PROCEDURAL DATA BASE	AUTOMATICALLY ASSIGNS SYSTEM BACKUP COMMANDS, PRIORITIES, ETC.	RESPOND TO CONTINGENCY WITHOUT AFFECTING ATC SERVICES
6.7.3	SWITCH TO BACKUP RADIO/FREQUENCY	PROCEDURAL DATA BASE	AUTOMATICALLY ASSIGNS SYSTEM BACKUP COMMANDS, PRIORITIES, ETC.	RESPOND TO CONTINGENCY WITHOUT AFFECTING ATC SERVICES
6.8.1	DETERMINE IMPENDING CONTROLLER OVERLOAD	- SORTS	PROVIDES RAPID RETRIEVAL/ SORTING AND COUNTING OF FLIGHTS ENTERING SECTOR DURING A PARAMETER TIME	ABILITY TO OBJECTIVELY ASSESS NEAR-TERM WORK-LOAD
6.8.2	EXCHANGE/ASSIGN INTRA-POSITION RESPONSIBILITIES			
6.8.3	REQUEST ASSISTANCE OR RELIEF			
6.9.1	PERCEIVE TRACKING FAULT OR TRANS- PORDER FAILURE	COLOR, HIGHLIGHTING	CLEARLY PROVIDES SENSOR/ TRACKING STATUS INFORMATION	AWARENESS OF SENSOR/ TRACKING STATUS
6.9.2	POSITION/UPDATE/ REASSOCIATE DATA BLOCKS	AUTOMATIC FLIGHT DATA BLOCK OUTPUT	MINIMIZES NEED TO MANUALLY REPOSITION DATA BLOCK	MAINTENANCE OF DISPLAY CLARITY
6.10.1	OBSERVE MESSAGE ON LOSS OF DATA BASE	COLOR, HIGHLIGHTING, AURAL ALARM	IMMEDIATELY SIGNALS FAILURE CONDITION TO CONTROLLER	AWARENESS OF DATA INTEGRITY

TABLE 5-7. MACHINE AIDING REQUIREMENTS (continued)

TASK NO.	TASK DEFINITION	MACHINE AIDS	RATIONALE	REQUIREMENTS
6.10.2	DETECT FAILURE TO UPDATE FLIGHT PLAN DATA BASE			
6.10.3	ENTER DISPLAY AMENDMENT MESSAGE ON CONSOLE			
6.10.4	ENTER FLIGHT PLAN ON CONSOLE			
6.10.5	RESEQUENCE FLIGHT PLAN ON CONSOLE	SORTS	RAPIDLY SEQUENCES FLIGHT PLANS BASED ON DESIRED SORTING STRATEGY	ABILITY TO RAPIDLY RESEQUENCE FLIGHT PLAN DATA
6.11.1	DETECT UNRELIABLE VSC'S COMMUNICATION			
7.0 *	PERFORM COORDINATION	COLOR, HIGHLIGHTING, INTENSITY	PROVIDES "CLUSTERING" OF COMMON INFORMATION, SYSTEM/FREQUENCY STATUS, AIDS TARGET ACQUISITION UNDER TIME STRESS	RAPID, ERROR-FREE EXECUTION OF COORDINATION TASKS

* ACTIVITY 7.0 THREATENED TO REFLECT THE COMMON NATURE OF TASK AIDING REQUIREMENTS

5.6 Event Chain Workload Assessment

This section presents the event chain workload assessment described in section 4.1.1 and Figure 5-2. Event chains are a time-sequenced series of a subset of the AAS events presented in Chapter 3.0. This sequenced subset of AAS events is derived from a postulated scenario or "snapshot" of activities at a given sector. In this case, postulated scenarios were chosen from Ref. 4 (CDRL A001). These scenarios have been associated with a qualitative workload measure for the current operations (Ref. 4) and so provide a vehicle to contrast current operations and AAS Controller workload for a given chain of events.

In mapping tasks to respond to the event chains, task clusters or portions of sub-activities are selected and appropriately grouped as shown in Figure 5-3. This task clustering is indicative of the multi-processing capabilities of Controllers in response to multiple events.

Figures 5-4 through 5-6 present the three event chain workload assessments which have been chosen as exemplary of the AAS. Time-sequenced events are derived from the scenario narratives in the figures listed in the leftmost columns. Logical displays (derived from Ref.3) directly involved in task accomplishment are shaded accordingly. Workload assessments are based upon the Controller task compositions at each stage of the scenario's evolution. An "overall AAS assessment" of Controller workload is also shown in each figure.

THREAD = (SCENARIO) = SEQUENCE OF EVENTS WHERE PROBABILITY OF OCCURRENCE IS HIGH

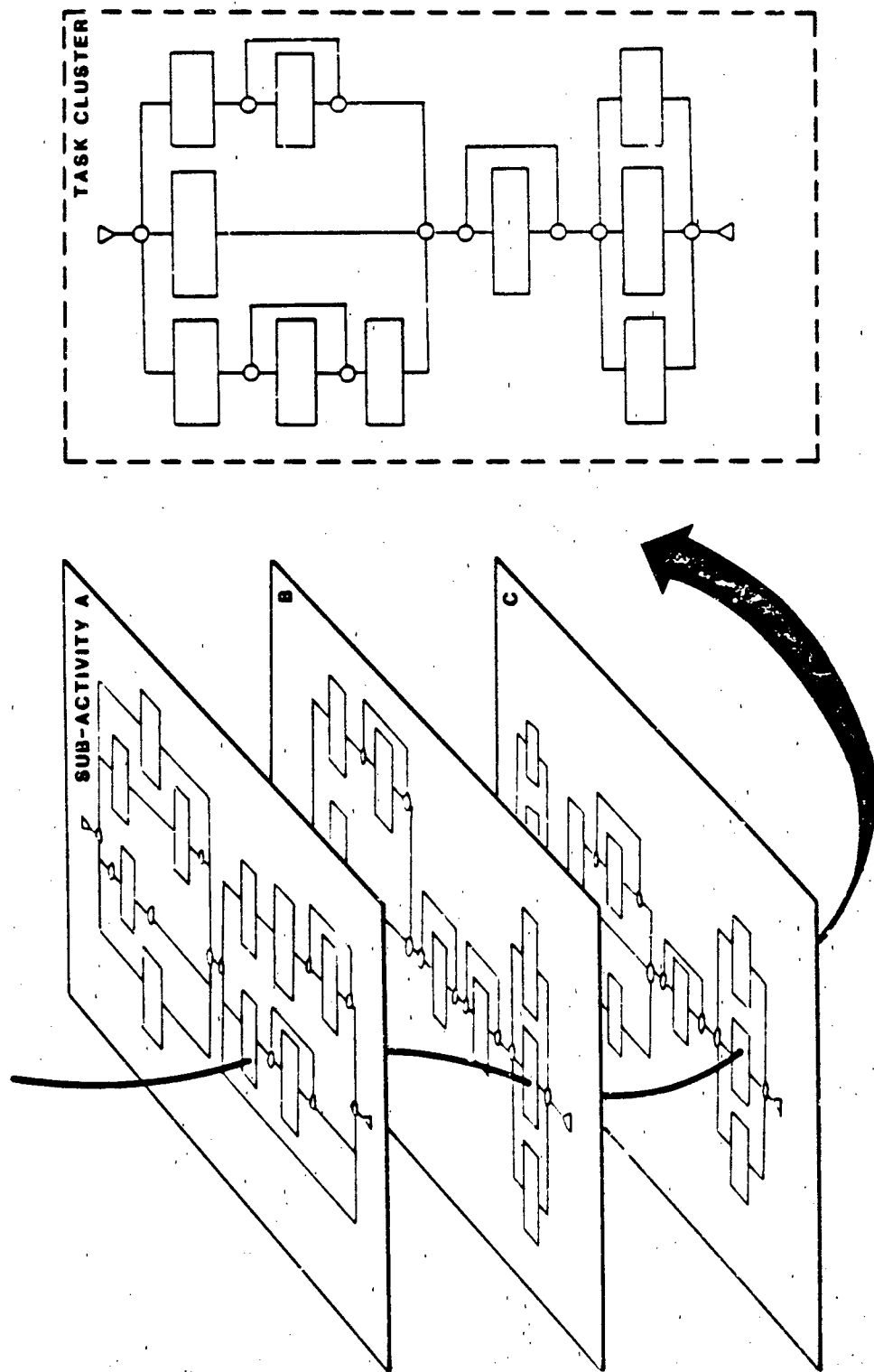


Figure 5-3. Task Clustering

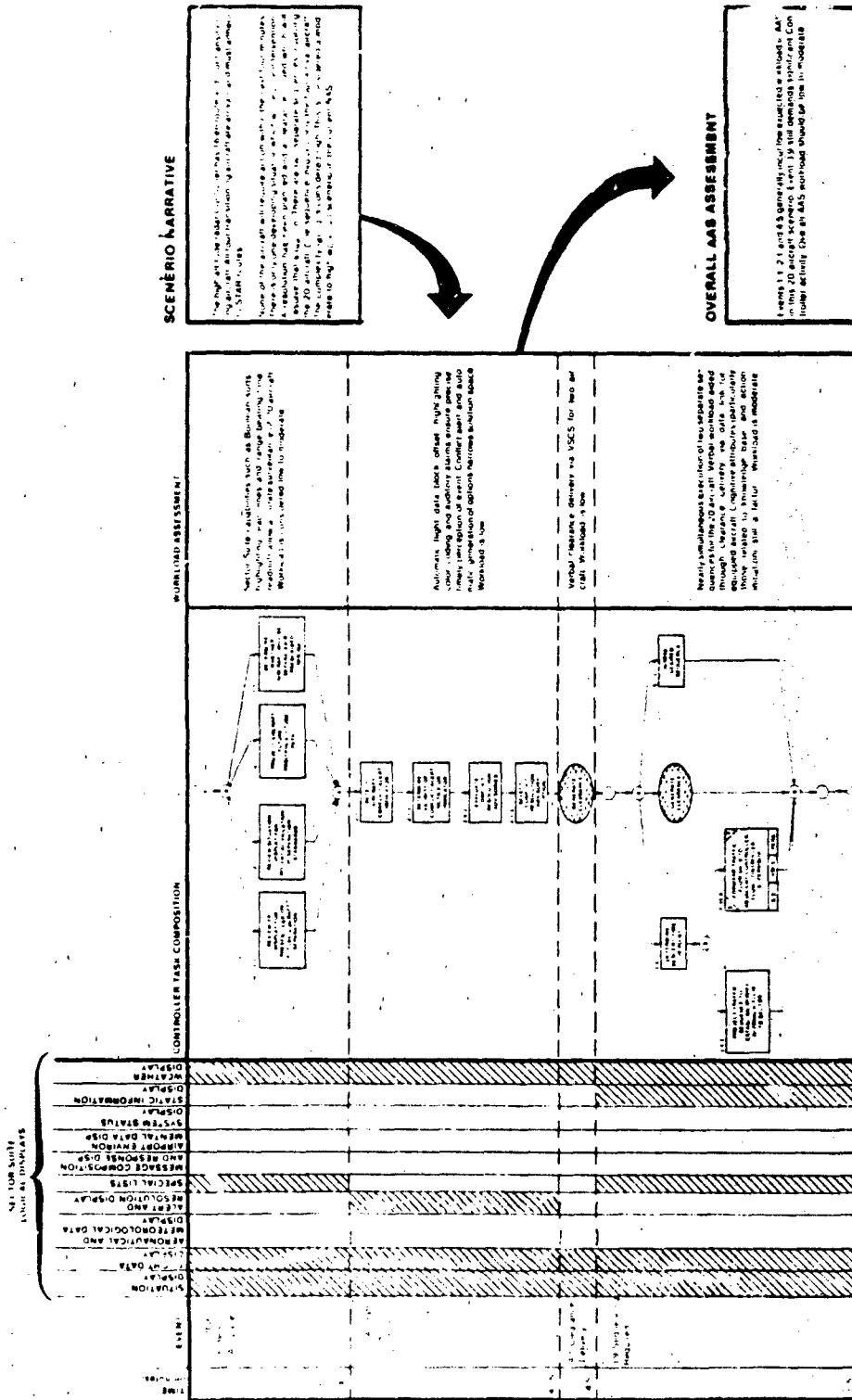


Figure 5-5, Event Chain #2
Workload Assessment

5-69/5-70



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**ACF CREW/AREA TEAM
ORGANIZATION**

CHAPTER 6.0

6.0 ACF CREW AREA TEAM ORGANIZATION FOR REAL-TIME OPERATIONS

6.1 Definition of Personnel Organization

Currently a center sector team, which is responsible for a designated airspace, may be composed of 1 Controller, 1 radar associate, 1D and radar R. Controllers. A terminal position is generally staffed by one Controller, occasionally aided by a radar operator position. An enroute area of operation consists of a minimum of six sectors, whereas a terminal area of operation consists of an unspecified group of operating positions, as determined by operational needs.

In the AAS environment, the area team is under the supervision of an Area Supervisor. The Area Supervisors report directly to an Area Manager, who is responsible for the overall management supervision of the operational control room for a given shift. Area Managers report to a facility assistant air traffic manager, who in turn reports to the facility air traffic manager. See Figure 6-1 for Team Organization.

An area of operation consists of a group of sectors requiring the service of seven teams. Two teams are on a major shift at one time. A typical enroute control room with 5 areas of operation, each with a minimum of 6 sectors, would contain approximately 30 operational sectors on the day and evening shift. The number of sectors is reduced considerably on a midnight shift by combining positions and sectors.

A full performance level journeyman radar Controller will be certified proficient on all sectors within the assigned area of specialization. Normally, an area of specialization will not encompass portions of two areas of operation. The size and configuration of sectors are determined by traffic volume, traffic flow, types of aircraft, terminal location and activity, special operations, coordination requirements, consolidation capability, radio and radar coverage, and airway alignment. Accordingly, sectors are aligned so as to: (a) contain the longest possible segments of airways; (b) conform with the primary traffic flow; (c) distribute workload equitably; and (d) provide for position and sector consolidation capability.

6.2 Definition of Controller-to-Controller Interfaces (Crew Team Factors)

Prior to automation, Controllers were required to verbally forward flight data and amendments. With the advent of computers, the Controllers entered the flight data into the computer system, which would then forward the data to appropriate Controllers. The radar tracking programs also replaced the verbal handoff with automated handoffs wherever facilities were interfaced by computer systems. Not only was Controller productivity increased, but the computer eliminated errors associated with fix time and speed calculation as well as most radar target misidentification.

Even though the computer systems have been significantly increasing Controller productivity and safety, considerable coordination was required between Controllers and/or facilities. This coordination involved the flight path of aircraft, especially on radar vectors, pointouts and use of airspace, transfer of control and restrictions, and weather information and dissemination.

Another factor which affected coordination was the difference in computer systems in the TRACON (ARTS III, ARTS II, FDEP, etc.) and the centers (NAS Stage A). The lack of flight plan data base within the ARTS or the lack of an interface to access the center's data base had a constraining effect on the exchange of information.

The functions of the ACF will reduce verbal coordination between Controllers. A common flight plan and radar data base will be available to all Sector Suites. Automatic pointouts, conflict probes, identification of probes, airspace redefinition, weather presentation and transmission, Mode S data link, and improved display and communications techniques will reduce Controller-to-Controller and Controller-to-pilot coordination and communication. Verbal communication between positions within the same Sector Suite will be reduced by automatic updating of data on all displays within the console, as opposed to strip marking and computer data entries.

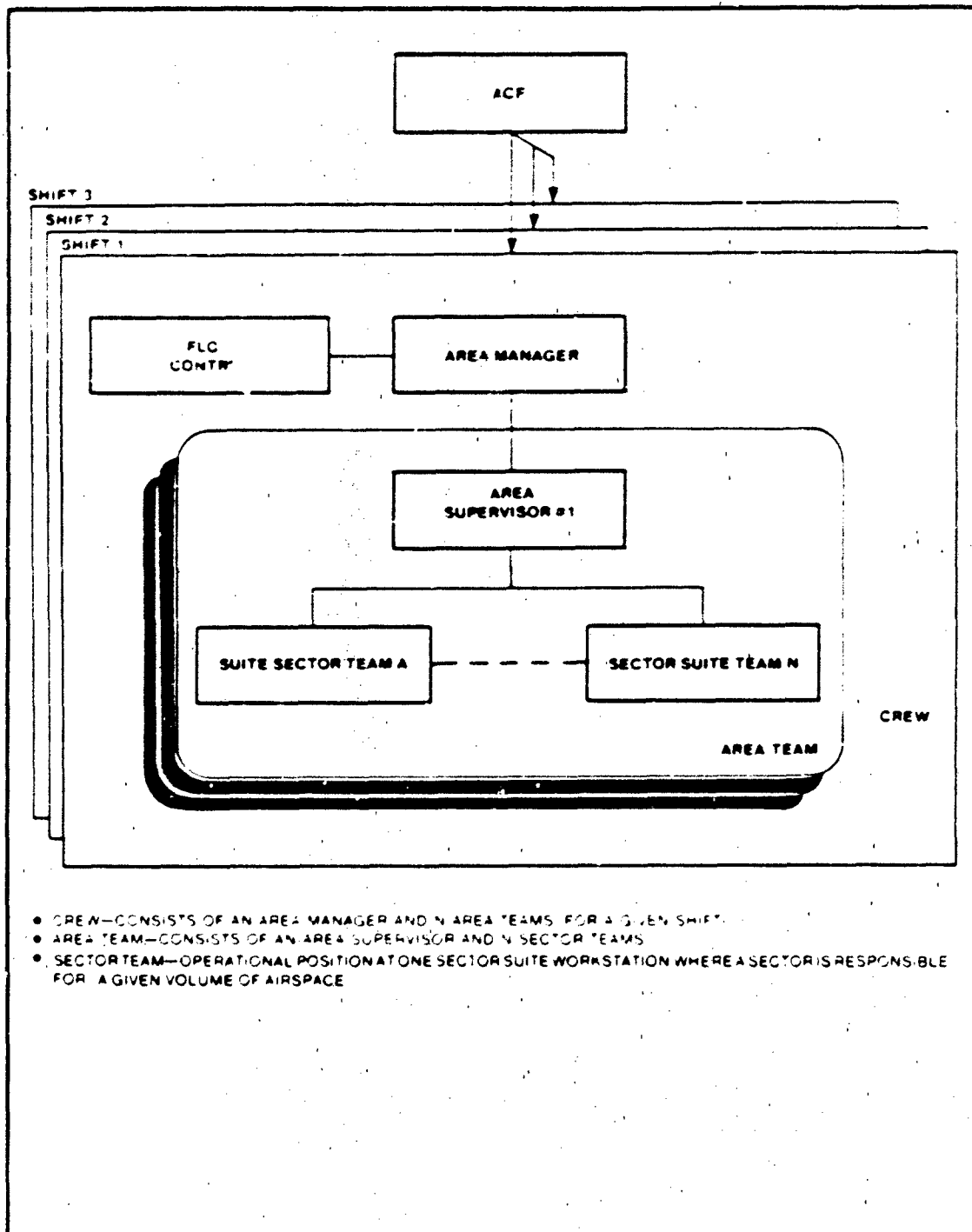


Figure 6-1. Team Organization

6.3 Personnel Organization Models

The operational positions within the current TRACON are associated with arriving and departing flights to the airports within the TRACON airspace. At some major airport areas the arriving flights are controlled by feeder positions who accept the transfer of control from the center and establish an arrival sequence for the final Controller. Departure Controllers normally control departing flights shortly after they are airborne until the transfer of control is effected with the center or another facility.

In addition to feeder, final, and departure positions, many current TRACONs have a satellite Controller position which is responsible for control of aircraft at satellite airports. Traffic that is flying through the terminal area is controlled by a position that is controlling that airspace.

The basic unit of airspace in each en route area of operation is the sector. The sector is a volume of defined horizontal and vertical dimensions for which a Controller, or a group of Controllers, has responsibility. Sectors are classified as radar, non-radar, or oceanic. Sectors can also be classified by altitude strata, such as high altitude or low altitude. Sectors may be categorized as overflight or transition types, where the transition sectors control inbound/outbound flights out of major terminal areas. Some sectors involve only military operations.

The sequence of positions/sectors that a jet aircraft might be controlled when departing and arriving at major airports in today's system is as follows:

<u>Position Sector</u>	<u>Facility</u>
Clearance Delivery	Tower
Ground Controller	Tower
Local Control	Tower
Departure Control	TRACON
Low Altitude (Departure Transition)	Center
High Altitude/ Multiple High Altitude	Center
Low Altitude (Arrival Transition)	Center
Feeder (or Arrival)	TRACON
Final	TRACON
Local Control	Tower
Ground Control	Tower

A scenario for a low altitude flight departing from and arriving at a small airport within a TRACON's area might be as follows:

<u>Position Sector</u>	<u>Facility</u>
Satellite Controller (From a local VFR tower, Flight Service Station, or direct frequency contact)	TRACON
Low Altitude (en route)	Center
Multiple Low Altitude (Including non-radar, manual sectors)	Center (Multiple)
Feeder (or arrival) Controller	TRACON
Satellite Controller	TRACON

The same jet aircraft might be controlled by the following positions in the AAS:

<u>Position Sector</u>	<u>Facility</u>
Clearance Delivery	Tower
Ground Control	Tower
Local Control	Tower
Low Altitude (Departure Transition)	ACF
High Altitude/ Multiple High Altitude	ACF
Low Altitude (Arrival Transition)	ACF
Feeder (or Arrival)	ACF
Final	ACF
Local Control	Tower
Ground Control	Tower

It is anticipated that new functions will permit Supervisors and Managers to improve upon the use of personnel resources and position staffing. The use of improved traffic management functions or flow control by traffic management coordinator will provide for a smoother flow of en route traffic. This, combined with metering improvements and improved weather forecasting, should substantially reduce major delays at terminal areas.

Sector workload probes will allow the Supervisor to make improved decisions on sector staffing. The allocation of personnel to positions, or the configuration of positions, will be predicated upon

the information provided by this sector workload analysis. A composite picture of all sectors, complete with flow control, weather, and historical traffic trends, will enable Managers to make informed decisions on ACF staffing requirements.

Given the results of sector workload analysis and dynamic reconfiguration capabilities, the Supervisor can match Controller workload to traffic demands. Thus, the Supervisor becomes more of a resource manager than is possible at present.

6.4 Task Allocation to Functional Controller Positions

Staffing of ACF Controller positions at sector workstations will be reasonably comparable to the current functional staffing of terminal and en route positions.

For sectors in the terminal area, the primary functional position of a one-man workstation is labeled "Approach Controller." This radar position implies feeder, final, and departure control functions for both the main terminal and any satellite operations. Local procedures may further subdivide that position into separate staffing of each such control function, or even further into directional subdivisions of each. Their tasks would be nearly identical, differing mainly in which aircraft are to be controlled. Task frequency of performance and perhaps the importance of some tasks may differ among the subdivided positions, but the same task units of work would generally be a part of each position.

The Approach Controller is a full performance level Controller, and is responsible for separation of aircraft that are within the position's area of responsibility. This basic position may be aided by a Controller in servicing the aircraft of the responsible Approach Controller. Performance of the Coordinator of some Approach Controller tasks does not relieve the Approach Controller from performance of those same tasks, though they will be performed for different aircraft or situations. The tasks are shared, not reallocated. However, when the Coordinator position is staffed, that position most often will be the predominant performer of those tasks assigned for Coordinator performance in feeder, final, and departure control.

For en route sectors, the primary functional position of a one-man workstation is labeled "En Route Controller." The En Route Controller is a full performance level radar Controller, and is respon-

sible for separation of aircraft that are within the sector's area of responsibility. When radar coverage is limited or not available, standard non-radar separation is applied. This requires greater pre-planning activity.

Should traffic warrant expansion of sector staffing to a two-man workstation, the En Route Controller normally will be aided by a position labeled the "Non-radar En Route Assist." This position is comparable to today's "D Radar Associated Controller," responsible for the management of the Flight Data Entries and Display, and for long-range preplanning control actions. Separation responsibility is primarily through the issuance of some clearances and coordination with other facilities and positions by use of VSCS inter-phone communication. Some information forwarding and emergency communicating tasks are also assumed by this position. These reflect the primary responsibilities of the second control position, and do not necessarily limit the task overlap between the two en route control positions.

Further expansion of an en route workstation to a three-man operation normally will be accomplished with aiding by a radar position labeled "Coordinator." This is comparable to today's Radar Handoff Controller in servicing the aircraft of the responsible En Route Controller. As with the Coordinator in the terminal area, the en route Coordinator tasks are shared with the En Route Controller, not reallocated. Both may perform many of the same tasks, but for different aircraft or situations as may be assigned or agreed. Both types of Coordinators perform essentially the same tasks.

These five functional ACF Controller positions assume the support of important functions performed by other ACF personnel, such as Area Supervisors, Flow Control Metering personnel, Meteorologists, and other system support positions.

The specific composition of a Sector Suite Team will fluctuate from time to time as the amount and nature of air traffic necessitate assistance in handling workload. Local procedures, as well as the size and character of terminal areas and sectors, also influence the makeup and responsibilities of the Sector Suite Team. In addition to the tasks captured here, ACF Controllers will contend with many area procedures and adaptations, and changes thereto.

Table 6-1 notes which ACF Controller tasks may be considered a part of the job of the five primary functional positions. These tasks are cited in columnar order as follows, along with their controller coding within the table:

Table Code Functional Position Label

Terminal Area Control Positions

A Approach Controller
C Coordinator

En Route Control Positions

R En Route Controller
D Non-radar En Route Assist
H Coordinator

The Approach Controller may perform all 264 tasks that may be performed by either the En Route Controller or the Non-radar En Route Assist. En Route Controllers perform 214 tasks. Non-radar En Route Assists perform 131 tasks (of which 82 tasks are performed by both positions). Of course, at a one-man sector workstation, the En Route Controller may perform all 264 tasks. But for the present tabled allocation, it is assumed that the En Route Controller is assisted by a Non-radar En Route Assist position.

One-hundred seventy-eight, or 67%, of the terminal area tasks may be a part of the job of the Coordinator position. For the most part, these 178 tasks are identical to the 175 tasks that may be a part of the Coordinator position in the en route environment.

All but 17 of the Coordinator tasks in en route areas are part of the En Route Controller job. Only 65 of this Coordinator's tasks, however, are part of the Non-radar En Route Assist job. This reflects the radar control focus of the handoff position.

Of the 214 En Route Controller tasks:

- a. One-hundred thirty-two (132) tasks are not part of the Non-radar En Route Assist position.
- b. Fifty-nine (59) tasks are not part of the Coordinator position.

Of the 131 Non-radar En Route Assist tasks:

- a. Forty-nine (49) tasks are not part of the

En Route Controller position (when assisted by the Non-radar En Route Assist).

- b. Sixty-six (66) tasks are not part of the En Route Coordinator position.

These functional sector positions will be modified somewhat by performance likelihood differences noted in Table 7-9, in which sector type differences are cited.

TABLE 6-1 TASKS THAT ARE PART OF EACH FUNCTIONAL CONTROLLER POSITION

TASK NO	TASK STATEMENT	APPROACH	ACCESS	ENROUTE	ARRIVAL	STATUS
1.1.1	REVIEW FLIGHT PLAN DISPLAY FOR PRESENT AND FUTURE AIRCRAFT SEPARATION	A				
1.1.2	REVIEW SEPARATION DISPLAY FOR PRESENT AND FUTURE SEPARATION STANDARDS	A				
1.1.3	REVIEW FLIGHT PLAN DISPLAY FOR PRESENT AND FUTURE PROJECT AIRCRAFT TRAJECTORIES AND ALTITUDE PATH	A				
1.1.4	REVIEW RANGE BEARING TIME FOR AN AIRCRAFT ON A FLIGHT	A				
1.1.5	REVIEW FLIGHT PLAN DATA BLOCKS TO DETERMINE TRAFFIC INFORMATION IN AIRCRAFT	A				
1.1.6	DETERMINE WHETHER AIRCRAFT WILL BE SEPARATED BY LESS THAN PREDEFINED MINIMA	A				
1.1.7	SELECT FOR EDITING AIRCRAFT WITH MINIMA	A				
1.1.8	OBSERVE DISPLAY FOR NEW MANEUVER ELEMENT OPERATIONAL STATUS	A				
1.1.9	OBSERVE DISPLAY FOR NEW MANEUVER TRAJECTORY WITH MINIMA	A				
1.1.10	MANAGEMENT	A				
1.1.11	REVIEW DISPLAY FOR MANEUVER FLIGHT PLAN IN CLEARANCE REQUEST	A				
1.1.12	REQUEST MANUAL FLIGHT PLAN PROBE	A				
1.1.13	REQUEST LIMITED STANDBY FLIGHT PLAN DISPLAY	A				
1.1.14	REQUEST FULL FLIGHT PLAN DISPLAY	A				
1.1.15	ENTER TRAIL DEPARTURE TIME	A				
1.1.16	ENTER DEPARTURE MESSAGE	A				
1.1.17	START TRAIL MAN ALERT	A				
1.1.18	OBSERVE AUTOMATIC TRAIL START	A				
1.1.19	ANALYZE CONDITIONS FOR PROVIDING FLIGHT FULL WING	A				
1.1.20	ENTER A DATA BLOCK	A				
1.1.21	UPDATE REVISION INPUT REMINDER NOTE SELECTED WITH MINIMA	A				
1.1.22	REMOVE FLIGHT DATA ENTRIES AND FULL DATA BLOCKS FROM ACC SYSTEM	A				
1.1.23	REMOVE FLIGHT DATA ENTRIES AND FULL DATA BLOCKS FROM INTERNAL ACC SYSTEM	A				
1.1.24	SUSPEND DISPLAY OF FLIGHT DATA ENTRIES AND FULL DATA BLOCKS	A				
1.1.25	SUSPEND TRAIL	A				
1.1.26	DELETE FULL DATA BLOCK FROM MAN DISPLAY	A				
1.1.27	SUPPRESS FULL DATA BLOCK FROM MAN DISPLAY	A				
1.1.28	DELETE FLIGHT DATA ENTRY FROM A SELECTED DISPLAY	A				
1.1.29	DELETE AIRCRAFT FROM TRAIL ALERT AND ACTION	A				
1.1.30	DETERMINE VALIDITY OF TRAIL ALERT ACTION IN INITIATION	A				
1.1.31	DETERMINE MAN INDICATION IN ALARM	A				
1.1.32	DETERMINE VALIDITY OF MAN INDICATION IN INITIATION	A				
1.1.33	DETERMINE VALIDITY OF AIRSPACE RESTRICTION BE	A				
1.1.34	DETERMINE VALIDITY OF SPECIAL SEPARATE RESULTS	A				
1.1.35	OBSERVE DISPLAY FOR SPECIAL SEPARATE RESULTS AND NON-CONTROLLED	A				
1.1.36	ANALYZE OBJECTS THAT MAY INTERFERE WITH AIRCRAFT FLIGHT	A				
1.1.37	EVALUATE CONFLICT RESOLUTION ADVISORY	A				
1.1.38	FORMULATE ADVISORY FOR ACTION IN ADVISORY	A				
1.1.39	DETERMINE AIRCRAFT MANEUVER IN RESPONSE TO ADVISORY	A				
1.1.40	DETERMINE VALIDITY OF APPROACHED USE OF AN ALERT DISPLAY	A				
1.1.41	INHIBIT CONFLICT ALERT FOR FAULTED AIRCRAFT	A				
1.1.42	INHIBIT CONFLICT ALERT FOR FAULTED SEPARATION	A				
1.1.43	INHIBIT CONFLICT ALERT BY SPECIFIED AREA	A				
1.1.44	INHIBIT MAN INDICATION IN SPECIFIED AREA	A				
1.1.45	INHIBIT MAN INDICATION FOR SPECIFIED AIRCRAFT	A				
1.1.46	RESTORE SPECIFIED ALERT FROM NON-NORMAL	A				
1.1.47	EVALUATE CONSTRAINT EFFECT IN FLIGHT	A				
1.1.48	CHOOSE DESIRED SEQUENCE	A				
1.1.49	SELECT NEW FLIGHT SEQUENCE	A				
1.1.50	DETERMINE THE TECHNIQUE FOR A DELAY	A				
1.1.51	PERFORM AN ALTITUDE RESTRICTION	A				
1.1.52	OBSERVE AIRCRAFT RESUME NORMAL FLIGHT PLAN	A				
1.1.53	DETERMINE MANEUVER TO ESTABLISH RESTORE FLIGHT PLAN	A				
1.1.54	PERFORMANCE	A				
1.1.55	REQUEST AIRSPACE PROXIMITY PROBE	A				
1.1.56	DESIGNATE DELETE AN AREA IN USE	A				
1.1.57	DETERMINE WHETHER TO CONTROL SPECIAL USE AIRSPACE	A				
1.1.58	RESTRICT AIRCRAFT ACTIVITY IN AREA BY ALTITUDE OR SEGMENT	A				
1.1.59	OBSERVE DISPLAY OF AIRSPACE RESTRICTION STATUS CHANGE	A				
1.1.60	DETERMINE DESCENT TIME OR POINT	A				
1.1.61	PROJECT TRAFFIC SEQUENCE TO ESTABLISH MODIFY APPROACH FLOW TO AIRPORT OR SECTOR	A				
1.1.62	OBSERVE RANGE BEARING BETWEEN AIRCRAFT	A				
1.1.63	OBSERVE AIRSPACE INTRUSION BY A NON-CONTROLLED OBJECT	A				
1.1.64	COMPOSE ENTER REMINDER NOTE OF AIRSPACE INTRUSION	A				
1.1.65	FLIGHT FOLLOW AN OBSERVED NON-CONTROLLED OBJECT	A				
1.1.66	ENTER TRAIL FLIGHT PLAN AMENDMENT	A				
1.1.67	REVIEW POTENTIAL IMPEDIMENTS FOR IMPACT ON PROPOSED CLEARANCE	A				
1.1.68	SELECT CONFLICT RESOLUTION ADVISORY ACTION	A				
1.1.69	FORMULATE A CLEARANCE WITH APPROPRIATE INSTRUCTIONS	A				
1.1.70	ISSUE CLEARANCE AND INSTRUCTIONS TO PILOT	A				
1.1.71	ISSUE CLEARANCE THROUGH ATIS FOR DELAY TO PILOT	A				
1.1.72	VERIFY AIRCRAFT COMPLIANCE WITH CLEARANCE	A				
1.1.73	DECLARE EMERGENCY EVENT AND INVOKE CONTINGENCY PLAN	A				
1.1.74	PERCEIVE PRESENCE OF SPECIAL OPERATIONS	A				
1.1.75	OBSERVE NEW FLIGHT PLAN ALERT	A				
1.1.76	REVIEW FLIGHT PLAN FOR COMPLETENESS	A				
1.1.77	COMPOSE ENTER FLIGHT PLAN	A				
1.1.78	DELETE NEW FLIGHT PLAN ALERT	A				
1.1.79	REVIEW FLIGHT PLAN FOR ERRORS DATA LIST SEQUENCE	A				
1.1.80	RECEIVE FLIGHT PLAN AMENDMENT FROM COMPUTER	A				
1.1.81	HIGHLIGHT FLIGHT PLAN POSTING FOR REMINDER ACTION	A				
1.1.82	COMPOSE ENTER FLIGHT PLAN AMENDMENT	A				
1.1.83	ENTER PILOT'S POSITION REPORT IN SYSTEM	A				
1.1.84	DELETE FLIGHT PLAN AMENDMENT HIGHLIGHTING	A				

TABLE 6-1 TASKS THAT ARE PART OF EACH FUNCTIONAL CONTROLLER POSITION (continued)

TASKNO	TASK STATEMENT	REQ. A	REQ. R	REQ. P	REQ. S	REQ. T	REQ. U
5.1.1	OBSERVE DISPLAY OF WEATHER	A					
5.1.2	LINE INTENSITY BASE HEIGHT MOVEMENT	A					
5.1.3	RECEIVE SIGNED AIRMET	A					
5.1.4	RECEIVE WEATHER BRIEFING FROM METEOROLOGIST	A					
5.1.5	ENTER PIREP INTO SYSTEM	A					
5.1.6	DETERMINE WHETHER ADJACENT CONTROLLER OR PILOT NEEDS WEATHER ADVISORY	A					
5.1.7	DETERMINE WEATHER IMPACT ON ROUTES PLAN	A					
5.1.8	DETERMINE ALTITUDE ROUTE CHANGE OR BYPASS WEATHER	A					
5.1.9	RECEIVE WEATHER SEQUENCE	A					
5.1.10	RECEIVE WEATHER REPORT UPDATE	A					
5.1.11	DETERMINE WHETHER USABLE FLIGHT LEVEL HAS CHANGED	A					
5.1.12	DETERMINE WHETHER RUNWAY CONDITIONS HAVE CHANGED	A					
5.1.13	DETERMINE WHETHER CONTROL LINE IS OPEN	A					
6.1.1	REVIEW SYSTEM STATUS	A					
6.1.2	REVIEW TRAFFIC STATUS WEATHER	A					
6.1.3	VERIFY THAT ALL REQUIRED DISPLAY AND COMMUNICATION SWITCHES ARE IN PROPER LOCATION	A					
6.1.4	PERFORM ROUTE SEQUENCE AT DESIGNATED TIME	A					
6.1.5	ADJUST PARAMETERS AND DISPLAY DIFFERS NAVI PRECEDENCE	A					
6.1.6	CHECK DISPLAY FOR PROPER ALIGNMENT, READABILITY, AND SATISFACTORY STATUS	A					
6.1.7	SET UP WORKSTATION SCARTION PARAMETERS	A					
6.1.8	DETECT NON-ACCEPTANCE OF INPUT DATA	A					
6.1.9	DETECT OCCURRENCE OF SECTION STATUS FAILURE	A					
6.1.10	OBSERVE SECTOR SUITE DATA BASE RESTRICTION COMPLETION MESSAGE	A					
6.1.11	DETECT OCCURRENCE OF DATA FAILURE	A					
6.1.12	REVERT TO ADJACENT PROCESSES, ETC.	A					
6.1.13	DETERMINE AIRCRAFT NEEDING SUBSTITUTE ROUTING	A					
6.1.14	MONITOR STATUS OF QUESTIONABLE NAVI	A					
6.1.15	OBSERVE SUBSTITUTE ROUTING IN DISPLAY	A					
6.1.16	DETERMINE COMMUNICATION FAULT	A					
6.1.17	ADJUST COMMUNICATION STRATEGY	A					
6.1.18	SWITCH TO BACKUP RADIO FREQUENCY	A					
6.1.19	DETERMINE IMPENDING CONTROLLER OVERLOAD	A					
6.1.20	EXCHANGE ASSIGN INTRA POSITION RESPONSIBILITIES	A					
6.1.21	REQUEST ASSISTANCE, A-FILE	A					
6.1.22	PERCEIVE TRACKING FAILURE OR TRANSMISSION FAILURE	A					
6.1.23	REPOSITION UPDATE REASSIGNATE DATA, ETC.	A					
6.1.24	OBSERVE MESSAGE IN LOSS OF DATA BASE	A					
6.1.25	DETECT FAILURE TO UPDATE FLIGHT PLAN DATA BASE	A					
6.1.26	ENTER DISPLAY AMENDMENT MESSAGE IN NSDI	A					
6.1.27	ENTER FLIGHT PLAN IN NSDI	A					
6.1.28	RESEVERVE FLIGHT PLAN IN NSDI	A					
6.1.29	DETECT UNRELIABLE USE COMMUNICATION	A					
6.1.30	ADVISE CONTROLLER SUPERVISOR OF AIRCRAFT FLIGHT PLAN DEVIATION	A					
7.1.1	ADVISE CONTROLLER OF RESULTS OF FLIGHT PLAN CONFLICT PROBE	A					
7.1.2	ADVISE CONTROLLER OF POTENTIAL CONFLICT IN HIS SECTOR	A					
7.1.3	ADVISE CONTROLLER OF POTENTIAL MSAM IN HIS SECTOR	A					
7.1.4	RECEIVE CONTROLLER NOTICE OF POTENTIAL AIRCRAFT CONFLICT IN SECTOR	A					
7.1.5	RECEIVE CONTROLLER NOTICE OF POTENTIAL MSAM IN SECTOR	A					
7.1.6	RECEIVE CONTROLLER NOTICE OF AIRCRAFT FLIGHT PLAN DEVIATION	A					
7.1.7	RECEIVE CONTROLLER NOTICE ON RESULTS OF FLIGHT PLAN CONFLICT PROBE	A					
7.1.8	ISSUE POINTOUT	A					
7.1.9	OBSERVE AUTOMATIC INITIATION OF POINTOUT TO ANOTHER CONTROLLER	A					
7.1.10	DIRECT FLIGHT DATA DISPLAY TO ADJACENT CONTROLLER	A					
7.1.11	RECEIVE ACCEPTANCE OF POINTOUT	A					
7.1.12	RECEIVE REJECTION OF POINTOUT	A					
7.1.13	RECEIVE CONTROLLER INITIATED POINTOUT	A					
7.1.14	ACCEPT POINTOUT	A					
7.1.15	REJECT POINTOUT	A					
7.1.16	SUPPRESS FULL DATA BLOCK AFTER POINTOUT	A					
7.1.17	RECEIVE NOTICE OF AIRSPACE RESTRICTION RELEASE FROM CONTROLLER SUPERVISOR	A					
7.1.18	REQUEST RELEASE OF SPECIAL USE AIRSPACE	A					
7.1.19	RECEIVE DENIAL OF REQUEST FOR RELEASE OF SPECIAL USE AIRSPACE	A					
7.1.20	ADVISE CONTROLLER OF AIRSPACE RESTRICTION IMPOSED	A					
7.1.21	ISSUE ADVISORY IN REGARD TO RESTRICTED AIRSPACE PROXIMITY	A					
7.1.22	RECEIVE NOTICE TO TAKE OVER AIRSPACE	A					
7.1.23	RECEIVE NOTICE TO RECONFIGURE SECTOR	A					
7.1.24	RECEIVE NOTICE TO RELEASE AIRSPACE	A					
7.1.25	RECEIVE FLIGHT PLAN FROM PILOT	A					
7.1.26	RECEIVE FLIGHT PLAN VERBALLY FORWARDED	A					
7.1.27	QUERY PILOT ABOUT FLIGHT PLAN	A					
7.1.28	QUERY THE RELAYER OF A FLIGHT PLAN	A					
7.1.29	RECEIVE CONTROLLER NOTICE ON REQUESTED CLEARANCE OF AIRCRAFT LEAVING HIS SECTOR	A					
7.1.30	DENY CLEARANCE REQUEST FROM CONTROLLER	A					
7.1.31	SUGGEST ALTERNATE TO CLEARANCE REQUEST FROM CONTROLLER	A					
7.1.32	RECEIVE CLEARANCE REQUEST FROM ATC/ESS PILOT SUPERVISOR	A					
7.1.33	RECEIVE CONTROLLER REQUEST FOR CLEARANCE APPROVAL	A					
7.1.34	DENY CLEARANCE REQUEST	A					
7.1.35	SUGGEST CLEARANCE ALTERNATIVES TO PILOT	A					
7.1.36	ACKNOWLEDGE DATA LINK CLEARANCE REQUEST	A					
7.1.37	APPROVE CLEARANCE REQUEST FROM CONTROLLER	A					
7.1.38	FORWARD CLEARANCE REQUEST TO ADJACENT CONTROLLER	A					
7.1.39	REQUEST CLEARANCE APPROVAL FROM ADJACENT CONTROLLER	A					
7.1.40	RECEIVE CLEARANCE APPROVAL/CLEARANCE RESTRICTIONS FROM ADJACENT CONTROLLER	A					
7.1.41	RECEIVE CLEARANCE DISAPPROVAL/DENIAL FROM ADJACENT	A					

TABLE 6-1 TASKS THAT ARE PART OF EACH FUNCTIONAL CONTROLLER POSITION (continued)

TASK NO.	TASK STATEMENT	APPROACH	A-1000	EN-ROUTE	R-ASSIST	ER-1000
7.10.4	CONTROLLED RECEIVE ALTERNATE IMMEDIATELY FOR DEPARTURE APPROVAL REQUESTED OF ADJACENT CONTROLLER	A		R		
7.11.1	FORWARD FLIGHT PLAN AMENDMENT TO PILOT	A				
7.11.2	RECEIVE FLIGHT PLAN AMENDMENT FROM PILOT	A				
7.11.3	RECEIVE FLIGHT PLAN AMENDMENT FROM PILOT	A				
7.11.4	ADVISE CONTROLLER OF FLIGHT PLAN AMENDMENT	A				
7.11.5	RECEIVE DEPARTURE MESSAGE FROM CONTROLLER FOR FLIGHT	A				
7.12.1	ISSUE NOTICE OF FLIGHT PLAN AMENDMENT TO ADJACENT CONTROLLER FOR FLIGHT SUPERVISOR	A				
7.12.2	TERMINATE FLIGHT PLAN AMENDMENT	A				
7.12.3	RECEIVE FLIGHT PLAN AMENDMENT FROM PILOT	A				
7.12.4	RECEIVE FLIGHT PLAN AMENDMENT FROM PILOT	A				
7.12.5	FORWARD FLIGHT PLAN AMENDMENT TO PILOT	A				
7.12.6	DELETE FLIGHT PLAN AMENDMENT	A				
7.12.7	CONFIRM FLIGHT PLAN AMENDMENT DURING TRANSITION STAGES	A				
7.12.8	RECEIVE NOTICE OF FLIGHT PLAN AMENDMENT FOR AUTOMATIC EQUIPMENT	A				
7.12.9	RECEIVE STATUS OF FLIGHT PLAN AMENDMENT FROM CONTROLLER SUPERVISOR	A				
7.12.10	RECEIVE INFORMATION OF FLIGHT PLAN AMENDMENT DURING TRANSITION STAGES	A				
7.13.1	COMPOSE ENTER REPORT FOR FLIGHT PLAN CHANGE	A				
7.13.2	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.3	CONTROLLED FLIGHT PLAN AMENDMENT	A				
7.13.4	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.5	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.6	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.7	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.8	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.9	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.10	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.11	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.12	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.13	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.14	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.15	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.16	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.17	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.18	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.19	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.20	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.21	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.22	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.23	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.24	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.25	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.26	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.27	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.28	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.29	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.30	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.31	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.32	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.33	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.34	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.35	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.36	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.37	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.38	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.39	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.40	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.41	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.42	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.43	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.44	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.45	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.46	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.47	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.48	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.49	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.50	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.51	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.52	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.53	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.54	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				
7.13.55	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER	A				

TABLE 6-1 TASKS THAT ARE PART OF EACH FUNCTIONAL CONTROLLER POSITION (continued)

TASKING	TASK STATEMENT	SE-1 A-1	SE-1 B-1	EN-1 A-1	EN-1 B-1	EN-1 C-1
7.35.6	FORWARD REQUESTED ROUTE ALTITUDE CHANGES TO ADJACENT CONTROLLER FROM CONTROLLER SUPERVISOR	A				
7.36.1	ISSUE ADVISORY IN REGARD TO FLIGHT PLAN DEVIATION	A				
7.37.1	RECEIVE OBSERVE HANDOFF	A				
7.37.2	ACCEPT VERBAL HANDOFF START TRACK	A				
7.37.3	REJECT HANDOFF	A				
7.37.4	ACCEPT AUTOMATIC HANDOFF	A				
7.37.5	VERIFY COMMUNICATIONS WITH PILOT ON TRANSFER OF CONTROL OF DEPARTURE	A				
7.37.6	VERIFY AIRCRAFT ALTITUDE WITH PILOT ON TRANSFER OF CONTROL OF DEPARTURE	A				
7.37.7	CONFIRM DATA LINK COMMUNICATIONS	A				
7.38.1	INITIATE HANDOFF	A				
7.38.2	OBSERVE AUTOMATIC INITIATION OF HANDOFF	A				
7.38.3	RETRACT HANDOFF	A				
7.38.4	RECEIVE HANDOFF ACCEPTANCE	A				
7.38.5	CONFIRM TRANSFER OF CONTROL WITH OTHER CONTROLLER	A				
7.38.6	ISSUE CHANGE OF FREQUENCY TO PILOT	A				
7.39.1	RECEIVE NOTICE OF RADAR SENSOR STATUS FROM ADJACENT CONTROLLER SUPERVISOR	A				
7.40.1	FORWARD NOTICE OF RADAR SENSOR STATUS TO ADJACENT CONTROLLER SUPERVISOR	A				
7.41.1	REQUEST TEMPORARY USE OF AIRSPACE	A				
7.41.2	RECEIVE RELEASE USE OF AIRSPACE	A				
7.41.3	RECEIVE REJECTION OF USE OF AIRSPACE	A				
7.42.1	RECEIVE CONTROLLER REQUEST FOR TEMPORARY USE OF AIRSPACE	A				
7.42.2	FORWARD APPROVAL FOR TEMPORARY USE OF AIRSPACE	A				
7.42.3	FORWARD DENIAL OF TEMPORARY USE OF AIRSPACE	A				
7.42.4	SUPPRESS MAP ASSOCIATED WITH TEMPORARY USE OF AIRSPACE	A				

6.5 References

1. Computer Technology Associates, Inc., En Route Terminal ATC Operations Concept (Contract No. DTFA01-83-Y-10554, CDRL A002), Englewood, CO: Author, October 1983.
2. Federal Aviation Administration, Facility Operation and Administration, Order 7210.3F, 1 October 1981.
3. Federal Aviation Administration, Standard Organization of Air Route Traffic Control Centers, Order 1100.123C, 1983.
4. Federal Aviation Administration, Standard Organization of Air Traffic Control Terminal Facilities, Order 1100.126E, 25 April 1983.

HUMAN PERFORMANCE REQUIREMENTS

CHAPTER 7.0

10 HUMAN PERFORMANCE REQUIREMENTS

This chapter profiles the task performance requirements of Controllers operating at Sector Suites in Area Control Facilities. Skill level requirements are specified for each task of Controllers, as previously identified in Chapter 4.0. A seven-interval scale is used for denoting the anticipated skill level requirement of each task. This measure is supplemented by a notation of the performance factors that are most meaningful for assessing Controller skill in performing each task. Thus, both the "level" and "area" of required performance content are recorded.

Performance requirements are stated first for Journeyman Controllers. Following the statement of these requirements comes a profile of task skill levels that may be expected of Controller trainees, upon completion of a hypothesized formal full-time training program (but prior to completion of full-time training and experience). The intended training performance point, thus, is Day 1 of on-the-job training on the control floor, in the control room environment after completion of simulation training. The difference between the two performance profiles represents a potential domain of interest for on-site training and job experience.

The results reflect a consideration of the likely Controller roles and situation scenarios presented earlier in this document. However, these task performance requirements were derived primarily in the context of sub-activities in which they occur.

7.1 Journeyman Controller Skill Level Requirements

Performance qualifications of experienced radar Controllers in an ACF are noted for each listed Controller task. If a task should pertain primarily to a particular type of sector, such as low altitude arrival or departure (as noted in section 4.2), then the cited performance qualifications apply principally to such sector Controllers.

The scale used to express the required skill level of a task is a modified Hemphill's (Ref. 2) scale of "How Much a Part of the Job is the Task." Originally developed for job analysis purposes, it was modified later (Ref. 1) to reflect performance-oriented training requirements. This latter modification is the basis of the skill level scale. Refer to Table 7-1 for a description of the several levels of this scale.

Hemphill's original scale contained an "O" level, but that is omitted here. In a job analysis context the "O" denotes that a task is not part of an individual's job. In a training context the "O" denotes that there is no training requirement for that task. For present purposes it is assumed, since all tasks are valid Controller tasks, there must be at least some minimal familiarization for even the least significant and infrequent tasks, hence the lowest available level of "1."

Skill level "4" represents the basic demonstrated ability to do the task in a real-life operational situation. Level "3" implies attainment of the basic knowledge to do; but only the process, not a demonstrated ability. Level "2" is some knowledge/awareness base less than that.

When used as a rating scale in a job survey, the Hemphill scale has the property of expanding the high end of the scale to obtain greater discrimination among the tasks. This serves to counter the common tendency of rating most of the tasks as highly significant to the job. The rating scale also combines factors of task frequency, importance, and difficulty into a single judgmental rating value. It thus becomes a very useful scale for non-routine, non-mechanical jobs such as performed by Supervisors, Controllers, and other jobs having high cognitive and/or perceptual content.

Typically, to measure task performance, the concepts of speed and accuracy do not encompass all that is important in the performance of job task. Some tasks may not benefit by these factors, at least beyond some moderate level or range. In assessing one's performance, there may be quite an array of factors that apply.

A quick scan of job measurement factors available, such as are cited by McCormick (Ref. 3), as well as discussions with ATC personnel, produced a number of other factors that may be important for some Controller tasks. The factors that appeared to be most frequently applicable are listed in Table 7-2 with identifying letters for use in computer storage and analysis. Table 7-2 also lists some additional factors thought to be less pertinent.

TABLE 7-1. SKILL LEVEL DEFINITIONS

Required Skill Levels:		
7		Very High Proficiency in the Skillful Performance of the Task
6	}	Increasing Ability to Perform With Speed, Accuracy and/or Excellence (proficiency)
5		
4		Demonstrated Ability To Do the Task (No Requirement for Speed or Accuracy)
3	}	Nonperformance Task Issues Only { Basic Knowledge of the Process Some Knowledge/Awareness Base Introductory Familiarization
2		
1		

TABLE 7-2. FACTORS FOR MEASURING CONTROLLER TASK PERFORMANCE

Performance Measurement Factors:	
A	Response Time
B	Timing of Action
C	Speed of Performance
D	Accuracy of Performance/Perception
E	Preplanning Accomplishment
F	Procedure Following (including concern for errors of omission of a procedural step)
G	Correctness of Action for the Situation
H	Awareness of Traffic "Picture"
I	Rule/Standards Application
J	Task Accomplishment Only (used only when no other Factors A through I are relevant)
Other Factors:	
Sequence of Actions	
Follow-Through Action Accomplishment	
Priority Consideration	
Task Option Selection	
Task Completion	
Awareness of Upstream (Oncoming) Traffic Potential	
Consideration of Subsequent Effects	
Appropriate/Adequate Information Gathering for the Task/Situation	
—— Specify Any Other Factor Noted ——	

Skill level ratings and relevant performance measurement factors (derived from Table 7-2) are associated with each Controller task in Table 7-3.

Within Table 7-3, all but one task receives a required skill level rating. The one exception, Task 6.5.2 (Revert to ACCC Backup Procedures), remains to be specified in the Sector Suite design. Table 7-4 summarizes the frequency with which each skill level was associated with a task. Nearly half the tasks receive a rating of "4" (Basic Ability To Do the Task—with no requirement for speed or accuracy). Approximately 15 percent more tasks warranted no performance standard at all. These were primarily involving the receipt of information in the coordination and communication activity. However, more than a third of all tasks do require performance at some level of speed, accuracy, and/or excellence ("proficiency," in Controller terms).

It would appear that some of the other measurement factors cannot readily be applied at the task level, for example, Priority Consideration. The distinction between Factor F, Procedure Following, and Factor I, Rule/Standards Application, is the extent to which procedural steps and components are prespecified. If procedure is prescribed, then Factor F applies. If standards, such as separation, are prescribed, often task procedural steps are not spelled out, but left to Controller judgment in the context of the operational situation. Standards must be met (Factor I), but preplanning can accomplish this in many ways.

No distinction is made between skill levels 1, 2, and 3. Levels 1 and 2 could be dropped as levels of performance. However, to maintain conformance of the scale with other possible applications (such as training requirements or task surveys of job performance), levels 1 and 2 are retained here.

Performance measures, of which there may be more than one (or none) per task, are summarized in Table 7-5. The most notable feature on this table is the infrequency with which "speed of performance" is required. These pertained primarily to judgments of conflict validity and resolution, as might be expected. Thus, while the air traffic control job itself may at times require rapid execution of tasks for the Controller to "stay ahead" of the traffic, individual tasks (isolated from a realistic traffic situation) tend not to require rapid performance.

Over 475 measurement factors are associated with Controller tasks, an average of more than 1.8 measures per task. In general, the most tactically-oriented operations in Activities 1, 2, 3, and 4, as well as pointout and transfer of control in Activity 7.0, have associations with several performance measures.

TABLE 7-3. JOURNEYMAN ACF CONTROLLER TASK PERFORMANCE REQUIREMENTS

Task No.	Task Statement	Required Skill Levels					Performance Measurement Factors										Other		
		7	6	5	4	3	2	1	A	B	C	D	E	F	G	H		I	J
1.1.1	REVIEW FLIGHT PLAN DISPLAY FOR PRESENT AND/OR FUTURE AIRCRAFT SEPARATION	7									B	D					H	I	
1.1.2	REVIEW SITUATION DISPLAY FOR POTENTIAL VIOLATION OF SEPARATION STANDARDS	7									B	D					H	I	
1.1.3	REVIEW FLIGHT PLAN CONFLICT PROBE RESULTS	7									B						H		CONSIDERATION OF SUBSEQUENT EFFECTS
1.1.4	PROJECT AIRCRAFT FUTURE POSITION/ALTITUDE/PATH			5								D							
1.1.5	READ-OUT RANGE/BEARING/TIME FOR AN AIRCRAFT TO A FIX OR GEOGRAPHIC POINT				4													J	
1.1.6	FORCE/QUICK-LOOK FULL DATA BLOCK/S TO EXAMINE TRACK INFORMATION ON AIRCRAFT				4													J	
1.1.7	DETERMINE WHETHER AIRCRAFT WILL BE SEPARATED BY LESS THAN PRESCRIBED MINIMA	7									B	D	E				H	I	CONSIDERATION OF SUBSEQUENT EFFECTS
1.1.8	SELECT FDE SORTING PRIORITY SCHEME				4													J	
1.2.1	OBSERVE DISPLAY OF NEW/CHANGED EQUIPMENT/OPERATIONAL STATUS				4														
1.2.2	OBSERVE DISPLAY OF NEW/CHANGED TRAFFIC FLOW CONTROL MANAGEMENT				4												I		CONSIDERATION OF SUBSEQUENT EFFECTS
1.3.1	SEARCH DISPLAY FOR INACTIVE FLIGHT PLAN ON CLEARANCE REQUEST				4													J	
1.3.2	PROJECT MANUAL FLIGHT PLAN PROBE		6									D					H		
1.3.3	REQUEST LIMITED/STANDARD FLIGHT PLAN DISPLAY				4													J	
1.3.4	REQUEST FULL FLIGHT PLAN READOUT				4	3												J	
1.3.5	ENTER TRAIL DEPARTURE TIME			5										E	F		H		AWARENESS OF UPSTREAM (ONCOMING) TRAFFIC POTENTIAL
1.4.1	ENTER DEPARTURE MESSAGE				4										F				
1.4.2	START TRACK MANUALLY				4					B					F				
1.4.3	OBSERVE AUTOMATIC TRACK START																		CONSIDERATION OF SUBSEQUENT EFFECTS
1.5.1	ANALYZE CONDITIONS FOR PROVIDING FLIGHT FOLLOWING			5									E		G	H			
1.6.1	OFFSET A DATA BLOCK				4														
1.6.2	UPDATE/REVISE INPUT REMINDER NOTE (ELECTRONIC MEMORANDA)				4														
1.6.3	REMOVE FLIGHT DATA ENTRIES AND FULL DATA BLOCKS FROM ACCC SYSTEM				4												G		
1.6.4	REMOVE FLIGHT DATA ENTRIES AND FULL DATA BLOCKS FROM INTERNAL ACCC SYSTEM				4												G		
1.6.5	SUSPEND DISPLAY OF FLIGHT DATA ENTRIES AND FULL DATA BLOCKS				4												G		
1.6.6	SUSPEND TRACK				4												G		
1.6.7	DELETE FULL DATA BLOCK FROM OWN DISPLAY				4												G		
1.6.8	SUPPRESS FULL DATA BLOCK FROM OWN DISPLAY				4												G		
1.6.9	DELETE FLIGHT DATA ENTRY FROM A SELECTED DISPLAY				4												G		

TABLE 7-3. JOURNEYMAN ACF CONTROLLER TASK PERFORMANCE REQUIREMENTS
(continued)

Task No	Task Statement	Required Skill Levels				Performance Measurement Factors										Other
		Very High Proficiency	Increasing Ability	Demonstrated Ability to Do	Nonperformance Issues	Response Time	Timing of Action	Speed of Performance	Accuracy of Performance	Preparation of Performance	Procedure Following	Correctness of Action	Awareness of Situation	Rule/Standards Application	Task Accomplishment	
2.1.1	DETECT AIRCRAFT CONFLICT ALERT INDICATION	7	6	4	2	A	B	C	D	E	F	G	H	I	J	
2.1.2	DETERMINE VALIDITY OF CONFLICT ALERT NOTICE OR INDICATION	7	6	4	2	A	B	C	D	E	F	G	H	I	J	
2.2.1	DETECT MSAM INDICATION OR ALARM	7	6	4	2	A	B	C	D	E	F	G	H	I	J	
2.2.2	DETERMINE VALIDITY OF MSAM NOTICE OR INDICATION	7	6	4	2	A	B	C	D	E	F	G	H	I	J	
2.3.1	DETERMINE NEED FOR AIRSPACE PROXIMITY PROBE	7	6	4	2	A	B	C	D	E	F	G	H	I	J	
2.3.2	DETERMINE VALIDITY OF SPECIAL USE AIRSPACE PROBE RESULTS	7	6	4	2	A	B	C	D	E	F	G	H	I	J	
2.4.1	OBSERVE DISPLAY FOR FIXED OBSTRUCTIONS AND NON-CONTROLLED AIRBORNE OBJECTS THAT MAY INTERFERE WITH AIRCRAFT FLIGHT	7	6	4	2	A	B	C	D	E	F	G	H	I	J	
2.4.2	EVALUATE CONFLICT RESOLUTION ADVISORIES	7	6	4	2	A	B	C	D	E	F	G	H	I	J	
2.4.3	FORMULATE ADVISORY/RESOLUTION CONTENT	7	6	4	2	A	B	C	D	E	F	G	H	I	J	
2.4.4	DETECT AIRCRAFT MANEUVER IN RESPONSE TO ADVISORY	7	6	4	2	A	B	C	D	E	F	G	H	I	J	
2.5.1	DETERMINE VALIDITY/ APPROPRIATENESS OF USE OF AN ALERT DISPLAY	7	6	4	2	A	B	C	D	E	F	G	H	I	J	
2.5.2	INHIBIT CONFLICT ALERT FOR PAIRED AIRCRAFT	7	6	4	2	A	B	C	D	E	F	G	H	I	J	
2.5.3	INHIBIT CONFLICT ALERT FOR GROUP SUPPRESSION	7	6	4	2	A	B	C	D	E	F	G	H	I	J	
2.5.4	INHIBIT CONFLICT ALERT IN SPECIFIED AREA	7	6	4	2	A	B	C	D	E	F	G	H	I	J	
2.5.5	INHIBIT MSAM FUNCTION IN SPECIFIED AREA	7	6	4	2	A	B	C	D	E	F	G	H	I	J	
2.5.6	INHIBIT MSAM FUNCTION FOR RESTORE SPECIFIC ALERT	7	6	4	2	A	B	C	D	E	F	G	H	I	J	
2.5.7	FUNCTION TO NORMAL	7	6	4	2	A	B	C	D	E	F	G	H	I	J	
3.1.1	EVALUATE CONSTRAINT EFFECT ON FLOW	7	6	4	2	A	B	C	D	E	F	G	H	I	J	
3.1.2	CHOOSE DESIRED SEQUENCE	7	6	4	2	A	B	C	D	E	F	G	H	I	J	
3.1.3	SELECT NEW FLOW SEQUENCE	7	6	4	2	A	B	C	D	E	F	G	H	I	J	
3.1.4	DETERMINE THE TECHNIQUE FOR A DELAY	7	6	4	2	A	B	C	D	E	F	G	H	I	J	
3.2.1	PERCEIVE AN ALTITUDE OR ROUTE DEVIATION	7	6	4	2	A	B	C	D	E	F	G	H	I	J	
3.2.2	OBSERVE AIRCRAFT RESUMING NORMAL FLIGHT PLAN	7	6	4	2	A	B	C	D	E	F	G	H	I	J	
3.2.3	DETERMINE MANEUVER TO ESTABLISH/RESTORE FLIGHT PLAN CONFORMANCE	7	6	4	2	A	B	C	D	E	F	G	H	I	J	
3.3.1	REQUEST AIRSPACE PROXIMITY PROBE	7	6	4	2	A	B	C	D	E	F	G	H	I	J	
3.3.2	DESIGNATE/DELETE AN AREA IN USE	7	6	4	2	A	B	C	D	E	F	G	H	I	J	
3.3.3	DETERMINE WHETHER ATC CONTROLS SPECIAL USE AIRSPACE	7	6	4	2	A	B	C	D	E	F	G	H	I	J	
3.3.4	RESTRICT AIRCRAFT ACTIVITY IN AREA BY ALTITUDE OR SEGMENT	7	6	4	2	A	B	C	D	E	F	G	H	I	J	
3.3.5	OBSERVE DISPLAY OF AIRSPACE RESTRICTION STATUS CHANGE	7	6	4	2	A	B	C	D	E	F	G	H	I	J	
3.4.1	DETERMINE DESCENT TIME OR POINT	7	6	4	2	A	B	C	D	E	F	G	H	I	J	
3.4.2	PROJECT TRAFFIC SEQUENCE ALERT IN PREVIEW AREA	7	6	4	2	A	B	C	D	E	F	G	H	I	J	

CONSIDERATION OF SUBSEQUENT EFFECTS

TABLE 7-3. JOURNEYMAN ACF CONTROLLER TASK PERFORMANCE REQUIREMENTS
(continued)

Task No	Task Statement	Required Skill Levels				Performance Measurement Factors										Other			
		Very High Proficiency	Increasing Ability	Demonstrated Ability To Do	Nonperformance Issues	Response Time	Timing of Action	Speed of Performance	Accuracy of Perf/Perception	Planning Accomplishment	Procedure Following	Correctness of Act for Situation	Awareness of Traffic "Picture"	Rule/Standards Application	Task Accomplishment				
		7	6	5	4	3	2	1	A	B	C	D	E	F	G	H	I	J	
3.4.3	TO ESTABLISH/MODIFY APPROACH FLOW TO AIRPORT OR SECTOR			5									D			H			
3.6.1	OBSERVE RANGE/BEARING BETWEEN AIRCRAFT			5					A			D							
3.6.2	OBSERVE AIRSPACE INTRUSION BY A NON-CONTROLLED OBJECT				4									F					
3.6.3	COMPOSE/ENTER REMINDER NOTE OF AIRSPACE INTRUSION																H		
4.1.1	FLIGHT-FOLLOW AN OBSERVED NON-CONTROLLED OBJECT			4													H		
4.1.1	ENTER TRIAL FLIGHT PLAN AMENDMENT			4									E	F			H		
4.1.2	REVIEW POTENTIAL IMPEDIMENTS FOR IMPACT ON PROPOSED CLEARANCE			5													H	I	
4.1.3	SELECT CONFLICT RESOLUTION ADVISORY OPTION			5					B		D							I	
4.1.4	FORMULATE A CLEARANCE WITH APPROPRIATE INSTRUCTIONS		6						B		E		G					I	
4.1.5	QUERY PILOT REGARDING COMPLIANCE WITH CLEARANCE			5												G			
4.1.6	ISSUE CLEARANCE AND INSTRUCTIONS TO PILOT			5					B				F						
4.1.7	ISSUE CLEARANCE THRU ATCT/FSS FOR RELAY TO PILOT			5					B				F						
4.1.8	VERIFY AIRCRAFT COMPLIANCE WITH CLEARANCE			5					B							G			
4.2.1	DECLARE EMERGENCY EVENT AND INVOKE CONTINGENCY PLAN		6						A		D					G			
4.3.1	PERCEIVE PRESENCE OF SPECIAL OPERATIONS				4				B										J
4.4.1	OBSERVE NEW FLIGHT PLAN ALERT				4														
4.4.2	REVIEW FLIGHT PLAN FOR COMPLETENESS			5										F					
4.4.3	COMPOSE/ENTER FLIGHT PLAN				4						C			F					J
4.4.4	DELETE NEW FLIGHT PLAN ALERT				4														
4.4.5	REVIEW FLIGHT PLAN FOR ERRORS/DATA LIST SEQUENCE		6								D			F				I	J
4.5.1	RECEIVE FLIGHT PLAN AMENDMENT FROM COMPUTER				4														J
4.5.2	HIGHLIGHT FLIGHT PLAN POSTING FOR REMINDER ACTION				4				B							G			
4.5.3	COMPOSE/ENTER FLIGHT PLAN AMENDMENT			5							D			F					
4.5.4	ENTER PILOT'S POSITION REPORT IN SYSTEM				4									F					J
4.5.5	DELETE FLIGHT PLAN AMENDMENT HIGHLIGHTING				4														
5.1.1	OBSERVE DISPLAY OF WEATHER LINE/INTENSITY/ BASE/HEIGHT/MOVEMENT			5							D					H			
5.1.2	RECEIVE SIGMET/AIRMET				4														J
5.1.3	RECEIVE WEATHER BRIEFING FROM METEOROLOGIST				4														
5.1.4	ENTER PIREP INTO SYSTEM				4									F					
5.1.5	DETERMINE WHETHER ADJACENT CONTROLLER OR PILOT NEEDS WEATHER ADVISORY			5							D				G				
5.1.6	DETERMINE WEATHER IMPACT				5				B		D				G				

CONSIDERATION OF SUBSEQUENT EFFECTS
AWARENESS OF UPSTREAM (ONCOMING) TRAFFIC POTENTIAL

CONSIDERATION OF SUBSEQUENT EFFECTS

CONSIDERATION OF SUBSEQUENT EFFECTS

TABLE 7-3. JOURNEYMAN ACFT CONTROLLER TASK PERFORMANCE REQUIREMENTS
(continued)

Task No.	Task Statement	Required Skill Levels					Performance Measurement Factors										Other		
		7 Very High Proficiency	6 Increasing Ability	5 Demonstrated Ability To Do	4 Nonperformance Issues	3 Nonperformance Issues	2 Nonperformance Issues	1 Nonperformance Issues	A Response Time	B Timing of Action	C Speed of Performance	D Accuracy of Perf/Perception	E Preplanning Accomplishment	F Procedure Following	G Correctness of Act for Situation	H Awareness of Traffic "Picture"		I Rule/Standards Application	J Task Accomplishment
5.1.7	ON ROUTES/FLOW DETERMINE ALTITUDE/ROUTE CHANGE TO BYPASS SEVERE WEATHER	6							B						G	H			
5.2.1	RECEIVE WEATHER SEQUENCE			1														J	
5.2.2	RECEIVE WEATHER REPORT UPDATE			1														J	
5.2.3	DETERMINE WHETHER USABLE FLIGHT LEVEL HAS CHANGED.		5														I		
5.2.4	DETERMINE WHETHER RUNWAY CONDITIONS HAVE CHANGED		4										F						
5.2.5	DETERMINE WHETHER CONTROL ZONE IS IFR/VFR		5							D						I			
6.2.1	REVIEW SYSTEM STATUS		5							D			F						
6.2.2	REVIEW TRAFFIC STATUS/WEATHER	6							D	D			F		H				
6.2.3	VERIFY THAT ALL REQUIRED DISPLAY AND COMMUNICATION SWITCHES ARE IN PROPER LOCATION		4										F						
6.2.4	PERFORM LOG-ON SEQUENCE AT DESIGNATED CONSOLE		4														J		
6.2.5	ADJUST PARAMETERS AND DISPLAY TO PERSONAL PREFERENCE		4														J		
6.2.6	CHECK DISPLAY FOR PROPER ALIGNMENT, USABILITY, AND SATISFACTORY STATUS	6								D			F						
6.2.7	SET-UP WORKSTATION ADAPTION PARAMETERS		5							D			F						
6.3.1	DETECT NON-ACCEPTANCE OF INPUT DATA		4					A											
6.4.1	DETECT OCCURRENCE OF SECTOR SUITE FAILURE		5					A		D									
6.4.2	OBSERVE SECTOR SUITE DATA BASE RESTORATION COMPLETION MESSAGE		4														J		
6.5.1	DETECT OCCURRENCE OF ACCC FAILURE		5					A		D									
6.5.2	REVERT TO ACCC BACKUP PROCEDURES (TBD)		5																
6.6.1	DETERMINE AIRCRAFT NEEDING SUBSTITUTE ROUTING		5										G	H					
6.6.2	MONITOR STATUS OF QUESTIONABLE NAVAID		4		3														
6.6.3	OBSERVE SUBSTITUTE ROUTING ON DISPLAY		4														J		
6.7.1	DETERMINE COMMUNICATION FAULT		4							D									
6.7.2	ADJUST COMMUNICATION STRATEGY		5										G						
6.7.3	SWITCH TO BACKUP RADIO/ FREQUENCY		4														J		
6.8.1	DETERMINE IMPENDING CONTROLLER OVERLOAD	6									E			G	H				
6.8.2	EXCHANGE/ASSIGN INTRA-POSITION RESPONSIBILITIES		4														J		
6.8.3	REQUEST ASSISTANCE OR RELIEF		4						B					G	H				
6.9.1	PERCEIVE TRACKING FAULT OR TRANSPONDER FAILURE		5							D				G					
6.9.2	REPOSITION/UPDATE/ REASSOCIATE DATA BLOCKS		4														J		
6.10.1	OBSERVE MESSAGE ON LOSS OF DATA BASE		4					A											
6.10.2	DETECT FAILURE TO UPDATE FLIGHT PLAN DATA BASE		4					A											
6.10.3	ENTER DISPLAY AMENDMENT MESSAGE ON CONSOLE		4									F							

CONSIDERATION OF SUBSEQUENT EFFECTS

FOLLOW-THROUGH ACTION ACCOMPLISHMENT

APPROP./ADEQUATE INFO GATHERING FOR
TASK/SITUATION

TABLE 7-3. JOURNEYMAN ACF CONTROLLER TASK PERFORMANCE REQUIREMENTS
(continued)

[illegible]

TABLE 7-3. JOURNEYMAN ACF CONTROLLER TASK PERFORMANCE REQUIREMENTS
(continued)

Task No.	Task Statement	Required Skill Levels					Performance Measurement Factors										Other			
		Very High Proficiency	Increasing Ability	Demonstrates Ability to Do	Nonperformance Issues		Response Time	Timing of Action	Speed of Performance	Accuracy of Perf/Perception	Preplanning Accomplishment	Procedure Following	Correctness of Act for Situation	Awareness of Traffic "Picture"	Rule/Standards Application	Task Accomplishment				
					7	6												5	4	3
7.8.2	RECEIVE FLIGHT PLAN VERBALLY FORWARDED					4													J	APPROP./ADEQUATE INFO GATHERING FOR TASK/SITUATION
7.8.3	QUERY PILOT ABOUT FLIGHT PLAN					4		3		B				G		I				
7.8.4	QUERY THE RELAYER OF A FLIGHT PLAN					4				B				G		I				APPROP./ADEQUATE INFO GATHERING FOR TASK/SITUATION
7.9.1	RECEIVE CONTROLLER NOTICE ON REQUESTED CLEARANCE OF AIRCRAFT LEAVING HIS SECTOR							3												
7.9.2	DENY CLEARANCE REQUEST FROM CONTROLLER		6							B				G	H	I				FOLLOW-THROUGH ACTION ACCOMPLISHMENT
7.9.3	SUGGEST ALTERNATE TO CLEARANCE REQUEST FROM CONTROLLER		6							B		E		G	H	I				
7.9.4	RECEIVE CLEARANCE REQUEST FROM ATCT/FSS/PILOT/SUPERVISOR							3												FOLLOW-THROUGH ACTION ACCOMPLISHMENT
7.9.5	RECEIVE CONTROLLER REQUEST FOR CLEARANCE/APPROVAL							3												
7.9.6	DENY CLEARANCE REQUEST		6							B				G	H	I				FOLLOW-THROUGH ACTION ACCOMPLISHMENT
7.9.7	SUGGEST CLEARANCE ALTERNATIVES TO PILOT		6							B				G	H	I				
7.9.8	ACKNOWLEDGE DATA LINK CLEARANCE REQUEST					4													J	FOLLOW-THROUGH ACTION ACCOMPLISHMENT
7.9.9	APPROVE CLEARANCE REQUEST FROM CONTROLLER			5						B					H	I				
7.9.10	FORWARD CLEARANCE REQUEST TO ADJACENT CONTROLLER					4				B										FOLLOW-THROUGH ACTION ACCOMPLISHMENT
7.10.1	REQUEST CLEARANCE/APPROVAL FROM ADJACENT CONTROLLER			5						B		E		G		I				
7.10.2	RECEIVE CLEARANCE APPROVAL/CLEARANCE RESTRICTIONS FROM ADJACENT CONTROLLER					4													J	FOLLOW-THROUGH ACTION ACCOMPLISHMENT
7.10.3	RECEIVE CLEARANCE DISAPPROVAL/DENIAL FROM ADJACENT CONTROLLER					4														
7.10.4	RECEIVE ALTERNATE SUGGESTION FOR CLEARANCE/APPROVAL REQUESTED OF ADJACENT CONTROLLER					4														CONSIDERATION OF SUBSEQUENT EFFECTS
7.11.1	FORWARD FLIGHT PLAN AMENDMENT VERBALLY					4				B		D								
7.11.2	RECEIVE CONTROLLER ADVICE OF UNABLE FLIGHT PLAN AMENDMENT					4														FOLLOW-THROUGH ACTION ACCOMPLISHMENT
7.12.1	RECEIVE FLIGHT PLAN AMENDMENT VERBALLY FORWARDED					4							F							
7.12.2	ADVISE CONTROLLER UNABLE FLIGHT PLAN AMENDMENT		5							B		E		G	H					FOLLOW-THROUGH ACTION ACCOMPLISHMENT
7.13.1	RECEIVE DEPARTURE MESSAGE FROM CONTROLLER/FSS/PILOT					4													J	
7.14.1	ISSUE NOTICE OF EQUIPMENT STATUS TO ADJACENT CONTROLLER/PILOT/SUPERVISOR					4													J	FOLLOW-THROUGH ACTION ACCOMPLISHMENT
7.14.2	TERMINATE RADAR SERVICE TO AIRCRAFT					4				B				G		I				
7.14.3	REQUEST PILOT POSITION REPORTS					4				B				G						FOLLOW-THROUGH ACTION ACCOMPLISHMENT
7.14.4	RECEIVE PILOT'S POSITION REPORT					4														
7.14.5	FORWARD FLIGHT PLAN VERBALLY					4						D								FOLLOW-THROUGH ACTION ACCOMPLISHMENT
7.14.6	DELETE PILOT POSITION					4				B										

TABLE 7-3. JOURNEYMAN ACF CONTROLLER TASK PERFORMANCE REQUIREMENTS
(continued)

Task No.	Task Statement	Required Skill Levels					Performance Measurement Factors										Other
		7 Very High Proficiency	6 Increasing Ability	5 Demonstrated Ability to Do	4 Nonperformance Issues	3 Response Time	2 Timing of Action	1 Speed of Performance	A Accuracy of Perf. Perception	B Preplanning Accomplishment	C Procedure Following	D Correctness of Act. for Situation	E Awareness of Traffic "Picture"	F Rule/Standards Application	G Task Accomplishment		
7.14.7	REPORTS CONFIRM COMPUTER ACTION DURING TRANSITION STAGES			4												APPROP. ADEQUATE INFO GATHERING FOR TASK/SITUATION	
7.15.1	RECEIVE NOTICE OF STATUS OF ADJACENT ACF				3										J		
7.15.2	AUTOMATION EQUIPMENT RECEIVE STATUS OF SECTOR SUITE FAILURE FROM				3											CONSIDERATION OF SUBSEQUENT EFFECTS	
7.15.3	CONTROLLER/SUPERVISOR RECEIVE CONFIRMATION OF COMPUTER ACTION DURING TRANSITION STAGES			4						F							
7.16.1	COMPOSE/ENTER REQUESTED ROUTE/ALTITUDE CHANGE		5				B		E			H					
7.17.1	RECEIVE WEATHER ADVISORY FROM ADJACENT				3											CONSIDERATION OF SUBSEQUENT EFFECTS	
7.17.2	CONTROLLER/SUPERVISOR/MET EOROLOGIST				3											CONSIDERATION OF SUBSEQUENT EFFECTS	
7.17.3	RECEIVE REVISION/ CANCELLATION TO PREVIOUS WEATHER REPORT				3											CONSIDERATION OF SUBSEQUENT EFFECTS	
7.17.4	RECEIVE WIND SHEAR REPORT				3											CONSIDERATION OF SUBSEQUENT EFFECTS	
7.17.5	RECEIVE PIREP ON WEATHER			4				D		G						CONSIDERATION OF SUBSEQUENT EFFECTS	
7.17.6	SELECT WEATHER ADVISORY/ UPDATE FOR DATA LINK			5			B	D		G							
7.17.7	TRANSMISSION TO PILOT			5			B	D		G							
7.17.8	ISSUE WEATHER ADVISORY/ UPDATE TO PILOT/ADJACENT CONTROLLER			5			B	D		G							
7.17.9	FORWARD WEATHER INFORMATION TO SUPER- VISOR/METEOROLOGIST			4			B	D		H							
7.17.10	ADVISE SUPERVISOR/FLOW CONTROLLER OF WEATHER IMPACT ON ROUTES/FLOW					3										FOLLOW-THROUGH ACTION ACCOMPLISHMENT	
7.18.1	RECEIVE CONTROLLED REQUEST FOR WEATHER INFORMATION			4								H					
7.18.2	REQUEST WEATHER INFORMATION				3											CONSIDERATION OF SUBSEQUENT EFFECTS	
7.18.3	RECEIVE NOTICE OF COMMUNICATION STATUS				3												
7.19.1	RECEIVE NEW FREQUENCY ASSIGNMENT				3											FOLLOW-THROUGH ACTION ACCOMPLISHMENT	
7.19.2	RECEIVE NOTICE OF ALTERNATE COMMUNICATION PATH				3								J				
7.19.3	FORWARD NOTICE OF COMMUNICATION STATUS			4			B										
7.20.1	FORWARD NEW FREQUENCY ASSIGNMENT TO ADJACENT CONTROLLER/SUPERVISOR			4			B										
7.20.2	FORWARD ALTERNATE COMMUNICATION PATH			4			B										
7.20.3	RECEIVE NOTICE OF NAVAID STATUS FROM ADJACENT CONTROLLER/FSS/SUPERVISOR/ PILOT				3											CONSIDERATION OF SUBSEQUENT EFFECTS	
7.21.1	RECEIVE SUBSTITUTE ROUTING				3											FOLLOW-THROUGH ACTION ACCOMPLISHMENT	
7.21.2	RECEIVE CANCELLATION OF SUBSTITUTE ROUTING				3											CONSIDERATION OF SUBSEQUENT EFFECTS	
7.21.3	FORWARD NAVAID STATUS TO ADJACENT			4			B										
7.21.4	CONTROLLER/SUPERVISOR/ PILOT			4			B										
7.21.5	FORWARD SUBSTITUTE ROUTING			4			B										
7.21.6	CANCEL PREVIOUS SUBSTITUTE ROUTING			4			B										

TABLE 7-3. JOURNEYMAN ACF CONTROLLER TASK PERFORMANCE REQUIREMENTS
(continued)

Task No.	Task Statement	Required Skill Levels					Performance Measurement Factors										Other			
		7	6	5	4	3	2	1	A	B	C	D	E	F	G	H		I	J	
		Very High Proficiency	Increasing Ability	Demonstrated Ability To Do	Nonperformance Issues					Response Time	Timing of Action	Speed of Performance	Accuracy of Perception	Preplanning Accomplishment	Procedure Following	Correctness of Act for Situation	Awareness of Traffic "Picture"	Rules/Standards Application	Task Accomplishment	
7.22.1	FORWARD NOTICE OF AIRSPACE INTRUSION BY A NON-CONTROLLED OBJECT				4						B						H			
7.22.2	RECEIVE NOTICE OF AIRSPACE INTRUSION BY A NON-CONTROLLED OBJECT					3														CONSIDERATION OF SUBSEQUENT EFFECTS
7.22.3	ISSUE ADVISORY IN REGARD TO A NON-CONTROLLED OBJECT				4						B									
7.22.4	ADVISE PILOT WHEN CLEAR OF NON-CONTROLLED OBJECT				4						B									
7.23.1	RECEIVE RUNWAY USE DATA					3														
7.24.1	FORWARD RUNWAY USE DATA				4															
7.25.1	DETECT A PILOT OR AIRCRAFT PROBLEM (E.G. HYPOXIA)	7								A		D			G				J	CONSIDERATION OF SUBSEQUENT EFFECTS
7.25.2	ALERT DESIGNATED PERSONNEL OF AIRCRAFT HAVING FLIGHT PROBLEMS			5						A	B									
7.25.3	FORWARD CONTINGENCY INFORMATION TO SUPERVISOR/ADJACENT CONTROLLER				4						B									
7.26.1	RECEIVE SUPERVISOR NOTICE TO INHIBIT ALERT					3														FOLLOW-THROUGH ACTION ACCOMPLISHMENT
7.27.1	BRIEF RELIEVING CONTROLLER			5										F	G				H	
7.28.1	RECEIVE NOTICE OF SPECIAL OPERATIONS					3														CONSIDERATION OF SUBSEQUENT EFFECTS
7.29.1	FORWARD NOTICE OF SPECIAL OPERATIONS TO ADJACENT CONTROLLER/SUPERVISOR				4					B										
7.30.1	RECEIVE INFORMATION ON LOSS OF RADIO CONTACT WITH AIRCRAFT					3														FOLLOW-THROUGH ACTION ACCOMPLISHMENT
7.30.2	CONDUCT RADIO/RADAR SEARCH FOR AIRCRAFT WITHOUT RADIO CONTACT			5								D		F						
7.30.3	ATTEMPT ESTABLISHMENT OF COMMUNICATIONS USING TRANSPONDER/RADAR EQUIPMENT			5								D		F						
7.31.1	RECEIVE INFORMATION ON OVERDUE AIRCRAFT					3														FOLLOW-THROUGH ACTION ACCOMPLISHMENT
7.31.2	CONTACT FACILITY ALONG ROUTE OF FLIGHT TO SECURE INFORMATION ON OVERDUE AIRCRAFT				4									F						
7.31.3	CONDUCT RADIO/RADAR SEARCH FOR OVERDUE AIRCRAFT			5								D		F						
7.32.1	EXPLORE WHETHER OTHERS ARE RECEIVING AN AIRCRAFT'S TRANSMISSIONS				4									F						
7.32.2	ISSUE ALTERNATE COMMUNICATION FOR AIR/GROUND TRANSMISSION				4									F						
7.33.1	RECEIVE PILOT/ADJACENT CONTROLLER REQUEST FOR FLIGHT FOLLOWING					3														FOLLOW-THROUGH ACTION ACCOMPLISHMENT
7.33.2	DENY FLIGHT FOLLOWING REQUEST				4					B				G						
7.33.3	REQUEST/ASSIGN BEACON CODE TO AIRCRAFT				4									F						
7.33.4	ISSUE TRAFFIC ADVISORY IN REGARD TO TRAFFIC PROXIMITY			5						B				G					H	
7.33.5	ADVISE PILOT WHEN CLEAR OF TRAFFIC				4					B				G						

TABLE 7-3. JOURNEYMAN ACF CONTROLLER TASK PERFORMANCE REQUIREMENTS
(continued)

Task No.	Task Statement	Required Skill Levels					Performance Measurement Factors										Other		
		7	6	5	4	3	2	1	A	B	C	D	E	F	G	H		I	J
7.34.1	RECEIVE A FAD NOTICE					3													CONSIDERATION OF SUBSEQUENT EFFECTS
7.34.2	CONFER WITH PILOT THRU ATCT ON DESIRE FOR FAD INTENTIONS				4									F					CONSIDERATION OF SUBSEQUENT EFFECTS
7.35.1	RECEIVE REQUESTED ROUTE/ ALTITUDE CHANGES FROM ANOTHER CONTROLLER/FLOW CONTROLLER/SUPERVISOR					3													CONSIDERATION OF SUBSEQUENT EFFECTS
7.35.2	RECEIVE A FLOW RESTRICTION					3													CONSIDERATION OF SUBSEQUENT EFFECTS
7.35.3	RECEIVE METERING DATA FROM FLOW CONTROLLER					3													CONSIDERATION OF SUBSEQUENT EFFECTS
7.35.4	REQUEST FLOW CONTROL BE IMPOSED	6							B				E			H			
7.35.5	NEGOTIATE DELAY TECHNIQUE WITH PILOT		5						B				E			H			
7.35.6	FORWARD REQUESTED ROUTE/ ALTITUDE CHANGES TO ADJACENT CONTROLLER/FLOW CONTROLLER/SUPERVISOR			4					B									J	
7.36.1	ISSUE ADVISORY IN REGARD TO FLIGHT PLAN DEVIATION							A	B							G	H		
7.37.1	RECEIVE/OBSERVE HANDOFF		5								D					H			FOLLOW-THROUGH ACTION ACCOMPLISHMENT
7.37.2	ACCEPT VERBAL HANDOFF/ START TRACK		5						B		D					H			
7.37.3	REJECT HANDOFF		5						B							G	H		
7.37.4	ACCEPT AUTOMATIC HANDOFF			4					B		D					H			FOLLOW-THROUGH ACTION ACCOMPLISHMENT
7.37.5	VERIFY COMMUNICATIONS WITH PILOT ON TRANSFER OF CONTROL OR DEPARTURE		5						B		D								
7.37.6	VERIFY AIRCRAFT ALTITUDE WITH PILOT ON TRANSFER OF CONTROL OR DEPARTURE		5						B		D								
7.37.7	CONFIRM DATA LINK COMMUNICATIONS		5								D								
7.38.1	INITIATE HANDOFF		5						B		D		F						TASK OPTION SELECTION
7.38.2	OBSERVE AUTOMATIC INITIATION OF HANDOFF			4					B		D								FOLLOW-THROUGH ACTION ACCOMPLISHMENT
7.38.3	RETRACT HANDOFF			4					B					G					TASK OPTION SELECTION
7.38.4	RECEIVE HANDOFF ACCEPTANCE				3														
7.38.5	CONFER ON TRANSFER OF CONTROL WITH OTHER CONTROLLER		5						B						G	H			
7.39.6	ISSUE CHANGE OF FREQUENCY TO PILOT			4					B										
7.39.1	RECEIVE NOTICE OF RADAR SENSOR STATUS FROM ADJACENT CONTROLLER/SUPERVISOR				3														CONSIDERATION OF SUBSEQUENT EFFECTS
7.40.1	FORWARD NOTICE OF RADAR SENSOR STATUS TO ADJACENT CONTROLLER/SUPERVISOR			4					B										
7.41.1	REQUEST TEMPORARY USE OF AIRSPACE		5						B										
7.41.2	RECEIVE RELEASE/USE OF AIRSPACE			4														J	FOLLOW-THROUGH ACTION ACCOMPLISHMENT
7.41.3	RECEIVE REJECTION OF USE OF AIRSPACE			4															
7.42.1	RECEIVE CONTROLLER REQUEST FOR TEMPORARY USE OF AIRSPACE			4															
7.42.2	FORWARD APPROVAL FOR TEMPORARY USE OF AIRSPACE		5						B						G	H			
7.42.3	FORWARD DENIAL OF TEMPORARY USE OF AIRSPACE		5						B						G	H			
7.42.4	SUPPRESS MAP ASSOCIATED WITH TEMPORARY USE OF AIRSPACE			4														J	

TABLE 7-4. SUMMARY OF CONTROLLER SKILL LEVEL REQUIREMENTS

Required Skill Levels		Frequency of Task Associations
7	Very High Proficiency	10
6	Increasing Ability (Proficiency)	25
5		57
4		129
3	Demonstrated Ability To Do	44
2		40
1		0

TABLE 7-5. SUMMARY OF CONTROLLER TASK PERFORMANCE MEASURES

Performance Measurement Factors	Frequency of Task Association
A Response Time	21
B Timing of Action	85
C Speed of Performance	5
D Accuracy of Performance/Perception	51
E Preplanning Accomplishment	23
F Procedure Following	33
G Correctness of Action for the Situation	58
H Awareness of Traffic "Picture"	55
I Rule/Standards Application	31
J Task Accomplishment Only	41
(None in A-J cited for a task)	(46)
Others:	
• Consideration of Subsequent Effects	29
• Follow-Through Action Accomplishment	28
• Appropriate/Adequate Information Gathering for the Task/ Situation	4
• Awareness of Upstream (Oncoming) Traffic Potential	2
• Task Option Selection	2

7.2 Development Controller Training Performance Requirements

Skill level requirements for Controller trainees completing the initial formal training program are cited in the same manner as above. The 1-to-7 skill level scale is used to denote the required task performance level (Table 7-1). The same list of possible performance measurement factors applies (Table 7-2).

In the context of training, these two measures may serve as the basis for identifying curriculum content in a performance-based training program. Curriculum content is strongly influenced by its intended inclusion and its emphasis in a training program. The inclusion influence has been encompassed by the derivation and validation of Controller tasks. In this section the emphasis influence is operationalized as *degree of emphasis* and *areas of emphasis*. The intended level of task development (performance skill level) indicates the degree of task emphasis. Pertinent performance measurement factors indicate the area(s) of emphasis.

Training skill level ratings and relevant performance measurement factors are associated with each Controller task in Table 7-6.

Within Table 7-6 (as it was in Table 7-3), Task 6.5.2, "Revert to ACCC Backup Procedures" receives no skill level requirement at this stage in the design of the Sector Suite workstation. Table 7-7 summarizes the frequency with which each skill level was associated with a task. Over half the tasks receive a rating of 4 (Basic Ability To Do the Task—with no requirement for speed or accuracy). Approximately 30 percent more tasks warranted no task *performance* at all, though that does not preclude a learning requirement for a *knowledge* base pertinent to those tasks. All but seven of the tasks receiving a skill level rating less than 4 are in Activity 7-0, Perform Coordination. Less than 15 percent of all Controller tasks require trainee achievement of a performance level at some degree of speed, accuracy, and/or excellence (proficiency). With but one exception, all are in the first six activities.

Training personnel may use the lower levels 1, 2, and 3 to distinguish among nonperformance training content. For example, level 1 could be used to denote a minimal familiarization to the task. Level 2 might then denote learning a pro-

cess, rules, or "when" a task would likely be performed. However, any level less than 4 does not warrant a performance testing of that task; though paper-and-pencil testing is not precluded. For example, Task 7.31.2, "Contact Facility Along Route of Flight to Secure Information on Overdue Aircraft," received a skill level rating less than 4. But, it also was assigned a measurement factor of "F," denoting that there are procedures that could be learned in training. A test on a trainee's knowledge of those procedures rather than ability to perform them is reasonable.

Performance measures, of which there may be more than one (or none), per task are summarized in Table 7-8. Except for Factors A and B, the pattern of these measurement factors is quite similar to that presented in Table 7-5 for journeyman Controllers. One difference is that more tasks merit none of the first 10 measurement factors, coded A through J. Thirty-eight tasks received no reference to any measurement factor, whereas this occurred only in three instances for journeyman Controllers.

Over 325 measurement factors are associated with the tasks. The more tactically-oriented operations in Activities 1, 2, 3, and 4 have associations with several performance measures.

The trainee task performance requirements of Table 7-6 are not necessarily requirements laid on training staffs. Rather, they reflect potential goals of formal initial training, wherever it occurs. They do not include learning requirements based on local procedures or adaptations. Other considerations, such as budget constraints or insufficient numbers of realistic training devices, may prohibit the adoption of some task performance requirements. This could reasonably result in a task's skill requirements being altered or lowered for training purposes.

The trainee task performance requirements of Table 7-6 assume there will be further development of the individual trainees through on-the-job training and experience. In time, each individual should attain the journeyman Controller levels noted in Table 7-3.

TABLE 7-6. TRAINEE TASK PERFORMANCE REQUIREMENTS

Task No.	Task Statement	Required Skill Levels					Performance Measurement Factors										Other	
		Very High Proficiency	Increasing Ability	Demonstrated Ability To Do	Nonperformance Issues	Response Time	Timing of Action	Speed of Performance	Accuracy of Perception	Preplanning Accomplishment	Procedure Following	Correctness of Act for Situation	Awareness of Traffic "Picture"	Rule/Standards Application	Task Accomplishment			
7	6	5	4	3	2	1	A	B	C	D	E	F	G	H	I	J		
1.1.1	REVIEW FLIGHT PLAN DISPLAY FOR PRESENT AND OR FUTURE AIRCRAFT SEPARATION			5									C			H	I	APPROP. ADEQUATE INFO GATHERING FOR TASK SITUATION
1.1.2	REVIEW SITUATION DISPLAY FOR POTENTIAL VIOLATION OF SEPARATION STANDARDS			5									D			H	I	APPROP. ADEQUATE INFO GATHERING FOR TASK SITUATION
1.1.3	REVIEW FLIGHT PLAN CONFLICT PROBE RESULTS			5												H		CONSIDERATION OF SUBSEQUENT EFFECTS
1.1.4	PROJECT AIRCRAFT FUTURE POSITION/ALTITUDE/PATH			5									D					
1.1.5	READ-OUT RANGE/BEARING/TIME FOR AN AIRCRAFT TO A FIX OR GEOGRAPHIC POINT				4													J
1.1.6	FORCE/QUICK-LOOK FULL DATA BLOCK/S TO EXAMINE TRACK INFORMATION ON AIRCRAFT				4													J
1.1.7	DETERMINE WHETHER AIRCRAFT WILL BE SEPARATED BY LESS THAN PRESCRIBED MINIMA			5									D	E		H	I	CONSIDERATION OF SUBSEQUENT EFFECTS
1.1.8	SELECT FDE SORTING PRIORITY SCHEME				4													J
1.2.1	OBSERVE DISPLAY OF NEW/CHANGED EQUIPMENT/OPERATIONAL STATUS				4													CONSIDERATION OF SUBSEQUENT EFFECTS
1.2.2	OBSERVE DISPLAY OF NEW/CHANGED TRAFFIC FLOW CONTROL MANAGEMENT				4								C					CONSIDERATION OF SUBSEQUENT EFFECTS
1.3.1	SEARCH DISPLAY FOR INACTIVE FLIGHT PLAN ON CLEARANCE REQUEST				4													J
1.3.2	PROJECT MANUAL FLIGHT PLAN PROBE			5									D			H		
1.3.3	REQUEST LIMITED/STANDARD FLIGHT PLAN DISPLAY				4											C		
1.3.4	REQUEST FULL FLIGHT PLAN READOUT				4											C		
1.3.5	ENTER TRAIL DEPARTURE TIME			5										E	F		H	
1.4.1	ENTER DEPARTURE MESSAGE				4											F		
1.4.2	START TRACK MANUALLY				4				B							F		
1.4.3	OBSERVE AUTOMATIC TRACK START					3		B										CONSIDERATION OF SUBSEQUENT EFFECTS
1.5.1	ANALYZE CONDITIONS FOR PROVIDING FLIGHT FOLLOWING				4								E			G	H	
1.6.1	OFFSET A DATA BLOCK				4													
1.6.2	UPDATE/REVISE INPUT REMINDER NOTE (ELECTRONIC MEMORANDA)				4													
1.6.3	REMOVE FLIGHT DATA ENTRIES AND FULL DATA BLOCKS FROM ACCO SYSTEM				4											G		
1.6.4	REMOVE FLIGHT DATA ENTRIES AND FULL DATA BLOCKS FROM INTERNAL ACCO SYSTEM				4											G		
1.6.5	SUSPEND DISPLAY OF FLIGHT DATA ENTRIES AND FULL DATA BLOCKS				4											G		
1.6.6	SUSPEND TRACK				4											G		
1.6.7	DELETE FULL DATA BLOCK FROM OWN DISPLAY				4											G		
1.6.8	SUPPRESS FULL DATA BLOCK FROM OWN DISPLAY IN RESPONSE TO ADVISORY				4											G		

TABLE 7-6. TRAINEE TASK PERFORMANCE REQUIREMENTS (continued)

Task No.	Task Statement	Required Skill Levels					Performance Measurement Factors										Other	
		7 Very High Proficiency	6 Increasing Ability	5 Demonstrated Ability To Do	4 Nonperformance Issues	3 2 1	A Response Time	B Timing of Action	C Speed of Performance	D Accuracy of Part/Perception	E Preplanning Accomplishment	F Procedure Following	G Correctness of Act for Situation	H Awareness of Traffic Picture	I Rule/Standards Application	J Task Accomplishment		
1.6.9	DELETE FLIGHT DATA ENTRY FROM A SELECTED DISPLAY				4													
2.1.1	DETECT AIRCRAFT CONFLICT ALERT INDICATION				4			A										
2.1.2	DETERMINE VALIDITY OF CONFLICT ALERT NOTICE OR INDICATION			5						C				H I				APPROP./ADEQUATE INFO GATHERING FOR TASK SITUATION
2.2.1	DETECT MSAM INDICATION OR ALARM				4			A										
2.2.2	DETERMINE VALIDITY OF MSAM NOTICE OR INDICATION			5						D				H I				APPROP./ADEQUATE INFO GATHERING FOR TASK SITUATION
2.3.1	DETERMINE NEED FOR AIRSPACE PROXIMITY PROBE			5				B		E			G H					
2.3.2	DETERMINE VALIDITY OF SPECIAL USE AIRSPACE PROBE RESULTS			5						D				H I				APPROP./ADEQUATE INFO GATHERING FOR TASK SITUATION
2.4.1	OBSERVE DISPLAY FOR FIXED OBSTRUCTIONS AND NON-CONTROLLED OBJECTS THAT MAY INTERFERE WITH AIRCRAFT FLIGHT			5						D								
2.4.2	EVALUATE CONFLICT RESOLUTION ADVISORIES			5						D E				H I				
2.4.3	FORMULATE ADVISORY/RESOLUTION CONTENT			5						E				G H I				
2.4.4	DETECT AIRCRAFT MANEUVER IN RESPONSE TO ADVISORY				4													
2.5.1	DETERMINE VALIDITY/ APPROPRIATENESS OF USE OF AN ALERT DISPLAY				4						F							
2.5.2	INHIBIT CONFLICT ALERT FOR PAIRED AIRCRAFT				4													
2.5.3	INHIBIT CONFLICT ALERT FOR GROUP SUPPRESSION				4													
2.5.4	INHIBIT CONFLICT ALERT IN SPECIFIED AREA				4													
2.5.5	INHIBIT MSAM FUNCTION IN SPECIFIED AREA				4													
2.5.6	INHIBIT MSAM FUNCTION FOR SPECIFIED AIRCRAFT				4													
2.5.7	RESTORE SPECIFIC ALERT FUNCTION TO NORMAL				4													
3.1.1	EVALUATE CONSTRAINT EFFECT ON FLOW			5						D E			G H					APPROP. ADEQUATE INFO GATHERING FOR TASK SITUATION
3.1.2	CHOOSE DESIRED SEQUENCE			4						E E			G H					
3.1.3	SELECT NEW FLOW SEQUENCE			4						E E			G H					
3.1.4	DETERMINE THE TECHNIQUE FOR A DELAY			4						E E			G H					
3.2.1	PERCEIVE AN ALTITUDE OR ROUTE DEVIATION			5				A										
3.2.2	OBSERVE AIRCRAFT RESUMING NORMAL FLIGHT PLAN				4					D								
3.2.3	DETERMINE MANEUVER TO ESTABLISH/RESTORE FLIGHT PLAN CONFORMANCE			5				B		E			G H					
3.3.1	REQUEST AIRSPACE PROXIMITY PROBE				4			B					G					
3.3.2	DESIGNATE/DELETE AN AREA IN USE				4													
3.3.3	DETERMINE WHETHER ATC CONTROLS SPECIAL USE AIRSPACE				4					F								
3.3.4	RESTRICT AIRCRAFT ACTIVITY IN AREA BY ALTITUDE OR SEGMENT				4								G					
3.3.5	OBSERVE DISPLAY OF AIRSPACE RESTRICTION STATUS CHANGE				4													
3.4.1	DETERMINE DESCENT TIME OR POINT				4					E								

TABLE 7-6. TRAINEE TASK PERFORMANCE REQUIREMENTS (continued)

Task No.	Task Statement	Required Skill Levels				Performance Measurement Factors										Other
		7 Very High Proficiency	6 Increasing Ability	5 Demonstrated Ability to Do	4 Nonperformance Issues	3 Response Time	2 Timing of Action	1 Speed of Performance	A Accuracy of Perf/Perception	B Preplanning Accuracy/Perception	C Proficiency Following	D Correctness of Action Situation	E Awareness of Traffic Situation	F Role/Standards Application	G Task Accomplishment	
3.4.2	PROJECT TRAFFIC SEQUENCE TO ESTABLISH/MODIFY APPROACH FLOW TO AIRPORT OR SECTOR		5													
3.4.3	OBSERVE RANGE/BEARING BETWEEN AIRCRAFT		5													
3.6.1	OBSERVE AIRSPACE INTRUSION BY A NON-CONTROLLED OBJECT		4						A							
3.6.2	COMPOSE/ENTER REMINDER NOTE OF AIRSPACE INTRUSION		4													
3.6.3	FLIGHT-FOLLOW AN OBSERVED NON-CONTROLLED OBJECT		4													
4.1.1	ENTER TRIAL FLIGHT PLAN AMENDMENT		4													
4.1.2	REVIEW POTENTIAL IMPEDIMENTS FOR IMPACT ON PROPOSED CLEARANCE		4													
4.1.3	SELECT CONFLICT RESOLUTION ADVISORY OPTION		5													
4.1.4	FORMULATE A CLEARANCE WITH APPROPRIATE INSTRUCTIONS		5													
4.1.5	QUERY PILOT REGARDING COMPLIANCE WITH CLEARANCE		5													
4.1.6	ISSUE CLEARANCE AND INSTRUCTIONS TO PILOT		5						B							
4.1.7	ISSUE CLEARANCE THRU ATCT/FSS FOR RELAY TO PILOT		4													
4.1.8	VERIFY AIRCRAFT COMPLIANCE WITH CLEARANCE		5													
4.2.1	DECLARE EMERGENCY EVENT AND INVOKE CONTINGENCY PLAN				3											
4.3.1	PERCEIVE PRESENCE OF SPECIAL OPERATIONS		4													
4.4.1	OBSERVE NEW FLIGHT PLAN ALERT		4													
4.4.2	REVIEW FLIGHT PLAN FOR COMPLETENESS		5													
4.4.3	COMPOSE/ENTER FLIGHT PLAN		5													
4.4.4	DELETE NEW FLIGHT PLAN ALERT		4													
4.4.5	REVIEW FLIGHT PLAN FOR ERRORS/DATA LIST SEQUENCE		5													
4.5.1	RECEIVE FLIGHT PLAN AMENDMENT FROM COMPUTER		4													
4.5.2	HIGHLIGHT FLIGHT PLAN POSTING FOR REMINDER ACTION		4													
4.5.3	COMPOSE/ENTER FLIGHT PLAN AMENDMENT		5													
4.5.4	ENTER PILOT'S POSITION REPORT IN SYSTEM		4													
4.5.5	DELETE FLIGHT PLAN AMENDMENT HIGHLIGHTING		4													
5.1.1	OBSERVE DISPLAY OF WEATHER		5													
5.1.2	LINE/INTENSITY/BASE/HEIGHT/MOVEMENT															
5.1.3	RECEIVE SIGMET AIRMET FROM METEOROLOGIST		4													
5.1.4	ENTER PIREP INTO SYSTEM		4													
5.1.5	DETERMINE WHETHER ADJACENT CONTROLLER OR PILOT NEEDS WEATHER				3											

CONSIDERATION OF SUBSEQUENT EFFECTS.

APPROP./ADEQUATE INFO GATHERING FOR TASK/SITUATION

APPROP./ADEQUATE INFO GATHERING FOR TASK/SITUATION

CONSIDERATION OF SUBSEQUENT EFFECTS

APPROP./ADEQUATE INFO GATHERING FOR TASK/SITUATION

TABLE 7-6. TRAINEE TASK PERFORMANCE REQUIREMENTS (continued)

Task No.	Task Statement	Required Skill Levels					Performance Measurement Factors										Other
		1 - Very High Proficiency	2 - Increasing Ability	3 - Demonstrated Ability To Do	4 - Nonperformance Issues	5 - Response Time	A - Timing of Action	B - Speed of Performance	C - Accuracy of Performance	D - Preparation of Action	E - Prioritization	F - Correctness of Action	G - Awareness of Traffic Picture	H - Hub/Standards Application	I - Task Accomplishment		
5.1.6	ADVISORY DETERMINE WEATHER IMPACT ON ROUTES FLOW		5							D							
5.1.7	DETERMINE ALTITUDE/ROUTE CHANGE TO BYPASS SEVERE WEATHER		4									G	H				
5.2.1	RECEIVE WEATHER SEQUENCE		4							E							
5.2.2	RECEIVE WEATHER REPORT UPDATE			3												CONSIDERATION OF SUBSEQUENT EFFECTS	
5.2.3	DETERMINE WHETHER USABLE FLIGHT LEVEL HAS CHANGED		5										I				
5.2.4	DETERMINE WHETHER RUNWAY CONDITIONS HAVE CHANGED		4							F							
5.2.5	DETERMINE WHETHER CONTROL ZONE IS IFR/VFR		4														
6.2.1	REVIEW SYSTEM STATUS		5						D	F							
6.2.2	REVIEW TRAFFIC STATUS/WEATHER		5						D			H					
6.2.3	VERIFY THAT ALL REQUIRED DISPLAY AND COMMUNICATION SWITCHES ARE IN PROPER LOCATION		4							F							
6.2.4	PERFORM LOG-ON SEQUENCE AT DESIGNATED CONSOLE		4											J			
6.2.5	ADJUST PARAMETERS AND DISPLAY TO PERSONAL PREFERENCE		4							F							
6.2.6	CHECK DISPLAY FOR PROPER ALIGNMENT, USABILITY, AND SATISFACTORY STATUS		5						D	F							
6.2.7	SET-UP WORKSTATION ADAPTION PARAMETERS		4							F							
6.3.1	DETECT NON-ACCEPTANCE OF INPUT DATA		4			A											
6.4.1	DETECT OCCURRENCE OF SECTOR SUITE FAILURE		4						D								
6.4.2	OBSERVE SECTOR SUITE DATA BASE RESTORATION COMPLETION MESSAGE			3													
6.5.1	DETECT OCCURRENCE OF ACCC FAILURE		4						D								
6.5.2	REVERT TO ACCC BACKUP PROCEDURES (TBD)																
6.6.1	DETERMINE AIRCRAFT NEEDING SUBSTITUTE ROUTING		5									G	H				
6.6.2	MONITOR STATUS OF QUESTIONABLE NAVAID		4											J			
6.6.3	OBSERVE SUBSTITUTE ROUTING ON DISPLAY		4											J			
6.7.1	DETERMINE COMMUNICATION FAULT		4						D							APPROP./ADEQUATE INFO GATHERING FOR TASK/SITUATION	
6.7.2	ADJUST COMMUNICATION STRATEGY		4								G						
6.7.3	SWITCH TO BACKUP RADIO/ FREQUENCY		4											J			
6.8.1	DETERMINE IMPENDING CONTROLLER OVERLOAD		4							E		G	H				
6.8.2	EXCHANGE/ASSIGN INTRA-POSITION RESPONSIBILITIES			3												SEQUENCE OF ACTIONS	
6.8.3	REQUEST ASSISTANCE OR RELIEF		4									G	H				
6.9.1	PERCEIVE TRACKING FAULT OR TRANSPONDER FAILURE		4						E								
6.9.2	REPOSITION/UPDATE/ REASSOCIATE DATA BLOCKS		4											J			
6.10.1	OBSERVE MESSAGE ON LOSS OF DATA BASE			3												CONSIDERATION OF SUBSEQUENT EFFECTS	
6.10.2	DETECT FAILURE TO UPDATE		4			A											

TABLE 7-6. TRAINEE TASK PERFORMANCE REQUIREMENTS (continued)

Task No	Task Statement	Required Skill Levels					Performance Measurement Factors										Other		
		7 - Very High Proficiency	6 - Increasing Ability	5 - Demonstrates Ability to Do	Nonperformance Issues			Response Time	Timing of Action	Speed of Performance	Accuracy of Perception	Planning/Preparation	Procedure Following	Correctness of Action for Situation	Awareness of Traffic "Picture"	Adherence to Standards/Procedures		Task Accomplishment	
					4	3	2												1
		7	6	5	4	3	2	1	A	B	C	D	E	F	G	H	I	J	
6.10.3	FLIGHT PLAN DATA BASE ENTER DISPLAY AMENDMENT MESSAGE ON CONSOLE				4								D		F				
6.10.4	ENTER FLIGHT PLAN ON CONSOLE				4								E		F				
6.10.5	RESEQUENCE FLIGHT PLAN ON CONSOLE				4													G	
6.11.1	DETECT UNRELIABLE VSCS COMMUNICATION			5									D						
7.1.1	ADVISE CONTROLLER/SUPER- VISOR OF AIRCRAFT FLIGHT PLAN DEVIATION					3													
7.1.2	ADVISE CONTROLLER OF RESULTS OF FLIGHT PLAN CONFLICT PROBE					3													
7.1.3	ADVISE CONTROLLER OF POTENTIAL CONFLICT IN HIS SECTOR					3													
7.1.4	ADVISE CONTROLLER OF POTENTIAL NSAM IN HIS SECTOR					3													
7.2.1	RECEIVE CONTROLLER NOTICE OF POTENTIAL AIRCRAFT CONFLICT IN SECTOR						2												FOLLOW-THROUGH ACTION ACCOMPLISHMENT
7.2.2	RECEIVE CONTROLLER NOTICE OF POTENTIAL NSAM IN SECTOR						2												FOLLOW-THROUGH ACTION ACCOMPLISHMENT
7.2.3	RECEIVE CONTROLLER NOTICE OF AIRCRAFT FLIGHT PLAN DEVIATION						2												FOLLOW-THROUGH ACTION ACCOMPLISHMENT
7.2.4	RECEIVE CONTROLLER NOTICE ON RESULTS OF FLIGHT PLAN CONFLICT PROBE						2												CONSIDERATION OF SUBSEQUENT EFFECTS
7.3.1	ISSUE POINTOUT			4					B										
7.3.2	OBSERVE AUTOMATIC INITIATION OF POINTOUT TO ANOTHER CONTROLLER				3												J		
7.3.3	DIRECT FLIGHT DATA DISPLAY TO ADJACENT CONTROLLER				3										G				CONSIDERATION OF SUBSEQUENT EFFECTS
7.3.4	RECEIVE ACCEPTANCE OF POINTOUT				3														
7.3.5	RECEIVE REJECTION OF POINTOUT			4									E						
7.4.1	RECEIVE CONTROLLER INITIATED POINTOUT			4							D								FOLLOW-THROUGH ACTION ACCOMPLISHMENT
7.4.2	ACCEPT POINTOUT					2													
7.4.3	REJECT POINTOUT					2													FOLLOW-THROUGH ACTION ACCOMPLISHMENT
7.4.4	SUPPRESS FULL DATA BLOCK AFTER POINTOUT			4											H				
7.5.1	RECEIVE NOTICE OF AIRSPACE RESTRICTION/ RELEASE FROM CONTROLLER SUPERVISOR					2													CONSIDERATION OF SUBSEQUENT EFFECTS
7.5.2	REQUEST RELEASE OF SPECIAL USE AIRSPACE					3													
7.5.3	RECEIVE DENIAL OF REQUEST FOR RELEASE OF SPECIAL USE AIRSPACE					2													
7.6.1	ADVISE CONTROLLER OF AIRSPACE RESTRICTION IMPOSED					3													
7.6.2	ISSUE ADVISORY IN REGARD TO RESTRICTED AIRSPACE PROXIMITY			4											G				
7.7.1	RECEIVE NOTICE TO TAKE OVER AIRSPACE					3													
7.7.2	RECEIVE NOTICE TO RECONFIGURE SECTOR					3					D								
7.7.3	RECEIVE NOTICE TO RELEASE AIRSPACE					3													

TABLE 7-6. TRAINEE TASK PERFORMANCE REQUIREMENTS (continued)

Task No.	Task Statement	Required Skill Levels				Performance Measurement Factors								Other	
		4 - Very High Proficiency	3 - Increasing Ability	2 - Demonstrated Ability to do	1 - Nonperformance Issues	Response Time	Timing of Action	Speed of Performance	Accuracy of Part/Perception	Planning Accomplishment	Prior Follow-up	Correctness of Act for Situation	Awareness of Traffic "Picture"		Rule/Standards Application
7.8.1	RECEIVE FLIGHT PLAN FROM PILOT			4											
7.8.2	RECEIVE FLIGHT PLAN VERBALLY FORWARDED			4											
7.8.3	QUERY PILOT ABOUT FLIGHT PLAN			4					F						
7.8.4	QUERY THE RELAYER OF A FLIGHT PLAN			4					F						
7.9.1	RECEIVE CONTROLLER NOTICE ON REQUESTED CLEARANCE OF AIRCRAFT LEAVING HIS SECTOR				3				F						
7.9.2	DENY CLEARANCE REQUEST FROM CONTROLLER				3										
7.9.3	SUGGEST ALTERNATE TO CLEARANCE REQUEST FROM CONTROLLER				3										
7.9.4	RECEIVE CLEARANCE REQUEST FROM ATCT/FSS/PILOT/SUPERVISOR				2										
7.9.5	RECEIVE CONTROLLER REQUEST FOR CLEARANCE/APPROVAL				2										
7.9.6	DENY CLEARANCE REQUEST														
7.9.7	SUGGEST CLEARANCE ALTERNATIVES TO PILOT														
7.9.8	ACKNOWLEDGE DATA LINK CLEARANCE REQUEST				3										
7.9.9	APPROVE CLEARANCE REQUEST FROM CONTROLLER			4					F						
7.9.10	FORWARD CLEARANCE REQUEST TO ADJACENT CONTROLLER			4									J		
7.10.1	REQUEST CLEARANCE/APPROVAL FROM ADJACENT CONTROLLER			4				E							
7.10.2	RECEIVE CLEARANCE APPROVAL/CLEARANCE RESTRICTIONS FROM ADJACENT CONTROLLER				3				F						
7.10.3	RECEIVE CLEARANCE DISAPPROVAL/DENIAL FROM ADJACENT CONTROLLER			4											FOLLOW-THROUGH ACTION ACCOMPLISHMENT
7.10.4	RECEIVE ALTERNATE SUGGESTION FOR CLEARANCE/APPROVAL REQUESTED OF ADJACENT CONTROLLER			4											CONSIDERATION OF SUBSEQUENT EFFECTS
7.11.1	FORWARD FLIGHT PLAN AMENDMENT VERBALLY			4				D							
7.11.2	RECEIVE CONTROLLER ADVICE OF UNABLE FLIGHT PLAN AMENDMENT			4											FOLLOW-THROUGH ACTION ACCOMPLISHMENT
7.12.1	RECEIVE FLIGHT PLAN AMENDMENT VERBALLY FORWARDED			4					F						
7.12.2	ADVISE CONTROLLER UNABLE FLIGHT PLAN AMENDMENT			4					G						
7.13.1	RELAY DEPARTURE MESSAGE FROM CONTROLLER/FSS/PILOT			4											
7.14.1	ISSUE NOTICE OF EQUIPMENT STATUS TO ADJACENT CONTROLLER/PILOT/SUPERVISOR			4											
7.14.2	TERMINATE RADAR SERVICE TO AIRCRAFT			4					G						
7.14.3	REQUEST PILOT POSITION REPORTS			4					G						
7.14.4	RECEIVE PILOT'S POSITION REPORT			4											
7.14.5	FORWARD FLIGHT PLAN			4				D							FOLLOW-THROUGH ACTION ACCOMPLISHMENT

TABLE 7-6. TRAINEE TASK PERFORMANCE REQUIREMENTS (continued)

Task No.	Task Statement	Required Skill Levels					Performance Measurement Factors										Other																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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Very High Proficiency					Increasing Ability					Demonstrated Ability To Do					Nonperformance Issues					Response Time					Timing of Action					Speed of Performance					Accuracy of Perf/Perception					Preplanning Accomplishment					Procedure Following					Correctness of Act for Situation					Awareness of Traffic "Picture"					Rule/Standards Application					Task Accomplishment																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
7.14.6	VERBALLY DELETE PILOT POSITION REPORTS				4																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													</

TABLE 7-6. TRAINEE TASK PERFORMANCE REQUIREMENTS (continued)

Task No.	Task Statement	Required Skill Levels					Performance Measurement Factors										Other			
		7	6	5	4	3	2	1	A	B	C	D	E	F	G	H		I	J	
		Very High Proficiency	Increasing Ability	Diminished Ability to Do	Nonperformance Issues	Response Time	Timing of Action	Speed of Performance	Accuracy of Perf/Perception	Preplanning Accomplishment	Procedure Following	Correctness of Act for Situation	Awareness of Traffic "Picture"	Rule/Standards Application	Task Accomplishment					
7.22.1	FORWARD NOTICE OF AIRSPACE INTRUSION BY A NON-CONTROLLED OBJECT					3														
7.22.2	RECEIVE NOTICE OF AIRSPACE INTRUSION BY A NON-CONTROLLED OBJECT						2													CONSIDERATION OF SUBSEQUENT EFFECTS
7.22.3	ISSUE ADVISORY IN REGARD TO A NON-CONTROLLED OBJECT				4				B											
7.22.4	ADVISE PILOT WHEN CLEAR OF NON-CONTROLLED OBJECT				4										G					
7.23.1	RECEIVE RUNWAY USE DATA					3														CONSIDERATION OF SUBSEQUENT EFFECTS
7.24.1	FORWARD RUNWAY USE DATA				4															
7.25.1	DETECT A PILOT OR AIRCRAFT PROBLEM (E.G., HYPOXIA)				4										G					J APPROP./ADEQUATE INFO GATHERING FOR TASK/SITUATION
7.25.2	ALERT DESIGNATED PERSONNEL OF AIRCRAFT HAVING FLIGHT PROBLEMS					3														
7.25.3	FORWARD CONTINGENCY INFORMATION TO SUPERVISOR/ADJACENT CONTROLLER					3														
7.26.1	RECEIVE SUPERVISOR NOTICE TO INHIBIT ALERT					3														
7.27.1	BRIEF RELIEVING CONTROLLER				4									F						
7.28.1	RECEIVE NOTICE OF SPECIAL OPERATIONS					3														CONSIDERATION OF SUBSEQUENT EFFECTS
7.29.1	FORWARD NOTICE OF SPECIAL OPERATIONS TO ADJACENT CONTROLLER/SUPERVISOR					3														
7.30.1	RECEIVE INFORMATION ON LOSS OF RADIO CONTACT WITH AIRCRAFT					3														FOLLOW-THROUGH ACTION ACCOMPLISHMENT
7.30.2	CONDUCT RADIO/RADAR SEARCH FOR AIRCRAFT WITHOUT RADIO CONTACT				4									F						
7.30.3	ATTEMPT ESTABLISHMENT OF COMMUNICATIONS USING TRANSPONDER/RADIO EQUIPMENT				4									F						
7.31.1	RECEIVE INFORMATION ON OVERDUE AIRCRAFT					3														FOLLOW-THROUGH ACTION ACCOMPLISHMENT
7.31.2	CONTACT FACILITY ALONG ROUTE OF FLIGHT TO SECURE INFORMATION ON OVERDUE AIRCRAFT					3								F						
7.31.3	CONDUCT RADIO/RADAR SEARCH FOR OVERDUE AIRCRAFT				4									F						
7.32.1	EXPLORE WHETHER OTHERS ARE RECEIVING AN AIRCRAFT'S TRANSMISSIONS				4									F						
7.32.2	ISSUE ALTERNATE COMMUNICATION FOR AIR/GROUND TRANSMISSION				4									F						
7.33.1	RECEIVE PILOT/ADJACENT CONTROLLER REQUEST FOR FLIGHT FOLLOWING					3														
7.33.2	DELY FLIGHT FOLLOWING REQUEST					3									G					
7.33.3	REQUEST/ASSIGN BEACON CODE TO AIRCRAFT				4									F						
7.33.4	ISSUE TRAFFIC ADVISORY IN REGARD TO TRAFFIC PROXIMITY				4										G H					
7.33.5	ADVISE PILOT WHEN CLEAR OF TRAFFIC				4										G					

TABLE 7-6. TRAINEE TASK PERFORMANCE REQUIREMENTS (continued)

Task No	Task Statement	Required Skill Levels					Performance Measurement Factors										Other	
		Very High Proficiency	Increasing Ability	Unimpaired Ability to Do	Nonperformance Issues	Response Time	Timing of Action	Speed of Performance	Accuracy of Perf/Perception	Preplanning Accomplishment	Procedure Following	Correctness of Act for Situation	Awareness of Traffic "Picture"	Rule/Standards Application	Task Accomplishment			
7	6	5	4	3	2	1	A	B	C	D	E	F	G	H	I	J		
7.34.1	RECEIVE A FAD NOTICE				3													CONSIDERATION OF SUBSEQUENT EFFECTS
7.34.2	CONFER WITH PILOT THRU ATCT ON DESIRE FOR FAD INTENTIONS			4									F				J	CONSIDERATION OF SUBSEQUENT EFFECTS
7.35.1	RECEIVE REQUESTED ROUTE ALTITUDE CHANGES FROM ANOTHER CONTROLLER/FLOW CONTROLLER/SUPERVISOR				3													CONSIDERATION OF SUBSEQUENT EFFECTS
7.35.2	RECEIVE A FLOW RESTRICTION				3													CONSIDERATION OF SUBSEQUENT EFFECTS
7.35.3	RECEIVE METERING DATA FROM FLOW CONTROLLER				3													CONSIDERATION OF SUBSEQUENT EFFECTS
7.35.4	REQUEST FLOW CONTROL BE IMPOSED			4				B			E			H				
7.35.5	NEGOTIATE DELAY TECHNIQUE WITH PILOT			4				B			E			H				
7.35.6	FORWARD REQUESTED ROUTE/ALTITUDE CHANGES TO ADJACENT CONTROLLER/FLOW CONTROLLER/SUPERVISOR				3													
7.36.1	ISSUE ADVISORY IN REGARD TO FLIGHT PLAN DEVIATION		5											G	H			
7.37.1	RECEIVE/OBSERVE HANDOFF			4						D	D				H			FOLLOW-THROUGH ACTION ACCOMPLISHMENT
7.37.2	ACCEPT VERBAL HANDOFF/START TRACK			4						D	D				H			
7.37.3	REJECT HANDOFF				3													
7.37.4	ACCEPT AUTOMATIC HANDOFF			4											H			FOLLOW-THROUGH ACTION ACCOMPLISHMENT
7.37.5	VERIFY COMMUNICATIONS WITH PILOT ON TRANSFER OF CONTROL OR DEPARTURE			4							F							
7.37.6	VERIFY AIRCRAFT ALTITUDE WITH PILOT ON TRANSFER OF CONTROL OR DEPARTURE			4						D	F							
7.37.7	CONFIRM DATA LINK COMMUNICATIONS			4						D							J	
7.38.1	INITIATE HANDOFF			4							F							TASK OPTION SELECTION
7.38.2	OBSERVE AUTOMATIC INITIATION OF HANDOFF				3													FOLLOW-THROUGH ACTION ACCOMPLISHMENT
7.38.3	RETRACT HANDOFF				3													TASK OPTION SELECTION
7.38.4	RECEIVE HANDOFF ACCEPTANCE			4														
7.38.5	CONFER ON TRANSFER OF CONTROL WITH OTHER CONTROLLER			4							E			H				
7.38.6	ISSUE CHANGE OF FREQUENCY TO PILOT			4													J	
7.39.1	RECEIVE NOTICE OF RADAR SENSOR STATUS FROM ADJACENT CONTROLLER/SUPERVISOR				3													CONSIDERATION OF SUBSEQUENT EFFECTS
7.40.1	FORWARD NOTICE OF RADAR SENSOR STATUS TO ADJACENT CONTROLLER/SUPERVISOR				3													
7.41.1	REQUEST TEMPORARY USE OF AIRSPACE			4				B										
7.41.2	RECEIVE RELEASE/USE OF AIRSPACE				3													
7.41.3	RECEIVE REJECTION OF USE OF AIRSPACE				3													
7.42.1	RECEIVE CONTROLLER REQUEST FOR TEMPORARY USE OF AIRSPACE			4													J	
7.42.2	FORWARD APPROVAL FOR TEMPORARY USE OF AIRSPACE			4										G	H			
7.42.3	FORWARD DENIAL OF TEMPORARY USE OF AIRSPACE			4										G	H			
7.42.4	SUPPRESS MAP ASSOCIATED WITH TEMPORARY USE OF AIRSPACE				3													

TABLE 7-7. SUMMARY OF TRAINING SKILL LEVEL REQUIREMENTS

Required Skill Levels		Frequency of Task Associations
7	Very High Proficiency	0
6 } 5 }	Increasing Ability (Proficiency)	2 35
4	Demonstrated Ability To Do	148
3 } 2 } 1 }	Nonperformance Issues	62 14 0

TABLE 7-8. SUMMARY OF TRAINING TASK PERFORMANCE MEASURES.

Performance Measurement Factors	Frequency of Task Association
A Response Time B Timing of Action C Speed of Performance D Accuracy of Performance/Perception E Preplanning Accomplishment F Procedure Following G Correctness of Action for the Situation H Awareness of Traffic "Picture" I Rule/Standards Application J Task Accomplishment Only (None in A-J cited for a task)	6 11 0 41 21 43 48 37 23 34 (79)
Others: ● Consideration of Subsequent Effects ● Follow-Through Action Accomplishment ● Appropriate/Adequate Information Gathering for the Task/ Situation ● Task Option Selection ● Sequence of Actions	30 16 12 2 1

7.3 Sector Deviations from Controller Performance Requirements

For the most part, all types of sectors require at least moderately frequent performance of all stated tasks. There are some exceptions, however. The most obvious is the Oceanic Sector.

Eight tasks have no relevance to the Oceanic Sector, assuming implementation of ODAPS, "Oceanic Display and Processing System." These are:

- 2.2.1 Detect MSAW Indication or Alarm
- 7.23.1 Receive Runway Use Data
- 7.24.1 Forward Runway Use Data
- 7.33.1 Receive Pilot/Adjacent Controller
Request for Flight Following
- 7.33.2 Deny Flight Following Request
- 7.33.3 Request/Assign Beacon Code to
Aircraft
- 7.33.4 Issue Traffic Advisory in Regard
to Traffic Proximity
- 7.33.5 Advise Pilot When Clear of
Traffic

Based on the analysis cited in Section 4.2, various sector types are likely to have very little involvement with 16 other stated tasks. That is not to say there may be no performance of the tasks, but the frequency of performance of those tasks is likely to be quite low. These 16 tasks are listed in Table 7-9, along with an indication of which sector type would have a low frequency of a need to perform them. Performance skill requirements could well be reduced for Controllers working such sectors.

TABLE 7-9. SECTOR TYPES WITH A LOW FREQUENCY OF TASK PERFORMANCE

Task No.	Task	Low Altitude Arrival	Low Altitude Departure	Low Altitude En Route	High Altitude En Route	Oceanic	Arrival Control	Departure Control
1.1.6	Force/Quick Look full data block to examine track information on aircraft					LOW		
1.3.1	Search display for inactive flight plan on clearance request	LOW			LOW	LOW	LOW	
1.3.5	Enter final departure time	LOW		LOW	LOW	LOW	LOW	
1.4.1	Enter departure message	LOW		LOW	LOW	LOW	LOW	
1.4.2	Start track manually	LOW			LOW	LOW*	LOW	
1.4.3	Observe automatic track start	LOW			LOW	LOW*	LOW	
2.3.1	Determine need for airspace proximity probe	LOW					LOW	
2.3.2	Determine validity of special use airspace probe results	LOW					LOW	
2.4.1	Observe display for fixed obstructions and non-controlled airborne objects that may interfere with aircraft flight				LOW	LOW		
3.4.1	Determine descent time or point		LOW			LOW		LOW
5.2.3	Determine whether usable flight level has changed	LOW	LOW				LOW	LOW
5.2.4	Determine whether runway conditions have changed				LOW	LOW		
5.2.5	Observe whether control zone is IFR/VFR				LOW	LOW		
7.3.1	Issue pointout					LOW		
7.3.2	Observe automatic initiation of pointout to another Controller					LOW		
7.4.1	Receive Controller-initiated pointout					LOW		

* Includes no performance of the task for flight following purposes

7.4 References

1. Ammerman, H.L., & Essex, D.W. Performance Content for Job Training. Volume 4: Deriving Performance Requirements (CVE R&D Series No. 124). Columbus: The Ohio State University. The Center for Vocational Education, March 1977.
2. Hemphill, J.K. Dimensions of Executive Positions (Bureau of Business Research Monograph No. 98). Columbus: The Ohio State University, College of Commerce and Administration, The Bureau of Business Research, 1960.
3. McCormick, E.J. Job Analysis: Methods and Applications. New York: AMACOM, A division of American Management Associations, 1979.

CONTROLLER MAN-MACHINE DIALOGUE DEFINITION

CHAPTER 8.0

8.0 CONTROLLER MAN-MACHINE DIALOGUE DEFINITION

This chapter extends the task analysis to describe the top level dialogue between the Controller and the Sector Suite console. This dialogue is termed the Dialogue Description Language (DDL) and requires a multi-step development process for each Controller information-processing task which has been identified. The objective in defining the DDL is to establish a basis for the development of the conceptual user model of interaction which will be contained in CDRL A005, Sector Suite Man-Machine Functional Capabilities and Performance Requirements (Ref. 1). The first step in developing the DDL is to analyze each of the tasks identified in Chapter 4.0 with respect to the following elements:

- Task Type
- Display Content
- Characteristic Action Type

These elements are defined in section 8.1. This analysis relies upon the task decomposition performed in Chapter 4.0 as well as the scenario descriptions and portrayals in Chapters 3.0 and 5.0. These chapters provide the conceptual syntax for understanding each of these tasks and determining what implications about each task may be drawn. By characterizing the task in terms of the preceding three elements, the task statement may be enhanced to imply information presentation coding and interaction techniques.

The enhanced task statements resulting from the DDL analysis impart semantic meaning to the tasks. In so doing they serve as unequivocal statements which describe display contents and interaction strategies. The final step in DDL development involves the documentation of inferences the Controller would have as a result of task performance. These inferences serve both as a validation tool for the individual DDL statements and as inputs to training program development.

Figure 8-1, Evolution of a Controller Dialogue Definition, depicts the flow of the analysis. From the point when the tasks are first identified, each step of the analysis which is documented in the preceding chapters adds additional information about the task as it is developed, until it may finally be unambiguously defined in an enhanced task statement. Figure 8-1 illustrates how the information appended to each task is used in the

development of the DDL. Chapter 4.0, Table 4-6, Task Information Requirements, characterizes each task in terms of Controller to Controller interaction and Controller to Sector Suite console interaction. Task information requirements are associated with appropriate machine aids in Chapter 5.0 (Table 5-7). The DDL uses this information and extends the task characterizations to include task types, characteristic action type, and display content. The DDL enhanced task statement brings all this information together in a semantically meaningful task requirements statement.

8.1 Components of Dialogue Definition

8.1.1 Task Type

Each task is first characterized in the DDL according to one or more of the following types:

- **Entry** — tasks which primarily involve Controller input to Sector Suite, e.g., Task 1.1.8, Select FDE sorting priority scheme.
- **Receipt** — tasks which are associated with review or observation of a given display for potential violation of separation standards, e.g., Task 1.1.2 Review situation display for potential violation of separation standards.
- **Analytical** — tasks which are primarily cognitive or decision making oriented, e.g., Task 1.1.4, Project aircraft future position/altitude/path.
- **Verbal Coordination** — coordination tasks accomplished through VSCS (or person-person), e.g., Task 7.1.4, Advise Controller of potential MSAW in his sector.

Tasks may be associated with more than one task type. For example, a coordination task which can be accomplished via VSCS or Sector Suite would be classified as a verbal coordination/entry task to reflect the alternative ways of performing the task.

Associating tasks with task types both clarifies the nature of the task and specifies the form of the DDL characterizations per task. Entry tasks are associated with characteristic action types, and display content. Typically, no inferences are

CHAPTER 4.0
Table 4-3 Task Information Requirements

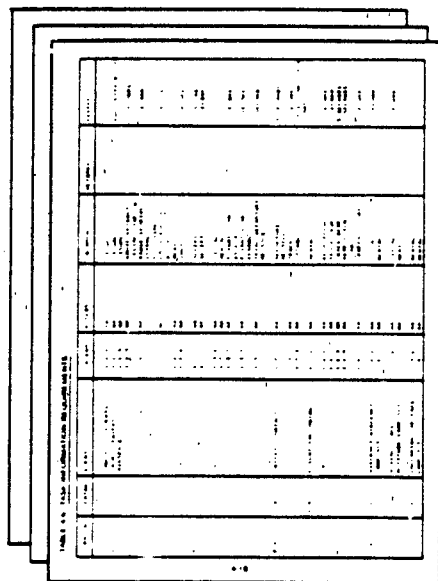


Table 4-3 is a multi-column table with 10 columns. The columns are labeled: Task ID, Task Name, Task Description, Task Category, Task Priority, Task Status, Task Assigned To, Task Assigned Date, Task Due Date, and Task Completed Date. The table contains several rows of data, including tasks like 'Task 1', 'Task 2', 'Task 3', 'Task 4', 'Task 5', 'Task 6', 'Task 7', 'Task 8', 'Task 9', and 'Task 10'.

CHAPTER 5.0
Table 5-7 Machine Aiding Requirements

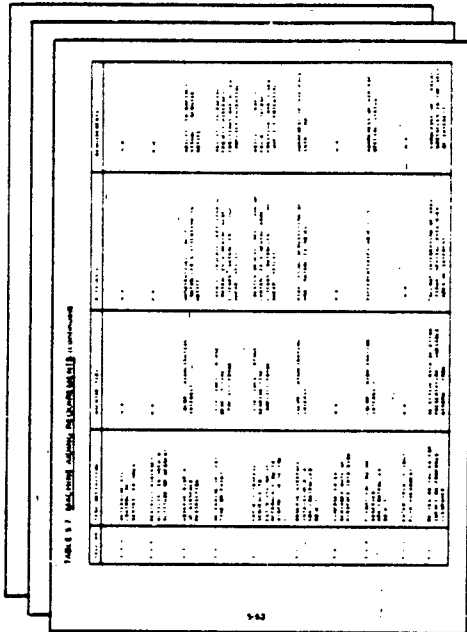


Table 5-7 is a multi-column table with 10 columns. The columns are labeled: Machine ID, Machine Name, Machine Description, Machine Category, Machine Priority, Machine Status, Machine Assigned To, Machine Assigned Date, Machine Due Date, and Machine Completed Date. The table contains several rows of data, including machines like 'Machine 1', 'Machine 2', 'Machine 3', 'Machine 4', 'Machine 5', 'Machine 6', 'Machine 7', 'Machine 8', 'Machine 9', and 'Machine 10'.

CHAPTER 8.0
Table 8-1 AAS Controller DDL

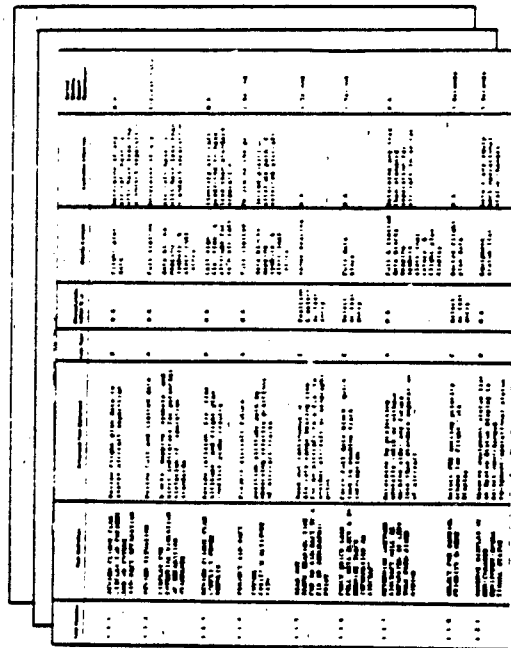


Table 8-1 is a multi-column table with 10 columns. The columns are labeled: Controller ID, Controller Name, Controller Description, Controller Category, Controller Priority, Controller Status, Controller Assigned To, Controller Assigned Date, Controller Due Date, and Controller Completed Date. The table contains several rows of data, including controllers like 'Controller 1', 'Controller 2', 'Controller 3', 'Controller 4', 'Controller 5', 'Controller 6', 'Controller 7', 'Controller 8', 'Controller 9', and 'Controller 10'.

Figure 8-1 Evolution of a Controller Dialogue Definition

listed for entry tasks since the inference *precedes* the entry task, rather than results from task accomplishment. Receipt and analytical tasks are associated with all elements except characteristic action type, since no Controller input is implied. Verbal coordination tasks are associated with logical displays, display contents, and inferences, as applicable. Tasks which represent a combination of types (e.g., receipt analytical, entry verbal coordination) are so specified. The enhanced task statement for these compound task types reflects the alternatives through the use of a Boolean "or".

8.1.2 Characteristic Action Type

Characteristic action types represent application and hardware-independent methods of Controller input to Sector Suite. The seven action types used in the DDL (derived from Ref. 2) are:

- Select
- Position
- Orient
- Path
- Quantify
- Text Entry
- Sketch

Foley (in Ref. 2) defines these action types as follows:

- **Select**

The user makes a selection from a set of alternatives. The set might be a group of commands, or a collection of displayed entities which form part of the applications information presentation.

- **Position**

In carrying out the positioning task the user indicates a position on the interactive display. This is typically done as a part of a command to place an entity at a particular position.

- **Orient**

The user orients an entity in 2D or 3D space. For 2D, this might mean rotating a symbol to be heading North-northeast. In 3D, it could mean controlling the pitch, roll, and yaw of the view of a terrain model.

- **Path**

The user generates a path, which is a series of positions or orientations, created over time. A path is considered a fundamental interaction task, even though it consists of other primitive tasks (position or orient) because another fundamental dimension, time, is involved. With a single position or orientation, the user's attention is focused on attaining a single end result. In the present case, by contrast, it is the series of positions or orientations, and their order, which is the focus of attention.

A path of positions might be generated by a user in the process of digitizing a sketch, of indicating the routing of a run on a printed circuit board, or of showing a desired route on a map. A path of orientations (and of positions) would be generated in a simulated flight over a terrain model.

- **Quantify**

The user specifies a value (i.e., number) to quantify a measure, such as the height of an entity, or the value, in ohms, of a resistor.

- **Text Entry**

The user inputs a text-string, used for example as an annotation on a drawing, or as part of a page of text. The key factor is that the text string itself becomes a part of the information stored in the computer, rather than being used as a command or being converted to a value, position, or orientation. These inputs can be accomplished via such means as keyboard, menu, voice recognition, or disc insertion techniques.

- **Sketch**

The user, by manipulating a locating device like it were a brush or a pen, causes an object to be created by free-hand sketching. Line structure (thick-

ness, dot-dash character, color, etc.) may be specified as part of the brush form.

An additional action type was added to those derived from Ref. 2 for the DDL analysis. This action type, "Macro" is used to indicate the invocation of a Controller defined pre-set sequence of commands with a single Controller input.

8.1.3 Display Content

Display content directly involved in task accomplishment such as a full and limited data blocks, flight plan data or runway lists, are cited in the DDL. It is assumed that a great deal of ancillary display information (particularly situation and flight plan display data) will always be available to Controllers at the Sector Suite. The focus in the DDL, however, is on information directly viewed or manipulated in the course of task accomplishment. The display content is derived from the logical displays defined in Ref. 3.

8.1.4 Enhanced Task Statement

The enhanced task statement expands the original task statement to include the characteristic action types and display content associated per task. By embedding this information within each task statement, a concise citation of MMI requirements per task is formed. The enhanced task statements, therefore, form the basis for subsequent development of the Controller conceptual model of interaction, further refined in CDRL A005, Sector Suite Man-Machine Functional Capabilities and Performance Requirements (Ref. 1).

8.1.5 Controller Inference

Inferences that a Controller would have as a result of task performance are described in the DDL. The purpose of the "Controller Inferences" column is to add descriptive data about the task which aids in interpretation and validation (by the SSRVT) of the DDL. These inferences will also aid in the development of learning objectives for AAS Controller training programs.

8.1.6 Derived Machine Support Response Time

The machine response times to inputs by the Controller represent maximum total system pro-

cessing time under peak conditions. The derivation of these requirements is described and reported in section 4.3.1, and is included in Table 8-1 for completeness of the man-machine dialogue definition.

Table 8-1 presents the AAS Controller DDL, as described in this section.

8.2 DDL Controller Activity Characteristics

The following sections summarize the DDL characterizations on an activity by activity basis. These summaries extract key Controller MMI functional capabilities which feed the development of the conceptual model of interaction (Ref. 1, CDRL A005).

8.2.1 Perform Situation Monitoring

In the performance of this activity, the Controller synthesizes what is commonly referred to as the "big picture" of traffic sequences and conditions in his sector. To achieve this awareness, the Controller must be able to correlate flight plan and situation display data. Machine aids including flight plan display sorts, range scales, selected data emphasis, mapping and situation display symbology (e.g., track symbols) must be carefully integrated into the AAS MMI design to facilitate the Controller's mental model of traffic in his sector. Situation monitoring will also be enabled through AAS interaction techniques which allow direct selection of display data items (e.g., aircraft data blocks), to minimize keystrokes.

8.2.2 Resolve Aircraft Conflicts

Improved conflict alert and MSAW accuracy, enhanced alert display discriminability and the generation of resolution options will facilitate Controller response to conflicts. Airspace probes will aid in aircraft separation from special use airspace. These alert and resolution aids, however, must be tailored to the unique demands of the en-route vs. terminal ATC environment to be of maximum use to all ACF Controllers.

8.2.3 Manage Air Traffic Sequences

This activity relies heavily on coordination with Metering/Flow Controllers. Range bearing information, flow/metering lists and general situation display data aid the Controller in effective traffic sequencing. Airspace restrictions are

handled using the special use airspace probe. The maintenance of the mental traffic picture created in Activity 1.0, Perform Situation Monitoring, is fundamental to the Controller's ability to expeditiously manage these sequences.

8.2.4 Route/Plan Flights

Machine aids (e.g., selected flight data entry emphasis), again, facilitate Controller performance of this activity. The most dramatic AAS productivity gains, however, will accrue as a result of the implementation of the flight plan conflict probe function. Properly designed, this function should greatly aid the accuracy and extent of the Controller's "look-ahead" ability. The reconfigurability, functionality, and improved Controller-machine interface of VSCS should aid air-ground communications tasks, resulting in lower Controller workload in this activity.

8.2.5 Assess Weather Impact

Increased time responsiveness and forecast accuracy will be available to the Controller with the integration of CWP. The effective use of graphic weather depictions, either overlayed on other data or independently displayed, will extend the Controller's mental model of meteorological activity in his sector.

8.2.6 Manage Sector/Position Resources

The implementation of AAS error detection/recovery procedures will be largely a function of the final design. As such, these procedures are acknowledged (via tasks) in the task analysis, but not fully characterized. In terms of more routine operations, the sector workload probe function will result in a more balanced workload between Controllers within an ACF. AAS Controllers will also be aided by automated tools which support position relief checklists, and reconfigure workstation characteristics according to a pre-programmed set of Controller preferences.

8.2.7 Perform Coordination

Coordination tasks remain a significant component in AAS air traffic control. The addition of VSCS, Mode S data link and "electronic mail" capabilities in the ACF will allow greater flexibility and functional support for coordination tasks. Dynamic reconfiguration will be supported by VSCS, allowing latitude in ACF resectorization.

TABLE 8-1. AAS CONTROLLER DDL

Task Number	Task Description	Enhanced Task Description	Task Type	Communications Action Type	Display Content	Controller Interface	Derived Block/Block Support Requirement
1.1.1	REVIEW FLIGHT PLAN DISPLAY FOR PRESENT AND/OR FUTURE AIRCRAFT SEPARATION	Review flight plan data to assess aircraft separation.	B	M/A	Flight plan data.	Determine if any aircraft have or will have less than standard separation.	M/A
1.1.2	REVIEW SITUATION DISPLAY FOR POTENTIAL VIOLATION OF SEPARATION STANDARDS	Review full and limited data blocks, mapping, symbols, and alert indicators for potential violation of separation standards.	B	M/A	Full/limited data blocks, mapping, symbols, alert indicators.	Determine if any aircraft have or will have less than standard separation.	Refresh rate
1.1.3	REVIEW FLIGHT PLAN CONFLICT PROBE RESULTS	Review collision, fis, time, altitude, and flight plan conflict probe results.	B	M/A	Call sign, fis, time, & altitude for each aircraft.	Identify aircraft predicted to have less than standard separation.	M/A
1.1.4	PROJECT AIRCRAFT FUTURE POSITION/ALTITUDE/PATH	Project aircraft future position/altitude/path by observing relative positions of aircraft tracks.	A	M/A	Full/limited data blocks, mapping, symbols, & alert indicators.	Determine the projected position/altitude/path of selected aircraft.	1 Second
1.1.5	READ OUT RANGE/BEARING/TIME FOR AN AIRCRAFT TO A FIX OR GEOGRAPHIC POINT	Read out continuous or discrete range/bearing/time for an aircraft to a fix, to another aircraft or geographic point.	E	Position & select or text entry.	Range/bearing.	M/A	1 Second
1.1.6	FORCE/QUICK LOOK FULL OR BLOCK/S TO EXAMINE TRACK INFORMATION ON AIRCRAFT	Force full data block /quick look to examine track information.	E	Select or text entry.	Full data block.	M/A	1 Second
1.1.7	DETERMINE WHETHER AIRCRAFT WILL BE SEPARATED BY LESS THAN PRESCRIBED MINIMA	Determine by projecting symbolically with or without machine aids any future less than-standard separation of aircraft.	A	M/A	Full & limited data blocks, mapping, symbols, alert indicators, flight plan display.	Determine any less than standard separation for aircraft in sector.	M/A
1.1.8	SELECT FILE SORTING PRIORITY SCHEDULE	Select file sorting priority scheme for flight data display.	E	Select or text entry.	Sorted flight plan data.	M/A	3 Seconds
1.2.1	OBSERVE DISPLAY OF NEW/CHANGED EQUIPMENT/OPERATIONAL STATUS	Observe equipment status list on System Status Display to detect new/changed equipment/operational status.	B	M/A	Equipment status list.	Detect any equipment/operational status changes.	5 Seconds

1. B. Block
E. Entry
A. Analytical
M. Manual Coordination

TABLE 8-1. AAS CONTROLLER DDL (continued)

Task Number	Task Description	Subelement Task Description	Task Type	Communications Action Type	Display Content	Controller Instructions	Observed Min. Time Between Requests/Inputs
1.2.2	OBSERVE DISPLAY OF NEW/CHANGED TRAFFIC FLOW CONTROL MANAGEMENT	Observe flow control list to detect new/changed traffic flow control management.	B	M/A	Flow control list.	Detect flow control management changes.	5 Seconds
1.3.1	SEARCH DISPLAY FOR INACTIVE FLIGHT PLAN ON CLEARANCE REQUEST	Search the system for associated flight plan.	B	Select.	Flight plan call sign/airport/ computer number.	Locate inactive flight plan for aircraft requesting a clearance.	M/A
1.3.2	PROJECT MANUAL FLIGHT PLAN FROM	Determine by projecting mentally any impacts of the requested clearance on aircraft separation.	A	M/A	Flight plans.	Assess impact of requested clearance on existing flight plans.	M/A
1.3.3	REQUEST LIMITED/STANDARD FLIGHT PLAN DISPLAY	Request flight plan data to appear in either limited or standard form.	E	Select or test entry.	Standard/limited flight plan display.	M/A	2 Seconds
1.3.4	REQUEST FULL FLIGHT PLAN READOUT	Request full flight plan data.	E	Select or test entry.	Full flight plan.	M/A	2 Seconds
1.3.5	ENTER TRIAL DEPARTURE TIME	Enter a trial departure time on the flight data display to force a conflict probe based upon the requested clearance.	E	Select or test entry.	List of conflicting flight plans.	M/A	3 Seconds
1.4.1	ENTER DEPARTURE MESSAGE	Enter a departure message for any aircraft which is not automatically activated.	E	Select or test entry.	Flight plan data.	M/A	1 Second
1.4.2	START TRACE MANUALLY	Start trace manually for any eligible target for which tracking has not been automatically initiated.	E	Select or test entry.	Full data block.	M/A	1/2 Second
1.4.3	OBSERVE AUTOMATIC TRACK START	Observe the appearance of a full data block correlated with a target.	B	M/A	Full data block.	Determine the proper activation of the flight plan associated with target.	LT 4 SCAMS
1.5.1	ANALYZE CONDITIONS FOR PROVIDING FLIGHT FOLLOWING	Analyze controller's workload (i.e., activity level) to assess feasibility of adding a flight following task.	A	M/A	M/A	Assess current/anticipated workload with sufficient accuracy to allow appropriate acceptance/rejection of additional activities.	M/A
1.6.1	OFFSET A DATA BLOCK	Offset a data block to eliminate overlapping data blocks or to align with traffic.	E	Select, position & test entry.	Full data block.	M/A	1/2 SECOND

TO Receive
B Entry
A Available
IC. Initial Communication

TABLE 8-1. AAS CONTROLLER DDL (continued)

Task Number	Task Description	Enhanced Task Description	Task Type	Characteristics/Action Type	Display Content	Controller Indication	Desired Alert Support Requirements
1.6.2	UPDATE/ADVISE INPUT REMOVAL NOTE (ELECTRONIC MEMORANDA)	Update/revise controller annotation (scratched entry).	E	Select & test entry.	Full data block -- disappear once upon removal.	M/A	2 SECONDS
1.6.3	REMOVE FLIGHT DATA ENTRIES AND FULL DATA BLOCKS FROM ACCC SYSTEM	Remove Flight Data Entries and Full Data Blocks for one flight from ACCC system, to include transmission of order to adjacent facilities ACCC.	E	Select.	Aircraft entry & full disappearance upon removal.	M/A	5 Seconds
1.6.4	REMOVE FLIGHT DATA ENTRIES AND FULL DATA BLOCKS FROM INTERNAL ACCC SYSTEM	Remove Flight Data Entries and Full Data Blocks for one flight from internal ACCC and backup system, with no transmission to adjacent facilities (in-house).	E	Select.	A/C call sign & fix (Spectral List Dis- play), flight plan (Flight Data Display), or full data block (Situation Display).	M/A	5 Seconds
1.6.5	SUSPEND DISPLAY OF FLIGHT DATA ENTRIES AND FULL DATA BLOCKS	Suspend display of Flight Data Entries and Full Data Blocks for a selected flight.	E	Select	M/A	M/A	5 Seconds
1.6.6	SUSPEND TRACE	Suspend processing of a Full Data Block.	E	Select.	M/A	M/A	5 Seconds
1.6.7	DELETE FULL DATA BLOCK FROM OWN DISPLAY	Suppress Full Data Block from own display.	E	Select.	M/A	M/A	1 Second
1.6.8	SUPPRESS FULL DATA BLOCK FROM OWN DISPLAY	Suppress Full Data Block from own display for a specified time interval.	E	Select.	M/A	M/A	1 Second
1.6.9	DELETE FLIGHT DATA ENTRY FROM A SELECTED DISPLAY	Suppress Flight Data Entry and associate notations from own workstation.	E	Select.	M/A	M/A	2 Seconds
2.1.1	LATEST AIRCRAFT CONFLICT ALERT INDICATION	Detect aircraft conflict alert indication.	R	M/A	Full data blocks & conflict alert list (on all appropriate displays/sectors).	Detect and acknowledge alert signifying potential conflict situation.	1 Second
2.1.2	DETERMINE VALIDITY OF CONFLICT ALERT NOTICE OR INDICATION	Determine validity of conflict alert indication by considering any data not available to computer system (e.g., VFR aircraft) which would have mitigated the alert situation.	A	M/A	M/A	Unless clearly determined otherwise, alert must be considered valid, and immediate action must be taken.	M/A

1.6.2, 1.6.3, 1.6.4, 1.6.5, 1.6.6, 1.6.7, 1.6.8, 1.6.9, 2.1.1, 2.1.2
 A. Analytical
 VC. Visual Confirmation

TABLE 8-1. AAS CONTROLLER DDL (continued)

Task Number	Task Description	Assessment Task Requirement	Task Type	Characteristics of Task	Display Content	Controller Inference	Periodic Machine Support Requirements
2.2.1	DETECT NSAM INDICATION OR ALARM	Detect aircraft NSAM alert indication.	N	N/A	Full data block & NSAM list on all appropriate displays/sec. total.	Detect and acknowledge alert signifying potential conflict situation.	1 Second
2.2.2	DETERMINE VALIDITY OF NSAM NOTICE OR INDICATION	Determine validity of NSAM alert indication by considering any data not available to computer by (e.g., VPM aircraft) which would have triggered the alert situation.	A	N/A	Geographic map data.	Unless clearly determined otherwise, alert must be considered valid, and immediate action must be taken.	N/A
2.3.1	EXTENSIVE WEL FOR AIRSPACE PROXIMITY PROBE	Determine the need for initiating an airspace proximity probe.	A	N/A	N/A	Determine proper conditions for initiating air space probe.	N/A
2.3.2	EXTENSIVE VALIDITY OF SUTAL USE AIRSPACE PROBE RESULTS	Determine validity of special use airspace probe results by considering any pertinent data affecting airspace utilization that has not been entered into the computer.	B/A	N/A	Air space probe list.	Assess & determine impact of any issues affecting special use airspace, and have been factored into airspace probe.	N/A
2.4.1	OBSERVE DISPLAY FOR NON CONTROLLED AIRBORNE OBJECTS THAT MAY INTERFERE WITH AIRCRAFT FLIGHT	Observe fixed obstructions and non-controlled airborne objects on the Situation Display to determine if they may represent any interference to controlled aircraft flight.	B/A	N/A	Targets.	Determine potential obstacles on the basis of their appearance and/or displayed behavior.	N/A
2.4.2	EVALUATE CONFLICT RESOLUTION ADVISORIES	Evaluate the alternative conflict resolution advisories presented by the computer.	A	N/A	Conflict resolution advisory list.	Assess & determine which advisory alternative (each of which has been determined to be "conflict-free") is most appropriate.	N/A
2.4.3	FORMULATE ADVISORY/RESOLUTION CONFLICT	Formulate an alternative resolution advisory to the computer.	A	N/A	Conflict resolution advisory list.	Formulate preferred resolution advisory if/when computer fails to suggest one.	N/A
2.4.4	DETECT AIRCRAFT MANEUVER IN RESPONSE TO ADVISORY	Detect aircraft maneuver undertaken in response to clearance and/or advisory.	B	N/A	Full data block & target.	Recognize maneuver execution & unit; determine if maneuver is providing obstacle.	Refresh Rate

1. No. 1000 2. Error 3. Manual 4. Verbal Communication

TABLE 8-1. AAS CONTROLLER DDL (continued)

Task Number	Task Subnumber	Subnumber Task Number as	Task Type	Characteristics Control Type	Display Content	Controller Interacts	Desired Min. Time Support Requirements
2.5.1	DETERMINE VALIDITY/APPROPRIATE NESS OF USE OF AN ALERT DISPLAY	Determine appropriateness of alert by observing and comparing full data block information and CH/MSAM data known, but not available to the computer.	N/A	N/A	Full data block 5 CA/ MSAM list.	Unless clearly determined other wise, alert must be considered valid, and immed- iate action must be taken.	N/A
2.5.2	INHIBIT CONFLICT ALERT FOR PAIRED AIRCRAFT	Suppress present conflict alert for affected (paired) aircraft by indicating affected aircraft and invoking function.	E	Select & test entry.	Full data block 5 inhibit list.	N/A	2 Seconds
2.5.3	INHIBIT CONFLICT ALERT FOR GROUP SUPPRESSION	Continuously suppress conflict alert for group of aircraft by indicating affected aircraft and invoking function.	E	Select & test entry.	Full data block 5 inhibit list.	N/A	2 Seconds
2.5.4	INHIBIT CONFLICT ALERT IN SPECIFIED AREA	Continuously suppress conflict alert for pre defined Special Use Airspace, optionally specifying time and altitude parameters.	E	Select or test entry & sketch.	Area map & inhibit list.	N/A	2 Seconds
2.5.5	INHIBIT MSAM FUNCTION IN SPECIFIED AREA	Continuously suppress MSAM alert for pre defined Special Use Airspace, optionally specifying time parameters.	E	Select & test entry and sketch.	Full data block 5 inhibit list.	N/A	2 Seconds
2.5.6	INHIBIT MSAM FUNCTION FOR SPECIFIED AIRCRAFT	Suppress present MSAM alert for specified aircraft by indicating affected aircraft and invoking suppression function.	E	Select & test entry.	Full data block 5 inhibit list.	N/A	2 Seconds
2.5.7	RESTORE SPECIFIC ALERT FUNCTION TO NORMAL	Restore specified alert function (s) which had previously been suppressed to normal status by identifying affected aircraft and invoking function.	E	Select & test entry.	Full data block 5 inhibit list, and/or area map.	N/A	2 Seconds
3.1.1	EVALUATE CONSTRAINT EFFECT ON FLOW	Evaluate all aircraft to determine what impact (if any) will result from implementa- tion of constraint or flow restriction.	A	N/A	Flight plan display.	Determine impact of flow restric- tions on aircraft flight plans.	N/A
3.1.2	CHOOSE DESIRED SEQUENCE	Develop a sequence of aircraft that is commensurate with control constraints & flight data entry.	A	N/A	Flight plan data, full data blocks, flow control list.	Choose aircraft sequences com- patible with flow constraints.	N/A

10. The end
of entry

11. Available
12. Visual Contribution

TABLE 8-1. AAS CONTROLLER DDL (continued)

Test Number	Test Definition	Subsequent Test Definition	Test Type	Characteristics Action Type	Display Content	Controller Reference	Required Machine Support Requirements
3.1.3	SELECT REM FLOW SEQUENCE	Select/Implement chosen or desired sequence by re-ordering any flights necessary.	E	Select entry.	Flight plan data, full data blocks, & flow control list.	Route: aircraft to fit chosen sequence.	1 Second
3.1.6	ESTIMATE THE TECHNIQUE FOR A DELAY	Determine suitable technique for implementing an aircraft delay necessary to fit a sequence or flow restriction.	A	M/A	Flight plan data, full data blocks, flow control list.	Properly delay a flight to fit a sequence or flow restriction.	M/A
3.2.1	PERMITIVE AN ALTITUDE OR ROUTE DEVIATION	Perceive altitude, route or speed deviations from flight plan.	B/A	M/A	Full data block and/or nonconformance indicators.	Detect altitude or route deviations from planned values.	Refresh Rate
3.2.2	OBSERVE AIRCRAFT RESUMING NORMAL FLIGHT PLAN	Observe aircraft resuming normal flight plan following controller query/advisory.	B/A	M/A	Full data block.	Ensure anomalous flight pattern returns to proper form.	M/A
3.2.3	DETERMINE MANEUVER TO ESTABLISH/RESTORE FLIGHT PLAN CONFORMANCE	Determine what type of maneuver would be needed to establish/restore flight plan conformance.	A	M/A	Full data block.	Formulate a clearance to establish/restore sequence.	M/A
3.2.4	REQUEST AIRSPACE PROXIMITY PROBE	Request initiation of an airspace proximity probe is requested as result of receiving a notice of airspace restriction, in order to assess impact of restriction on aircraft in area.	E	Test entry & select.	Airspace probe, list results.	M/A	5 Seconds
3.3.2	DESIGNATE/DELETE AN AREA IN USE	Designate user/release of indicated predefined airspace.	E	Test entry, select, and/or sketch.	Outline of restricted airspace and altitude/ features.	M/A	2 Seconds
3.3.3	DETERMINE WHETHER ATC CONTROLS SPECIAL USE AIRSPACE	Determine the sector or agency which has/will have responsibility for control of any air traffic in the Special Use Airspace.	A	M/A	M/A	Determine appropriate control and coordinated usage of restricted airspace.	M/A
3.3.4	RESTRICT AIRCRAFT ACTIVITY IN AREA BY ALTITUDE OR SEGMENT	Temporarily restrict aircraft activity in a specified area by segment and/or altitude so as to reflect dynamically changing conditions.	A	M/A	M/A	Determine how restricted area under ATC jurisdiction can be optimally utilized under dynamically changing conditions.	M/A

1. Manual
2. Display
3. Audio
4. Analysis of
5. Verbal Coordination

TABLE 8-1. AAS CONTROLLER DDL (continued)

Task Number	Task Definition	Enhanced Task Description	Task Type ^a	Characterized Action Type	Display Content	Controller Interface	Desired Machine Response Requirements
3.5	OBSERVE DISPLAY OF AIRSPACE RESTRICTION STATUS CHANGE	Observe appearance of airspace outline and supporting textual information which indicates that the special use airspace status has changed by the controlling agency/facility.	R	N/A	Airspace outline, name, altitude, time, and controlling agency.	Detect activation on specified airspace.	N/A
3.6.1	DETERMINE DESCENT TIME OR POINT	Determine the descent time or point for an aircraft based upon the traffic and flow control information.	A	N/A	Full data block & flow metering list.	Determine appropriate descent time/point input components for clearance formulation.	3 Seconds
3.6.2	PROJECT TRAFFIC SEQUENCE TO ESTABLISH/MODIFY APPROACH FLOW TO AIRPORT OR SECTOR	Project mentally the air traffic sequence so as to properly establish/modify the flow of aircraft approaching an airport or sector.	A	N/A	N/A	Structure traffic flow in accordance with control restrictions.	N/A
3.6.3	OBSERVE RANGE/BEARING BETWEEN AIRCRAFT	Observe continuous range/bearing or discrete range/bearing function results obtained by identifying/selecting the desired aircraft and invoking the range/bearing function.	E/R	Select & test entry.	Range/bearing list.	Utilize range/bearing information to determine multiple aircraft relationships.	1 Second
3.6.4	OBSERVE AIRSPACE INTRUSION BY A NON-CONTROLLED OBJECT	Observe appearance of non-controlled object in controlled airspace.	R	N/A	Target list, map data.	Detect/monitor non-controlled objects which could become hazard to controlled aircraft.	N/A
3.6.5	COMPOSE/ENTER REMINDER NOTE OF AIRSPACE INTRUSION	Compose/enter reminder note with target i.d. associated Display to annotate non-controlled intruding object.	E	Test entry & select.	Note field, limited data, block, or a full data block.	N/A	5 Seconds
3.6.6	FLIGHT-FOLLOW AN OBSERVED NON-CONTROLLED OBJECT	Flight-follow (continuously monitor the movements/behavior of) a non-controlled object to determine possibility of a hazardous situation.	R/A	Test entry & select.	Note field, limited data, block, or a full data block.	Monitor behavior of unpredictable, non-controlled object for possible impact on controlled aircraft.	Refresh Rate
6.1.1	ENTER TRIAL FLIGHT PLAN AMENDMENT	Enter trial flight plan amendment by selecting/identifying aircraft and entering proposed amendment triggering flight plan conflict probe to assess impact of amendment.	E	Test entry & select.	Flight plan conflict & conflict resolution advisories list.	N/A	2 Seconds

^aR: Receipt
E: Entry
A: Analytical
VC: Verbal Coordination

TABLE 8-1. AAS CONTROLLER DDL (continued)

Task Number	Task Subtitle	Subscribed Task Description	Task Type	Classification/Action Type	Display Content	Controller Instructions	Required Machine Support Requirements
4.1.2	REVIEW POTENTIAL IMPEDIMENTS FOR IMPACT ON PROPOSED CLEARANCE	Review for any additional factors which might impact proposed clearance.	R/A	M/A	Targets & map data.	Determine need for clearance revision based upon review of obstacles.	M/A
4.1.3	SELECT CONFLICT RESOLUTION ADVISORY OPTION	Select from the conflict resolution advisory list the resolution option determined to be best.	E/A	Select or test entry.	Conflict resolution advisory list.	Determine optimal conflict resolution option.	1 Second
4.1.4	FORMULATE A CLEARANCE WITH APPROPRIATE INSTRUCTIONS	Formulate a clearance which would satisfy the applicable constraints and conditions.	A	M/A	M/A	Develop a more appropriate clearance when systems provided options are deemed inadequate.	M/A
4.1.5	QUERY PILOT REGARDING COMPLIANCE WITH CLEARANCE	Query pilot regarding any apparent non-compliance with clearance.	VC	M/A	Full data block, symbol.	Determine reason(s) for apparent non-compliance with clearance with direct contact with pilot.	M/A
4.1.6	ISSUE CLEARANCE AND INSTRUCTIONS TO PILOT	Issue to pilot the clearance and instructions which were either selected from the advisory option list or alternatively formulated by controller.	E (VC)	Select or test entry.	Clearance, short resolution advisory list.	Directly convey to pilot the chosen clearance.	M/A
4.1.7	ISSUE CLEARANCE THROUGH RELAY TO PILOT	Issue thru ATCT/RS the clearance and instructions which were either selected from the advisory option list or alternatively formulated by the controller for relay to pilot.	VC	M/A	M/A	Indirectly convey to pilot the chosen clearance when determined more appropriate than direct issuance.	M/A
4.1.8	VERIFY AIRCRAFT COMPLIANCE WITH CLEARANCE	Verify aircraft compliance with issued clearance by observing movement/behavior of symbolic/textual data on Situation Display.	M/A	M/A	Full data block, symbol.	Determine non-compliance via monitoring of textual/geographical data on Situation Display.	Refresh Rate
4.2.1	DECLARE EMERGENCY EVENT AND INVOKE CONTINGENCY PLAN	Declare that an emergency event is in progress and invoke an appropriate contingency plan to handle the given situation.	A (VC)	M/A	Full data block, emergency list, and/or other data as needed/required.	Recognize emergency situation, grasp its salient characteristics, and initiate appropriate action to handle situation.	M/A

Percent	A Analytical
100	100
90	90
80	80
70	70
60	60
50	50
40	40
30	30
20	20
10	10
0	0

TABLE 8-1. AAS CONTROLLER DDL (continued)

Task Number	Task Definition	Enhanced Task Description	Task Type	Characteristics Index Type	Display Content	Controller Reference	Related Machine Response Requirement
4.3.1	PENDING PRESENCE OF SPECIAL OPERATIONS	Perceive presence of special operations via monitoring/analysis of data on Systems Status, Static Information Flight Data, and/or Situation Display (3).	A	M/A	Full data block & flight plan display, maps, lists.	Recognize situations requiring special operations & judge manner most appropriate for handling them.	M/A
4.4.1	OBSERVE NEW FLIGHT PLAN ALERT	Observe highlighted new flight plan in Flight Plan Display.	A	M/A	Flight plan display.	Observe new flight plans as they become available.	5 Seconds
4.4.2	REVIEW FLIGHT PLAN FOR COMPLETION	Review flight plan on Flight Data Display to ensure that all data fields are complete.	A	M/A	Flight plan display.	Ensure flight plan contents and format are accurate and appropriate.	M/A
4.4.3	COMPOSE/ENTER FLIGHT PLAN	Compose/enter and original flight plan as received from the pilot's aircraft into controlled aircraft encounter conditions requiring clearance.	E	Test entry or select, sketch.	M/A	M/A	3 Seconds
4.4.4	DELETE NEW FLIGHT PLAN ALERT	Delete highlighted status of flight plan data in the Flight Data Display.	E	Select or test entry.	Flight plan display.	M/A	1/2 Second
4.4.5	REVIEW FLIGHT PLAN FOR ERROR/DATA LIST SEQUENCE	Review flight plan amendment on the Flight Data Display to ensure that all data fields are current and accurate.	A	M/A	Flight plan display.	Ensure flight plan contents and format are accurate and appropriate.	M/A
4.5.1	RECEIVE FLIGHT PLAN AMENDMENT FROM COMPUTER	Receive/observe flight plan amendment on the Flight Data Display as it is received from the computer.	E	M/A	Amended fields of the flight plan display.	Note the reception of flight plan amendments presented via computer.	5 Seconds
4.5.2	HIGHLIGHT FLIGHT PLAN PORTION FOR REMINDER ACTION	Highlight (flag) selected fields of the flight plan on the Flight Data Display for reminder action.	E	Select.	Highlighted fields of the flight plan display.	Flag (for reminder purposes) portions of a flight plan requiring later controller attention.	1 Second
4.5.3	COMPOSE/ENTER FLIGHT PLAN AMENDMENT	Compose/enter amendment/change to an existing flight plan.	E	Test entry or select, sketch.	Flight plan display & full data block (if appropriate).	M/A	5 Seconds
4.5.4	ENTER PILOT'S POSITION REPORT IN SYSTEM	Enter pilot's position report into system.	E	Test entry, select and/or position.	Updated fields in the flight data block and the flight plan display.	M/A	5 Seconds

10. Review of
E. Entry
A. Analysis of
M. Monitor
S. Status
C. Control
D. Display
L. List
S. Sketch

TABLE 8-1. AAS CONTROLLER DDL (continued)

Task Number	Task Description	Enhanced Task Statement	Task Type ¹	Characteristics Action Type	Display Content	Controller Inference	Derived Machine Action Requirements
4.5.5	DELETE FLIGHT PLAN AMENDMENT HIGHLIGHTING	Remove emphasis (remove flag) for selected items of the flight plan posting upon completion of the action for which the emphasis had served as a reminder.	E	Select.	Flight plan highlights highlighted before deletion, normal afterward.	N/A	5 Seconds
5.1.1	OBSERVE DISPLAY OF WEATHER LINE/INTENSITY/BASE/ HEIGHT/MOVEMENT	Observe the display of all relevant weather data to be able to determine the intensity and dimensions of the weather.	R	N/A	Weather phenomena.	Monitor all available weather data in order to provide safe & efficient service.	5 Seconds
5.1.2	RECEIVE SIGMET/ALM/WT	Receive all SIGMET/ALM/WT messages which affect controller's sector.	R	N/A	SIGMET/ ALM/WT messages.	Monitor all available weather data in order to provide safe & efficient service.	5 Seconds
5.1.3	RECEIVE WEATHER BRIEFING FROM METEOROLOGIST	Receive meteorological briefings on weather conditions affecting controller's sector.	R (VC)	Select.	Meteorological briefing.	Monitor all available weather data in order to provide safe & efficient service.	5 Seconds
5.1.4	ENTER PIREP INTO SYSTEM	Enter all appropriate weather-related pilot reports into system.	E (VC)	Text entry.	Selected pilot reports.	Selectively enter PIREP data into system for wide-spread access-ability.	10 Seconds
5.1.5	DETERMINE WHETHER ADJACENT CONTROLLER OR PILOT NEEDS WEATHER ADVISORY	Determine whether weather information made available to controller would be of use to adjacent controller and/or pilot (a) in his sector.	A	N/A	Weather phenomena & air traffic.	Assess utility of issuing weather advisory to pilots and other controllers.	N/A
5.1.6	DETERMINE WHETHER IMPACT ON ENROUTE/FLOW	Determine whether impact on aircraft routing and/or flow control.	A	N/A	Weather phenomena & air traffic, flow data.	Evaluate effects of weather on routing and/or flow control.	N/A
5.1.7	DETERMINE ALTITUDE/ROUTE CHANGE TO BYPASS SEVERE WEATHER	Determine altitude and/or route changes necessary to bypass areas of severe weather by evaluating all relevant data.	A	N/A	Weather data, flight plan, display, & full data block, flow control data.	Integrate available weather and air traffic data to formulate appropriate air traffic control response.	N/A
5.2.1	RECEIVE WEATHER SEQUENCE	Receive hourly weather observation reports.	R	N/A	Weather sequence.	Monitor all available weather data in order to provide safe & efficient service.	5 Seconds

¹ E: Manual Entry
R: Manual Entry
VC: Visual Confirmation

TABLE 8-1. AAS CONTROLLER DDL (continued)

Task Number	Task Definition	Enhanced Task Statement	Task Type*	Characteristic Action Type	Display Content	Controller Instructions	Required Machine Support Equipment
5.2.2	RECEIVE LOCATION REPORT UPDATE	Receive weather reports as they appear.	R	N/A	Weather updates.	Monitor all available weather data in order to provide safe & efficient service.	5 Seconds
5.2.3	DETERMINE WHETHER USABLE FLIGHT LEVEL HAS CHANGED	Determine whether usable flight level has changed.	R	N/A	Weather report & usable flight level table.	Determine flight level usability by checking barometric pressure altimeter setting.	N/A
5.2.4	DETERMINE WHETHER RUNWAY CONDITIONS HAVE CHANGED	Determine whether runway conditions have changed.	R	N/A	Weather sequence & noise abatement procedure reference data.	Assess impact of wind and/or time-of-day on runway usability.	N/A
5.2.5	DETERMINE WHETHER CONTROL ZONE IS IFR/VFR	Determine whether specified control zones are IFR/VFR as a function of weather condition data.	R	N/A	Recommended control zone condition.	Determine recommended control zone IFR/VFR conditions.	N/A
6.2.1	REVIEW SYSTEM STATUS	Review communication assignments, procedure changes, route changes, etc. to determine any changes since controller's last assignment.	R/A	N/A	Communications assignments, procedure changes, & route changes.	Monitor all system/procedural changes and understand their impact on controller's task.	N/A
6.2.2	REVIEW TRAFFIC STATUS/WEATHER	Review all relevant traffic and weather status data (e.g., flight plans, flow control list, hold list, runway list, targets, full data blocks, etc.) to determine the current operational control picture.	R/A	N/A	Flight plan display, situation display, and all appropriate list (e.g., flow control, hold, runway, etc.).	Grasp and understand current operational control status via review of traffic flow and weather condition data presented on computer displays.	N/A
6.2.3	VERIFY THAT ALL REQUIRED DISPLAY AND COMMUNICATION SWITCHES ARE IN PROPER LOCATION	Verify that all display and communication parameters ('switches') are properly set.	R	Select, position, orient, macro, quantify, and/or test entry.	"Switch" setting status.	Configure workstation for proper operation via appropriate "switch" position/selection.	N/A
6.2.4	PERFORM LOG-ON SEQUENCE AT DESIGNATED CONSOLE	Perform log-on sequence at designated console by accessing log-on function and entering controller i.d. (e.g., controller initials) and/or other input parameters.	E	Select and/or test entry or TBD.	Log-on parameter prompt & system acceptance response.	N/A	1/2 Second

* R: Recipient
E: Entry
A: Action
N: Not Used

TABLE 8-1. AAS CONTROLLER DDL (continued)

Task Number	Task Subtitle	Estimated Task Statement	Task Type	Characteristics Action Type	Display Content	Controller Inference	Required Marking Requirement
6.2.5	ADJUST PARAMETERS AND DISPLAY TO PERSONAL PREFERENCE	Adjust control, display, and/or interaction parameters as desired to suit controller preference.	E	Select, position, orient, magnify, and/or test entry.	Current/optional parameter values.	N/A	1/2 Second
6.2.6	CHECK DISPLAY FOR PROPER ALIGNMENT, USABILITY, AND SATISFACTORY STATUS	Check workstation for satisfactory status.	A	Select.	Requested/needed data items.	Ensure display system is properly operating.	N/A
6.2.7	SET UP WORKSTATION ADAPTION PARAMETERS	Establish workstation adaptation parameters (i.e., controller-specific file of personalized default parameters).	E	Select, position, orient, magnify, and/or test entry.	Adaption parameter file.	Custom configure workstation set up in a storage/editable/reloadable file.	10 Seconds
6.3.1	DETECT NON-ACCEPTANCE OF INPUT DATA	Detect non-acceptance of input data.	N/A	N/A	Absence of appropriate display.	Detect potential fault (possibly transient) via non-acceptance of input(s).	N/A
6.4.1	DETECT OCCURRENCE OF SECTOR SUITE FAILURE	Detect occurrence of failure localized at the Sector Suite level via absence of appropriate response/display.	N/A	N/A	Absence of appropriate display.	Detect fault occurrence & determine apparent locus of impact.	N/A
6.4.2	OBSERVE SECTOR SUITE DATA BASE RESTORATION COMPLETION MESSAGE	Observe restoration of flight plan and situation data along with appearance of restoration completion message. If result of backup procedures, respond to sector suite fault.	R	N/A	Flight plan display normal situation display data, and restoration completion message.	Detect restoration to operational conditions following Sector Suite fault detection/correction.	1 Second
6.5.1	DETECT OCCURRENCE OF ACCC FAILURE	Detect occurrence of ACCC failure.	N/A	N/A	Local entries only.	Detect fault occurrence & determine apparent locus of impact.	1 Second
6.5.2	REVERT TO ACCC BACKUP PROCEDURES (TMD)	Revert to (TMD) backup procedures for ACCC failures.	A/R/E/VC (TMD)	TMD	TMD	Deploy appropriate (TMD) backup procedures in response to fault situation.	TMD
6.6.1	DETERMINE AIRCRAFT NEEDING SUBSTITUTE ROUTING	Determine aircraft needing substitute routing due to inoperability of a given RNAV/D.	A	N/A	Substitute RNAV/D routing.	Formulate revised clearance for aircraft inspected by RNAV/D inoperability.	N/A

VC: Backup
E: Entry
A: Aerial
VC: Vertical Coordination

TABLE 8-1. AAS CONTROLLER DDL (continued)

Task Number	Task Subname	Estimated Task Description	Task Type	Communications Element Type	Display Content	Controller Information	Derived Machine Support Requirements
6.6.2	MONITOR STATUS OF QUESTIONABLE MAVAID	Monitor status of questionable MAVAID by receiving verbal contact and/or assistance pilot in vicinity of MAVAID.	VC	M/A	Verbal status report.	Monitor normality of MAVAID operations.	5 Seconds
6.6.3	OBSERVE SUBSTITUTE ROUTING ON DISPLAY	Reference substitute routing.	R	M/A	Substitute routing.	Monitor rerouting as a function of MAVAID inoperability.	4 Seconds
6.7.1	DETERMINE COMMUNICATION FAULT	Determine occurrence of VCS communication fault.	A	M/A	M/A	Detect fault occurrence & determine apparent extent of impact.	M/A
6.7.2	ADJUST COMMUNICATION STRATEGY	Adjust communication strategy in response to VCS fault.	A	M/A	M/A	Adapt communication strategy to fit situational needs.	M/A
6.7.3	SWITCH TO BACKUP RADIO/FREQUENCY	Switch to backup VCS radio or frequency.	E	Select or quantify.	Available frequencies (VCS).	M/A	M/A
6.8.1	DETERMINE IMPENDING CONTROLLER OVERLOAD	Determine if oneself or team member is approaching limit via recognition of contributory impact of such factors as traffic level, weather conditions, and flow restrictions.	A	M/A	Any or all of traffic, flow, weather, or data related to or indicative of controller activity level.	Recognize potential degradation of controller capability as a function of workload prior to actual occurrence thereof.	M/A
6.8.2	EXCHANGE/ASSIGN INTRA-POSITION RESPONSIBILITIES	Exchange/assign responsibility with supervisory coordination intra-positional responsibilities within a Sector Suite in order to handle heavy workload situations.	A	M/A	M/A	Ensure workload balance during overload conditions.	1/2 Second
6.8.3	REQUEST ASSISTANCE OR RELIEF	Request from supervisor any needed assistance or relief due to workload conditions and/or individual personal factors.	S (VC)	Select.	M/A	Recognize need for and request appropriate help or relief.	5 Seconds
6.9.1	PERCEIVE TRACKING FAULT OR TRANSPONDER FAILURE	Perceive any tracking faults or transponder failures by monitoring the updating of data blocks and noting any anomalous behavior therein.	R/A	M/A	Data blocks on Situation Display.	Detect fault occurrence & determine apparent locus of impact.	Refresh Rate

VC Verbal Communication
R Receive
S Send

TABLE 8-1. AAS CONTROLLER DDL (continued)

Task Number	Task Subtitle	Enhanced Task Statement	Task Type	Characteristics/Action Type	Display Content	Controller Interaction	Refresh Rate
6.9.2	REPOSITION/UPDATE/REASSOCIATE DATA BLOCKS	Reposition/update/reassociate any data blocks needing same upon the re-establishment of tracking (i.e., following any occurrence and correction of sensor or tracking fault).	E	Select.	Data blocks on Situation Display.	N/A	Refresh Rate
6.10.1	OBSERVE MESSAGE ON LOSS OF DATA BASE	Observe message indicating loss of data base.	B	N/A	Data base loss message.	Detect fault occurrence & determine apparent locus of impact.	1 Second
6.10.2	IDENTIFY FAILURE TO UPDATE FLIGHT PLAN DATA BASE	Detect failure to update flight plan data base.	B/A	N/A	Flight plan display.	Detect fault occurrence & determine apparent locus of impact.	N/A
6.10.3	ENTER DISPLAY AMENDMENT MESSAGE ON CONSOLE	Enter flight plan amendment message manually in response to verbally forwarded flight plan amendment operating in degraded mode.	E	Select & test entry, or sketch/position.	Flight plan display.	N/A	2 Seconds
6.10.4	ENTER FLIGHT PLAN ON CONSOLE	Enter flight plan manually.	E	Test entry.	Flight plan display.	N/A	2 Seconds
6.10.5	RESEQUENCE FLIGHT PLAN ON CONSOLE	Resequence (legally locate/order) flight plans manually so as to display aircraft within for approaching sector in an order meaningful to controller.	A/E	Select & position.	Flight plan display.	Employ appropriate step-back procedure in response to loss of flight plan data base.	2 Seconds
6.11.1	IDENTIFY UNRELIABLE VCS COMMUNICATION	Detect unreliable VCS communication via monitoring of radio and interphone operations.	B/A/VC	N/A	N/A	Detect fault occurrence & determine apparent locus of impact.	N/A
7.1.1	ADVISE CONTROLLER/SUPERVISOR OF AIRCRAFT FLIGHT PLAN DEVIATION	Advise another controller/supervisor of an aircraft deviating in-route, altitude and/or speed from flight plan, via BS/VCS or direct.	E (VC)	N/A	N/A	N/A	2 Seconds
7.1.2	ADVISE CONTROLLER OF RESULTS OF FLIGHT PLAN CONFLICT PROBE	Advise controller by VCS or direct of the results of a flight plan conflict probe.	VC	N/A	Flight plan conflict probe results.	N/A	N/A
7.1.3	ADVISE CONTROLLER OF POTENTIAL CONFLICT IN HIS SECTOR	Advise controller by VCS or direct of a potential conflict in his sector.	VC	N/A	Conflict alert notice.	N/A	N/A

VC, Conflict
E, Entry
VC, Visual Communication

TABLE 8-1: AAS CONTROLLER DDL (continued)

Test Number	Test Description	Enhanced Test Description	Task Type	Characteristics Action Type	Display Content	Controller Information	Desired Results Support Requirements
7.1.4	ADVISE CONTROLLER OF POTENTIAL NSAM IN HIS SECTOR	Advise controller by VSCS or direct of a potential NSAM in his sector.	VC	M/A	Minimum safe altitude warning.	M/A	M/A
7.2.1	ADVISE CONTROLLER OF POTENTIAL AIRCRAFT CONFLICT IN SECTOR	Receive notice by VSCS or directly from another controller of potential aircraft conflict in the sector.	VC	M/A	M/A	M/A	M/A
7.2.2	RECEIVE CONTROLLER NOTICE OF POTENTIAL NSAM IN SECTOR	Receive notice by VSCS or directly from another controller of potential NSAM in the sector.	VC	M/A	M/A	M/A	M/A
7.2.3	RECEIVE CONTROLLER NOTICE OF AIRCRAFT FLIGHT PLAN DEVIATION	Receive notice from another controller of an aircraft deviation in route, altitude, and/or speed from flight plan.	B (VC)	M/A	M/A	M/A	3 Seconds
7.2.4	RECEIVE CONTROLLER NOTICE OF RESULTS OF FLIGHT PLAN CONFLICT PROBE	Receive notice by VSCS or direct from another controller of the results of a flight plan conflict probe.	VC	M/A	M/A	M/A	M/A
7.3.1	ISSUE POINTOUT	Initiate pointout to adjacent controller by identifying target and address via SS, VSCS or direct.	E (VC)	Position & macro, or position & test entry.	Target identification and/or sector address.	Aware of aircraft approaching edge of sector but needing to coordinate with adjacent controller if not wishing to transfer control.	1 Second; response required.
7.3.2	OBSERVE AUTOMATIC INITIATION OF POINTOUT TO ANOTHER CONTROLLER	Observe the cue from the automatic initiation of a pointout to another controller by noting the full data block.	B	M/A	Full data block display.	Aware that computer detected an aircraft about to enter another sector and initiate a pointout to that sector.	1 Second
7.3.3	DIRECT FLIGHT DATA DISPLAY TO ADJACENT CONTROLLER	Direct Flight Data Entry to an adjacent controller by indicating the flight data entry and address and invoking the force FDE function.	E	Position & macro, or position & test entry.	Flight plan display.	Aware of need of aid of another in coordinating a flight.	1 Second
7.3.4	RECEIVE ACCEPTANCE OF POINTOUT	Receive controller acceptance of pointout via SS, VSCS or direct.	B	M/A	Data block pointout accept.	Alert to receipt of release/use of airspace associated with the coordinated aircraft.	1 Second

7.0 Percent
8 Entry

A. Artificial
V. Verbal Communication

TABLE 8-1. AAS CONTROLLER DDL (continued)

Task Number	Task Description	Automated Task Description	Task Type	Characterized Action Type	Display Content	Controller Interface	Required Response Requirement
7.3.5	RECEIVE REJECTION OF POINTOUT	Receive controller rejection of pointout via SS, VSCB or direct.	R	N/A	Data block pointout accepted.	Alert to rejection of use of associated with the coordinated aircraft.	1 Second
7.4.1	ADVISE CONTROLLER INITIATED POINTOUT	Receive controller pointout request via SS, VSCB or direct.	R (VC)	N/A	Data block pointout with alert.	Need to take action to allow the pointout and associated airspace, traffic permitting.	1 Second
7.4.2	ACCEPT POINTOUT	Accept pointout by selecting or entering approval message via SS, VSCB or direct.	E (VC)	Select or test entry.	Full data block.	Alert to the need to authorize use of the airspace if traffic or conditions do not prohibit it.	1 Second
7.4.3	REJECT POINTOUT	Reject pointout request by noting the full data block and indicating a pointout reject message via SS, VSCB, or direct.	E (VC)	Select or test entry.	Absence of full data block.	Traffic or conditions prohibit aircraft use/release.	1 Second
7.4.4	SUPPRESS FULL DATA BLOCK AFTER POINTOUT	Suppress full data block after pointout by selecting or entering suppression message.	E	Select or test entry.	Absence of flight data block.	Aware of the results of displaying or not displaying data blocks when electing to suppress a full data block.	2 Seconds
7.5.1	RECEIVE NOTICE OF AIRSPACE RESTRICTION/RELEASE FROM CONTROLLER/SUPVISOR	Receive notice of an airspace restriction or release via SS, VSCB or direct.	R (VC)	N/A	Test message or map of area.	Aware of consequences to planned traffic flow.	N/A
7.5.2	REQUEST RELEASE OF SPECIAL USE AIRSPACE	Request the temporary release of special use airspace via SS, VSCB or direct.	E (VC)	Test entry.	Test feedback.	Aware of need for airspace release to allow traffic to move through the area.	2 Seconds
7.5.3	RECEIVE DETAIL OF REQUEST FOR RELEASE OF SPECIAL USE AIRSPACE	Receive detail of request for release of special use airspace via SS, VSCB or direct.	R (VC)	N/A	Test.	Aware of consequences to planned traffic flow.	2 Seconds
7.6.1	ADVISE CONTROLLER OF AIRSPACE RESTRICTION IMPOSED	Advise adjacent controller by selecting a map or inputting a test message of the imposition of an airspace restriction, via SS, VSCB or direct.	E (VC)	Path and/or test entry.	Acceptance of input.	Aware of the possible need of other controllers for information on airspace restriction and the use of that airspace.	2 Seconds

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TABLE 8-1. AAS CONTROLLER DDL (continued)

Task Number	Task Description	Enhanced Task Statement	Task Type	Communication System Type	Display Content	Controller Int. Notes	Derived Action Support Requirements
7.6.2	ISSUE ADVISORY IN REGARD TO RESTRICTED AIRSPACE PROXIMITY	Issue advisory to pilot regarding proximity to special use airspace.	VC	M/A	Location of target and of restricted airspace	Observe that aircraft is or will be in close proximity of restricted airspace.	2 Seconds
7.7.1	RECEIVE NOTICE TO TAKE OVER AIRSPACE	Receive message/indication on the use of particular airspace to revert to sector control via SS, VCSB or direct.	B (VC)	M/A	Text, CI message, revised lists, and/or revised sep.	Aware of nature and time of actions to be taken upon receipt of notice.	M/A
7.7.2	RECEIVE NOTICE TO RECONFIRM SECTOR	Receive notification of the reconfirmation of the sector, via SS, VCSB or direct.	B (VC)	M/A	Revised specifications and/or revised displays.	Aware of nature and time of actions to be taken to combine or decombine positions and/or sectors.	M/A
7.7.3	RECEIVE NOTICE TO RELEASE AIRSPACE	Receive message/indication of the release of a particular airspace, via SS, VCSB, or direct.	B (VC)	M/A	Text, CI message, and/or revised lists.	Aware of nature and time of actions to be taken upon receipt of notice.	M/A
7.8.1	RECEIVE FLIGHT PLAN FROM PILOT	Receive flight plan proposal from pilot via SS or VCSB.	B (VC)	M/A	Flight plan.	Aware of action to be taken upon receipt of flight plan directly from a pilot.	3 Seconds
7.8.2	RECEIVE FLIGHT PLAN VERBALLY FORWARDED	Receive flight plan verbally forwarded via VCSB or direct.	VC	M/A	M/A	Aware of action to be taken upon receipt of flight plan, particularly during nonoperation of computer system.	M/A
7.8.3	QUERY PILOT ABOUT FLIGHT PLAN	Query pilot about flight plan via SS or VCSB.	E (VC)	Select or test entry.	Data link query test.	Correct route logic and elements of a flight plan.	2 Seconds
7.8.4	QUERY THE DELIVER OF A FLIGHT PLAN	Query adjacent controller or others about a flight plan via SS, VCSB or direct.	E (VC)	TMD	TMD	Correct route logic and elements of a flight plan.	2 Seconds
7.9.1	RECEIVE CONTROLLER NOTICE OF REQUESTED CLEARANCE OF AIRCRAFT LEAVING HIS SECTOR	Receive message from another controller of a requested clearance from an aircraft leaving that sector via SS, VCSB or direct.	B (VC)	M/A	Clearance (on request).	Remember to act upon the pilot's request for an amended clearance after transfer of control.	5 Seconds

VC Verbal
E Entry
A Assigned
VC Verbal Communication

TABLE 8-1: AAS CONTROLLER DDL (continued)

Task Number	Task Outline a	Submerged Task Statement	Task Type ^b	Characterizable Action Type	Display Content	Controller Inference	Required Machine Support Requirements
7.9.2	DENY CLEARANCE REQUEST FROM CONTROLLER	Deny clearance request from another controller via SS, VSCB or direct.	E (VC)	Select or test entry.	Clearance reject feedback.	Nature of traffic or conditions warranting denial of clearance request.	2 Seconds
7.9.3	SUGGEST ALTERNATIVE TO CLEARANCE REQUEST FROM CONTROLLER	Suggest alternatives verbally via VSCB or direct to another controller when unable to approve a clearance as requested.	VC	M/A	M/A	Consideration of clearance alternatives.	M/A
7.9.4	RECEIVE CLEARANCE REQUEST FROM ATCT/F33/PILOT/SUPERVISOR	Receive from a pilot or relayed through ATCT, F33, or supervisor, a clearance request message via SS, VSCB, or direct.	B (VC)	M/A	Clearance (in request).	Remember to respond to the clearance request at appropriate time.	5 Seconds
7.9.5	RECEIVE CONTROLLER REQUEST FOR CLEARANCE/APPROVAL	Receive from adjacent controller a clearance request message via SS, VSCB, or direct.	B (VC)	M/A	Clearance (on request).	Alert to traffic in the area near that location that might impact the intended clearance.	2 Seconds
7.9.6	DENY CLEARANCE REQUEST	Deny clearance request via SS, VSCB or direct.	E (VC)	Select or test entry.	Clearance reject feedback.	Aware of traffic or conditions that prohibit clearance approval.	2 Seconds
7.9.7	SUGGEST CLEARANCE ALTERNATIVES TO PILOT	Suggest clearance alternatives to pilot via SS or VSCB.	E (VC)	Select or test entry.	Clearance feedback.	Consideration of clearance alternatives.	2 Seconds
7.9.8	ACKNOWLEDGE DATA LINK CLEARANCE REQUEST	Acknowledge through data link a data link clearance request.	E	Select	Clearance feedback.	Respond through acknowledgment of request if unable to respond with an immediate clearance.	1 Second
7.9.9	APPROVE CLEARANCE REQUEST FROM CONTROLLER	Approve clearance request coordinated by another controller by giving a clearance approved via SS, VSCB or direct.	E (VC)	Select or test entry.	Clearance feedback.	Aware of traffic and conditions that permit approval of the request.	2 Seconds
7.9.10	FORWARD CLEARANCE REQUEST TO ADJACENT CONTROLLER	Forward clearance request verbally to adjacent controller via SS, VSCB or direct.	VC	M/A	M/A	Aware of traffic or conditions prohibiting a clearance that might be handled by next controller.	M/A

^a E: Request
B: Entry
^b M: Manual
VC: Verbal Communication

TABLE 8-1. AAS CONTROLLER DOL (continued)

Task Identifier	Task Description	End-onset Task Description	Task Type	Controller/Observer/Target Type	Display/Control	Controller Instructions	Observer/Observer/Target Type
7.10.1	REQUEST CLEARANCE/APPROVAL FROM ADJACENT CONTROLLER	Request clearance/approval from adjacent controller via SS, VSCB or direct.	E (VC)	Select and/or text entry.	Clearance feedback.	Aware aircraft requesting the clearance is in close proximity to an adjacent sector, necessitating an approval request from the adjacent controller before issuing the clearance.	2 Seconds
7.10.2	RECEIVE CLEARANCE APPROVAL/RESTRICTION FROM ADJACENT CONTROLLER	Receive from adjacent controller a message regarding clearance approval, possibly with restrictions via SS, VSCB, or direct.	B (VC)	N/A	Clearance and restriction.	Aware of restrictions that may be required if coordination is needed.	2 Seconds
7.10.3	RECEIVE CLEARANCE DISAPPROVAL/DENIAL FROM ADJACENT CONTROLLER	Receive from adjacent controller a clearance rejection message via SS, VSCB or direct.	B (VC)	N/A	Clearance rejection message and ID.	Aware of impact planned traffic picture when adjacent controller may be unable to approve a clearance request due to traffic or conditions.	2 Seconds
7.10.4	RECEIVE ALTERNATE SUGGESTION FOR CLEARANCE/APPROVAL REQUESTED OF ADJACENT CONTROLLER	Receive message of alternative clearance suggestion from adjacent controller verbally via VSCB or direct.	B (VC)	N/A	Clearance alternative and ID.	N/A	N/A
7.11.1	FORWARD FLIGHT PLAN AMENDMENT VERBALLY	Forward flight plan amendment verbally to another controller via VSCB or direct.	M/A	M/A	M/A	Need for verbal amendment for warding during nonoperation of the system.	N/A
7.11.2	RECEIVE CONTROLLER ADVICE OF UNABLE FLIGHT PLAN AMENDMENT	Receive advice that adjacent controller is unable to accept a flight plan amendment via SS, VSCB or direct.	VC	M/A	M/A	Aware of impact on planned traffic picture when adjacent controller is unable to accept amendment due to traffic or conditions.	1 Second

10. Project
11. Display
12. Observer
13. Target
14. Controller

TABLE 8-1. AAS CONTROLLER DDL (continued)

Task Number	Task Description	Endogenous Task Statement	Task Type ^a	Coordination/Action Type	Display Content	Controller Inference	Required Message Support Requirements
7.12.1	RECEIVE FLIGHT PLAN AMENDMENT VERBALLY FORWARDED	Receive flight plan amendment verbally forwarded via VCS or direct.	VC	M/A	M/A	Alert to receipt of verbal flight plan amendments during nonoperation of the computer system.	M/A
7.12.2	ADVISE CONTROLLER UNABLE FLIGHT PLAN AMENDMENT	Advise controller forwarding a flight plan amendment of the unacceptability of that amendment via SB, VCS or direct.	E (VC)	Select and/or test entry	Unable message feedback.	Aware of traffic or conditions make an amendment unacceptable.	2 Seconds
7.12.3	RECEIVE DEPARTURE MESSAGE FROM CONTROLLER/FSS/PILOT	Receive departure message from a controller, FSS or pilot via SB, VCS or direct.	E (VC)	M/A	Departure message and ID/airport.	Alert to arrival of a departure message on the display, or situation for verbal transmission from pilot, nonauto-seated facility, or during nonoperation of the computer system.	1 Second
7.16.1	ISSUE NOTICE OF EQUIPMENT STATUS TO AIRCRAFT CONTROLLER/PILOT/SUPERVISOR	Issue notice of equipment status to an adjacent controller, a pilot or supervisor via SB, VCS or direct.	VC	M/A	M/A	Aware of the impact of the status of equipment on others, and advise them of it.	5 Seconds
7.16.2	TERMINATE RADAR SERVICE TO AIRCRAFT	Terminate radar service to aircraft via SB, VCS or direct.	VC	M/A	M/A	M/A	1 Second
7.16.3	REQUEST PILOT POSITION REPORTS	Request pilot position reports via SB, VCS or direct.	VC	M/A	M/A	Aware when to supplement radar information with pilot position reports.	2 Seconds
7.16.4	RECEIVE PILOT'S POSITION REPORT	Receive a pilot's position report via SB, VCS or direct.	VC	M/A	M/A	M/A	M/A
7.16.5	FORWARD FLIGHT PLAN VERBALLY	Forward flight plan verbally to another controller via VCS or direct.	VC	M/A	M/A	M/A	M/A
7.16.6	DELETE PILOT POSITION REPORTS	Delete pilot position reporting via SB, VCS or direct.	VC	M/A	M/A	Determination of when position reporting is no longer needed to supplement radar information.	5 Seconds

^a VC = Verbal, E = Entry, M/A = Manual/Automatic

TABLE 8-1. AAS CONTROLLER DDL (continued)

Task Number	Task Definition	Enhanced Task Description	Task Type ^a	Communications Action Type	Display Content	Controller Indication	Required Action Response Requirement
7.14.7	CONFIRM COMPUTER ACTION DURING TRANSITION STAGES	Confirm computer action during transition stages by verbal discussions with appropriate controllers via VSCS.	VC	N/A	N/A	Aware of other controllers involved with data that should have been passed by the computer during transition stages.	N/A
7.15.1	RECEIVE NOTICE OF STATUS OF ADJACENT ACP AUTOMATION EQUIPMENT	Receive notice of the status of adjacent ACP automation equipment via SS, VSCS, or direct.	R (VC)	N/A	GI test.	Expectation of being kept informed of equipment status of adjacent ACPs.	3 Seconds
7.15.2	RECEIVE STATUS OF SECTOR SUITE FAILURE FROM CONTROLLER/SUPERVISOR	Receive status of a sector suite failure reported by another controller or the supervisor verbally via VSCS or direct.	VC	N/A	N/A	N/A	3 Seconds
7.15.3	RECEIVE CONFIRMATION OF COMPUTER ACTION DURING TRANSITION STAGES	Receive verbal confirmation via VSCS of computer action during transition stages.	VC	N/A	N/A	N/A	N/A
7.16.1	COMPOSE/ENTER REQUESTED ROUTE/ALTITUDE CHANGE	Forward a requested route and/or altitude change via SS, VSCS or direct.	E	Text entry.	Route/altitude request feed-back.	Record of request may be observed on Situation Display.	5 Seconds
7.17.1	RECEIVE WEATHER ADVISORY FROM CONTROLLER/SUPERVISOR/METEOROLOGIST	Receive weather information from an adjacent controller, supervisor, and/or meteorologist, via SS, VSCS or direct.	R (VC)	N/A	Weather test.	Expectation of being kept informed of significant weather advisories.	5 Seconds
7.17.2	RECEIVE REVISION/CANCELLATION TO PREVIOUS WEATHER REPORT	Receive a revision to or cancellation of previous weather information via SS, VSCS or direct.	R (VC)	N/A	Weather test.	Expectation of being kept informed of current status of weather.	5 Seconds
7.17.3	RECEIVE LOW ALTITUDE WIND SHEAR REPORT	Receive Low Level Wind Shear Alert via SS or VSCS.	R (VC)	N/A	Weather test and alert.	Expectation that urgent messages will contain an alert feature.	1 Second
7.17.4	RECEIVE FIREP ON WEATHER	Receive FIREP (weather) verbally reported via VSCS.	R (VC)	N/A	Weather test.	Expectation of receiving pilot weather reports on conditions the pilot considers significant.	2 Seconds

^a R: Receipt
E: Entry
VC: Verbal Communication

TABLE 8-1. AAS CONTROLLER DDL (continued)

Task Number	Task Description	Estimated Task Statement	Task Type ^a	Communications Action Type ^b	Display Content	Controller Interface	Derived Function Support Requirement
7.17.5	SELECT WEATHER/ADVISORY/UPD ATE FOR DATA LINK TRANSMISSION TO PILOT	Issue weather information for pilot or adjacent controller via SS, VSCS or direct.	E	Select or text entry.	Weather transmission feed-back.	N/A	2 Seconds
7.17.6	ISSUE WEATHER/ADVISORY/UPD ATE TO PILOT/ADJACENT CONTROLLER	Issue weather information to pilot or adjacent controller via SS, VSCS or direct.	E (VC)	Select or text entry.	Weather transmission feed-back.	N/A	2 Seconds
7.17.7	FORWARD WEATHER INFORMATION TO SUPERVISOR/ METEOROLOGIST	Forward weather information to supervisor or meteorologist via SS, VSCS or direct.	E (VC)	Text entry.	Weather transmission feed-back.	N/A	5 Seconds
7.17.8	ADVISE SUPERVISOR/FLW CONTROLLER OF WEATHER IMPACT ON ROUTES/FLW	Advise supervisor or flow controller of weather impact on routes/flow by entering message on SS or verbally reporting via VSCS or direct.	E (VC)	Text entry.	GI message feedback.	N/A	3 Seconds
7.17.9	RECEIVE CONTROLLER REQUEST FOR WEATHER INFORMATION	Receive controller's request for weather information via SS, VSCS or direct.	VC	N/A	N/A	Aware of other controller's desire for weather reports in this sector.	5 Seconds
7.17.10	REQUEST WEATHER INFORMATION FROM ANOTHER CONTROLLER	Request weather information via SS or verbally via VSCS or direct.	VC	N/A	N/A	N/A	5 Seconds
7.18.1	RECEIVE NOTICE OF COMMUNICATION STATUS	Receive test message of communication status via SS or verbally via VSCS or direct.	B (VC)	N/A	GI test.	Expectation of receiving notice when communication status of an adjacent sector has changed.	5 Seconds
7.18.2	RECEIVE NDA FREQUENCY ASSIGNMENT	Receive message of new radio frequency via SS or verbally via VSCS or direct.	B (VC)	N/A	Changes on frequency assignment list.	Expectation of receiving notice if the air/ground frequency has been changed at an adjacent sector or facility.	5 Seconds
7.18.3	RECEIVE NOTICE OF ALTERNATE COMMUNICATION PATH	Receive message of new communication path via SS, or verbally via VSCS or direct.	B (VC)	N/A	GI test.	Expectation of being given an alternate communication route if a change exists in the communication path.	5 Seconds

^a E: Entry
^b VC: Verbal Communication
 B: Broadcast
 A: Assigned

TABLE 8-1. AAS CONTROLLER DDL (continued)

Task Number	Task Description	Substantive Task Statement	Task Type	Characteristics Action Type	Display Content	Controller Inference	Derived Action Requirement
7.19.1	FORWARD NOTICE OF COMMUNICATION STATUS	Forward text message of communication status via SS, VSCS, or direct.	E (UC)	Select or test entry.	GI trans- mission feed- back.	N/A	5 Seconds
7.19.2	FORWARD NEW FREQUENCY ASSIGNMENT TO ADJACENT CONTROLLER/ SUPERVISOR	Forward new frequency assignment to adjacent controller or to supervisor via SS, VSCS or direct.	E (UC)	Select or test entry.	Frequency status trans- mission feed- back.	N/A	5 Seconds
7.19.3	FORWARD ALTERNATE COMMUNICATION PATH	Forward alternative communication path via SS, VSCS or direct.	E (UC)	Select or test entry.	GI message transmission feedback.	N/A	5 Seconds
7.20.1	RECEIVE NOTICE OF MAVAID STATUS FROM ADJACENT CONTROLLER/FSS/ SUPERVISOR/PILOT	Receive notice of MAVAID status from adjacent controller, FSS, supervisor, or pilot via SS, VSCS, or direct.	B (UC)	N/A	MAVAID status test.	Expectation of being notified of the status of any MAVAID which impacts this sect.	5 Seconds
7.20.2	RECEIVE SUBSTITUTE ROUTING	Receive a substitute routing via SS, VSCS or direct.	B (UC)	N/A	MAVAID route test.	Expectation of being notified of a substitute routing due to a change in MAVAID status.	5 Seconds
7.20.3	RECEIVE CANCELLATION OF SUBSTITUTE ROUTING	Receive cancellation of substitute routing via SS, VSCS, or direct.	B (UC)	N/A	MAVAID route test.	N/A	5 Seconds
7.21.1	FORWARD MAVAID STATUS TO ADJACENT CONTROLLER/ SUPERVISOR/PILOT	Forward MAVAID status to an adjacent controller, supervisor, or to a pilot via SS, VSCS, or direct.	E (UC)	Select or test entry.	MAVAID status transmission feedback.	Aware of change in MAVAID status affecting other sectors.	5 Seconds
7.21.2	FORWARD SUBSTITUTE ROUTING	Forward substitute routing via SS, VSCS, or direct.	E (UC)	Select or test entry.	MAVAID route transmission feedback.	N/A	5 Seconds
7.21.3	CANCEL PREVIOUS SUBSTITUTE ROUTING	Cancel previous substitute routing via SS, VSCS, or direct.	E (UC)	Select or test entry.	MAVAID route message feed- back.	Aware of MAVAID return to service.	5 Seconds
7.22.1	FORWARD NOTICE OF AIRSPACE INTRUSION BY A NON-CONTROLLED OBJECT	Forward notice of airspace intrusion by a non-controlled object via SS, VSCS, or direct.	E (UC)	Test entry.	Force data block feed- back.	Alert to a non- controlled object posing a threat to another sector.	5 Seconds
7.22.2	RECEIVE NOTICE OF AIRSPACE INTRUSION BY A NON-CONTROLLED OBJECT	Receive notice of airspace intrusion by a non-controlled object, via SS, VSCS, or direct.	B (UC)	N/A	Data block.	N/A	5 Seconds

7. Forward
E Entry
A Airspace
UC Uncontrolled

TABLE 8-1. AAS CONTROLLER DDL (continued)

Task Number	Task Substeps	Subscribed Task Statement	Task Type ^a	Characterizable Action Type	Display Content	Controller's Actions	Required Member Support Requirements
7.22.3	ISSUE ADVISORY IN REGARD TO A NON-CONTROLLED OBJECT	Issue advisory to pilot via SS or VSCS, in regard to a non-controlled object.	VC	M/A	M/A	Aware of which pilot, are in the vicinity of the non-controlled object.	M/A
7.22.4	ADVISE PILOT WHEN CLEAR OF NON-CONTROLLED OBJECT	Advise the pilot when the aircraft is clear of non-controlled object.	VC	M/A	M/A	Alert to aircraft position in regard to an obstruction such as a non-controlled object.	M/A
7.23.1	RECEIVE RUNWAY USE DATA	Receive runway in use data via SS, VSCS, or direct.	A (VC)	M/A	Status test.	Expectation of being kept informed by a terminal or FSS, or through supervisor or flow controller, of appropriate runway use data.	2 Seconds
7.24.1	FORWARD RUNWAY USE DATA	Forward runway in use data via SS, VSCS, or direct.	E (VC)	Test entry.	Status transmission feed-back.	Alert to any other sectors which may be affected by a change.	2 Seconds
7.25.1	DETECT A PILOT OR AIRCRAFT PROBLEM (E.G., HYPOXIA)	Detect a pilot or aircraft problem (e.g., hypoxia) by noting erratic aircraft movement, appearance of special beacon codes, or erratic pilot behavior via SS, VSCS, or direct.	A	M/A	FDB non-conformance & alert indicators (altitude or track).	Ability to determine the nature of the problem.	1 Second
7.25.2	ALERT DESIGNATED PERSONNEL OF AIRCRAFT HAVING FLIGHT PROBLEMS	Alert designated personnel via SS or VSCS, of aircraft having flight problems.	VC	M/A	M/A	Able to quickly determine what personnel need to be advised, based on the aircraft location and nature of the problem.	2 Seconds
7.25.3	FORWARD CONTINGENCY INFORMATION TO SUPERVISOR/ADJACENT CONTROLLER	Forward contingency information to supervisor or an adjacent controller via SS, VSCS, or direct.	E (VC)	Test entry.	GI message or force data block feed-back.	M/A	2 Seconds
7.26.1	RECEIVE SUPERVISOR NOTICE TO INHIBIT ALERT	Receive supervisor notice to inhibit alert via SS, VSCS, or direct.	A (VC)	M/A	GI test.	Informed of instructions for acting to inhibit an alert function.	3 Seconds
7.27.1	BRIEF RELIEVING CONTROLLERS	Brief relieving controller verbally, cross-referencing specified checklist.	E (VC)	M/A	M/A	M/A	3 Seconds

^a VC - Verbal
E - Entry
A - Analytical
VC - Verbal Coordination

TABLE 8-1. AAS CONTROLLER DDL (continued)

Test Number	Test Subname	Enhanced Test Subname	Test Type	Communications Link Type	Display Content	Controller Information	Desired Machine Response
7.28.1	RECEIVE NOTICE OF SPECIAL OPERATIONS	Receive notice of special operations via SS, VSCB, or direct.	B	N/A	GI test or flight plan display remarks.	Expectation to receive a special operation that will affect this sector.	5 Seconds
7.29.1	FORWARD NOTICE OF SPECIAL OPERATIONS TO ADJACENT CONTROLLER/SUPERVISOR	Forward notice of special operations to an adjacent controller or supervisor via SS, VSCB, or direct.	E (VC)	Test entry.	GI test or remarks on flight plan display feedback.	Alert to note other sectors which may be affected by a special operation	5 Seconds
7.30.1	RECEIVE INFORMATION ON LOSS OF RADIO CONTACT WITH AIRCRAFT	Receive information on loss of radio contact with an aircraft via SS, VSCB, or direct.	B (VC)	N/A	GI test or FDB.	N/A	3 Seconds
7.30.2	CONDUCT RADIO/RADAR SEARCH FOR AIRCRAFT WITHOUT RADIO CONTACT	Conduct radio/radar search for aircraft having lost radio contact via SS, VSCB, or direct.	A	N/A	FDB or LDB.	Observation of signals that a pilot is attempting to respond to communication by the controller.	5 Seconds
7.30.3	ATTEMPT ESTABLISHMENT OF COMMUNICATIONS USING TRANSPONDER/RADAR EQUIPMENT	Attempt establishment of communications using transponder/radar equipment by observing the movement of aircraft or the occurrence of the IDENT transponder/radar feature.	A	N/A	FDB or LDB.	Observation of signals that a pilot is attempting to respond to communication by the controller.	5 Seconds
7.31.1	RECEIVE INFORMATION ON OVERLAP AIRCRAFT	Receive information on overlap aircraft by observing Test Message or flight plan display remarks or via VSCB or direct.	B (VC)	N/A	GI test or flight plan display remarks.	Alert to attempt securing information on aircraft from facilities along route of flight.	5 Seconds
7.31.2	CONTACT FACILITY ALONG ROUTE OF FLIGHT TO SECURE INFORMATION ON OVERLAP AIRCRAFT	Communicate with facility along route of flight to secure information on overlap aircraft by entering test message or via VSCB.	E (VC)	Test entry.	GI test.	N/A	5 Seconds
7.31.3	CONDUCT RADIO/RADAR SEARCH FOR OVERLAP AIRCRAFT	Conduct radio/radar search for overlap aircraft by VSCB or direct broadcasting via frequency, MAUVID, or other aircraft, and observe appropriate response or movement.	A	N/A	Data link feedback.	Observation of signals that a pilot is attempting to respond to communication by the controller.	5 Seconds

VC - Visual
E - Entry
A - Analytical
VC - Visual Controller

TABLE 8-1. AAS CONTROLLER DDL (continued)

Test Number	Test Definition	Subsequent Test Statement	Test Type	Characteristics Action Type	Display Content	Controller Information	Expected Response Requirement
7.32.1	EXPLORE WHETHER OTHERS ARE RECEIVING AIRCRAFT'S TRANSMISSIONS	Explore via VCS or data link communications with other aircraft whether others are receiving an aircraft's transmissions.	A	N/A	N/A	Determination of possibility that communication problem is or is not fault of aircraft.	5 Seconds
7.32.2	ISSUE ALTERNATE COMMUNICATION FOR AIR/GROUND TRANSMISSION	Issue alternate communication for air/ground transmission by entering data link callup message or via VCS.	E (UC)	Test entry.	Data link callup message transmission feedback.	Determination if communication is intermittent to issue alternate communications by issuing another controller's frequency, terminal, FSS, or other means of communication.	3 Seconds
7.33.1	RECEIVE PILOT/ADJACENT PILOT/ADJACENT CONTROLLER REQUEST FOR FLIGHT FOLLOWING	Receive pilot or adjacent controller request for flight following by observing LDM and flight following message or by VCS or direct.	B (UC)	N/A	LDM & flight follow request message.	Alert to need to take action on the request.	5 Seconds
7.33.2	DENY FLIGHT FOLLOWING REQUEST	Deny flight following request by entering flight follow request or via VCS or direct.	E (UC)	Test entry.	Flight follow transmission feedback.	Whether traffic, weather, or other conditions warrant denial of the request.	5 Seconds
7.33.3	REQUEST/ISSUE BEACON CODE TO AIRCRAFT	Request/assign beacon code to aircraft by entering beacon code request and assignment message, observing assigned code, and transmitting it to a pilot verbally via VCS or direct.	UC	Test entry.	Beacon code assignment feedback.	N/A	1 Second
7.33.4	ISSUE TRAFFIC ADVISORY IN REGARD TO TRAFFIC PROXIMITY	Issue traffic advisory with regard to traffic proximity.	E (UC)	Test entry & post-tion.	Traffic advisory pointout feedback in FDM/LDM.	Awareness of traffic in close proximity and need to advise the pilot.	3 Seconds
7.33.5	ADVISE PILOT WHEN CLEAR OF TRAFFIC	Advise pilot when clear of traffic by entering traffic advisory pointout and locating target or via VCS.	E (UC)	Test entry & post-tion.	Traffic advisory pointout feedback in FDM/LDM.	Awareness of traffic no longer in close proximity.	3 Seconds
7.34.1	RECEIVE A FAD NOTICE	Receive a FAD notice for specific locations.	B (UC)	N/A	Flow control test.	Advised when FAD is affected for specific locations.	5 Seconds

UC: Uncontrolled
E: Entry
B: Backward
A: Forward
UC: Uncontrolled

TABLE 8-1. AAS CONTROLLER DDL (continued)

Task Number	Task Subtitle	Enhanced Task Description	Task Type	Characteristics Action Type	Display Content	Controller Inference	Expected Air-Alex Support Requirements
7.34.2	CONFER WITH PILOT THAT PILOT CAN DESIRE FOR FAD INTENTIONS	Confer with pilot through ATCT via VCS on pilot's desire for FAD intentions.	VC	M/A	M/A	Determination of whether the delay will be taken on the ground or in the air.	N/A
7.35.1	RECEIVE REQUESTED ROUTE/ALTITUDE CHANGES FROM ANOTHER CONTROLLER/FLOW SUPERVISOR	Receive route/altitude changes from appropriate controller, flow controller, or supervisor or received via VCS or direct.	B (VC)	M/A	Flow control test.	Notification con- cerning traffic flow to specific sectors, airports, or facilities.	3 Seconds
7.35.2	RECEIVE A FLOW RESTRICTION	Receive a flow restriction message via VCS or direct.	B (VC)	M/A	Flow control test.	Notification con- cerning specific flow restrictions.	3 Seconds
7.35.3	RECEIVE METERING DATA FROM FLOW CONTROLLER	Receive metering data from flow controller by observing flow control message or via VCS.	B (VC)	M/A	Water list test.	Notification con- cerning specific metering data to a terminal or air- port.	5 Seconds
7.35.4	REQUEST FLOW CONTROL BE IMPOSED	Request that flow control be imposed.	VC	M/A	M/A	M/A	3 Seconds
7.35.5	NEGOTIATE DELAY TECHNIQUE WITH PILOT	Negotiate delay technique with pilot via VCS.	E (VC)	Test entry.	Data link clearance feedback.	M/A	N/A
7.35.6	FORWARD REQUESTED ROUTE/ALTITUDE CHANGES TO ADJACENT CONTROLLER/FLOW SUPERVISOR	Forward temporary route/altitude changes to an adjacent controller or to flow controller.	E (VC)	Test entry.	Flow control message trans- mission feed- back.	M/A	5 Seconds
7.36.1	ISSUE ADVISORY IN REGARD TO FLIGHT PLAN DEVIATION	Issue advisory in regard to flight plan deviation.	VC	M/A	M/A	Indication received of unex- pected movement of an aircraft, coast tracking, erroneous speed, or nonconformance of the altitude in a data block.	3 Seconds
7.37.1	RECEIVE/OBSERVE HANDOFF	Observe handoff FDS indication or receive it verbally via VCS or direct.	B (VC)	M/A	FDS, includ- ing handoff field.	Aircraft about to enter this sector.	1 Second

7.34.2 VC
7.35.1 VC
7.35.2 VC
7.35.3 VC
7.35.4 VC
7.35.5 VC
7.35.6 VC
7.36.1 VC
7.37.1 VC

TABLE 8-1. AAS CONTROLLER DDL (continued)

Task Number	Task Description	Subsequent Task Description	Task Type	Communication Action Type	Display Control	Controller Instruction	Required Pilot Support Requirement
7.37.2	ACCEPT VERBAL HANDOFF/START TRACK	Accept handoff transmitted via VCS or direct, and start a track.	E (VC)	Test entry & position.	Track location specified in a verbal handoff.	Target location can be identified.	1 Second
7.37.3	REJECT HANDOFF	Reject a handoff.	E (VC)	Test entry.	Handoff reject message feedback.	Target is not as specified or ambiguity exists.	N/A
7.37.4	ACCEPT AUTOMATIC HANDOFF	Accept automatic handoff message.	B/E	Test entry.	FDB.	Control is transferred to this sector.	1 Second
7.37.5	VERIFY COMMUNICATIONS WITH PILOT ON TRANSFER OF CONTROL ON DEPARTURE	Verify communications with pilot via data link on transfer of control or departure.	E (VC)	TMD.	Data link calling feedback.	N/A	N/A
7.37.6 to	VERIFY AIRCRAFT ALTITUDE WITH PILOT ON TRANSFER OF CONTROL ON DEPARTURE	Verify aircraft altitude with pilot on transfer of control or departure by observing FDB or verbally via VCS.	B (VC)	N/A	FDB including altitude field.	Current altitude, possibly compared to altitude assignment when appropriate.	Refresh As
7.37.7	CONFIRM DATA LINK COMMUNICATIONS	Confirm data link communications.	B	N/A	N/A	Data link communications exist.	3 Seconds
7.38.1	INITIATE HANDOFF	Initiate handoff by entering handoff message on situation display, or via VCS or direct.	E (VC)	Test entry.	Handoff message feedback.	Determination that a manual or nonautomated handoff is required.	1 Second
7.38.2	OBSERVE AUTOMATIC INITIATION OF HANDOFF	Observe automatic initiation of a handoff by observing Handoff Indicator.	B	N/A	FDB including handoff field.	Aircraft about to leave this sector.	1 Second
7.38.3	RETRACT HANDOFF	Retract handoff by entering VCS or direct.	E (VC)	Test entry.	Handoff message transmission feedback.	Transfer of control needs to be delayed.	1 Second
7.38.4	RECEIVE HANDOFF ACCEPTANCE	Receive handoff acceptance by observing FDB or via VCS or direct.	B (VC)	Test entry.	FDB including handoff field.	Control is transferred to that sector.	1 Second
7.38.5	CONFIRM ON TRANSFER OF CONTROL WITH OTHER CONTROLLER	Confer on transfer of control via VCS or direct with another controller.	VC	N/A	N/A	Normal procedures are not accomplished.	N/A
7.38.6	ISSUE CHANGE OF FREQUENCY TO PILOT	Issue change of frequency to pilot by data link message or via VCS.	E (VC)	Test entry.	Data link frequency transmission feedback.	Frequency assignment not otherwise coordinated after transfer of control is accomplished.	N/A

VC = Verbal Communication
E = Entry
B = Broadcast

TABLE 8-1. AAS CONTROLLER DDL (continued)

Task Number	Task Definition	Substantive Task Statement	Task Type	Characteristics Action Type	Output Control	Comments: Information	Required Action Response
7.39.1	RECEIVE NOTICE OF RADAR SENSOR STATUS FROM ADJACENT CONTROLLER/SUPER- VISOR	Receive notice of sensor status from adjacent controller or supervisor by observing test message and sensor number indication or via VICS or direct.	B (UC)	N/A	GI Test.	Advised as a change in status occurs.	5 Seconds
7.40.1	FORWARD NOTICE OF RADAR SENSOR STATUS TO ADJACENT CONTROLLER/ SUPERVISOR	Forward radar sensor status to an adjacent controller or supervisor via SS, VICS, or direct.	E (UC)	N/A	N/A	N/A	5 Seconds
7.41.1	REQUEST TEMPORARY USE OF AIRSPACE	Request temporary use of another sector, airspace by identifying area or target or by entering a message or request via VICS or direct.	E (UC)	Position a sector, block, or target & test entry.	Data block pointout accept.	Accurate and timely identi- fication of the needed airspace.	3 Seconds
7.42.2	RECEIVE RELEASE/USE AIRSPACE	Receive release/use of airspace requested.	B (UC)	N/A	Full data block.	Alert to time available for receipt of airspace release/use.	3 Seconds
7.43.3	RECEIVE REJECTION OF USE OF AIRSPACE	Receive rejection of requested use of another's airspace.	B (UC)	N/A	N/A	Alert to time available for receipt of airspace release/use.	3 Seconds
7.43.4	RECEIVE CONTROLLER REQUEST FOR TEMPORARY USE OF AIRSPACE	Receive controller request for temporary use of sector airspace via SS, VICS, or direct.	B (UC)	N/A	Full data block	Need to take action to authorize airspace use, traffic permitting.	2 Seconds
7.42.2	FORWARD APPROVAL FOR TEMPORARY USE OF AIRSPACE	Forward approval for another's temporary use of airspace via SS, VICS, or direct.	E (UC)	N/A	N/A	N/A	2 Seconds
7.42.3	FORWARD DENIAL OF TEMPORARY USE OF AIRSPACE	Forward denial of request for temporary use of airspace by entering data block and indicating a reject message via SS, VICS, or direct.	E (UC)	N/A	N/A	N/A	2 Seconds
7.42.4	SUPPRESS MAP ASSOCIATED WITH TEMPORARY USE OF AIRSPACE	Suppress map with re-quested temporary use of airspace transmitted by another controller.	E	N/A	Temporary use Airspace Map	N/A	3 Seconds

10. Receipt
11. Entry
12. Approval
13. VC Visual Coordination

8.3 References

1. Computer Technology Associates, Inc. Sector suite man-machine functional capabilities and performance requirements (DTF A01-83-Y-10054, CDRL A005). Englewood, CO: Author, in press.
2. Foley, J.D., Wallace, V.H., & Chan, P. The human factors of graphic interaction. (GWV-11ST-81-3). Washington, DC: The George Washington University. January 1981.
3. Federal Aviation Administration. Advanced Automation System, System level specification, Design competition phase. (FAA-ER-130-005D), April 1983.

CONCLUSIONS

CHAPTER 9.0

9.0 CONCLUSIONS

This document presents a set of analyses that decompose AAS Controller activities into sequences of tasks which respond to ATC events. The information network which defines interactions with other Controllers, Pilots, Supervisory, and Metering Flow Control personnel is described, along with the conceptual dialogue between the Controller and his workstation. The information needed by the Controller to successfully execute tasks accurately and in a timely fashion is also defined. In specifying this information, this document provides the foundation for Prime Contractor development of Sector Suite prototypes and associated design documentation.

Task characterizations are provided to assess AAS Controller workload and machine aiding requirements. Skill level requirements for both journeyman Controllers and Controller trainees are documented. These later characterizations enable the establishment of learning objectives and an Air Traffic Service skills development, acquisition, and training policy.

The analyses contained here show several areas of significant improvement for Controllers in the AAS. Among these are:

- *Enhanced ergonomic quality*—AAS displays will allow more information coding dimensions than current NAS displays, thus enabling more information to be coherently displayed to the Controller. The addition of machine aids to extend the Controller's "look ahead" ability and streamlined interaction techniques will also enhance Controller productivity.
- *Increased system accuracy and operational availability*—Overall system accuracy in terms of tracking and, particularly, conflict prediction is critical to Controller confidence in the system and will be greatly improved in the AAS. Increased AAS operational availability will largely mitigate the need to revert to use of backup procedures/equipment.
- *Coordination*—VSCS will aid Controllers through automatic frequency reconfiguration, and a straightforward

interaction technique for coordination. Also, future data link capabilities will reduce the routine verbal exchange with data link equipped aircraft and free the Controller to provide more end-user (pilot) services, such as flight following, direct fuel-efficient routing, and weather advisory updates.

- *Conflict alert/resolution aids*—The flight plan conflict probe function will reduce the incidence of conflict alert. For situations which do result in a conflict alert, the generation of clearance advisory options (and eventual automatic clearance routing to data link equipped aircraft) will aid Controller response time and reduce workload.
- *Enhanced weather displays*—Additional aeronautical and meteorological data will allow greater and more timely knowledge of environmental factors impacting a Controller's sector.

The above system improvements will initiate the first step in changing the Controllers' role in the ATC system. The current model of the Controller as an "event-sensitive, multi-tasking, interruptible information processor" (Ref. 1, CDRL A001) begins to evolve more towards a model of the Controller as a dynamic programming processor with the advent of significant automated air traffic planning tools. In short, the AAS Controller will place greater emphasis on strategic planning rather than rely solely on tactical execution to maintain separation of aircraft. The AAS Controllers' role as a systems manager will also grow, since selective application of traffic management tools and machine aids will be under the Controllers' discretion.

However, these role developments do not represent a dramatic change from the role of the Controller in the current NAS. Current cognitive and perceptual skills required of Controllers will continue to be essential in the AAS. Knowledge of ATC procedures, maintenance of the traffic picture, and coordination skills will be as much an integral part of the AAS as in today's system. Controller task characterizations included in this document, therefore, reflect evolutionary rather than revolutionary development towards the time when AAS AERA 1 becomes fully operational.

9.1 Open Issues

Certain Controller task areas remain relatively undefined at this stage of AAS development, since they are particularly design dependent. The degraded control operations within Activity 6.0—Manager Sector Position Resources and the housekeeping tasks within Sub-Activity 1.6 are identified at a fairly coarse level because further explication is only possible with respect to a given system design. The impact of these and other AAS tasks on ATC procedures (i.e., 7110.65) is also unknown.

The Controller-Machine interaction strategy to be implemented in VSCS is also uncertain. The concern here is that the VSCS MMI be consistent with that of the rest of Sector Suite. Specifically, coding (e.g., color codes, blink rates, highlighting) and input techniques (e.g., select, text entry) must be consistent between Sector Suite and VSCS to achieve a successful AAS MMI. It must be stressed that the Controller will perceive an overall AAS MMI, not a compilation of discrete subsystems. Consistency in requirements, and ultimately, design approaches, is therefore critical.

Currently the form and content of CWP products is ill-defined. The consistency issue noted above is also applicable here in terms of display coding, display clutter, and Controller selection of aeronautical and meteorological data.

One final open issue concerns the operational development and deployment of data link. Data transmitted, and its impact to coordination, will significantly impact AAS Controller workload. Currently, this impact is ill-defined.

9.2 Areas for Further Investigation

The issue of workload assessment warrants continued study and research. Broader consideration of traffic situational factors is needed to produce a more comprehensive measure of scenario impact on workload experienced by Controllers. Additionally, the mental workload imposed by specific tasks remains elusive to quantitative measurements.

Individual differences, task interactions, and the interaction between sector geometry and traffic density have been identified as being significant overall contributors to perceived mental load. While these factors are considered beyond

the scope of the analytic workload baseline documented here, they do have particular relevance to the selection and training of Controllers. Requirements for robustness and variability in the AAS MMI design (e.g., Controller-selectable automated aids, variable information coding strategy) may also be indicated by these factors. Empirical investigations of AAS Controller mental workload, with respect to alternative functional Sector Suite prototype designs, need to be carried out to establish a more accurate model of AAS Controller performance. These investigations should be carried out with a variety of scenario conditions and sector types to achieve a data set which adequately characterizes AAS situational variability.

Another critical question concerns changes in the Controllers' role and skill requirements as the AAS transitions beyond AERA 1. The skill profile of AERA 1 Controllers may be significantly different from that of AERA 2 Controllers. Questions regarding selection, transfer of training, and skill obsolescence will require further investigation as the AAS develops towards AERA 2.

9.3 References

1. Computer Technology Associates, Inc. En Route Terminal ATC Operations Concept (Contract No. DTF A01-83-Y-10554, CDRL A001). Denver, CO: Author.

APPENDICES

APPENDIX A — IDENTIFICATION OF CONTROLLER INFORMATION PROCESSING TASKS

Tasks are the meaningful units of work activity performed by a Controller in accomplishing a sub-activity. Each task can be viewed as a unit of work effort, typically being performed to completion. Together in a composition graph they can illustrate different routes and sequences by which a sub-activity is accomplished.

Controller tasks may be characterized as perceptual and/or cognitive or combinations thereof. There is ongoing use of short-term memory, recognition of spatial patterns and trajectories, and pre-learned procedures and standards. In actuality, the Controller may perform multiple tasks almost simultaneously, with some being interrupted when higher priority matters require immediate attention. The composition graphs may not individually depict all this interaction, but they as a set portray sub-activity action to its conclusion.

Since much of Controller action terminates in the generation and issuance of a clearance to a pilot, the composition graphs contained in this Appendix employ a shorthand notation for this reoccurring set of tasks. The component task structure of this notation is given in Figure 4-1. It can be noted that this represents a portion of the composition graph for Sub Activity 4.1, Planning and Issuing Clearances. Through inclusion of the "Generate Clearance" task cluster in applicable sub-activity graphs, the closure of sub-activity performance is preserved in response to events.

This appendix contains the composition graphs and TDL for each of 77 sub-activities, of which 42 constitute coordination and communication among Controllers. Two-hundred sixty-two (262) AAS Controller tasks and their sequences are documented herein.

As with the composition graphs for activities and sub-activities, the task/sub-activity composition graphs employ the same symbology to show decision points, poss-

ible parallel actions, and actions that may be repeated or may be ongoing for a time. These symbols are:

- + Path selection (or decision point)
- & Parallel path or tasks
- @* Task repetition or iteration

Triangles are used to note the entry and exit points to the task flow or sequence within a sub-activity action, and is repeated at the end of that action to show where it concludes.

Tasks are numbered only once. This usually occurs arbitrarily in relation to the primary sub-activity to which it pertains or the graph in which it first occurs. All Controller coordination and communication tasks are numbered within Activity 7.0. When a task is cited in a graph other than the one in which it was originally numbered, that task is enclosed in a box of dashed lines, rather than a solid-line box.

Coordination and communication task boxes also contain information on the media used in performing those tasks. Additionally, when either the Area Supervisor or the Flow Control/Metering position is or may be involved with the Controller in a coordination task, that involvement is noted by shading in the upper left corner if the box for Area Supervisor (S) and in the upper right corner for Flow Control/Metering (F).

Media categories are noted along the bottom of the task box, abbreviated as S/S, VSCS, and Pers (person-to-person). More than one of these boxes may be shaded if the Controller has communication options available. S/S media includes data link as a communication tool. Again, shading indicates the relevance of a category requirement. Figure A-2 illustrates the use of these symbols and shadings in Sub-Activity 3.1, Responding to Flow Constraints. Connecting lines and arrows reflect the possible flows of task performance. Note in Figure A-2 the use of dashed boxes where tasks from other sub-activities (in this case coordination and communication) have been invoked, to ensure a complete portrayal of a sub-activity's response to a given event. Figure A-3 shows composition graph basic elements and symbology.



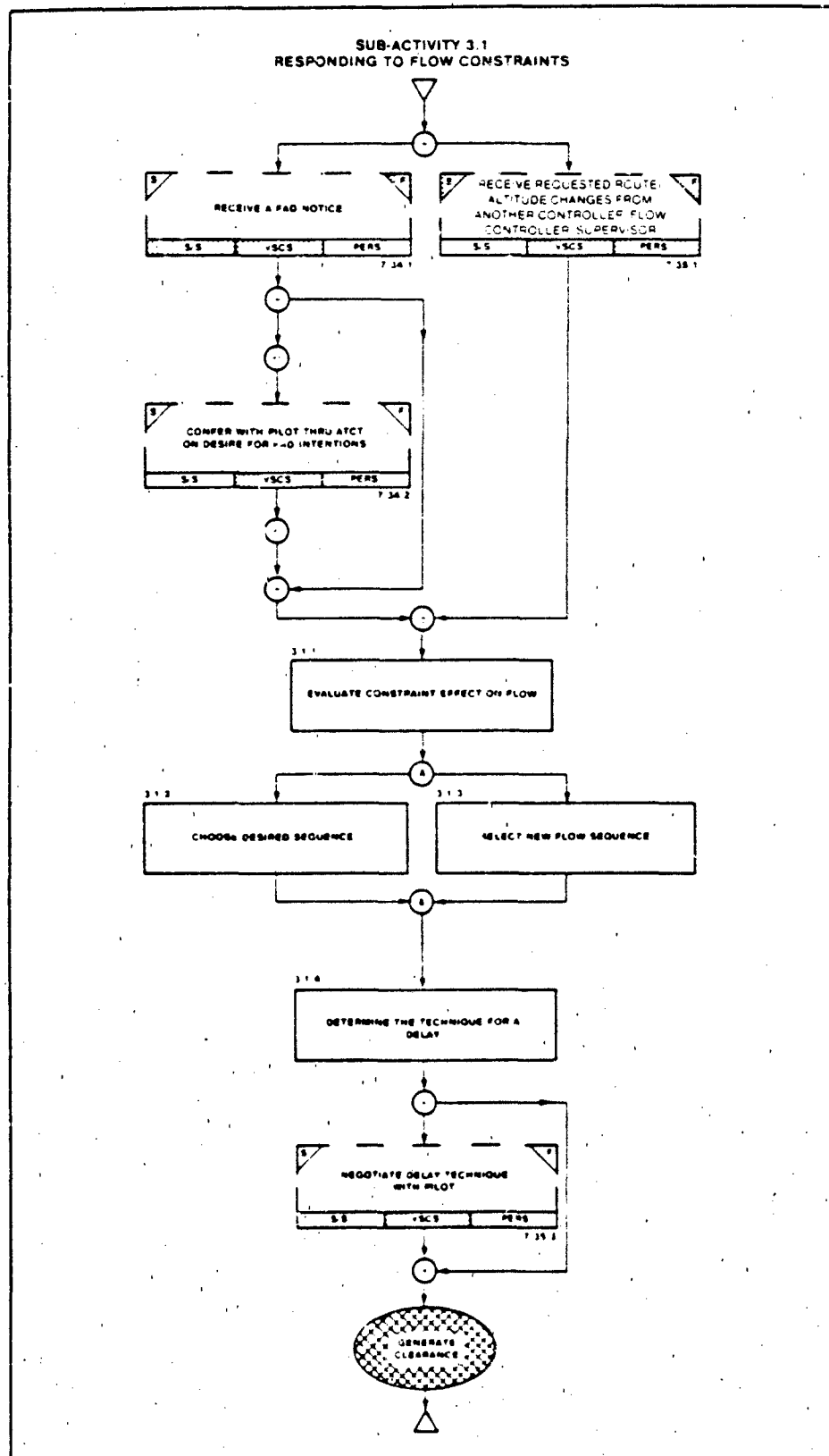


Figure A-2. Illustration of Graphing Symbology

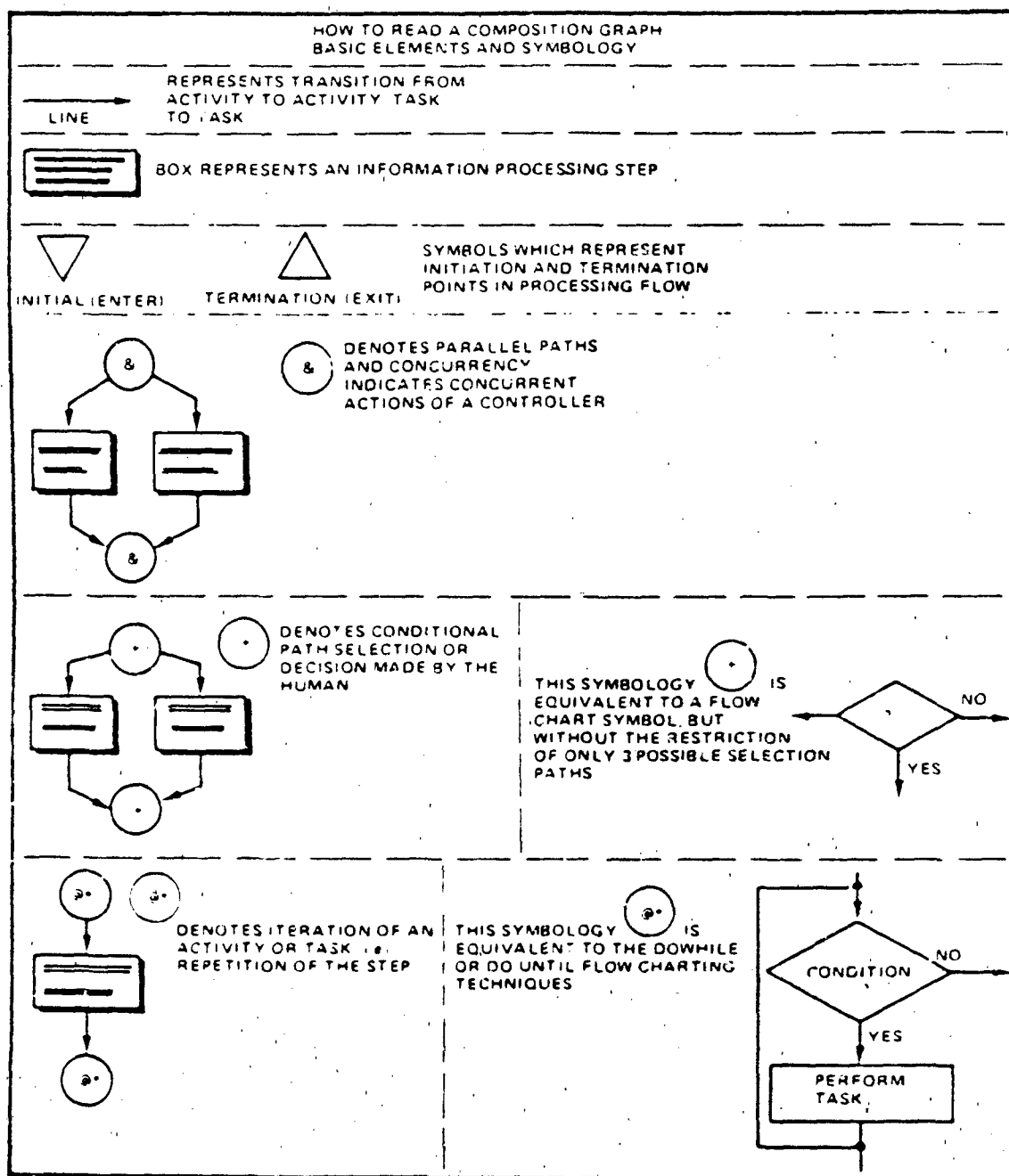


Figure A-3. Composition Graph: Basic Elements and Symbology

The composition graphs so created are presented along with their associated TDL (as described in section 4.1.2.). The following nine rules have been applied in the development of the TDL. These rules always apply and may be carried out automatically with the aid of a syntax checker.

TDL Rules:

- 1) Define inputs to entire sub-activity process.
- 2) All sub-activities are encased by:

```
DO
END DO
```

If iteration needs to be displayed, e.g., @*, encase the sub-activity by:

```
DO WHILE (condition exists)
END DO
```

or

```
DO UNTIL (something happens,
e.g., time = t)
END DO
```

whichever is appropriate.

- 3) If there is more than one input and the input tasks are joined by a +, handle each input separately with an IF clause.

```
IF input is 1.
THEN (Task No. 1) Task 1
ELSE
  IF input is 2
  THEN (Task No. 2) Task 2
  ELSE (Task No. 3) Task 3
  END IF
END IF
```

This example illustrates the case of 3 input tasks. This requires 2 IF clauses, because there is no choice in processing the 3rd Input Task. That is, if the Input Tasks were not numbers 1 and 2, it *must* be number 3 or one wouldn't be

in the sub-activity. So, in general, if there are n input tasks joined by a +, there are $(n-1)$ IF clauses.

- 4) If the input tasks are joined by an &, then apply the following construction:

```
IF necessary
THEN (Task #1) Task 1
END IF
```

```
ASE
```

```
IF necessary
THEN (Task #2) Task 2
END IF
```

This implies that the tasks will be done simultaneously only when deemed necessary. The parameter for assigning necessity has yet to be established. There will be as many IF clauses as there are input tasks.

- 5) If there is only one input task, no construction is required other than the starting DO which encases the entire sub-activity.
- 6) If there is more than one task or construct to "do" within an IF clause, put a:

```
THEN DO (Task #1) Task 1
        (Task #2) Task 2
END DO
```

If there is only one task to "do", then the THEN is sufficient.

- 7) Similar to item 6) above, if there is more than one task which follows the ELSE, then use an:

```
ELSE DO
(Task #1) Task 1
(Task #2) Task 2
END DO
```

- 8) In general, after the input has been processed, a decision point will be reached, signified by a (dp). This decision point is implicit within the tasks and called out for the sake of clarity in the TDL. The only time the (dp) is not used is in the initial processing of

input, where the decision is clear and in the go-around clause (see item 9)) where the (dp) would be cumbersome rather than clarifying. The (dp) phrase usually takes the form of evaluating the necessity to do something if an active decision is required by the Controller, or determining the requirements which go into deciding which path to take. The (dp) statement is in either case followed by an IF clause. Parameters for implementing these (dp)s have not yet been determined.

The remainder of this Appendix presents the composition graphs and TDL which define the role of the AAS Controller in the ACF. Figure A-5 presents the top-level Controller activity set.

- 9) The construction which indicates that a task may or may not be done in the composition graphs has the following form:

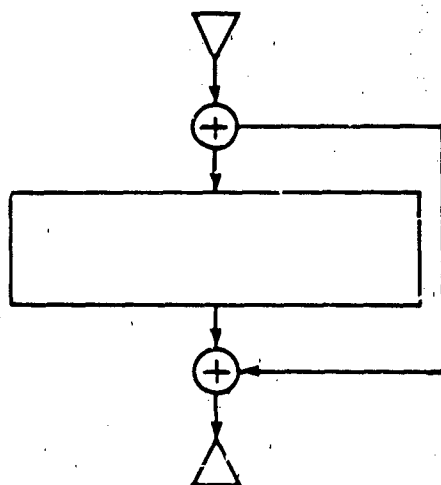


Figure A-4.
TDL "If-/Then" Construct

This is mirrored in the TDL by the

```
IF necessary
THEN (Task #) Task
END IF
```

clause.

To be more explicit, one would have to precede this clause with a (dp), but in the case of this construction only, it is omitted because of the additional clarity. It must be noted that a decision point does exist.

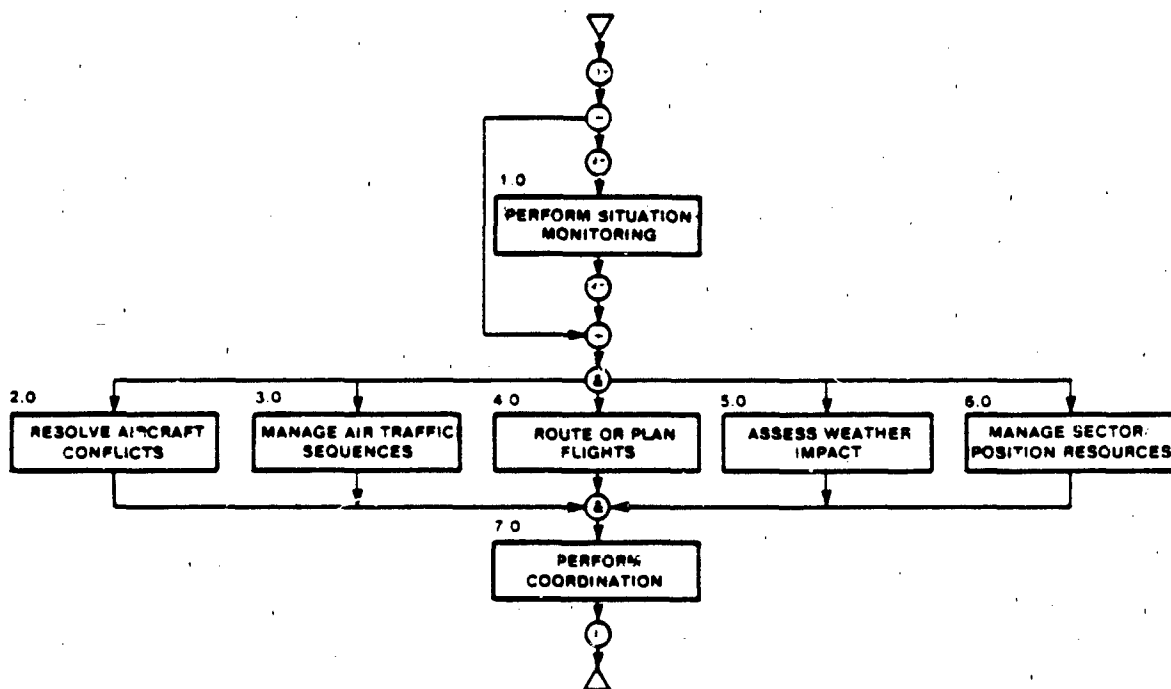
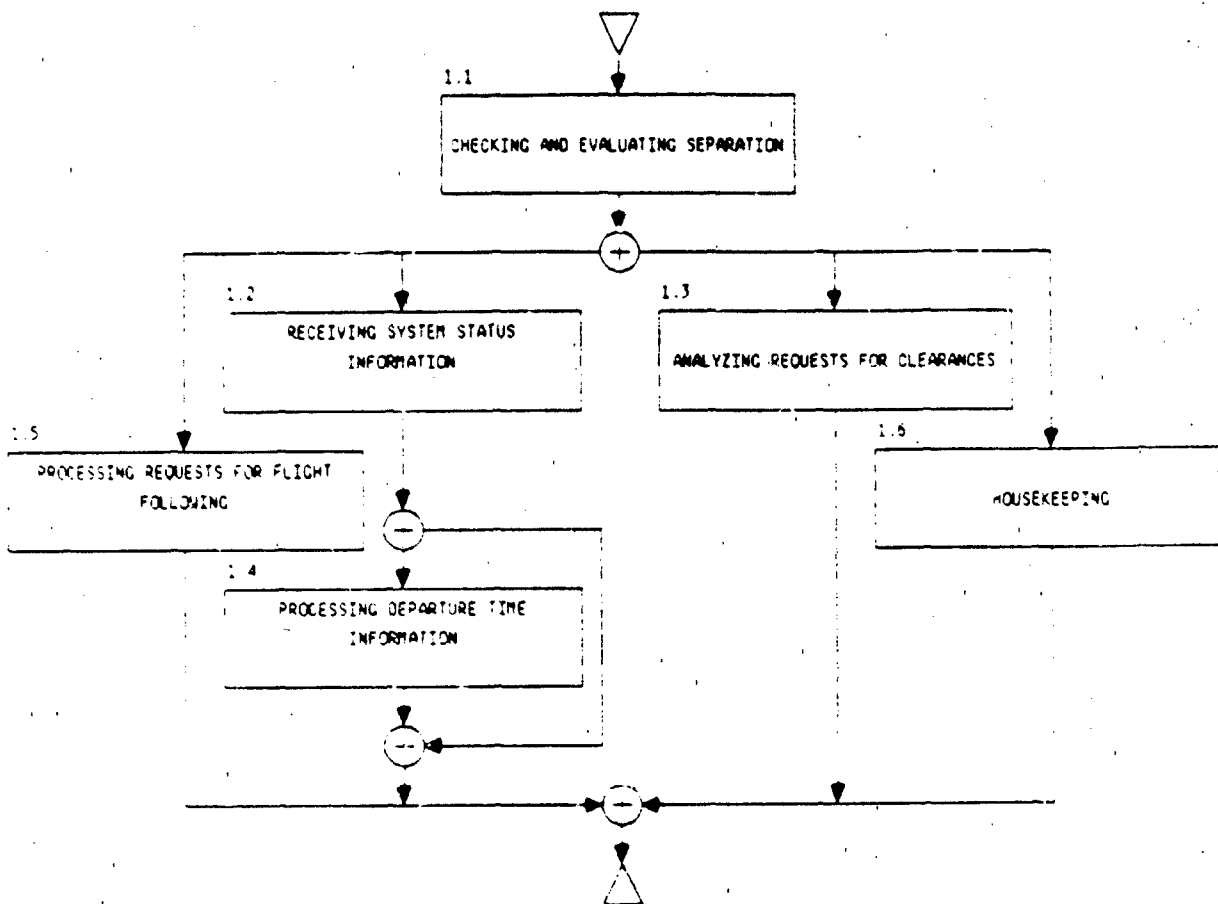


Figure A-5. Top-Level Air Traffic Controller Operational Activities.

PERFORM SITUATION MONITORING

1.0

ACTIVITY 1
PERFORM SITUATION MONITORING



```

graph TD
    Start(( )) --> 111[REVIEW FLIGHT PLAN  
DISPLAY FOR PRESENT  
/ 40. OR FUTURE  
AIR CRAFT SEPARATION]
    111 --> 112[REVIEW SITUATION  
DISPLAY FOR  
POTENTIAL VIOLATION  
OF SEPARATION  
STANDARDS]
    112 --> 113[REVIEW FLIGHT PLAN  
CONFLICT PROBE  
RESULTS]
    113 --> 114[SELECT FOR SORTING  
PRIORITY SCHEME]
    114 --> 115[PROJECT AIRCRAFT  
FUTURE POSITION.  
ALTITUDE PATH]
    115 --> 116[READ OUT RANGE  
BEARING TIME FOR AN  
AIRCRAFT TO A FIX OR  
GEOGRAPHIC POINT]
    116 --> 117[FORCE/OWNER LOOK  
FULL DATA BLOCK TO  
EXAMINE TRACK  
INFORMATION ON  
AIRCRAFT]
    117 --> 118[DETERMINE WHETHER  
AIRCRAFT WILL BE  
SEPARATED BY LESS  
THAN DESCRIBED  
MINIMA]
    118 --> 119[COMPOSE ENTER  
REQUESTED ROUTE  
ALTITUDE CHANGE]
    119 --> 120[ENTER TRIAL FLIGHT  
PLAN AMENDMENT]
    120 --> End(( ))
  
```

The flowchart illustrates the process for reviewing and amending a flight plan. It begins with a start symbol (a circle with a downward arrow) leading to step 111: "REVIEW FLIGHT PLAN DISPLAY FOR PRESENT / 40. OR FUTURE AIR CRAFT SEPARATION". From 111, the flow proceeds to step 112: "REVIEW SITUATION DISPLAY FOR POTENTIAL VIOLATION OF SEPARATION STANDARDS". Step 112 leads to step 113: "REVIEW FLIGHT PLAN CONFLICT PROBE RESULTS". From 113, the flow goes to step 114: "SELECT FOR SORTING PRIORITY SCHEME". Step 114 leads to step 115: "PROJECT AIRCRAFT FUTURE POSITION. ALTITUDE PATH". From 115, the flow proceeds to step 116: "READ OUT RANGE BEARING TIME FOR AN AIRCRAFT TO A FIX OR GEOGRAPHIC POINT". Step 116 leads to step 117: "FORCE/OWNER LOOK FULL DATA BLOCK TO EXAMINE TRACK INFORMATION ON AIRCRAFT". From 117, the flow goes to step 118: "DETERMINE WHETHER AIRCRAFT WILL BE SEPARATED BY LESS THAN DESCRIBED MINIMA". Step 118 leads to step 119: "COMPOSE ENTER REQUESTED ROUTE ALTITUDE CHANGE". From 119, the flow proceeds to step 120: "ENTER TRIAL FLIGHT PLAN AMENDMENT". Finally, step 120 leads to an end symbol (a circle with an upward arrow). There are also feedback loops: from step 113, an arrow points back to step 112; from step 117, an arrow points back to step 116; and from step 120, an arrow points back to step 118.

SUB-ACTIVITY 1.1 CHECKING AND EVALUATING SEPARATION

INPUT = FLIGHT PLAN DISPLAY, SITUATION DISPLAY, FLIGHT PLAN CONFLICT PROBE RESULTS

DO WHILE (INPUT CONDITION EXISTS)

**IF INPUT IS FLIGHT PLAN DISPLAY
THEN (1.1.1) REVIEW FLIGHT PLAN DISPLAY FOR PRESENT AND/OR FUTURE AIRCRAFT SEPARATION
ELSE**

**IF INPUT IS SITUATION DISPLAY
THEN (1.1.2) REVIEW SITUATION DISPLAY FOR POTENTIAL VIOLATION OF SEPARATION STANDARDS
ELSE (1.1.3) REVIEW FLIGHT PLAN CONFLICT PROBE RESULTS
END IF**

END IF

**IF DEEMED NECESSARY BY CONTROLLER
THEN (1.1.8) SELECT FDE SORTING PRIORITY SCHEME
END IF**

**IF POTENTIAL CONFLICTING TRAFFIC EXISTS
THEN (1.1.4) PROJECT AIRCRAFT FUTURE POSITION/ALTITUDE PATH
END IF**

**IF DEEMED NECESSARY BY CONTROLLER
THEN (1.1.5) READ OUT RANGE/BEARING/TIME FOR AN AIRCRAFT TO A FIX OR GEOGRAPHIC POINT
END IF**

**IF DEEMED NECESSARY BY CONTROLLER TO GAIN MORE INFORMATION ON TRAFFIC NOT UNDER YOUR CONTROL
THEN (1.1.6) FORCE/QUICK LOOK FULL DATA BLOCK(S) TO EXAMINE TRACK INFORMATION ON AIRCRAFT
END IF**

(1.1.7) DETERMINE WHETHER AIRCRAFT WILL BE SEPARATED BY LESS THAN PRESCRIBED MINIMA

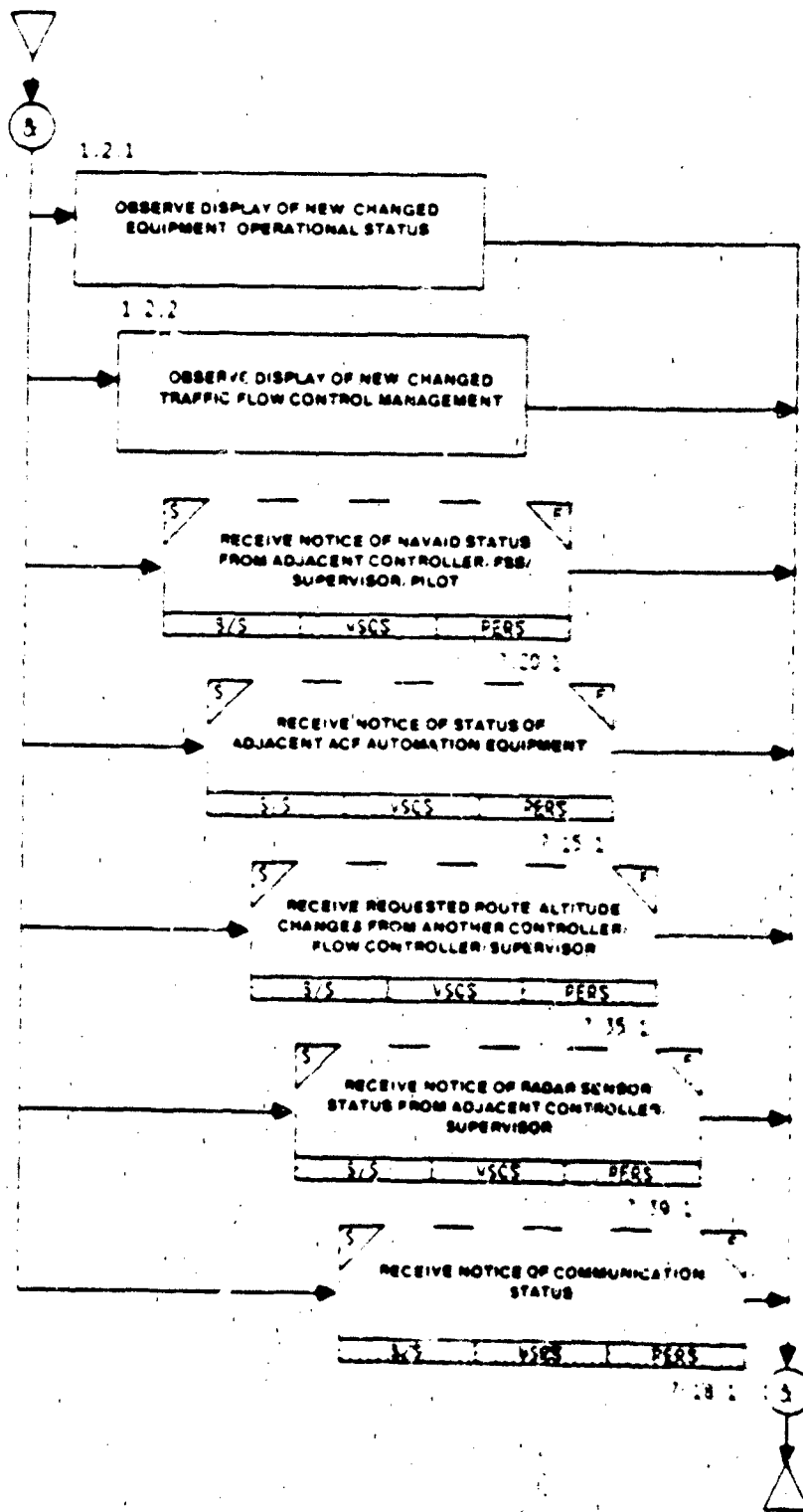
**IF DEEMED NECESSARY BY CONTROLLER
THEN (7.16.1) COMPOSE/ENTER REQUESTED ROUTE/ALTITUDE CHANGE
END IF**

ASE

(4.1.1) ENTER TRAIL FLIGHT PLAN AMENDMENT

END DO

SUB-ACTIVITY 1.2 **RECEIVING SYSTEM STATUS INFORMATION**



SUB-ACTIVITY 1.2: RECEIVING SYSTEM STATUS INFORMATION

INPUT = DISPLAY OF NEW/CHANGED EQUIPMENT/OPERATIONAL STATUS. DISPLAY OF NEW/CHANGED TRAFFIC FLOW CONTROL MANAGEMENT, NOTICE OF NAVAID STATUS FROM ADJACENT CONTROLLER/FSS/SUPERVISOR/PILOT, NOTICE OF ADJACENT ACF AUTOMATION EQUIPMENT, REQUESTED ROUTE/ALTITUDE CHANGES FROM ANOTHER CONTROLLER/FLOW CONTROLLER/SUPERVISOR, NOTICE OF RADAR SENSOR STATUS FROM ADJACENT CONTROLLER/SUPERVISOR, NOTICE OF COMMUNICATION STATUS

DO

IF STATUS CHANGES

THEN (1.2.1) OBSERVE DISPLAY OF NEW/CHANGED EQUIPMENT/OPERATIONAL STATUS

END IF

ASE

IF FLOW CONTROL STATUS CHANGES

THEN (1.2.2) OBSERVE DISPLAY OF NEW/CHANGED TRAFFIC FLOW CONTROL MANAGEMENT

END IF

ASE

IF IN NAVAID STATUS CHANGES

THEN (7.20.1) RECEIVE NOTICE OF NAVAID STATUS FROM ADJACENT CONTROLLER/FSS/SUPERVISOR/PILOT

END IF

ASE

IF STATUS OF ADJACENT ACF AUTOMATION EQUIPMENT CHANGES

THEN (7.15.1) RECEIVE NOTICE OF STATUS OF ADJACENT ACF AUTOMATION EQUIPMENT

END IF

ASE

IF REQUESTED ROUTE/ALTITUDE CHANGES

THEN (7.35.1) RECEIVE REQUESTED ROUTE/ALTITUDE CHANGES FROM ANOTHER CONTROLLER/FLOW CONTROLLER/SUPERVISOR

END IF

ASE

IF RADAR SENSOR STATUS CHANGES

THEN (7.39.1) RECEIVE NOTICE OF RADAR SENSOR STATUS FROM ADJACENT CONTROLLER/SUPERVISOR

END IF

ASE

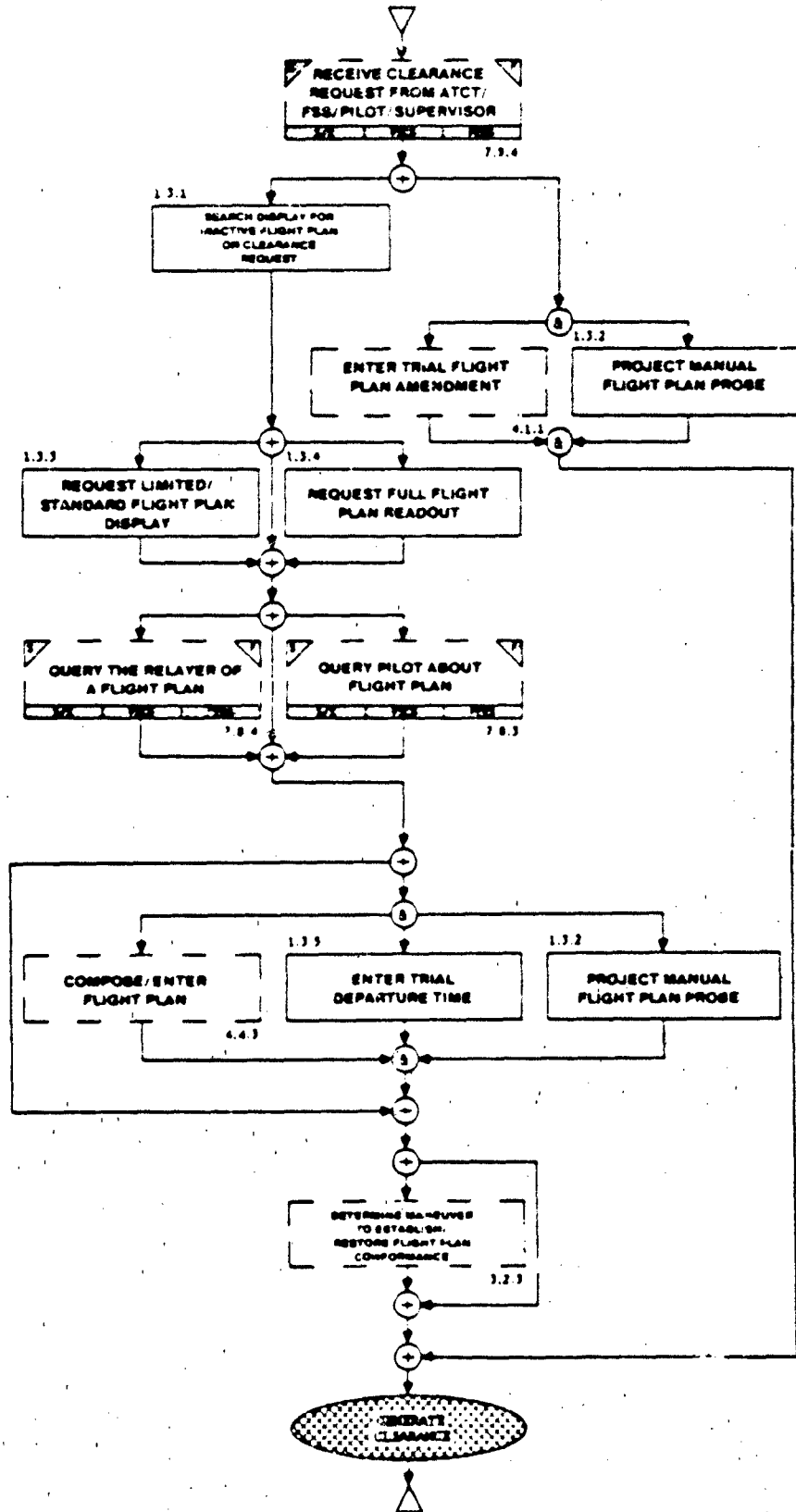
IF COMMUNICATION STATUS CHANGES

THEN (7.18.1) RECEIVE NOTICE OF COMMUNICATION STATUS

END IF

END DO

SUB-ACTIVITY 1.3 **ANALYZING REQUESTS FOR CLEARANCES**



SUB-ACTIVITY 1.3: ANALYZING REQUESTS FOR CLEARANCES

INPUT = CLEARANCE REQUEST FROM ATCT/FSS/PILOT/SUPERVISOR

DO

(7.8.4) RECEIVE CLEARANCE FROM ATCT/FSS/PILOT/SUPERVISOR

(dd) DETERMINE WHETHER FLIGHT PLAN IS AVAILABLE

**IF ACTIVE
THEN DO**

IF DEEMED NECESSARY BY CONTROLLER TO CHECK FOR CONFLICTS, SPACING, WEATHER, AND COORDINATION ISSUES

[4.1.1] ENTER TRIAL FLIGHT PLAN AMENDMENT

END IF

ASE

IF DEEMED NECESSARY BY CONTROLLER TO CHECK FLOW CONTROL, AMENDMENTS, AND SEPARATION IMPACT

(1.3.2) PROJECT MANUAL FLIGHT PLAN PROBE

END IF

**END DO
ELSE DO**

[1.3.1] SEARCH DISPLAY FOR INACTIVE FLIGHT PLAN ON CLEARANCE REQUEST

IF NO DISPLAY IS FOUND

THEN DO

(dd) EVALUATE NECESSITY FOR FULL FLIGHT PLAN READOUT

IF DEEMED NECESSARY BY CONTROLLER TO GAIN MORE INFORMATION

THEN (1.3.4) REQUEST FULL FLIGHT PLAN READOUT

ELSE (1.3.3) REQUEST LIMITED/STANDARD FLIGHT PLAN DISPLAY

END IF

END DO

END IF

(dd) EVALUATE NECESSITY TO QUERY RELAYER OF FLIGHT PLAN

IF DEEMED NECESSARY BY CONTROLLER IF FLIGHT PLAN ERROR EXISTS

THEN (7.8.4) QUERY THE RELAYER OF A FLIGHT PLAN

ELSE (7.8.3) QUERY PILOT ABOUT FLIGHT PLAN

END IF

(dd) EVALUATE NECESSITY TO COMPOSE/ENTER FLIGHT PLAN, ENTER TRIAL DEPARTURE TIME, OR PROJECT MANUAL FLIGHT PLAN PROBE

IF DEEMED NECESSARY BY CONTROLLER TO CHECK FOR CONFLICTS, SPACING, WEATHER, AND COORDINATION ISSUES

(1.3.5) ENTER TRIAL DEPARTURE TIME

END IF

ASE

IF FLIGHT PLAN DOES NOT EXIST

[4.4.3] COMPOSE/ENTER FLIGHT PLAN

END IF

ASE

IF DEEMED NECESSARY BY CONTROLLER TO CHECK FLOW CONTROL, AMENDMENTS, AND SEPARATION IMPACT

(1.3.2) PROJECT MANUAL FLIGHT PLAN PROBE

END IF

**END DO
END IF**

IF DEEMED NECESSARY BY CONTROLLER TO ASSURE SEQUENCE

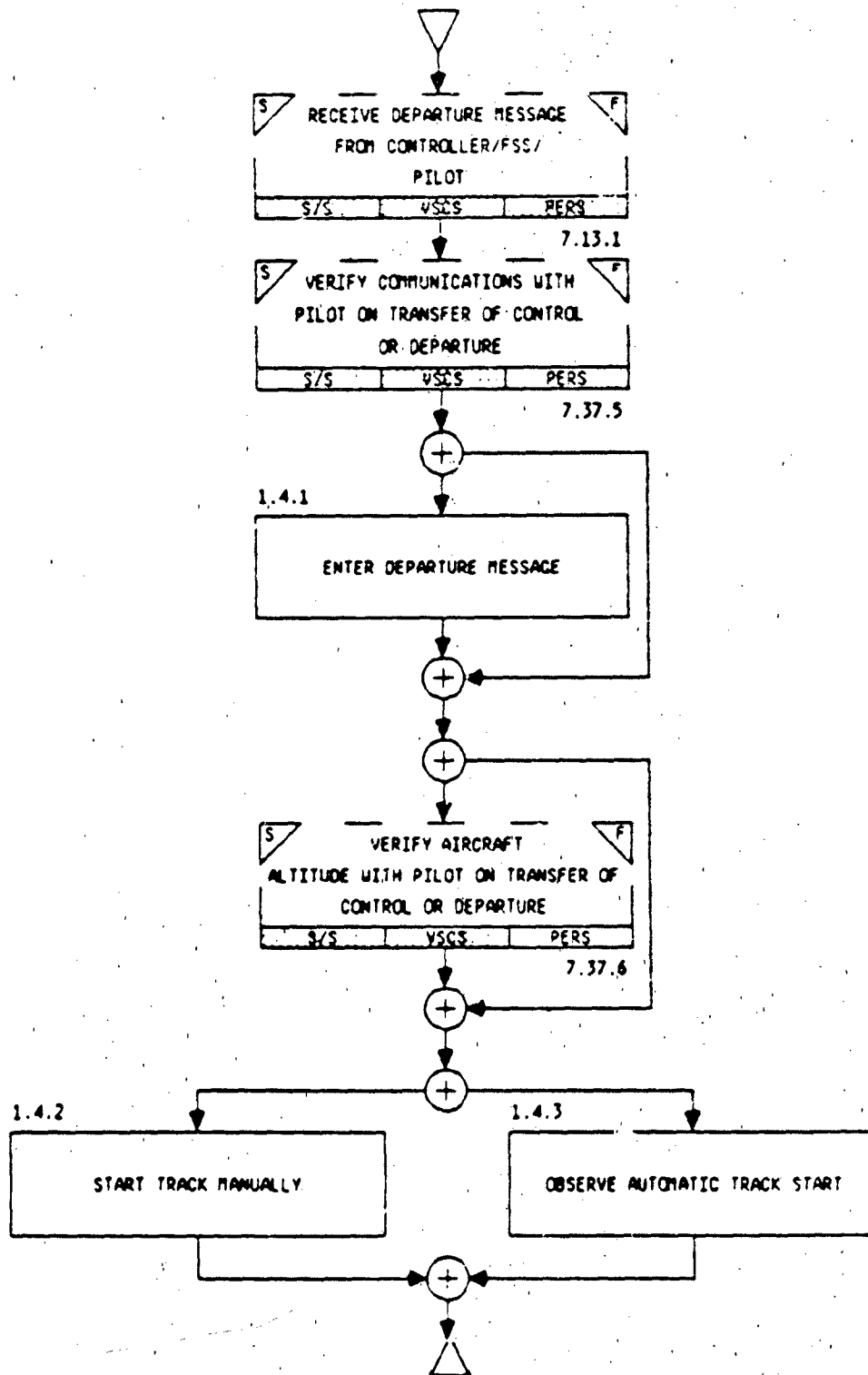
THEN (3.2.3) DETERMINE MANEUVER TO ESTABLISH/RESTORE FLIGHT PLAN CONFORMANCE

END IF

GENERATE CLEARANCE

END DO

**SUB-ACTIVITY 1.4
PROCESSING DEPARTURE TIME
INFORMATION**



SUB-ACTIVITY 1.4: PROCESSING DEPARTURE TIME INFORMATION

INPUT = DEPARTURE MESSAGE FROM ADJACENT CONTROLLER/FSS/PILOT
DO

[7.13.1] RECEIVE DEPARTURE MESSAGE FROM CONTROLLER/FSS/PILOT
[7.37.5] VERIFY COMMUNICATIONS WITH PILOT ON TRANSFER OF CONTROL OR DEPARTURE

IF AUTOMATION SUPPORT IS NOT AVAILABLE
THEN (1.4.1) ENTER DEPARTURE MESSAGE
END IF

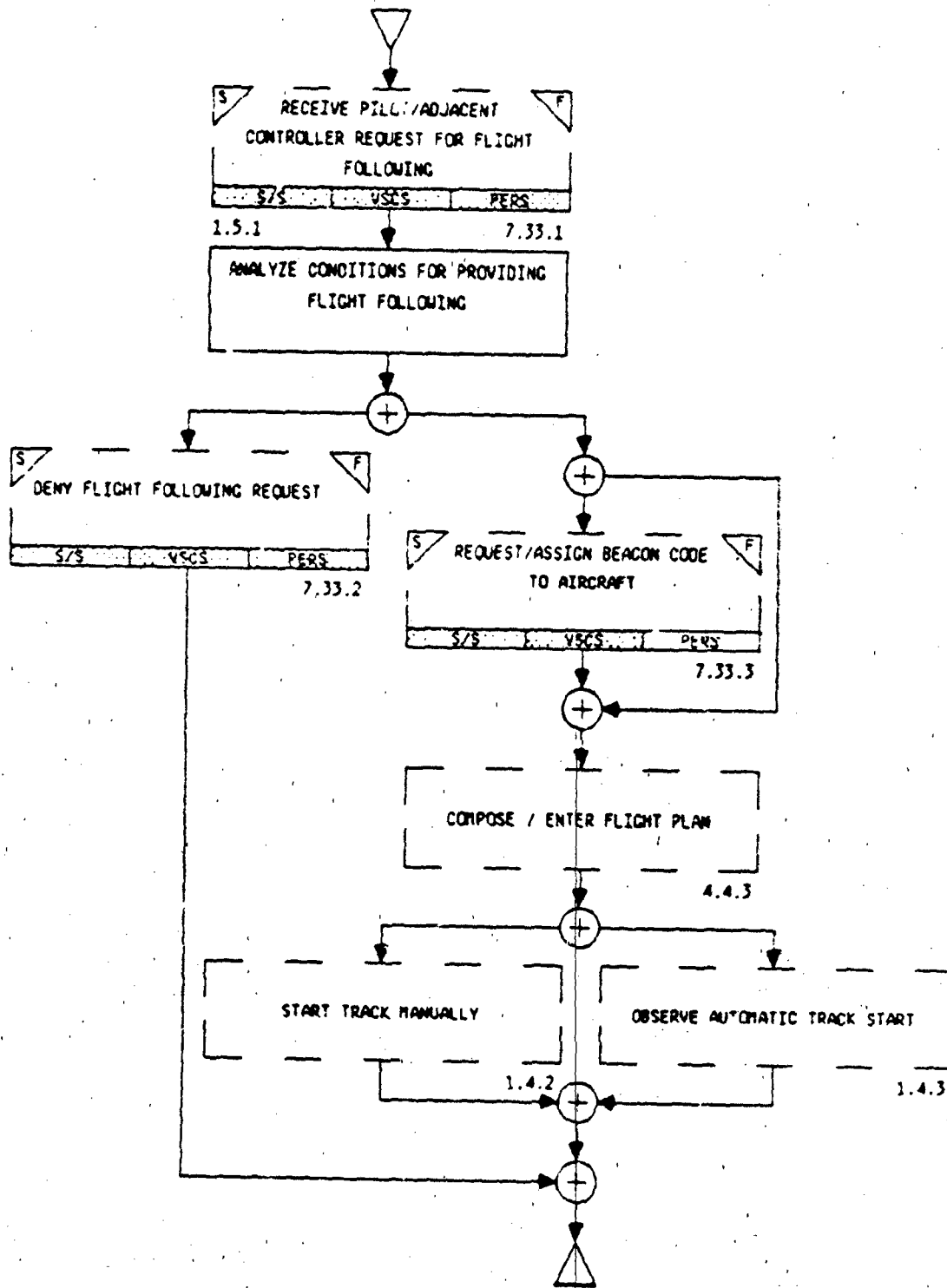
IF NOT PREVIOUSLY VALIDATED
THEN [7.37.6] VERIFY AIRCRAFT ALTITUDE WITH PILOT ON TRANSFER OF CONTROL OR DEPARTURE
END IF

(dp) EVALUATE NECESSITY TO START TRACK MANUALLY

IF AUTOMATED ACQUISITION IS NOT AVAILABLE
THEN (1.4.2) START TRACK MANUALLY
ELSE (1.4.3) OBSERVE AUTOMATIC TRACK START
END IF

END DO

SUB-ACTIVITY 15
PROCESSING REQUESTS FOR
FLIGHT FOLLOWING



SUB-ACTIVITY 1.5: PROCESSING REQUESTS FOR FLIGHT FOLLOWING

INPUT = PILOT/ADJACENT CONTROLLER REQUEST FOR FLIGHT FOLLOWING

DO

**[7.33.1] RECEIVE PILOT/ADJACENT CONTROLLER REQUEST FOR FLIGHT
FLIGHT FOLLOWING**

**(1.5.1) ANALYZE CONDITIONS FOR PROVIDING FLIGHT FOLLOWING
(dc) EVALUATE ABILITY TO GRANT FLIGHT FOLLOWING REQUEST**

**IF DEEMED NECESSARY BY CONTROLLER BASED ON WORKLOAD
THEN DO**

**IF TRANSPONDER EQUIPPED
THEN [7.33.3] REQUEST/ASSIGN BEACON CODE TO AIRCRAFT
END IF**

[4.4.3] COMPOSE/ENTER FLIGHT PLAN

(dp) EVALUATE NECESSITY TO START TRACK MANUALLY

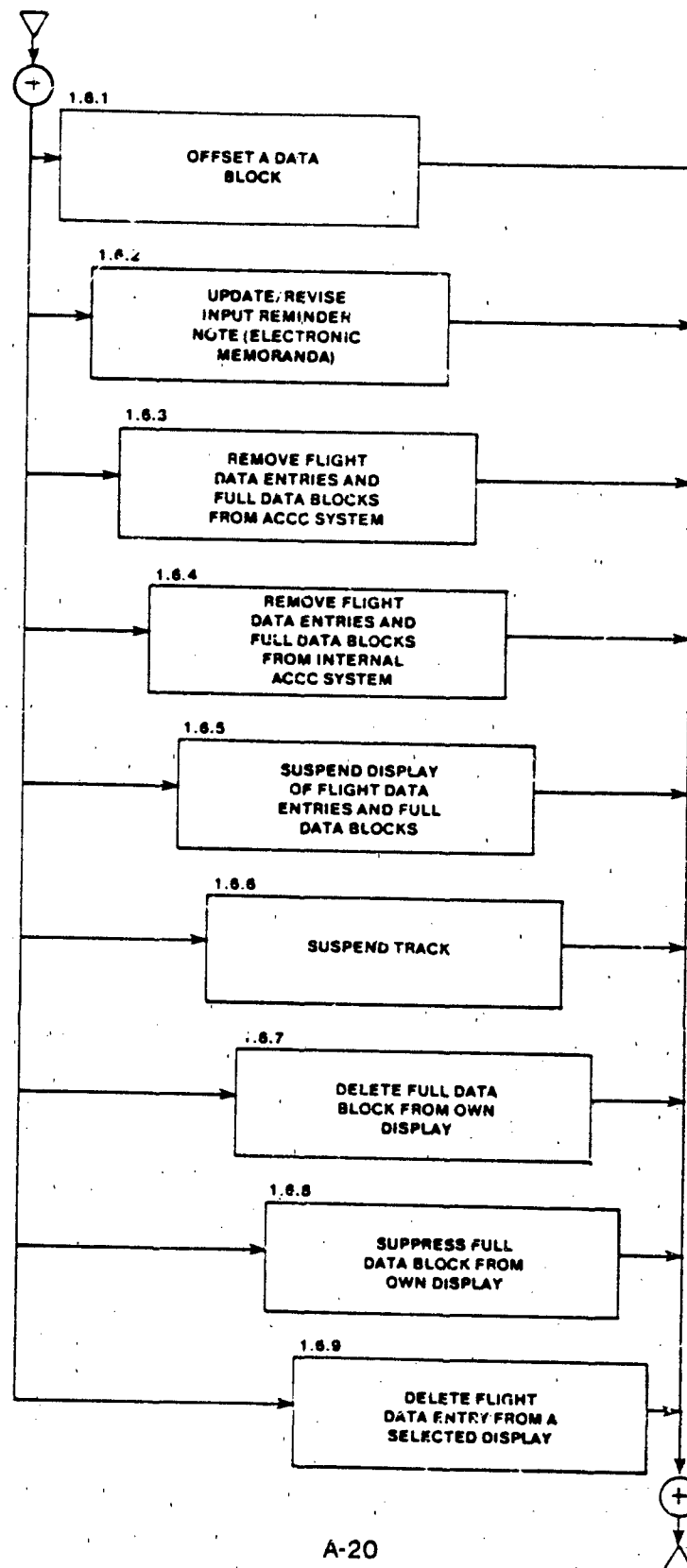
**IF TRACK DOES NOT AUTO ACQUIRE
THEN [1.4.2] START TRACK MANUALLY
ELSE [1.4.3] OBSERVE AUTOMATIC TRACK START
END IF**

END DO

**ELSE [7.33.2] DENY FLIGHT FOLLOWING REQUEST
END IF**

END DO

SUB-ACTIVITY 1.6
HOUSEKEEPING



SUB-ACTIVITY 1.6: HOUSEKEEPING

INPUT = NECESSITY TO ADJUST DATA BLOCKS, INACTIVE TRACKS, FLIGHT DATA IN DATA BASE

DO

(dp) EVALUATE NECESSITY TO OFFSET A DATA BLOCK

IF DEEMED NECESSARY BY CONTROLLER TO ADJUST DATA BLOCK
THEN (1.6.1) OFFSET A DATA BLOCK
ELSE DO

(dp) EVALUATE NECESSITY TO UPDATE/REVISE INPUT REMINDER NOTE
IF DATA CONTAINED IN REMINDER NOTE IS NOT CURRENT
THEN (1.6.2) UPDATE/REVISE INPUT REMINDER NOTE
ELSE DO

(dp) EVALUATE NECESSITY TO REMOVE FLIGHT DATA ENTRIES AND FULL DATA BLOCKS FROM ACCC SYSTEM
IF AIRCRAFT IS NO LONGER A FACTOR IN ANY FACILITY
THEN (1.6.3) REMOVE FLIGHT DATA ENTRIES AND FULL DATA BLOCKS FROM ACCC SYSTEM
ELSE DO

(dp) EVALUATE NECESSITY TO REMOVE FLIGHT DATA ENTRIES AND FULL DATA BLOCKS FROM INTERNAL ACCC SYSTEM

IF AIRCRAFT IS NO LONGER A FACTOR IN THIS ACCC BUT MAY BE UNDER THE JURISDICTION OF AN ADJACENT FACILITY
THEN (1.6.4) REMOVE FLIGHT DATA ENTRIES AND FULL DATA BLOCKS FROM INTERNAL ACCC SYSTEM
ELSE DO

(dp) EVALUATE NECESSITY TO SUSPEND DISPLAY OF FLIGHT DATA ENTRIES AND FULL DATA BLOCKS

IF DEEMED NECESSARY BY CONTROLLER TO SUSPEND THE DISPLAY OF AN AIRCRAFT BUT ALLOW IT TO BE RECALLED
THEN (1.6.5) SUSPEND DISPLAY OF FLIGHT DATA ENTRIES AND FULL DATA BLOCKS
ELSE DO

(dp) EVALUATE NECESSITY TO SUSPEND TRACK

IF DEEMED NECESSARY BY CONTROLLER TO SUSPEND THE DISPLAY OF A FULL DATA BLOCK BUT RETAIN THE FLIGHT DATA ENTRIES
THEN (1.6.6) SUSPEND TRACK
ELSE DO

(dp) EVALUATE NECESSITY TO DELETE FULL DATA BLOCK FROM OWN DISPLAY

IF DEEMED NECESSARY BY CONTROLLER TO DELETE THE DISPLAY OF A FULL DATA BLOCK ON OWN DISPLAY
THEN (1.6.7) DELETE FULL DATA BLOCK FROM OWN DISPLAY
ELSE DO

(dp) EVALUATE NECESSITY TO SUPPRESS FULL DATA BLOCK FROM OWN DISPLAY

IF DEEMED NECESSARY BY CONTROLLER TO SUPPRESS FULL DATA BLOCK FOR A VARIABLE TIME
THEN (1.6.8) SUPPRESS FULL DATA BLOCK FROM OWN DISPLAY
ELSE (1.6.9) DELETE FLIGHT DATA ENTRY FROM A SELECTED DISPLAY

END IF

END DO
END IF

END DO
END IF

END DO
END IF

END DO
END IF

END DO
END IF

END DO
END IF

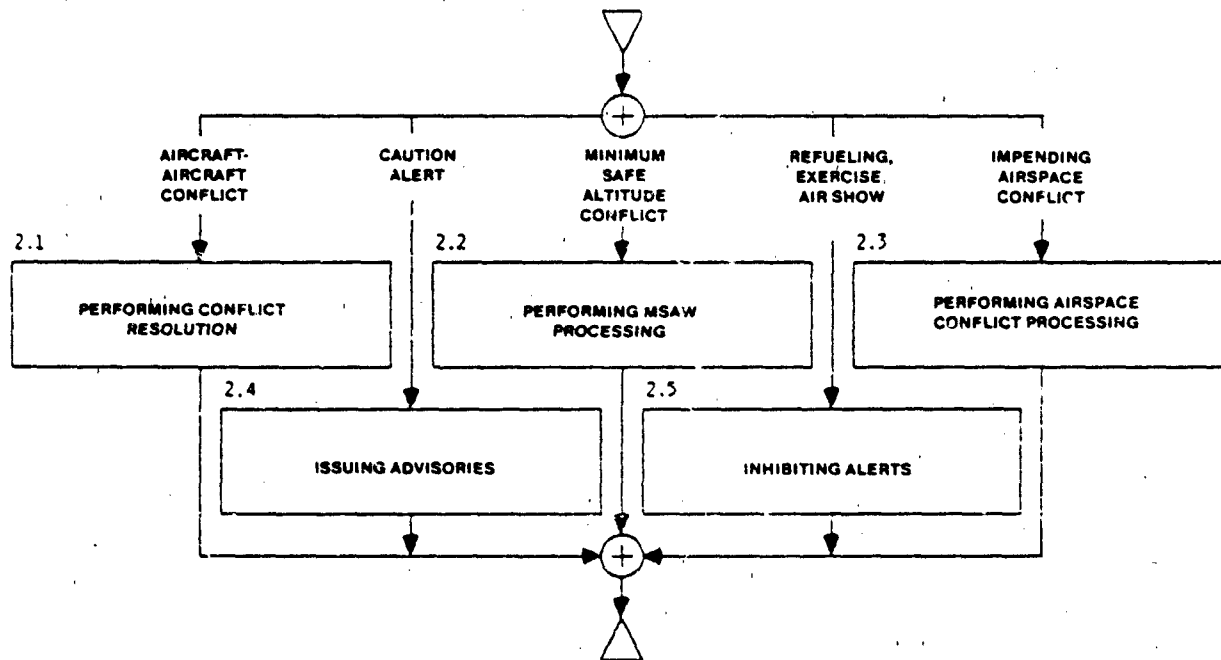
END DO
END IF

END DO

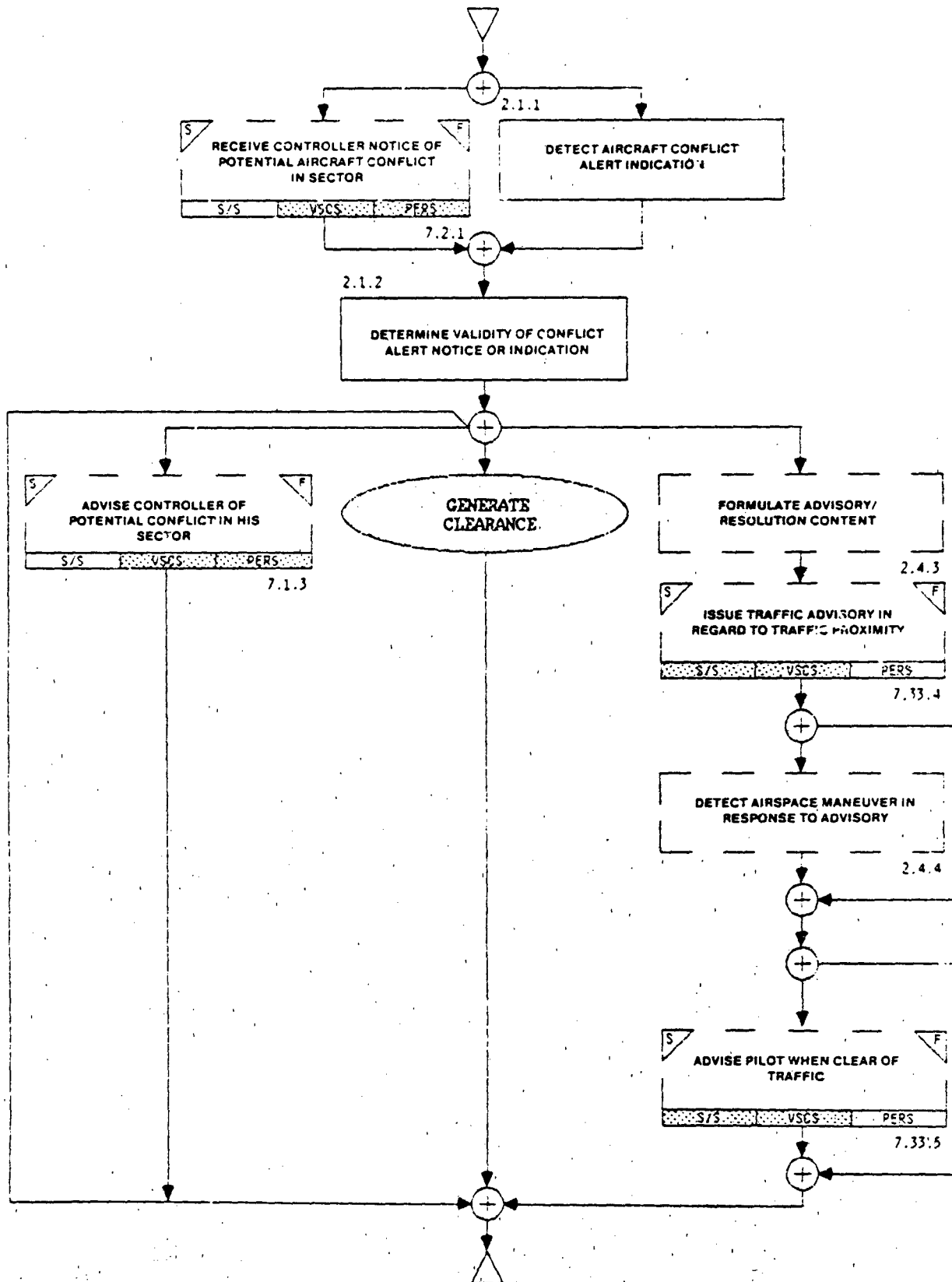
RESOLVE AIRCRAFT CONFLICTS

2.0

ACTIVITY 2
RESOLVE AIRCRAFT CONFLICTS



SUB-ACTIVITY 21 **PERFORMING CONFLICT RESOLUTION**



SUB-ACTIVITY 2.1: PERFORMING CONFLICT RESOLUTION

**INPUT = CONTROLLER NOTICE OF POTENTIAL AIRCRAFT CONFLICT IN SECTOR, AIR-
CRAFT CONFLICT ALERT INDICATION**

DO

**IF INPUT IS CONTROLLER NOTICE OF POTENTIAL AIRCRAFT CONFLICT IN SECTOR
THEN [7.2.1] RECEIVE CONTROLLER NOTICE OF POTENTIAL AIRCRAFT CONFLICT IN
SECTOR
ELSE (2.1.1) DETECT AIRCRAFT CONFLICT ALERT INDICATION
END IF**

(2.1.2) DETERMINE VALIDITY OF CONFLICT ALERT NOTICE OR INDICATION

**IF ALERT IS VALID
THEN DO**

(dp) EVALUATE NECESSITY TO ADVISE ADJACENT CONTROLLER

**IF CONFLICT ALERT GOES OFF ON AIRCRAFT NOT UNDER YOUR
CONTROL
THEN [7.1.3] ADVISE ADJACENT CONTROLLER OF POTENTIAL
CONFLICT IN HIS SECTOR
ELSE DO**

(dp) EVALUATE NECESSITY TO GENERATE CLEARANCE

**IF CLEARANCE IS REQUIRED TO RESOLVE CONFLICT
THEN GENERATE CLEARANCE
ELSE DO**

**[2.4.3] FORMULATE ADVISORY/RESOLUTION
CONFLICT**

**[7.33.4] ISSUE TRAFFIC ADVISORY IN REGARD
TO TRAFFIC PROXIMITY**

**IF DEEMED NECESSARY BY CONTROLLER
THEN [2.4.4] DETECT AIRCRAFT
MANEUVER IN RESPONSE TO ADVISORY
END IF**

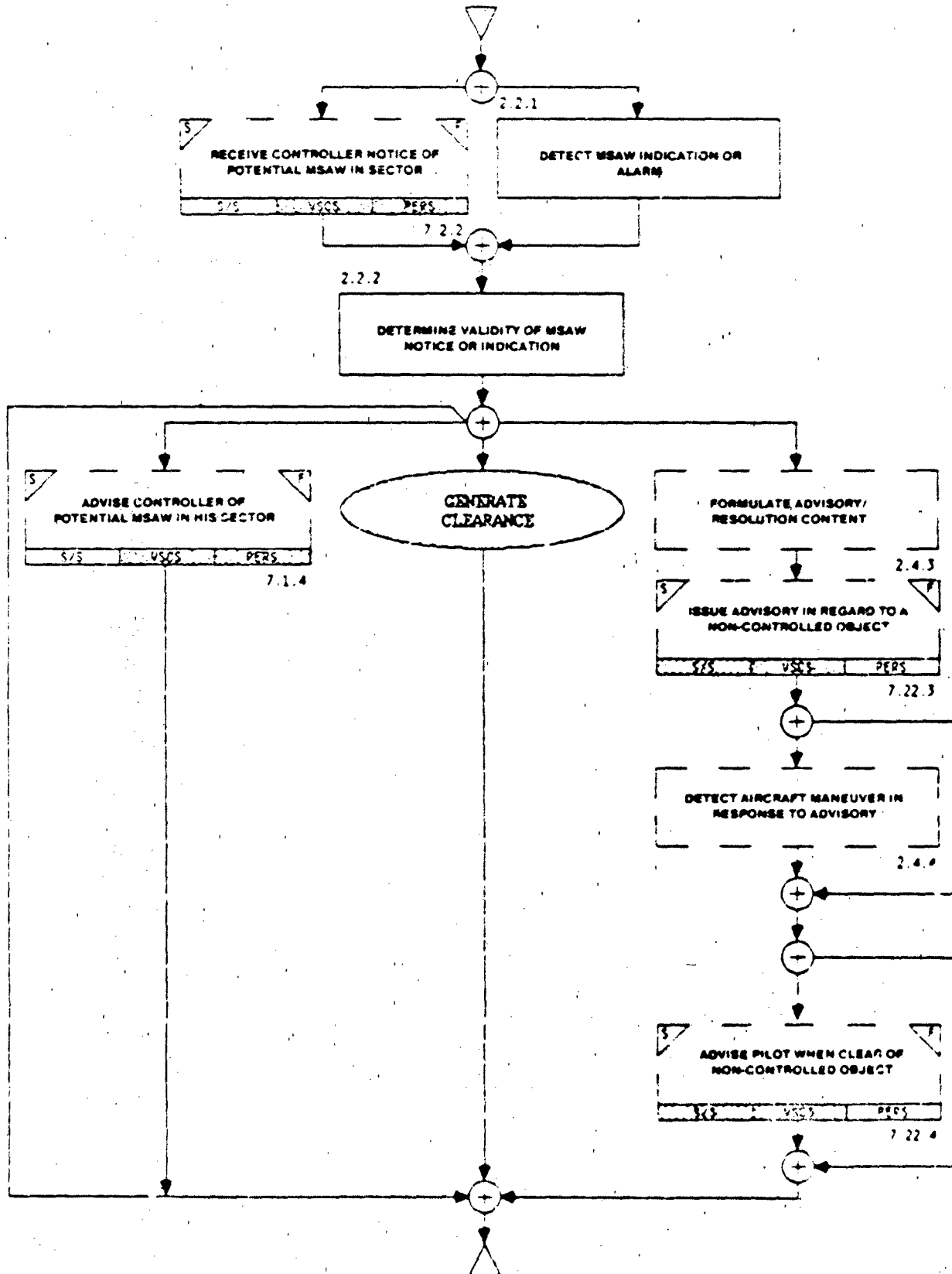
**IF PILOT DOES NOT HAVE TRAFFIC IN
SIGHT
THEN [7.33.5] ADVISE PILOT WHEN CLEAR
OF TRAFFIC
END IF**

**END DO
END IF**

**END DO
END IF**

**END DO
END IF
END DO**

**SUB-ACTIVITY 22
PERFORMING MINIMUM SAFE ALTITUDE
WARNING PROCESSING**



SUB-ACTIVITY 2.2: PERFORMING MINIMUM SAFE ALTITUDE WARNING PROCESSING

**INPUT = CONTROLLER NOTICE OF POTENTIAL MSAW IN SECTOR, MSAW INDICATION
 OR ALARM**

DO

**IF INPUT IS CONTROLLER NOTICE OF POTENTIAL MSAW IN SECTOR
THEN [7.2.2] RECEIVE CONTROLLER NOTICE OF POTENTIAL MSAW IN SECTOR
ELSE (2.2.1) DETECT MSAW INDICATION OR ALARM
END IF**

(2.2.2) DETERMINE VALIDITY OF MSAW NOTICE OR INDICATION

**IF ALERT IS VALID
THEN DO**

(dp) EVALUATE NECESSITY TO ADVISE ADJACENT CONTROLLER

**IF MSAW GOES OFF AN AIRCRAFT NOT UNDER YOUR CONTROL
THEN [7.1.4] ADVISE ADJACENT CONTROLLER OF POTENTIAL MSAW
IN HIS SECTOR
ELSE DO**

(dp) EVALUATE NECESSITY TO GENERATE CLEARANCE

**IF CLEARANCE IS REQUIRED TO RESOLVE MSAW
THEN GENERATE CLEARANCE
ELSE DO**

**[2.4.3] FORMULATE ADVISORY/RESOLUTION
CONTENT
[7.22.3] ISSUE ADVISORY IN REGARD TO A NON-
CONTROLLED OBJECT**

**IF DEEMED NECESSARY BY CONTROLLER
THEN [2.4.4] DETECT AIRCRAFT MANEUVER IN
RESPONSE TO ADVISORY
END IF**

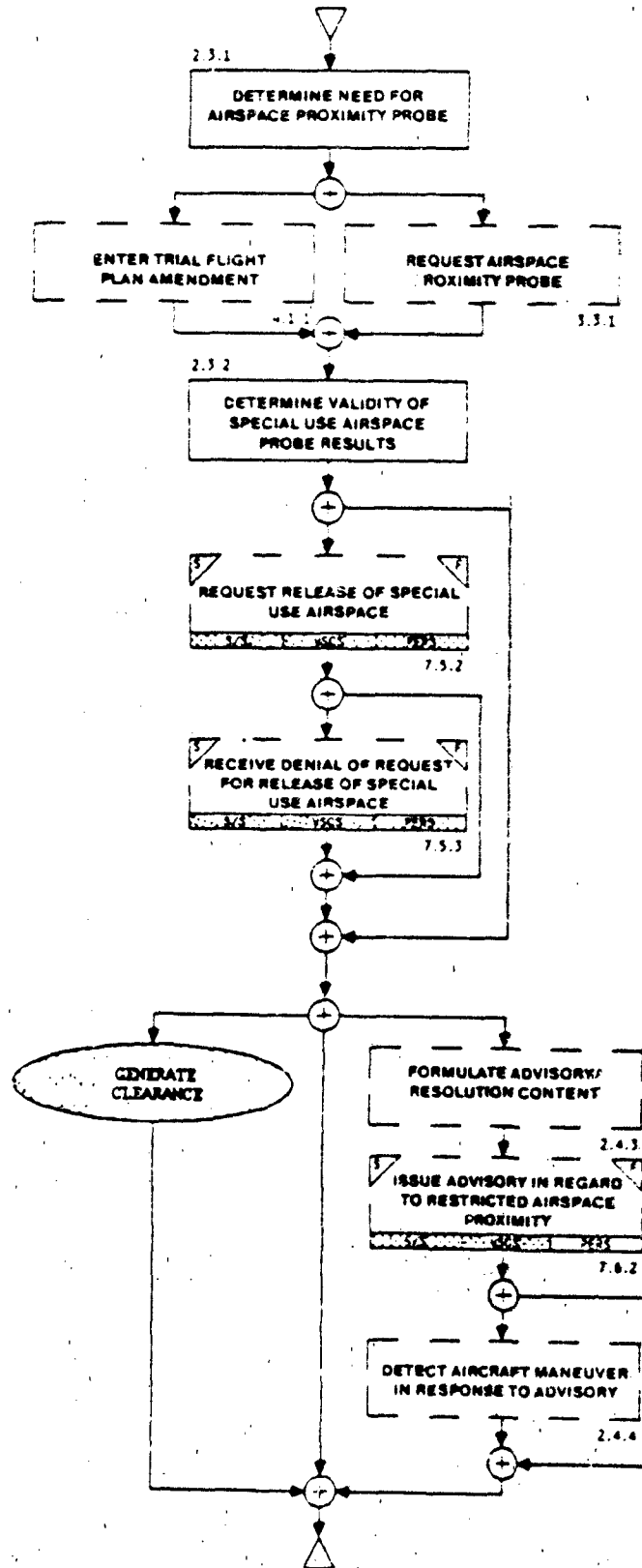
**IF DEEMED NECESSARY BY CONTROLLER
THEN [7.22.4] ADVISE PILOT WHEN CLEAR OF
NON-CONTROLLED OBJECT
END IF**

**END DO
END IF**

**END DO
END IF**

**END DO
END IF
END DO**

**SUB-ACTIVITY 2.3
PERFORMING AIRSPACE CONFLICT
PROCESSING**



SUB-ACTIVITY 2.3: PERFORMING AIRSPACE CONFLICT PROCESSING

INPUT = NEED FOR AIRSPACE PROXIMITY PROBE

DO

(2.3.1) DETERMINE NEED FOR AIRSPACE PROXIMITY PROBE

(dp) EVALUATE NECESSITY TO ENTER TRIAL FLIGHT PLAN AMENDMENT

**IF DEEMED NECESSARY BY CONTROLLER TO OBTAIN AIRSPACE PROBE RESULTS
THEN [4.1.1] ENTER TRIAL FLIGHT PLAN AMENDMENT
ELSE [3.3.1] REQUEST AIRSPACE PROXIMITY PROBE
END IF**

(2.3.2) DETERMINE VALIDITY OF SPECIAL USE AIRSPACE PROBE RESULTS

**IF DEEMED NECESSARY FOR OPERATIONAL NEEDS
THEN DO
[7.5.2] REQUEST RELEASE OF SPECIAL USE AIRSPACE
IF AIRSPACE CANNOT BE RELEASED
THEN [7.5.3] RECEIVE DENIAL OF REQUEST FOR
RELEASE OF SPECIAL USE AIRSPACE
END IF**

**END DO
END IF**

**(dp) EVALUATE NECESSITY TO FORMULATE CLEARANCE OR ADVISORY
IF CLEARANCE FORMULATION IS REQUIRED
THEN DO**

(dp) EVALUATE NECESSITY TO GENERATE CLEARANCE

**IF DEEMED NECESSARY BY CONTROLLER
THEN GENERATE CLEARANCE
ELSE DO**

**[2.4.3] FORMULATE ADVISORY/RESOLUTION
CONTENT
[7.6.2] ISSUE ADVISORY IN REGARD TO
RESTRICTED AIRSPACE PROXIMITY**

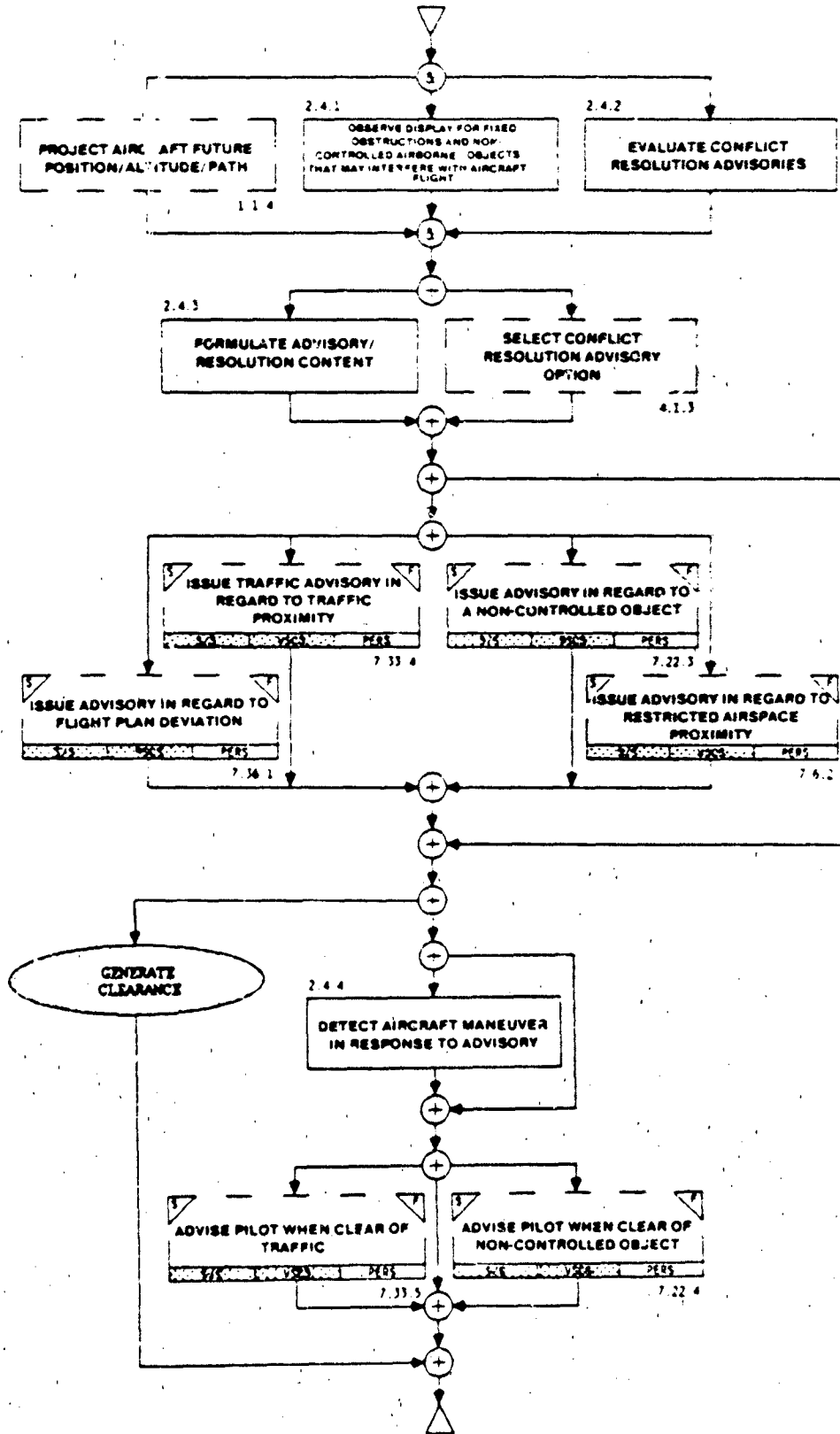
**IF PILOT REQUESTS OR OPERATIONAL
NEEDS REQUIRE
THEN [2.4.4] DETECT AIRCRAFT
MANEUVER IN RESPONSE TO ADVISORY
END IF**

**END DO
END IF**

**END DO
END IF
END DO**

SUB-ACTIVITY 24

ISSUING ADVISORIES



SUB-ACTIVITY 2.4: ISSUING ADVISORIES

INPUT = POSSIBLE AIRCRAFT POSITION/ALTITUDE/PATH CONFLICT, POSSIBLE AIRCRAFT OBSTACLE, CONFLICT RESOLUTION ADVISORIES

DO

**IF POTENTIAL CONFLICT EXISTS
THEN [1.1.4] PROJECT AIRCRAFT POSITION/ALTITUDE/PATH
END IF**

ASE

**IF POTENTIAL CONFLICT EXISTS
THEN (2.4.1) OBSERVE DISPLAY FOR FIXED OBSTRUCTIONS AND NON-CONTROLLED AIRBORNE OBJECTS THAT MAY INTERFERE WITH AIRCRAFT FLIGHT
END IF**

ASE

**IF PROBE GENERATES ADVISORY LIST
THEN (2.4.2) EVALUATE CONFLICT RESOLUTION ADVISORIES
END IF**

**(dp) EVALUATE NECESSITY TO FORMULATE ADVISORY/RESOLUTION CONTENT
IF DEEMED NECESSARY BY CONTROLLER TO FORMULATE ADVISORY
THEN (2.4.3) FORMULATE ADVISORY/RESOLUTION CONTENT
ELSE [4.1.3] SELECT CONFLICT RESOLUTION ADVISORY OPTION
END IF**

(dp) EVALUATE NECESSITY TO ISSUE ADVISORIES

**IF DEEMED NECESSARY BY CONTROLLER TO ISSUE ADVISORY
THEN GO**

(dp) EVALUATE TYPE OF ADVISORY TO ISSUE

**IF TYPE IS IN REGARD TO TRAFFIC PROXIMITY
THEN [7.33.4] ISSUE TRAFFIC ADVISORY IN REGARD TO TRAFFIC PROXIMITY
ELSE**

**IF TYPE IS IN REGARD TO A NON-CONTROLLED OBJECT
THEN [7.22.3] ISSUE ADVISORY IN REGARD TO A NON-CONTROLLED OBJECT
ELSE**

**IF TYPE IS IN REGARD TO FLIGHT PLAN DEVIATION
THEN [7.36.1] ISSUE ADVISORY IN REGARD TO FLIGHT PLAN DEVIATION
ELSE**

**IF TYPE IS IN REGARD TO RESTRICTED AIRSPACE PROXIMITY
THEN [7.6.2] ISSUE ADVISORY IN REGARD TO RESTRICTED AIRSPACE PROXIMITY
END IF**

END IF

END IF

END IF

END DO

END IF

(dp) EVALUATE NECESSITY TO GENERATE CLEARANCE

**IF DEEMED NECESSARY BY CONTROLLER TO GENERATE CLEARANCE
THEN GENERATE CLEARANCE
ELSE DO**

**IF DEEMED NECESSARY BY CONTROLLER TO CONTINUE ADVISORY
THEN (2.4.4) DETECT AIRCRAFT MANEUVER IN RESPONSE TO ADVISORY**

(dp) EVALUATE ABILITY IN TIME TO ADVISE PILOT WHEN CLEAR OF TRAFFIC

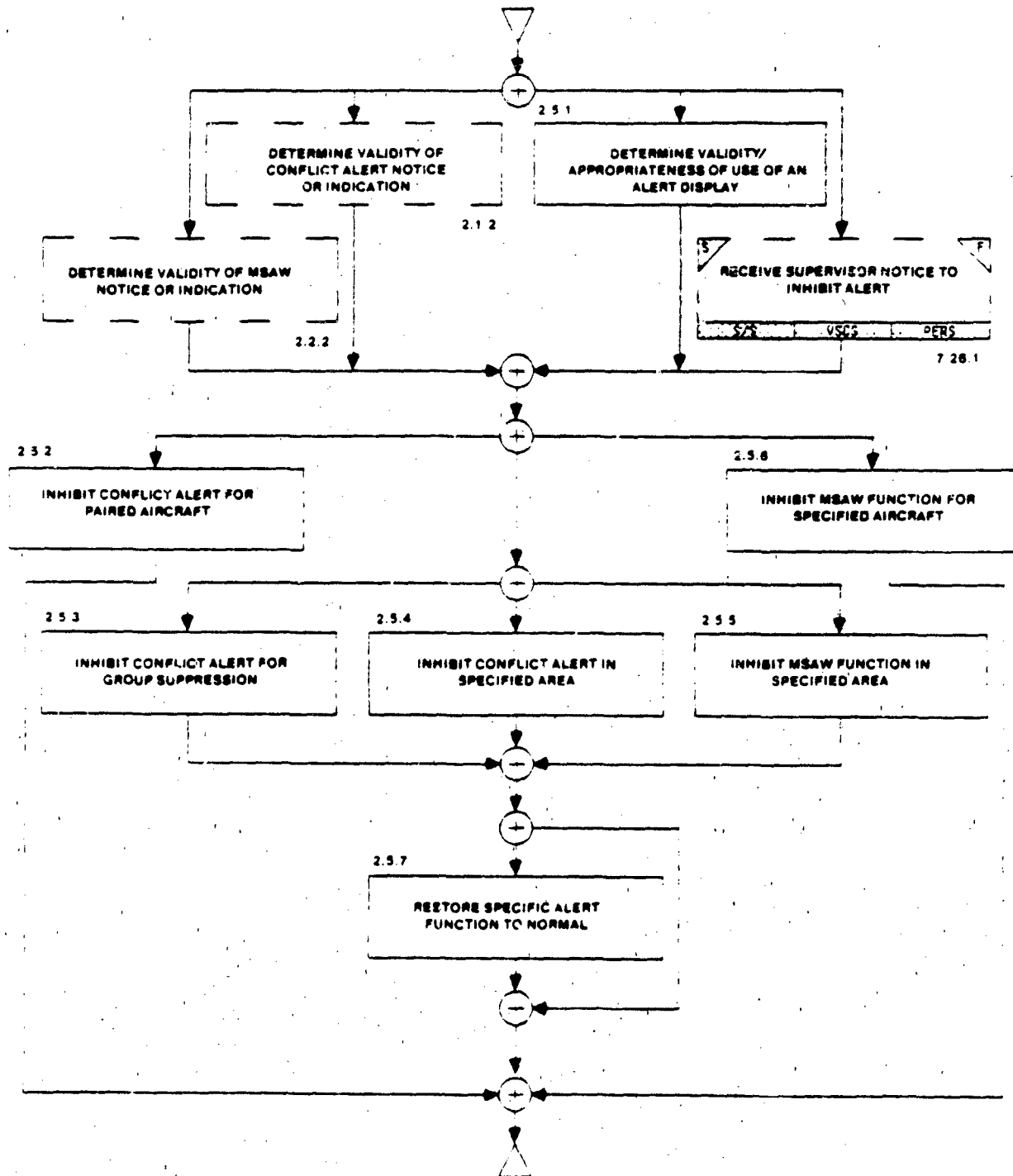
**IF PILOT DOES NOT HAVE TRAFFIC IN SIGHT
THEN [7.33.5] ADVISE PILOT WHEN CLEAR OF TRAFFIC
ELSE [7.22.4] ADVISE PILOT WHEN CLEAR OF NON-CONTROLLED OBJECT
END IF**

END IF

**END DO
END IF**

END DO

SUB-ACTIVITY 25 **INHIBITING ALERTS**



SUB-ACTIVITY 2.5: INHIBITING ALERTS

INPUT = CONFLICT ALERT NOTICE OR INDICATION, ALERT DISPLAY, MSAW NOTICE OR INDICATION, SUPERVISOR NOTICE TO INHIBIT ALERT

DO

**IF INPUT IS CONFLICT ALERT NOTICE OR INDICATION
THEN (2.1.2) DETERMINE VALIDITY OF CONFLICT ALERT NOTICE OR INDICATION
ELSE**

**IF INPUT IS ALERT DISPLAY
THEN (2.5.1) DETERMINE VALIDITY/APPROPRIATENESS OF USE OF AN ALERT
DISPLAY
ELSE**

**IF INPUT IS MSAW NOTICE OR INDICATION
THEN (2.2.2) DETERMINE VALIDITY OF MSAW NOTICE OR INDICATION
ELSE (7.26.1) RECEIVE SUPERVISOR NOTICE TO INHIBIT ALERT
END IF**

END IF

END IF

(dp) EVALUATE TYPE OF ALERT FUNCTION

**IF TYPE IS CONFLICT ALERT FOR PAIRED AIRCRAFT
THEN (2.5.2) INHIBIT CONFLICT ALERT FOR PAIRED AIRCRAFT
ELSE**

**IF TYPE IS MSAW FUNCTION FOR SPECIFIED AIRCRAFT
THEN (2.5.6) INHIBIT MSAW FUNCTION FOR SPECIFIED AIRCRAFT
ELSE DO**

**IF TYPE IS CONFLICT ALERT FOR GROUP SUPPRESSION
THEN (2.5.3) INHIBIT CONFLICT ALERT FOR GROUP SUPPRESSION
ELSE**

**IF TYPE IS CONFLICT ALERT IN SPECIFIC AREA
THEN (2.5.4) INHIBIT CONFLICT ALERT IN SPECIFIED AREA
ELSE (2.5.5) INHIBIT MSAW FUNCTION IN SPECIFIED AREA
END IF**

END IF

**IF NEED FOR ALERT INHIBIT IS PAST
THEN (2.5.7) RESTORE SPECIFIC ALERT FUNCTION TO NORMAL
END IF**

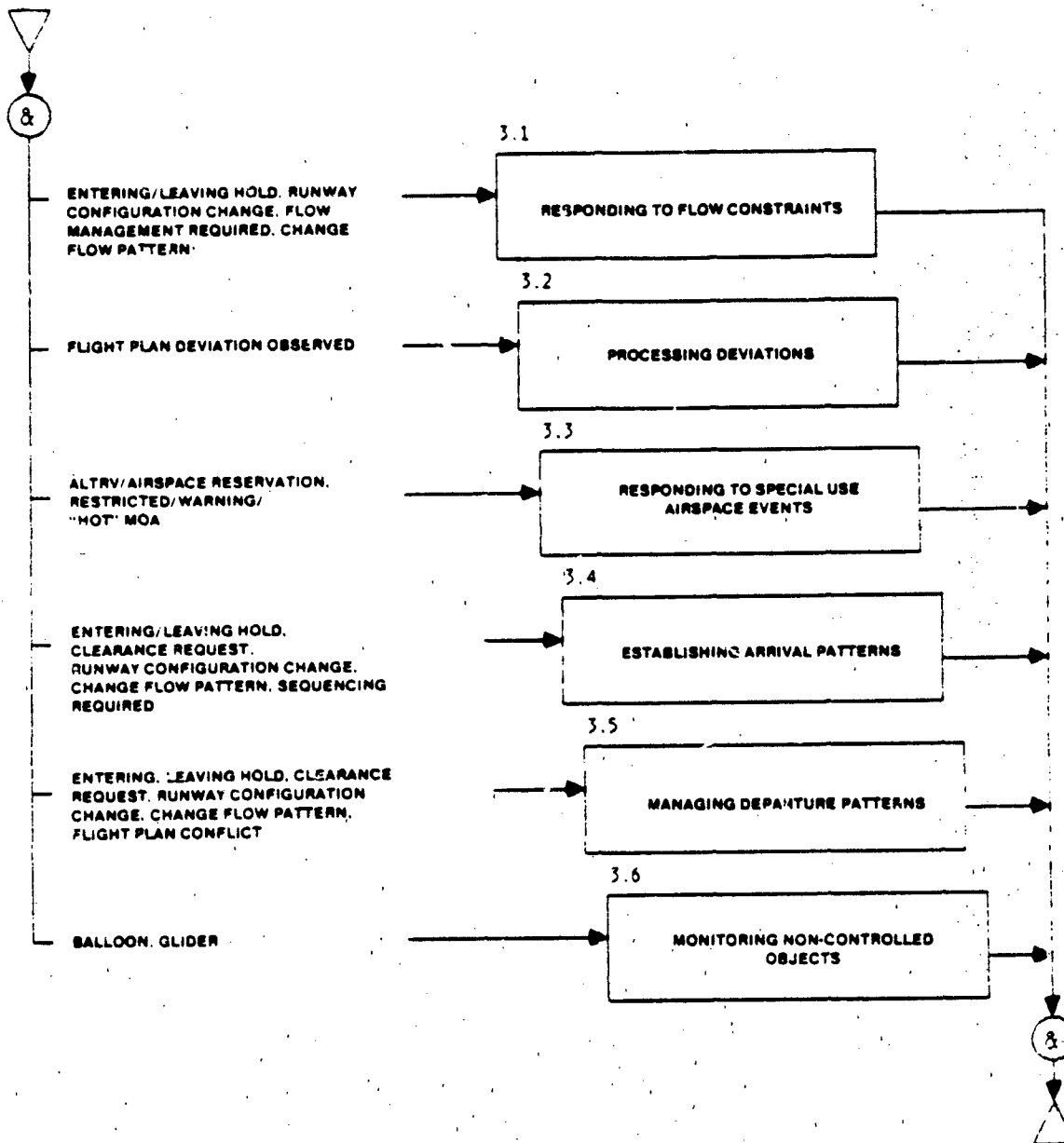
**END DO
END IF**

**END IF
END DO**

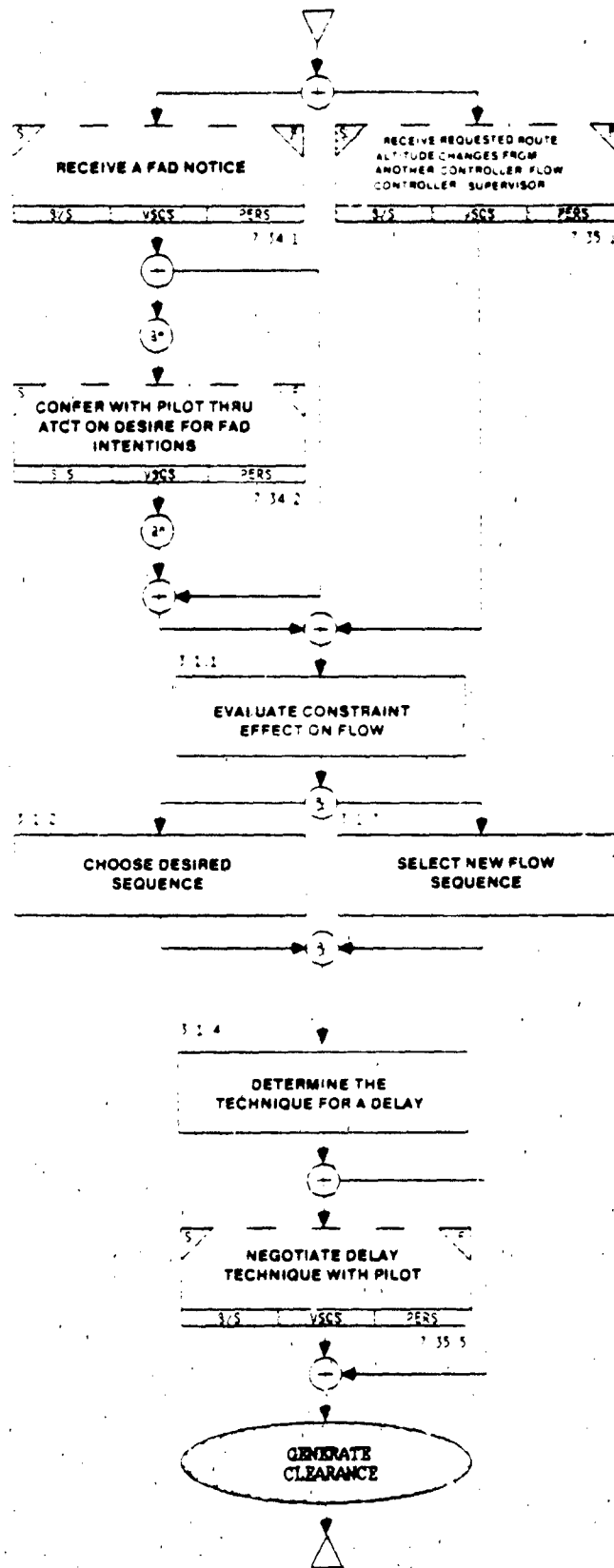
MANAGE AIR TRAFFIC SEQUENCES

3.0

ACTIVITY 3 **MANAGE AIR TRAFFIC SEQUENCES**



SUB-ACTIVITY 3.1 **RESPONDING TO FLOW CONSTRAINTS**



SUB-ACTIVITY 3.1: RESPONDING TO FLOW CONSTRAINTS

**INPUT = FAD NOTICE, REQUESTED ROUTE/ALTITUDE CHANGES FROM ANOTHER
CONTROLLER/FLOW CONTROLLER/SUPERVISOR**

DO

**IF INPUT IS REQUESTED ROUTE/ALTITUDE CHANGES FROM ANOTHER CONTROLLER/FLOW
CONTROLLER/SUPERVISOR**

**THEN [7.35.1] RECEIVE REQUESTED ROUTE/ALTITUDE CHANGES FROM
ANOTHER CONTROLLER/FLOW CONTROLLER/SUPERVISOR**

ELSE DO

[7.34.1] RECEIVE A FAD NOTICE

IF PILOT PREFERS GROUND DELAY OR AIR DELAY

THEN DO UNTIL (INTENTIONS ARE CLEAR)

**[7.34.2] CONFER WITH PILOT THROUGH ATCT ON DESIRE FOR FAD
INTENTIONS**

END DO

END IF

END DO

END IF

(3.1.1) EVALUATE CONSTRAINT EFFECT ON FLOW

IF DEEMED NECESSARY BY CONTROLLER

THEN (3.1.2) CHOOSE DESIRED SEQUENCE

END IF

ASE

IF CURRENT SEQUENCE IS INADEQUATE

THEN (3.1.3) SELECT NEW FLOW SEQUENCE

END IF

(3.1.4) DETERMINE THE TECHNIQUE FOR A DELAY

IF DELAY TECHNIQUES REQUIRE PILOT INPUT

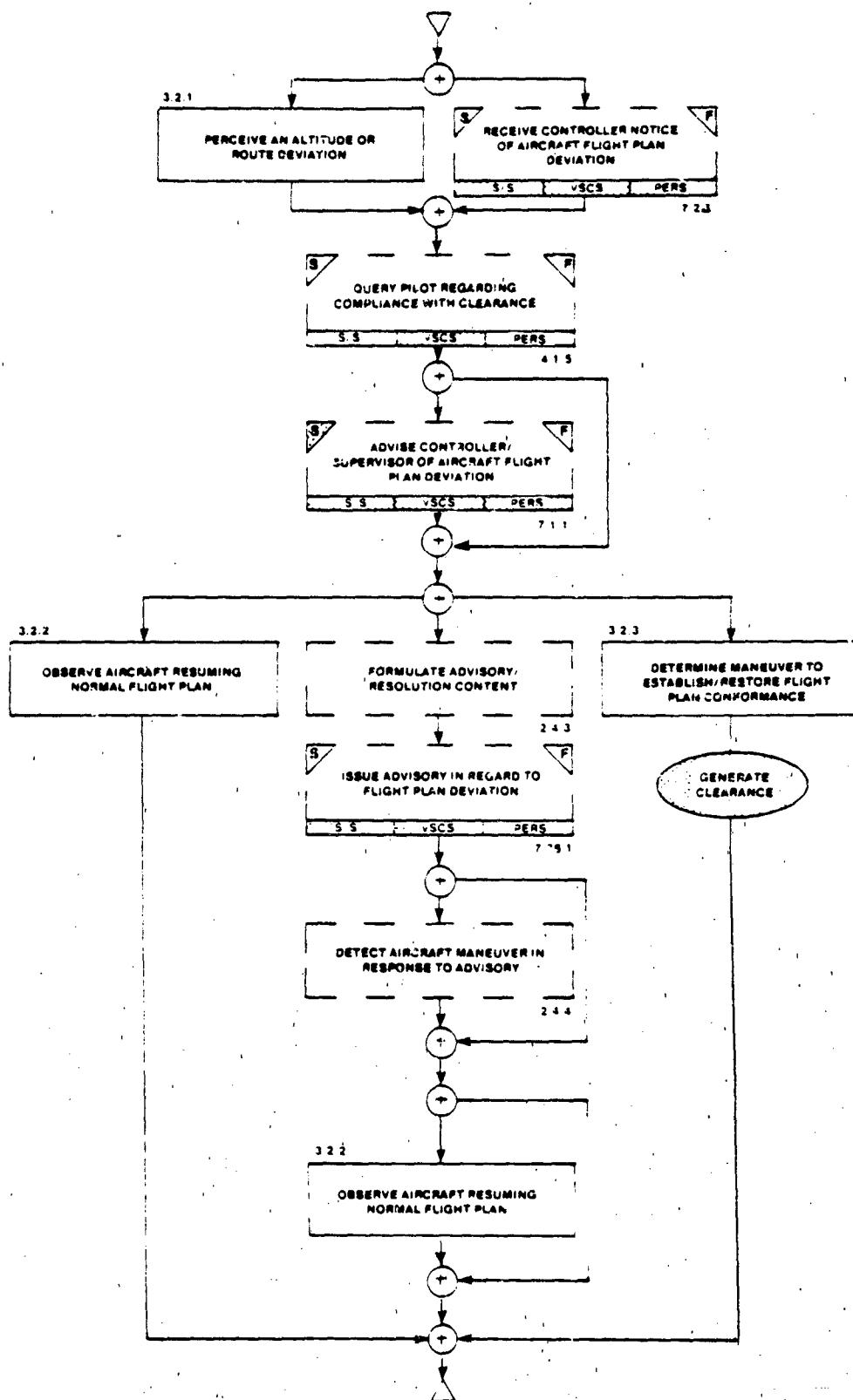
THEN [7.35.5] NEGOTIATE DELAY TECHNIQUE WITH PILOT

END IF

GENERATE CLEARANCE

END DO

SUB-ACTIVITY 3.2 **PROCESSING DEVIATIONS**



SUB-ACTIVITY 3.2: PROCESSING DEVIATIONS

**INPUT = AN ALTITUDE OR ROUTE DEVIATION, CONTROLLER NOTICE OF AIRCRAFT
FLIGHT PLAN DEVIATION**

DO

**IF INPUT IS AN ALTITUDE OR ROUTE DEVIATION
THEN (3.2.1) PERCEIVE AN ALTITUDE OR ROUTE DEVIATION
ELSE (7.2.3) RECEIVE CONTROLLER NOTICE OF AIRCRAFT FLIGHT PLAN DEVIATION
END IF**

[4.1.5] QUERY PILOT REGARDING COMPLIANCE WITH CLEARANCE

**(dp) DETERMINE WHETHER TO ADVISE ANOTHER CONTROLLER/SUPERVISOR OF THE
DEVIATION
IF DEEMED NECESSARY BY CONTROLLER
THEN (7.1.1) ADVISE CONTROLLER/SUPERVISOR OF FLIGHT PLAN DEVIATION
END IF**

**IF AIRCRAFT IS RESUMING NORMAL FLIGHT PLAN
THEN (3.2.2) OBSERVE AIRCRAFT RESUMING NORMAL FLIGHT PLAN
ELSE DO**

**(dp) DETERMINE WHETHER TO ESTABLISH/RESTORE SEQUENCE
IF DEEMED NECESSARY BY CONTROLLER
THEN DO**

**(3.2.3) DETERMINE MANEUVER TO ESTABLISH/RESTORE FLIGHT
PLAN CONFORMANCE
GENERATE CLEARANCE**

**END DO
ELSE DO**

[2.4.3] FORMULATE ADVISORY/RESOLUTION CONTENT

(7.36.1) ISSUE ADVISORY IN REGARD TO FLIGHT PLAN DEVIATION

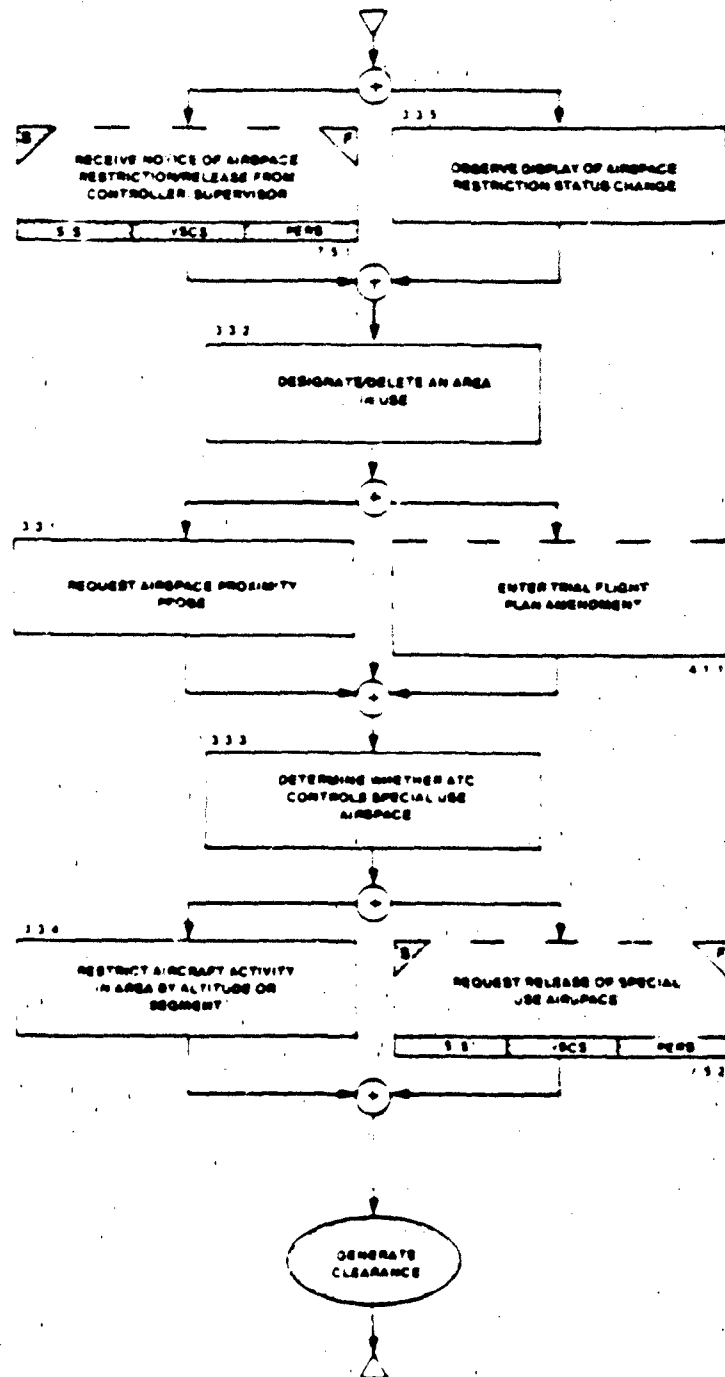
**IF DEEMED NECESSARY BY CONTROLLER TO CONTINUE ADVISORY
(SERVICE)
THEN [2.4.4] DETECT AIRCRAFT MANEUVER IN RESPONSE TO
ADVISORY
END IF**

**IF DEEMED NECESSARY BY CONTROLLER TO CHECK CONFOR-
MANCE WITH FLIGHT PLAN
THEN (3.2.2) OBSERVE AIRCRAFT RESUMING NORMAL FLIGHT
PLAN
END IF**

**END DO
END IF**

**END DO
END IF
END DO**

SUB-ACTIVITY 3.3. RESPONDING TO SPECIAL USE AIRSPACE EVENTS



SUB-ACTIVITY 3.3: RESPONDING TO SPECIAL USE AIRSPACE EVENTS

**INPUT = NOTICE OF AIRSPACE RESTRICTION/RELEASE FROM CONTROLLER/
SUPERVISOR, DISPLAY OF AIRSPACE RESTRICTION STATUS CHANGE**

DO

**IF INPUT IS NOTICE OF AIRSPACE RESTRICTION/RELEASE
THEN [7.5.1] RECEIVE NOTICE OF AIRSPACE RESTRICTION/RELEASE FROM CONTROLLER/
SUPERVISOR
ELSE (3.3.5) OBSERVE DISPLAY OF AIRSPACE RESTRICTION STATUS CHANGE
END IF**

(3.3.2) DESIGNATE/DELETE AN AREA IN USE

**(dp) DETERMINE WHETHER TO REQUEST AIRSPACE PROXIMITY PROBE OR TRIAL FLIGHT
PLAN AMENDMENT**

**IF DEEMED NECESSARY BY CONTROLLER TO OBTAIN PROBE RESULTS
THEN (3.3.1) REQUEST AIRSPACE PROXIMITY PROBE
ELSE (4.1.1) ENTER TRIAL FLIGHT PLAN AMENDMENT
END IF**

(3.3.3) DETERMINE WHETHER ATC CONTROLS SPECIAL USE AIRSPACE

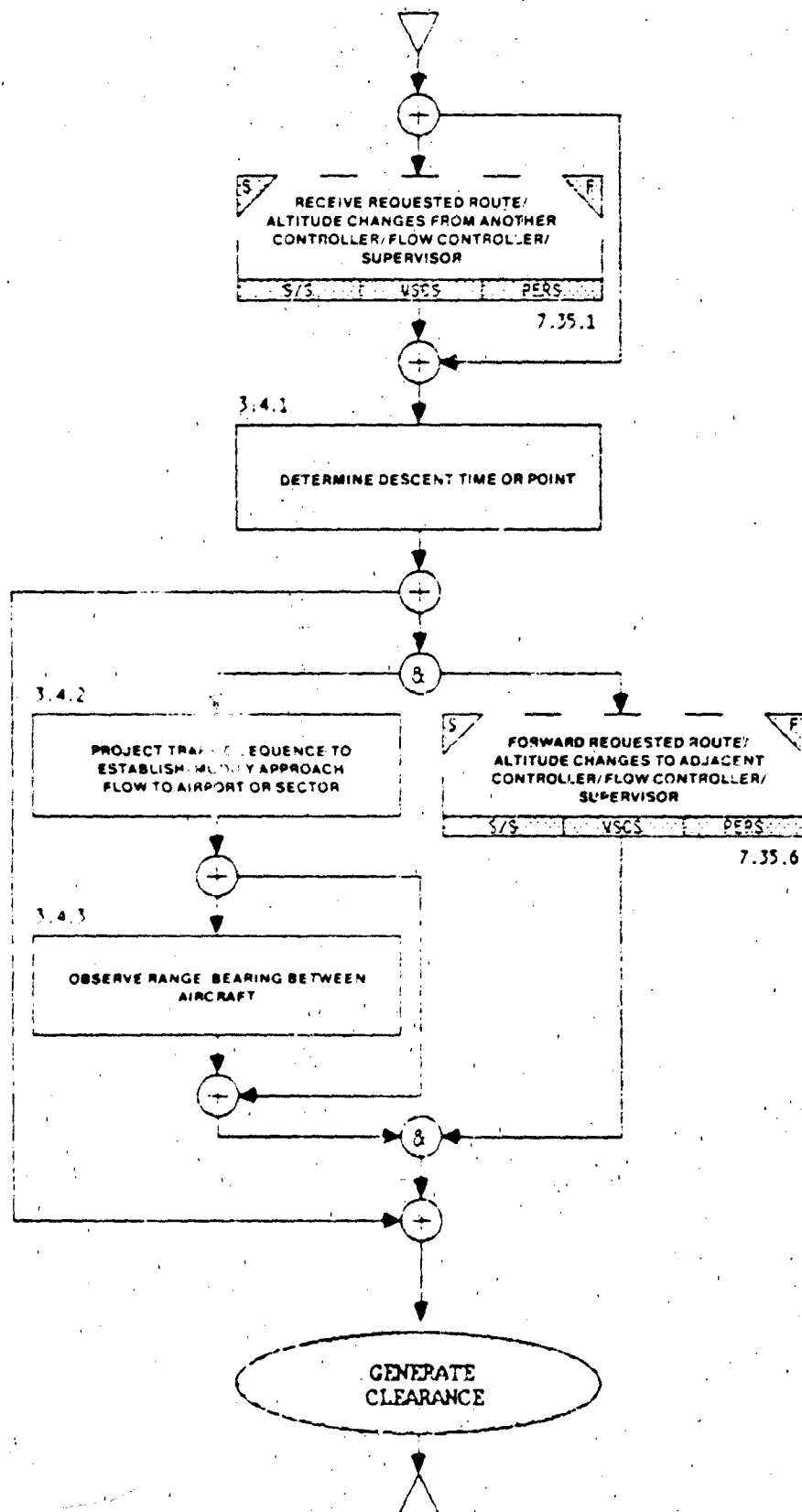
(dp) EVALUATE NECESSITY TO REQUEST RELEASE OF SPECIAL USE AIRSPACE

**IF DEEMED NECESSARY BY CONTROLLER
THEN [7.5.2] REQUEST RELEASE OF SPECIAL USE AIRSPACE
ELSE (3.3.4) RESTRICT AIRCRAFT ACTIVITY IN AREA BY ALTITUDE OR
SEGMENT
END IF**

GENERATE CLEARANCE

END DO

SUB-ACTIVITY 3.4 **ESTABLISHING ARRIVAL PATTERNS**



SUB-ACTIVITY 3.4: ESTABLISHING ARRIVAL PATTERNS

INPUT = REQUESTED ROUTE/ALTITUDE CHANGES FROM ANOTHER CONTROLLER/
FLOW CONTROLLER/SUPERVISOR, DESCENT TIME OR POINT

DO

IF DEEMED NECESSARY BY OTHER CONTROLLER, FLOW CONTROLLER, OR
SUPERVISOR
THEN [7.35.1] RECEIVE REQUESTED ROUTE/ALTITUDE CHANGES FROM ANOTHER
CONTROLLER/FLOW CONTROLLER/SUPERVISOR
END IF

(3.4.1) DETERMINE DESCENT TIME OR POINT

(dp) DETERMINE NECESSITY TO PROJECT TRAFFIC SEQUENCE OR FORWARD TRAFFIC
FLOW
IF DEEMED NECESSARY BY CONTROLLER TO PROJECT TRAFFIC SEQUENCE OR FOR-
WARD TRAFFIC
THEN DO

(dp) DETERMINE NECESSITY TO CREATE SEQUENCE

IF DEEMED NECESSARY BY CONTROLLER TO CREATE SEQUENCE
THEN (3.4.2) PROJECT TRAFFIC SEQUENCE TO ESTABLISH/MODIFY
APPROACH FLOW TO AIRPORT OR SECTOR
END IF

IF DEEMED NECESSARY TO MONITOR SPACING AND
SEPARATION
THEN (3.4.3) OBSERVE RANGE/BEARING BETWEEN
AIRCRAFT
END IF

ASE

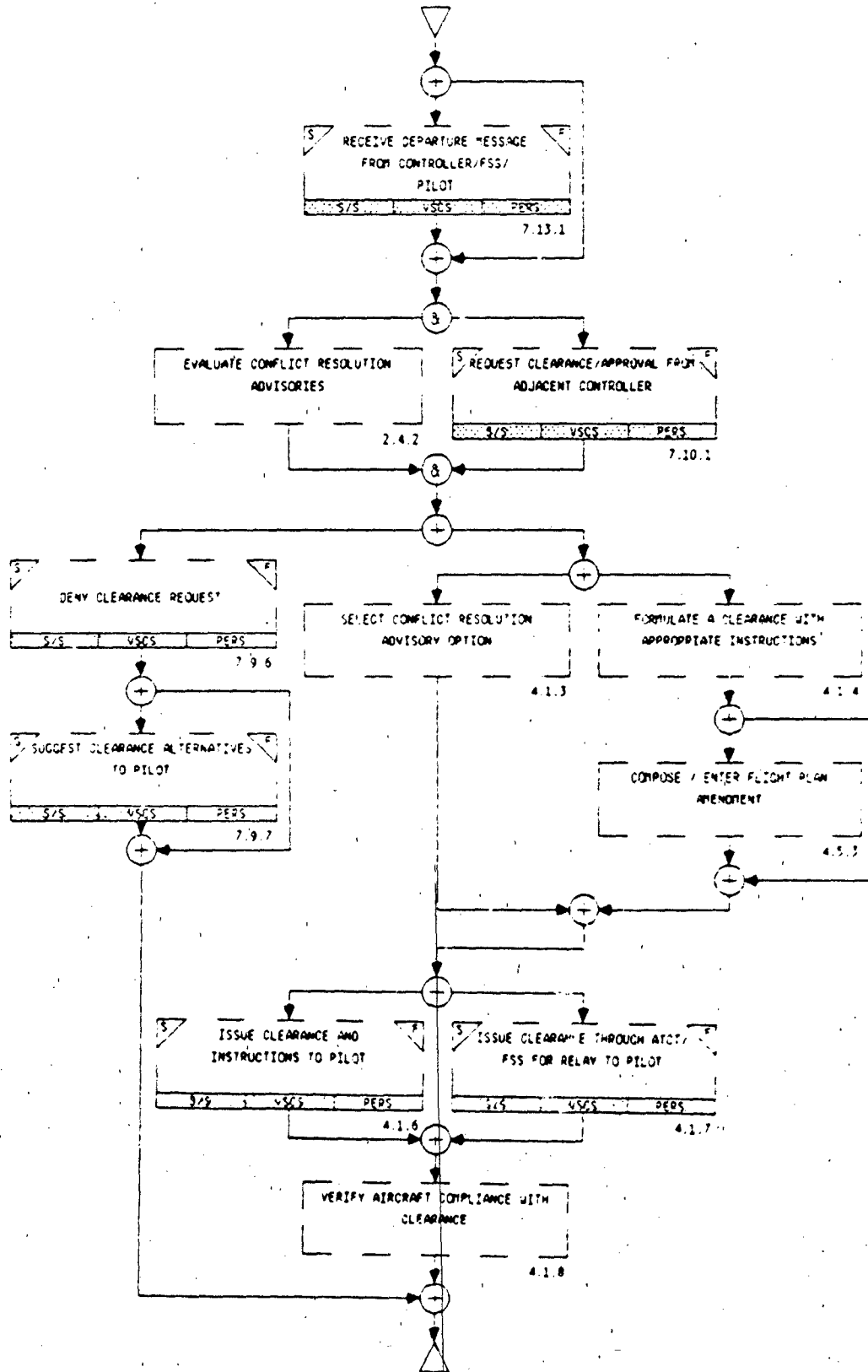
IF DEEMED NECESSARY BY CONTROLLER TO ESTABLISH FLOW
PATTERN
THEN [7.35.6] FORWARD REQUESTED ROUTE/ALTITUDE CHANGES
TO ADJACENT CONTROLLER/FLOW CONTROLLER/SUPERVISOR
END IF

END DO
END IF

GENERATE CLEARANCE

END DO

SUB-ACTIVITY 3.5 **MANAGING DEPARTURE PATTERNS**



SUB-ACTIVITY 3.5: MANAGING DEPARTURE PATTERNS

INPUT = DEPARTURE MESSAGE FROM CONTROLLER/FSS/PILOT, CONFLICT RESOLUTION ADVISORIES. CLEARANCE/APPROVAL FROM ADJACENT CONTROLLER

DO

IF AUTOMATION SUPPORT NOT AVAILABLE
THEN [7.13.1] RECEIVE DEPARTURE MESSAGE FROM CONTROLLER/FSS/PILOT
END IF

IF SYSTEM GENERATES ADVISORY LIST
THEN [2.4.2] EVALUATE CONFLICT RESOLUTION ADVISORIES
END IF

ASE

IF DEEMED NECESSARY BY CONTROLLER
THEN [7.10.1] REQUEST CLEARANCE/APPROVAL FROM ADJACENT CONTROLLER
END IF

(dp) DETERMINE WHETHER TO ISSUE CLEARANCE

IF CLEARANCE IS TO BE DENIED
THEN DO

[7.9.6] DENY CLEARANCE REQUEST

IF DEEMED NECESSARY BY CONTROLLER TO FORMULATE CLEARANCE
ALTERNATIVES
THEN [7.9.7] SUGGEST CLEARANCE ALTERNATIVES TO PILOT
END IF

END DO
ELSE DO

(dp) EVALUATE NECESSITY TO FORMULATE CLEARANCE
IF CONTROLLER PREFERENCE
THEN DO

[4.1.4] FORMULATE A CLEARANCE WITH APPROPRIATE
INSTRUCTIONS
IF FLIGHT PLAN AMENDMENT IS REQUIRED TO UPDATE THE DATA
BASE
THEN [4.5.3] COMPOSE/ENTER FLIGHT PLAN AMENDMENT
END IF

END DO
ELSE [4.1.3] SELECT CONFLICT RESOLUTION ADVISORY OPTION
END IF

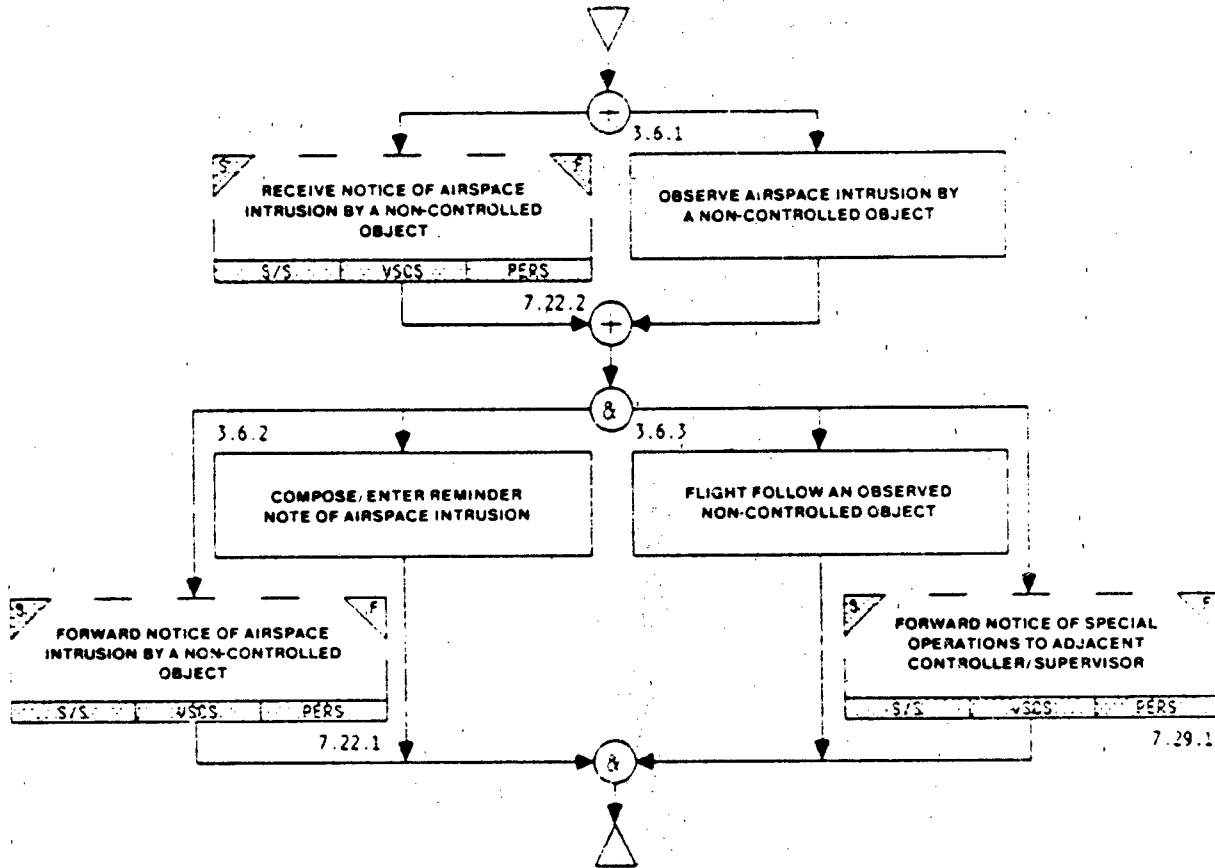
(dp) EVALUATE NECESSITY TO ISSUE CLEARANCE TO PILOT

IF PILOT IS ON YOUR FREQUENCY
THEN [4.1.6] ISSUE CLEARANCE AND INSTRUCTIONS TO PILOT
ELSE [4.1.7] ISSUE CLEARANCE THROUGH ATCT/FSS FOR RELAY TO PILOT
END IF

[4.1.8] VERIFY AIRCRAFT COMPLIANCE WITH CLEARANCE

END DO
END IF
END DO

**SUB-ACTIVITY 3.6
MONITORING NON-CONTROLLED
OBJECTS**



SUB-ACTIVITY 3.6: MONITORING NON-CONTROLLED OBJECTS

**INPUT = NOTICE OF AIRSPACE INTRUSION BY A NON-CONTROLLED OBJECT, AIR-
SPACE INTRUSION BY A NON-CONTROLLED OBJECT**

DO

**IF INPUT IS NOTICE OF AIRSPACE INTRUSION BY A NON-CONTROLLED OBJECT
THEN [7.22.2] RECEIVE NOTICE OF AIRSPACE INTRUSION BY A NON-CONTROLLED
OBJECT
ELSE (3.6.1) OBSERVE AIRSPACE INTRUSION BY A NON-CONTROLLED OBJECT**

END IF

IF DEEMED NECESSARY BY CONTROLLER

**THEN (3.6.2) COMPOSE/ENTER REMINDER NOTICE OF AIRSPACE INTRUSION
END IF**

ASE

**IF DEEMED NECESSARY BY CONTROLLER DUE TO OPERATIONAL REQUIREMENTS
THEN (3.6.3) FLIGHT FOLLOW AN OBSERVED NON-CONTROLLED OBJECT
END IF**

ASE

IF COORDINATION IS REQUIRED

**THEN [7.22.1] FORWARD NOTICE OF AIRSPACE INTRUSION BY A NON-CONTROLLED
OBJECT
END IF**

ASE

IF COORDINATION IS REQUIRED

**THEN [7.29.1] FORWARD NOTICE OF SPECIAL OPERATIONS TO ADJACENT CONTROLLER/
SUPERVISOR**

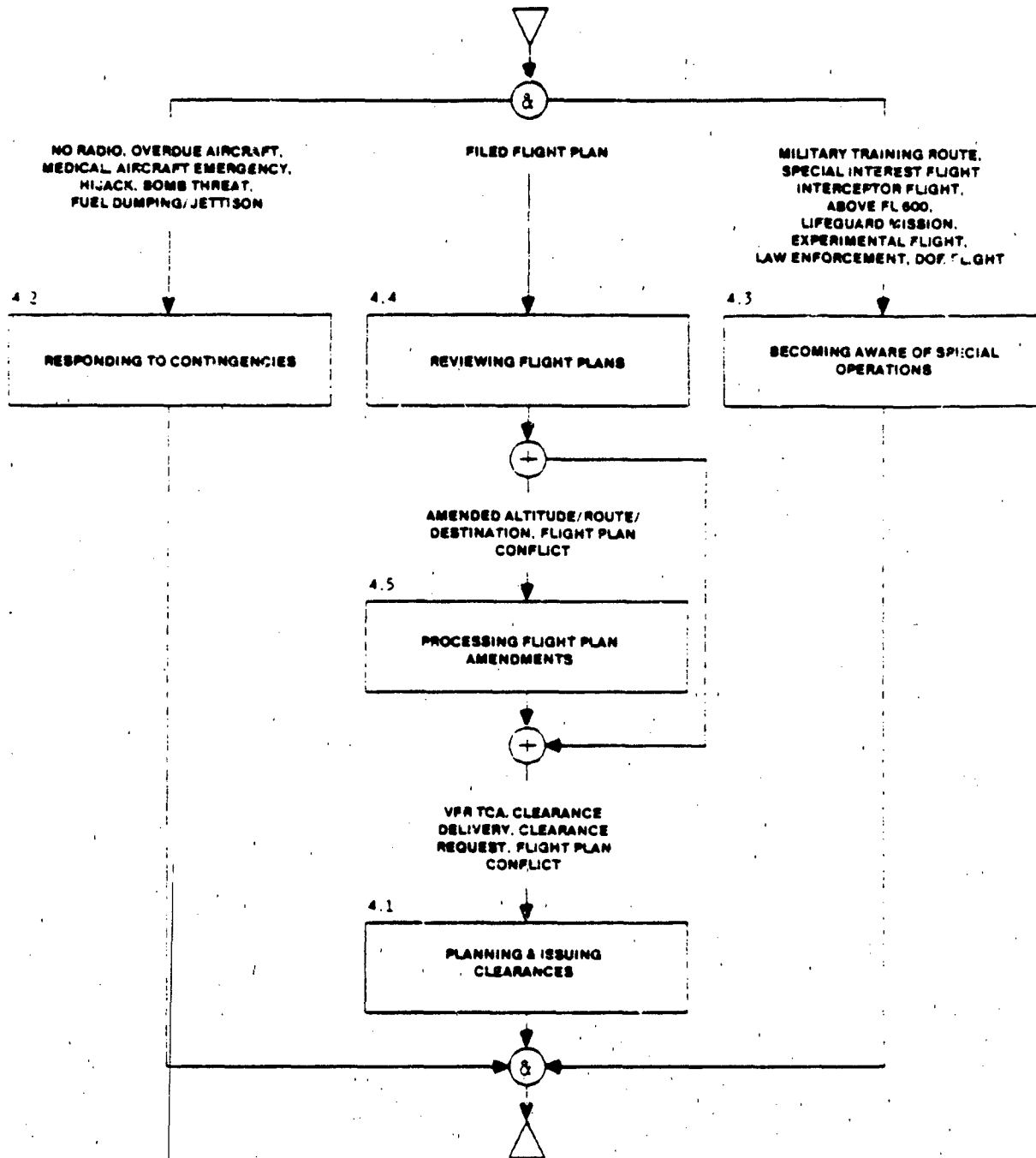
END IF

END DO

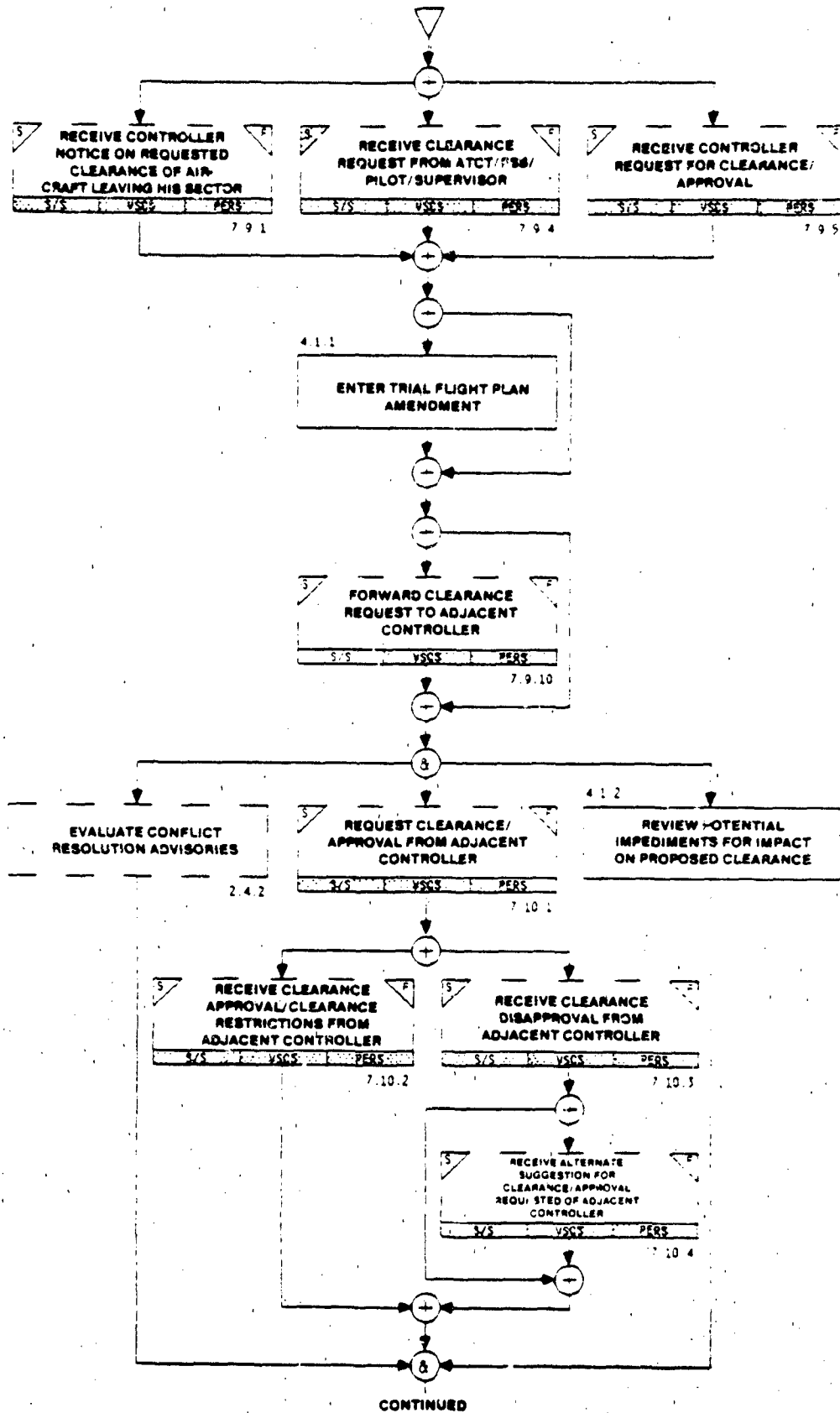
ROUTE/PLAN FLIGHTS

4.0

ACTIVITY 4 **ROUTE OR PLAN FLIGHTS**



SUB-ACTIVITY 4.1 PLANNING AND ISSUING CLEARANCES



SUB-ACTIVITY 4.1: PLANNING AND ISSUING CLEARANCES

INPUT = CONTROLLER NOTICE ON REQUESTED CLEARANCE OF AIRCRAFT LEAVING HIS SECTOR, CLEARANCE REQUEST FROM ATCT/FSS/PILOT/SUPERVISOR

DO

**IF INPUT IS CONTROLLER NOTICE ON REQUESTED CLEARANCE OF AIRCRAFT LEAVING HIS SECTOR
THEN [7.9.1] RECEIVE CONTROLLER NOTICE ON REQUESTED CLEARANCE OF AIRCRAFT LEAVING HIS SECTOR**

ELSE

**IF INPUT IS CLEARANCE REQUEST FROM ATCT/FSS/PILOT/SUPERVISOR
THEN [7.9.4] RECEIVE CLEARANCE REQUEST FROM ATCT/FSS/PILOT/SUPERVISOR
ELSE**

[7.9.5] RECEIVE CONTROLLER REQUEST FOR CLEARANCE/APPROVAL

END IF

END IF

**IF DEEMED NECESSARY BY CONTROLLER TO OBTAIN RESULTS
THEN (4.1.1) ENTER TRAIL FLIGHT PLAN AMENDMENT
END IF**

**IF COORDINATION IS REQUIRED
THEN [7.9.10] FORWARD CLEARANCE REQUEST TO ADJACENT CONTROLLER
END IF**

**(dp) DETERMINE NECESSITY TO EVALUATE CONFLICT RESOLUTION ADVISORIES OR REQUEST CLEARANCE/APPROVAL
OR REVIEW POTENTIAL IMPEDIMENTS**

**IF DEEMED NECESSARY BY CONTROLLER TO OBTAIN PROBE RESULTS
THEN (2.4.2) EVALUATE CONFLICT RESOLUTION ADVISORIES
END IF**

ASE

**IF DEEMED NECESSARY BY CONTROLLER
THEN DO**

[7.10.1] REQUEST CLEARANCE/APPROVAL FROM ADJACENT CONTROLLER

(dp) DETERMINE WHETHER CLEARANCE HAD BEEN APPROVED

IF CLEARANCE HAS BEEN APPROVED

THEN [7.10.2] RECEIVE CLEARANCE APPROVAL CLEARANCE RESTRICTIONS FROM ADJACENT CONTROLLER

ELSE DO

[7.10.3] RECEIVE CLEARANCE DISAPPROVAL FROM ADJACENT CONTROLLER

IF DEEMED NECESSARY BY CONTROLLER

**THEN [7.10.4] RECEIVE ALTERNATE SUGGESTION FOR CLEARANCE/APPROVAL REQUESTED
OF ADJACENT CONTROLLER**

END IF

END DO

END IF

END DO

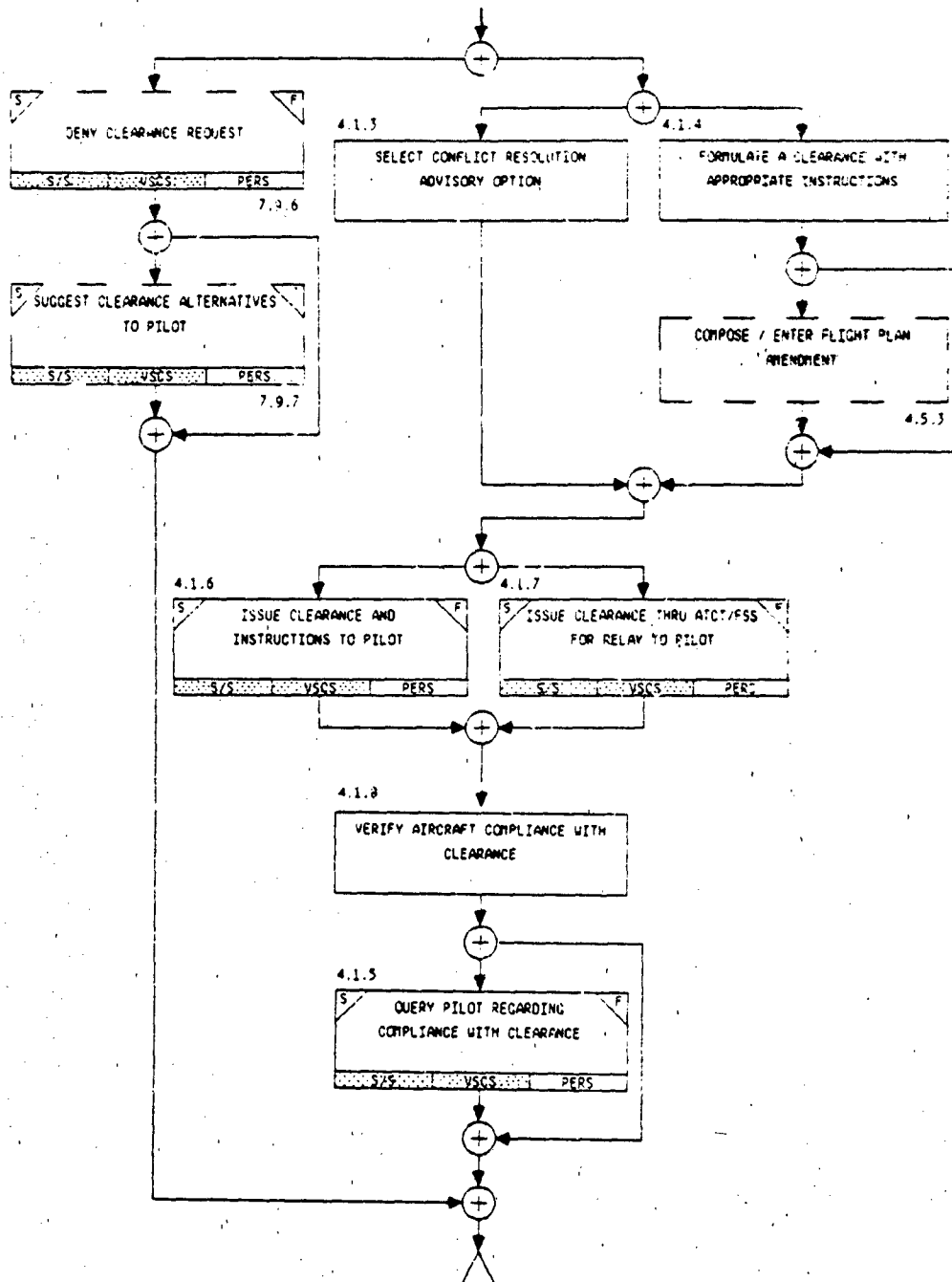
END IF

ASE

**IF DEEMED NECESSARY BY CONTROLLER
THEN (4.1.2) REVIEW POTENTIAL IMPEDIMENTS FOR IMPACT ON PROPOSED CLEARANCE
END IF**

(continued)

SUB-ACTIVITY 4.1 (continued)



(continued)

(do) DETERMINE WHETHER TO GRANT CLEARANCE REQUEST

IF CLEARANCE IS TO BE DENIED
THEN DO

[7.9.6] DENY CLEARANCE REQUEST
IF DEEMED NECESSARY BY CONTROLLER
THEN [7.9.7] SUGGEST CLEARANCE ALTERNATIVES TO PILOT
END IF

END DO
ELSE DO

(dp) EVALUATE NECESSITY TO FORMULATE CLEARANCE
IF CONTROLLER PREFERENCE
THEN DO

(4.1.4) FORMULATE A CLEARANCE WITH APPROPRIATE
INSTRUCTIONS
IF FLIGHT PLAN AMENDMENT IS REQUIRED TO UPDATE THE DATA
BASE
THEN [4.5.3] COMPOSE/ENTER FLIGHT PLAN AMENDMENT
END IF

END DO
ELSE (4.1.3) SELECT CONFLICT RESOLUTION ADVISORY OPTION
END IF

(dp) DETERMINE METHOD TO ISSUE CLEARANCE TO PILOT

IF DEEMED NECESSARY BY CONTROLLER AND PILOT ON YOUR FREQUENCY
THEN (4.1.8) ISSUE CLEARANCE AND INSTRUCTIONS TO PILOT
ELSE (4.1.7) ISSUE CLEARANCE THROUGH ATCT/FSS FOR RELAY TO PILOT

END IF

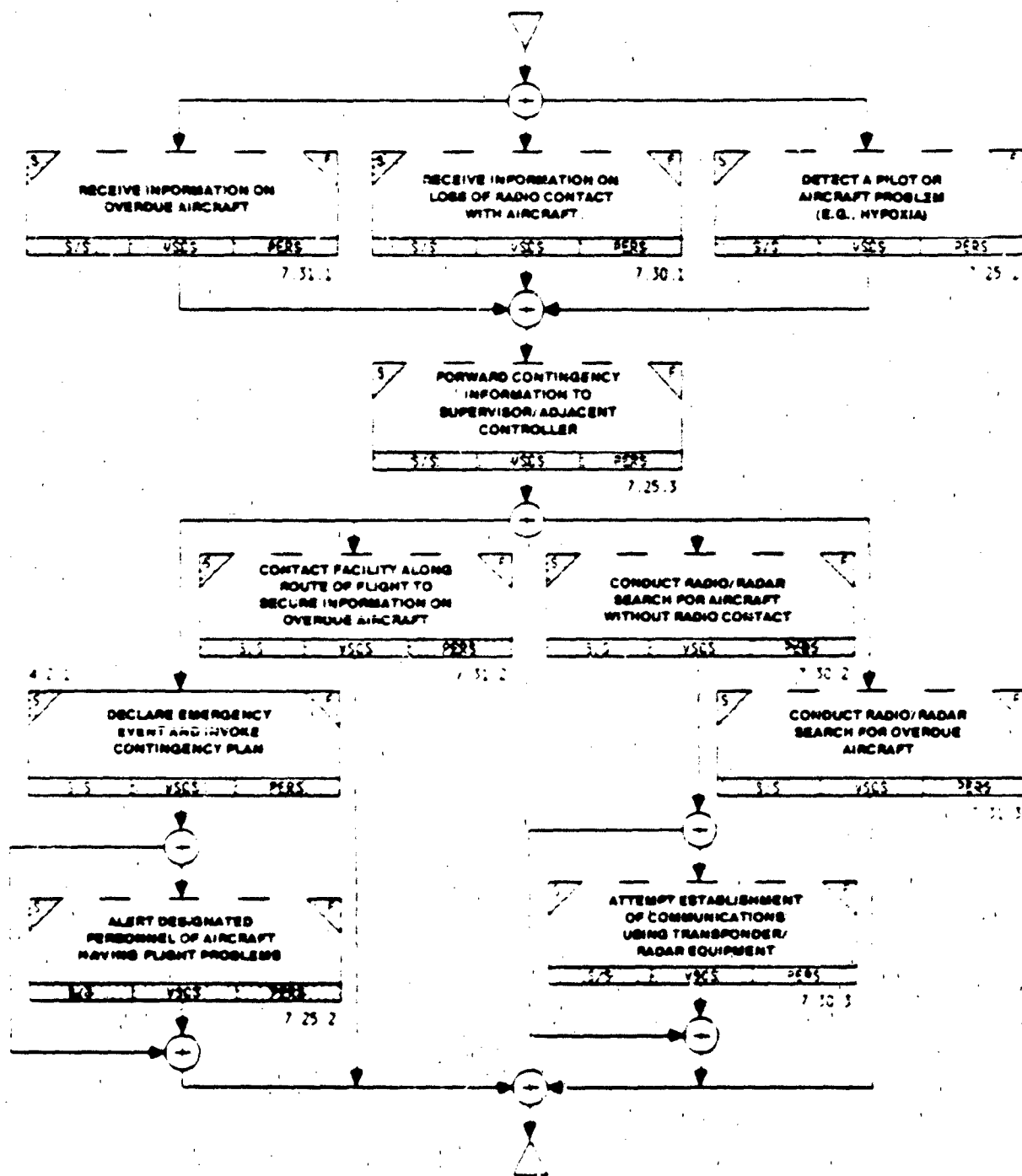
(4.1.8) VERIFY AIRCRAFT COMPLIANCE WITH CLEARANCE

IF DEEMED NECESSARY BY CONTROLLER IF NON-COMPLIANCE IS
SUSPECTED
THEN (4.1.5) QUERY PILOT REGARDING COMPLIANCE WITH CLEARANCE
END IF

END DO
END IF

END DO

SUB-ACTIVITY A.2 **RESPONDING TO CONTINGENCIES**



SUB-ACTIVITY 4.2: RESPONDING TO CONTINGENCIES

INPUT = INFORMATION ON OVERDUE AIRCRAFT, INFORMATION ON LOSS OF RADIO CONTACT WITH AIRCRAFT, A PILOT OR AIRCRAFT PROBLEM

DO

IF INPUT IS INFORMATION ON OVERDUE AIRCRAFT

THEN [7.31.1] RECEIVE INFORMATION ON OVERDUE AIRCRAFT

ELSE

IF INPUT IS INFORMATION ON LOSS OF RADIO CONTACT WITH AIRCRAFT

THEN [7.30.1] RECEIVE INFORMATION ON LOSS OF RADIO CONTACT WITH AIRCRAFT

ELSE [7.25.1] DETECT A PILOT OR AIRCRAFT PROBLEM (e.g., HYPOXIA)

END IF

END IF

[7.25.3] FORWARD CONTINGENCY INFORMATION TO SUPERVISOR/ADJACENT CONTROLLER

(dp) EVALUATE NECESSITY TO CONTACT FACILITY ALONG ROUTE

IF DEEMED NECESSARY BY CONTROLLER TO OBTAIN INFORMATION

THEN [7.31.2] CONTACT FACILITY ALONG ROUTE OF FLIGHT TO SECURE INFORMATION ON OVERDUE AIRCRAFT

ELSE DO

(dp) EVALUATE NECESSITY TO CONDUCT RADIO/RADAR SEARCH FOR AIRCRAFT WITHOUT RADIO CONTACT

IF DEEMED NECESSARY BY CONTROLLER

THEN DO

[7.30.2] CONDUCT RADIO/RADAR SEARCH FOR AIRCRAFT WITHOUT RADIO CONTACT

IF DEEMED NECESSARY BY CONTROLLER

THEN [7.30.3] ATTEMPT ESTABLISHMENT OF COMMUNICATIONS USING TRANSPONDER/RADAR EQUIPMENT

END IF

END DO

ELSE DO

(dp) EVALUATE NECESSITY TO CONDUCT RADIO/RADAR SEARCH FOR OVERDUE AIRCRAFT

IF REQUIRED BY DIRECTIVE

THEN [7.31.3] CONDUCT RADIO/RADAR SEARCH FOR OVERDUE AIRCRAFT

ELSE DO

(4.2.1) DECLARE EMERGENCY EVENT AND INVOKE CONTINGENCY PLAN

IF REQUIRED BY DIRECTIVE

THEN [7.25.2] ALERT DESIGNATED PERSONNEL OF AIRCRAFT HAVING FLIGHT PROBLEMS

END IF

END DO

END DO

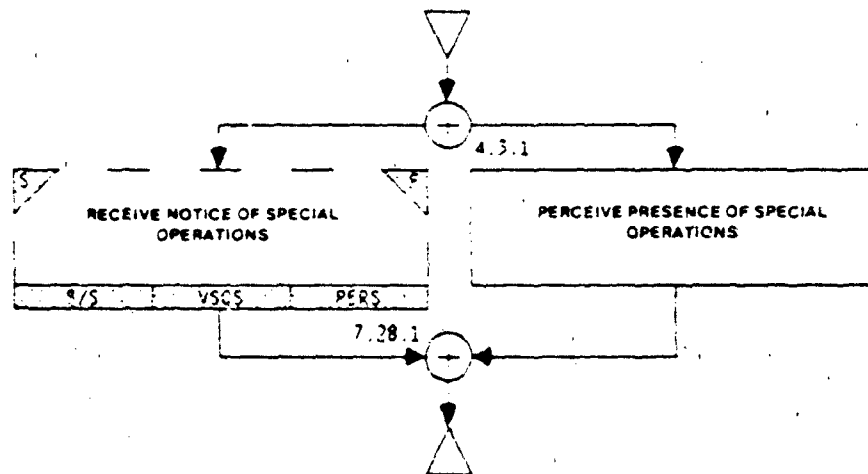
END IF

END DO

END IF

END DO

SUB-ACTIVITY 4.3
BECOMING AWARE OF
SPECIAL OPERATIONS



SUB-ACTIVITY 4.3: BECOMING AWARE OF SPECIAL OPERATIONS

INPUT = NOTICE OF SPECIAL OPERATIONS, PRESENCE OF FOR SPECIAL OPERATIONS

DO

IF INPUT IS NOTICE OF SPECIAL OPERATIONS

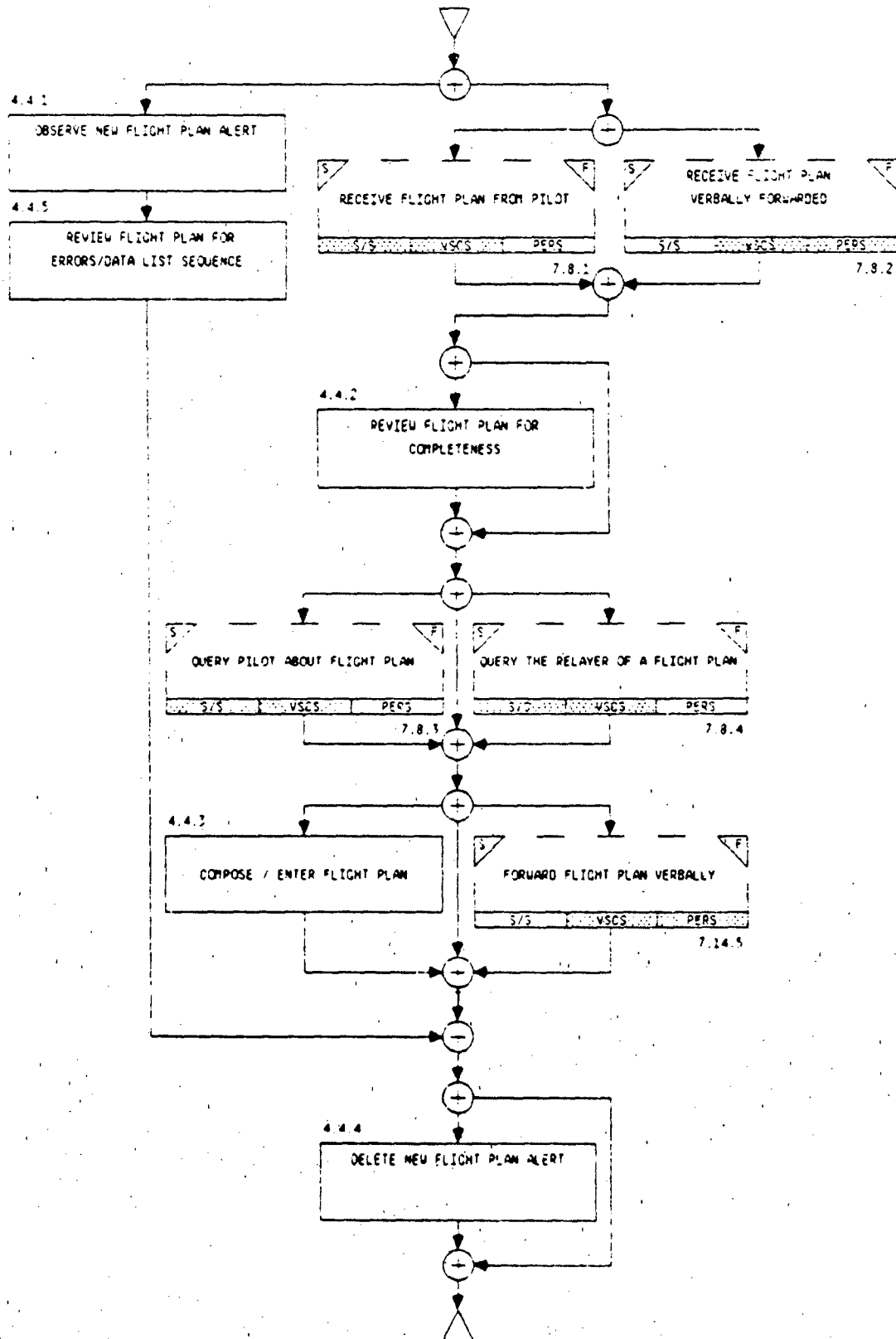
THEN [7.28.1] RECEIVE NOTICE OF SPECIAL OF .RATIONS

ELSE (4.3.1) PERCEIVE PRESENCE OF SPECIAL OPERATIONS

END IF

END DO

SUB-ACTIVITY 4.4 **REVIEWING FLIGHT PLANS**



SUB-ACTIVITY 4.4: REVIEWING FLIGHT PLANS

INPUT = FLIGHT PLAN FROM PILOT, NEW FLIGHT PLAN ALERT, FLIGHT PLAN
VERBALLY FORWARDED

DO

IF INPUT IS NEW FLIGHT PLAN ALERT
THEN DO

(4.4.1) OBSERVE NEW FLIGHT PLAN ALERT
(4.4.5) REVIEW FLIGHT PLAN FOR ERRORS/DATA LIST SEQUENCE

ELSE DO

IF INPUT IS FLIGHT PLAN FROM PILOT
THEN [7.8.1] RECEIVE FLIGHT PLAN FROM PILOT
ELSE [7.8.2] RECEIVE FLIGHT PLAN VERBALLY FORWARDED
END IF

IF REQUIRED BY DIRECTIVE
THEN (4.4.2) REVIEW FLIGHT PLAN FOR COMPLETENESS
END IF

(dp) EVALUATE NECESSITY TO VERIFY FLIGHT PLAN
IF DEEMED NECESSARY BY CONTROLLER TO VERIFY FLIGHT PLAN
THEN [7.8.3] QUERY PILOT ABOUT FLIGHT PLAN
ELSE DO

(dp) EVALUATE NECESSITY TO QUERY RELAYER OF A FLIGHT PLAN
IF DEEMED NECESSARY BY CONTROLLER TO VERIFY FLIGHT PLAN
THEN [7.8.4] QUERY THE RELAYER OF A FLIGHT PLAN
END IF

END DO
END IF

(dp) EVALUATE NECESSITY TO INITIATE OR UPDATE DATA BASE OR FORWARD
FLIGHT PLAN VERBALLY
IF DEEMED NECESSARY TO INITIATE OR UPDATE DATA BASE
THEN (4.4.3) COMPOSE/ENTER FLIGHT PLAN
ELSE DO

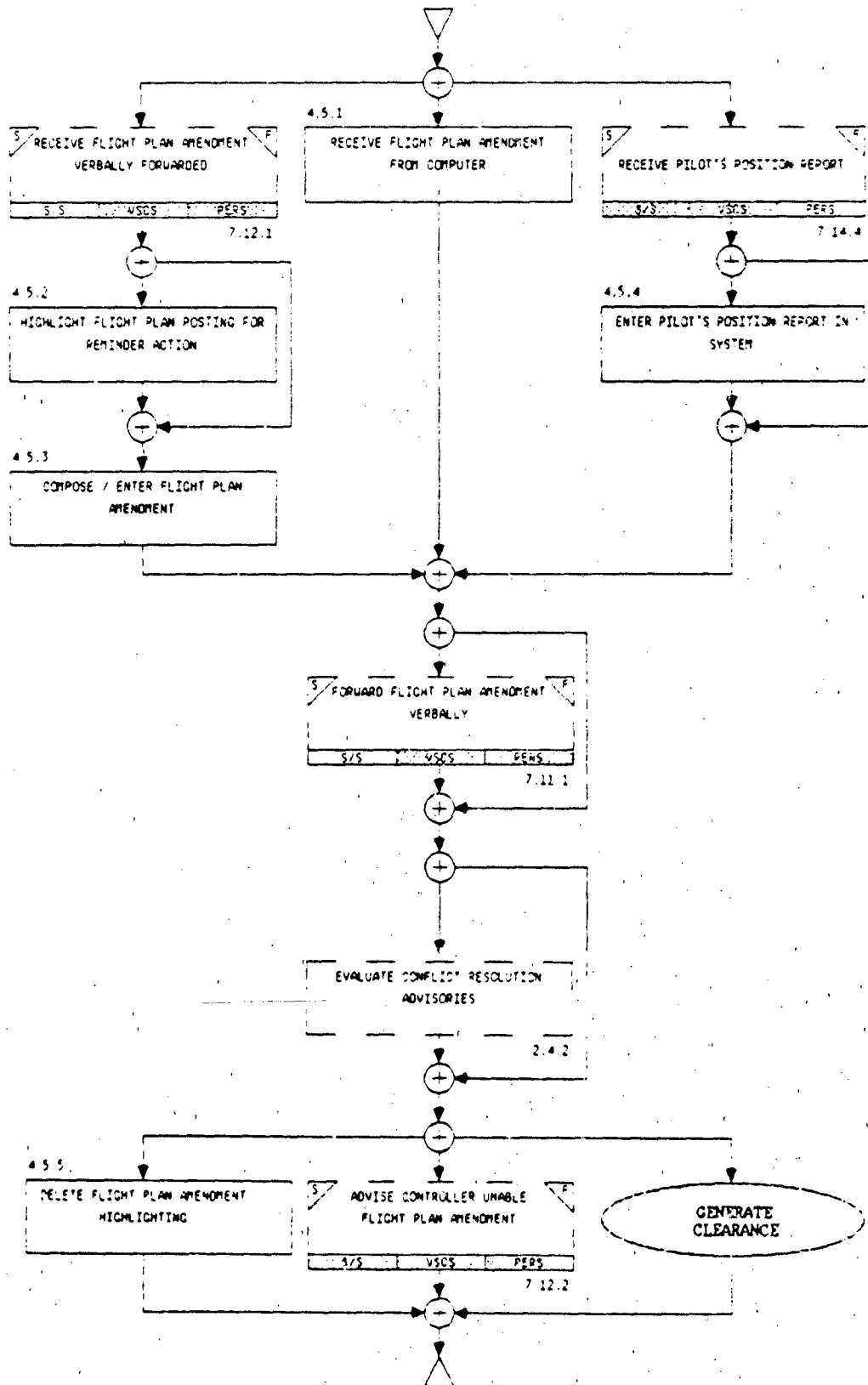
(dp) EVALUATE NECESSITY TO FORWARD FLIGHT PLAN VERBALLY
IF AUTOMATION SUPPORT IS UNAVAILABLE
THEN [7.14.5] FORWARD FLIGHT PLAN VERBALLY
END IF

END DO
END IF

IF CONTROLLER PREFERENCE
THEN (4.4.4) DELETE NEW FLIGHT PLAN ALERT

END IF
END DO
END DO

SUB-ACTIVITY 4.5 **PROCESSING FLIGHT PLAN AMENDMENTS**



SUB-ACTIVITY 4.5: PROCESSING FLIGHT PLAN AMENDMENTS

INPUT = FLIGHT PLAN AMENDMENT VERBALLY FORWARDED, FLIGHT PLAN AMENDMENT FROM COMPUTER, PILOT'S POSITION REPORT

DO

IF INPUT IS FLIGHT PLAN AMENDMENT FROM COMPUTER
THEN (4.5.1) RECEIVE FLIGHT PLAN AMENDMENT FROM COMPUTER
ELSE

IF INPUT IS PILOT'S POSITION REPORT
THEN DO

[7.14.4] RECEIVE PILOT'S POSITION REPORT
IF AIRCRAFT NOT RECEIVING RADAR SERVICE
THEN (4.5.4) ENTER PILOT'S POSITION REPORT IN SYSTEM
END IF

END DO
ELSE DO

[7.12.1] RECEIVE FLIGHT PLAN AMENDMENT VERBALLY
FORWARDED
IF DEEMED NECESSARY BY CONTROLLER
THEN (4.5.2) HIGHLIGHT FLIGHT PLAN POSTING FOR REMINDER
ACTION
END IF

(4.5.3) COMPOSE/ENTER FLIGHT PLAN AMENDMENT

END DO
END IF

END IF

IF AUTOMATION SUPPORT NOT AVAILABLE
THEN [7.11.1] FORWARD FLIGHT PLAN AMENDMENT VERBALLY
END IF

IF SYSTEM GENERATES ADVISORY LIST
THEN [2.4.2] EVALUATE CONFLICT RESOLUTION ADVISORIES
END IF

(dp) EVALUATE NECESSITY TO DELETE FLIGHT PLAN AMENDMENT HIGHLIGHTING

IF DEEMED NECESSARY BY CONTROLLER
THEN (4.5.5) DELETE FLIGHT PLAN AMENDMENT HIGHLIGHTING
ELSE

(dp) EVALUATE NECESSITY TO ADVISE CONTROLLER
IF DEEMED NECESSARY BY CONTROLLER DUE TO OPERATIONAL REQUIREMENTS OR DIRECTIVE
THEN [7.12.2] ADVISE CONTROLLER UNABLE FLIGHT PLAN AMENDMENT
ELSE GENERATE CLEARANCE
END IF

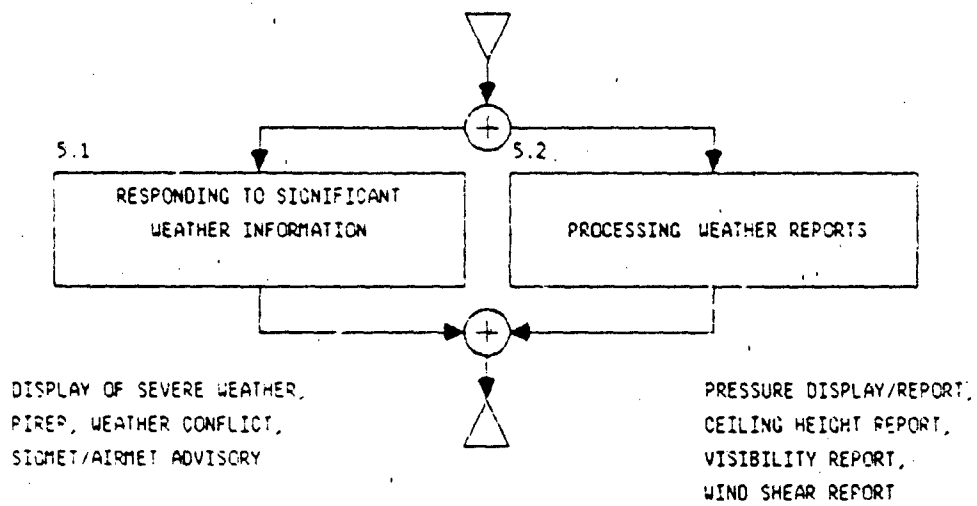
END IF

END DO

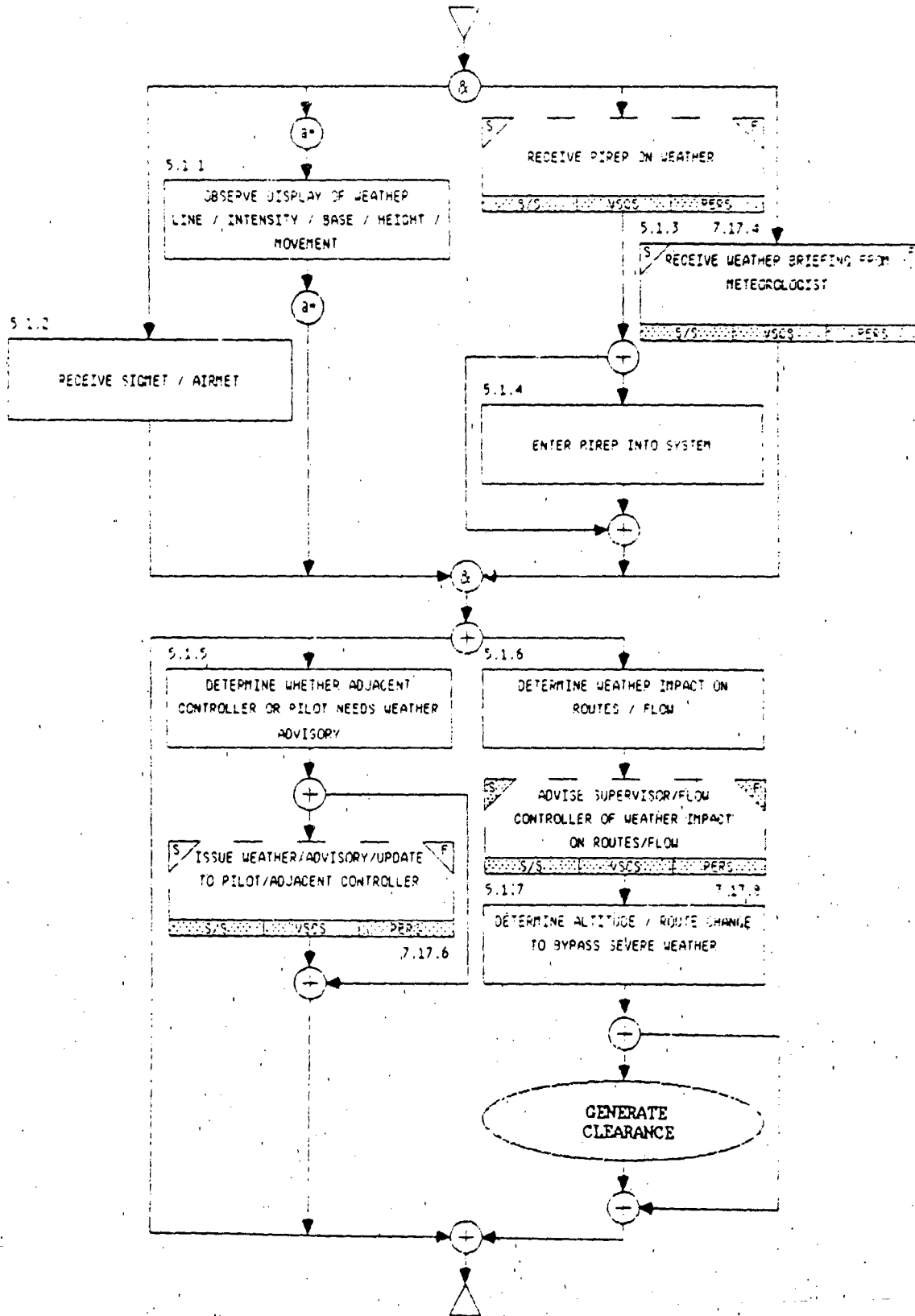
ASSESS WEATHER IMPACT

5.0

ACTIVITY 5
ASSESS WEATHER IMPACT



**SUB-ACTIVITY 5.1
RESPONDING TO SIGNIFICANT WEATHER
INFORMATION**



SUB-ACTIVITY 5.1: RESPONDING TO SIGNIFICANT WEATHER INFORMATION

INPUT = DISPLAY OF WEATHER, PIREP, SIGMET/AIRMET, WEATHER BRIEFING

DO

IF DISPLAY OF WEATHER IS OBSERVABLE

THEN DO WHILE (CONDITION EXISTS)

(5.1.1) OBSERVE DISPLAY OF WEATHER LINE/INTENSITY/BASE/HEIGHT/MOVEMENT

END DO

END IF

ASE

IF PIREP SENT

THEN DO

[7.17.4] RECEIVE PIREP ON WEATHER

IF DEEMED NECESSARY BY CONTROLLER OR DIRECTIVE

THEN (5.1.4) ENTER PIREP INTO SYSTEM

END IF

END DO

END IF

ASE

IF DEEMED NECESSARY BY OTHER PEOPLE

THEN (5.1.2) RECEIVE SIGMET/AIRMET

END IF

ASE

IF AVAILABLE FROM METEOROLOGIST

THEN (5.1.3) RECEIVE WEATHER BRIEFING FROM METEOROLOGIST

END IF

(dp) EVALUATE NECESSITY TO DETERMINE WEATHER IMPACT ON ROUTES/FLOW OR
WHETHER ADJACENT CONTROLLER OR PILOT NEEDS WEATHER ADVISORY

IF REQUIRED BY DIRECTIVE

THEN DO

(dp) EVALUATE NECESSITY TO DETERMINE WEATHER IMPACT ON
ROUTES/FLOW

IF REQUIRED BY DIRECTIVE

THEN DO

(5.1.6) DETERMINE WEATHER IMPACT ON ROUTES/FLOW

[7.17.8] ADVISE SUPERVISOR/FLOW CONTROLLER OF
WEATHER IMPACT ON ROUTES/FLOW

(5.1.7) DETERMINE ALTITUDE/ROUTE CHANGE TO BYPASS
SEVERE WEATHER

IF DEEMED NECESSARY BY CONTROLLER

THEN GENERATE CLEARANCE

END IF

END DO

END IF

END DO

ELSE DO

(5.1.5) DETERMINE WHETHER ADJACENT CONTROLLER OR PILOT
NEEDS WEATHER ADVISORY

IF DEEMED NECESSARY BY CONTROLLER

THEN [7.17.6] ISSUE WEATHER/ADVISORY/UPDATE TO
PILOT/ADJACENT CONTROLLER

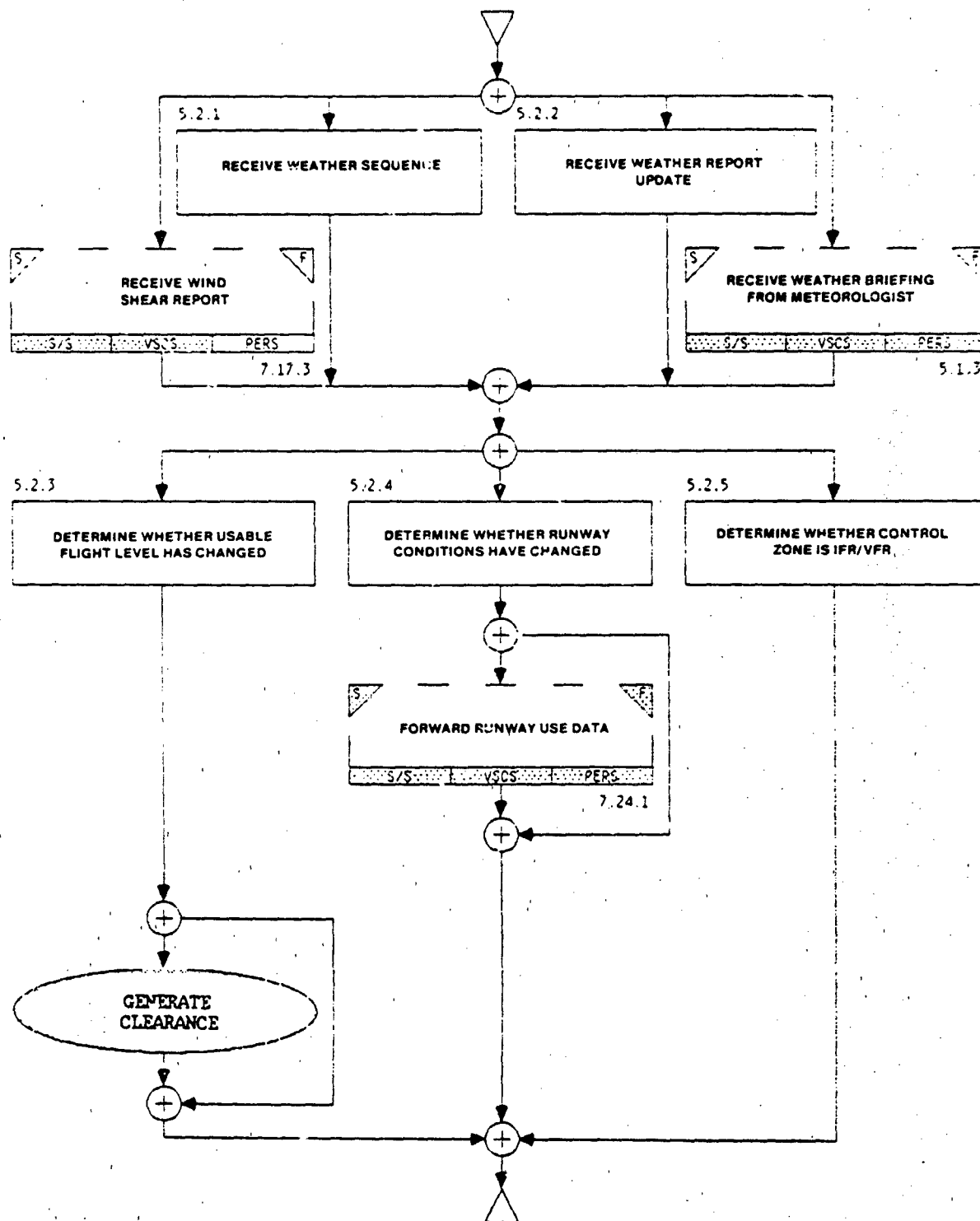
END IF

END DO

END IF

END DO

SUB-ACTIVITY 5.2 **PROCESSING WEATHER REPORTS**



SUB-ACTIVITY 5.2: PROCESSING WEATHER REPORTS

INPUT = WEATHER SEQUENCE, WEATHER REPORT UPDATE, WIND SHEAR REPORT,
WEATHER BRIEFING FROM METEOROLOGIST

DO

IF INPUT IS WEATHER SEQUENCE

THEN (5.2.1) RECEIVE WEATHER SEQUENCE

ELSE

IF INPUT IS WEATHER REPORT UPDATE

THEN (5.2.2) RECEIVE WEATHER REPORT UPDATE

ELSE

IF INPUT IS WIND SHEAR REPORT

THEN [7.17.3] RECEIVE WIND SHEAR REPORT

ELSE [5.1.3] RECEIVE WEATHER BRIEFING FROM
METEOROLOGIST

END IF

END IF

(dp) EVALUATE NECESSITY TO DETERMINE WHETHER USABLE FLIGHT LEVEL HAS
CHANGED

IF REQUIRED BY DIRECTIVE

THEN (5.2.3) DETERMINE WHETHER USABLE FLIGHT LEVEL HAS CHANGED

IF DEEMED NECESSARY BY CONTROLLER OR REQUIRED BY
DIRECTIVE

THEN GENERATE CLEARANCE

END IF

ELSE DO

(dp) EVALUATE NECESSITY TO DETERMINE WHETHER RUNWAY CONDITIONS
HAVE CHANGED

IF REQUIRED BY DIRECTIVE

THEN DO

(5.2.4) DETERMINE WHETHER RUNWAY CONDITIONS HAVE
CHANGED

IF COORDINATION IS REQUIRED

THEN [7.24.1] FORWARD RUNWAY USE DATA

END IF

END DO

ELSE

(5.2.5) DETERMINE WHETHER CONTROL ZONE IS IFR/VFR

END IF

END DO

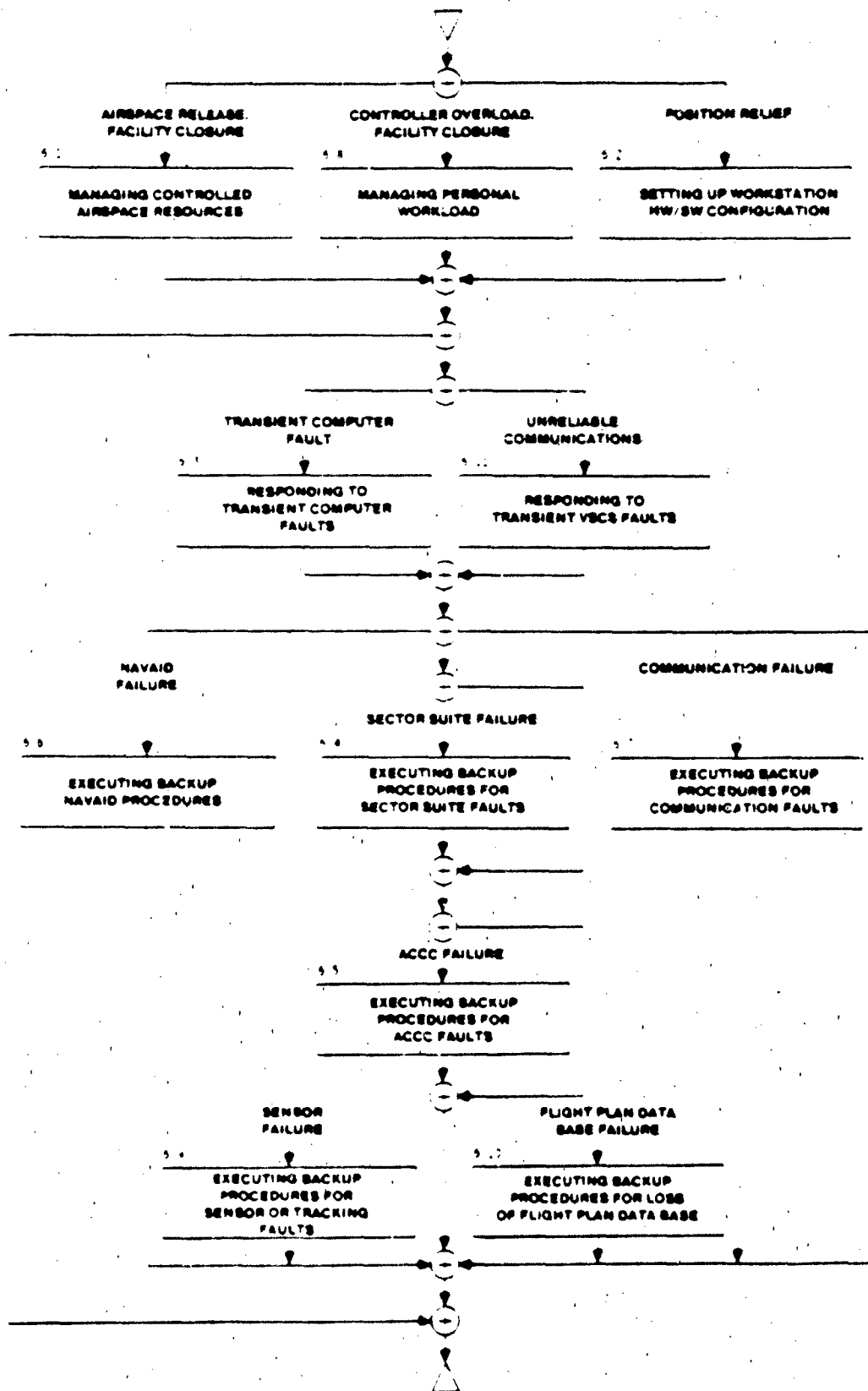
END IF

END DO

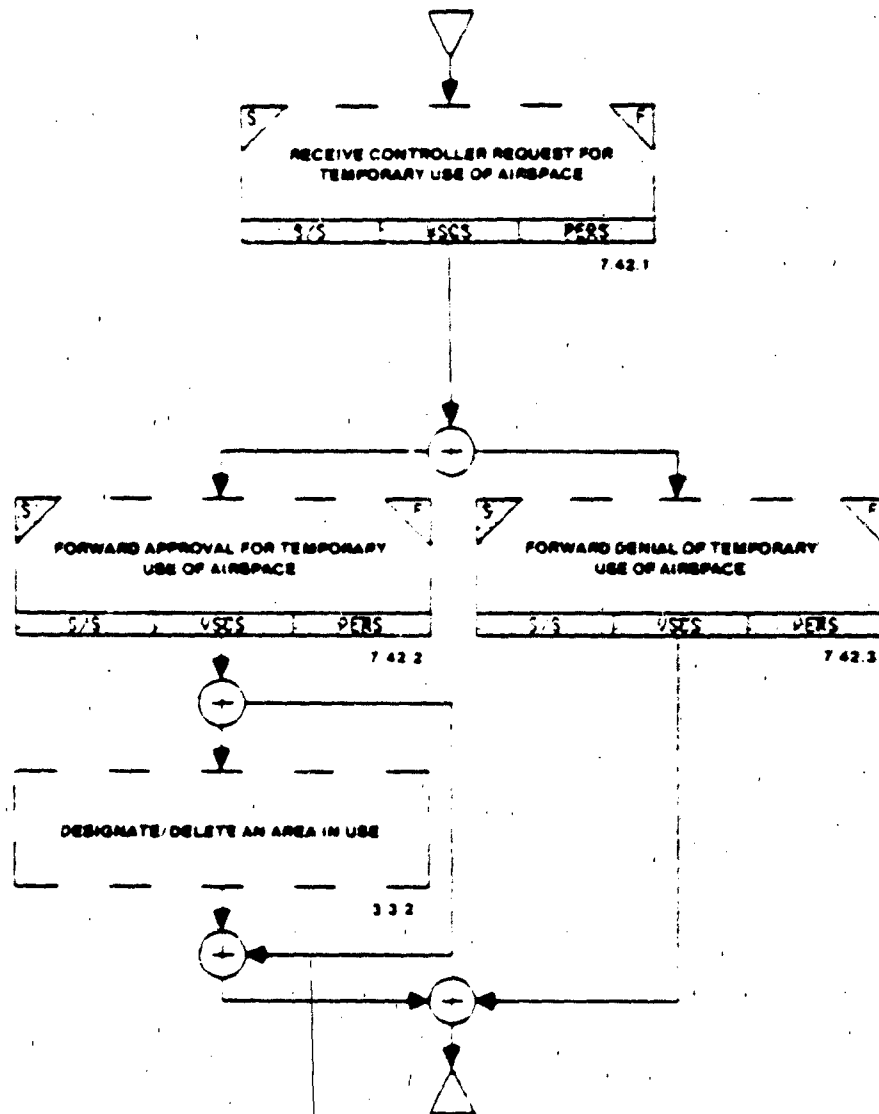
MANAGE SECTOR/POSITION RESOURCES

6.0

ACTIVITY 6 **MANAGE SECTOR/POSITION RESOURCES**



**SUB-ACTIVITY 6.1
MANAGING CONTROLLED AIRSPACE
RESOURCES**



SUB-ACTIVITY 6.1: MANAGING CONTROLLED AIRSPACE RESOURCES

INPUT = CONTROLLER REQUEST FOR TEMPORARY USE OF AIRSPACE

DO

[7.42.1] RECEIVE CONTROLLER REQUEST FOR TEMPORARY USE OF AIRSPACE

(dp) EVALUATE NECESSITY TO RELEASE AIRSPACE

IF DIRECTIVE PERMITS

THEN DO

[7.42.2] FORWARD APPROVAL FOR TEMPORARY USE OF AIRSPACE

IF DEEMED NECESSARY BY CONTROLLER

THEN [3.3.2] DESIGNATE/DELETE AN AREA IN USE

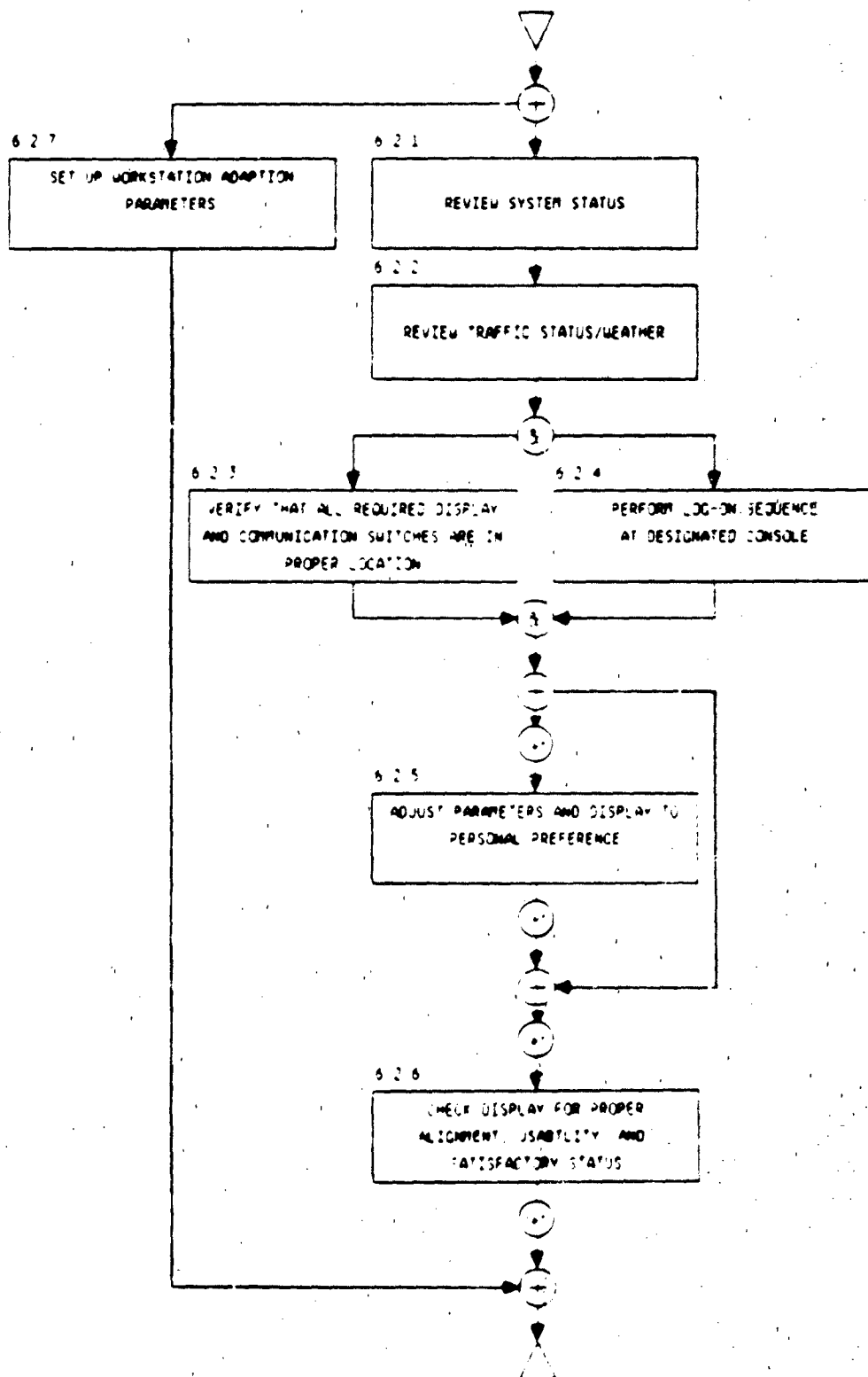
END IF

ELSE [7.42.3] FORWARD DENIAL OF TEMPORARY USE OF AIRSPACE

END IF

END DO

SUB-ACTIVITY 6.2
SETTING UP WORKSTATION
HW/SW CONFIGURATION



SUB-ACTIVITY 6.2: SETTING UP WORKSTATION HW/SW CONFIGURATION

INPUT = NEED TO SET UP WORKSTATION PARAMETERS, NEED TO REVIEW SYSTEM STATUS

DO

**IF INPUT IS NEED TO REVIEW SYSTEM STATUS
THEN (6.2.1) REVIEW SYSTEM STATUS**

(6.2.2) REVIEW TRAFFIC STATUS/WEATHER

(dp) DETERMINE NECESSITY TO VERIFY DISPLAY AND SWITCHES

**IF CONTROLLER PREFERENCE OR REQUIRED BY DIRECTIVE
THEN (6.2.3) VERIFY THAT ALL REQUIRED DISPLAY AND COMMUNICATION SWITCHES ARE
IN PROPER LOCATION**

END IF

ASE

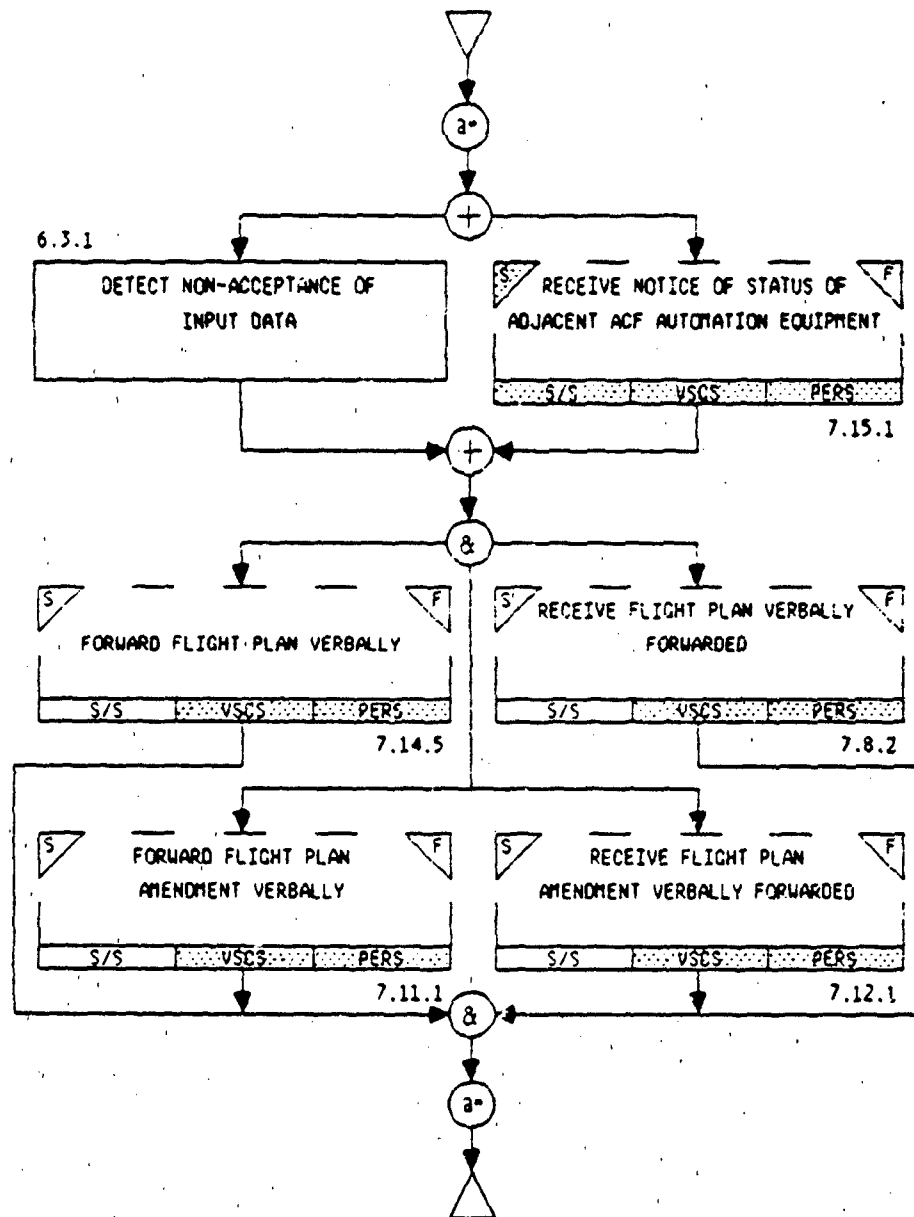
**IF REQUIRED BY DIRECTIVE
THEN (6.2.4) PERFORM LOG-ON SEQUENCE AT DESIGNATED CONSOLE
END IF**

**IF CONTROLLER PREFERENCE
THEN (6.2.5) ADJUST PARAMETERS AND DISPLAY TO PERSONAL PREFERENCE
END IF**

**(6.2.6) CHECK DISPLAY FOR PROPER ALIGNMENT, USABILITY, AND SATISFACTORY STATUS
ELSE (6.2.7) SET UP WORKSTATION ADAPTION PARAMETERS
END IF**

END DO

**SUB-ACTIVITY 6.3
RESPONDING TO TRANSIENT
COMPUTER FAULTS**



SUB-ACTIVITY 6.3: RESPONDING TO TRANSIENT COMPUTER FAULTS

INPUT = TRANSIENT COMPUTER FAULTS

DO WHILE (TRANSIENT COMPUTER FAULT CONDITION EXISTS)

**IF NOTICE OF STATUS OF ADJACENT ACF AUTOMATION EQUIPMENT APPEARS
OR NON-ACCEPTANCE OF INPUT DATA OCCURS
THEN DO**

**IF NON-ACCEPTANCE OF INPUT DATA OCCURS
 THEN (6.3.1) DETECT NON-ACCEPTANCE OF INPUT DATA
 END DO**

**ELSE [7.15.1] RECEIVE NOTICE OF STATUS OF ADJACENT ACF
 AUTOMATION EQUIPMENT
 END IF**

**IF REPEATED TRANSMISSIONS FAIL
[7.14.5] FORWARD FLIGHT PLAN VERBALLY
END IF**

ASE

**IF REPEATED TRANSMISSIONS FAIL
[7.12.1] RECEIVE FLIGHT PLAN AMENDMENT VERBALLY FORWARDED
END IF**

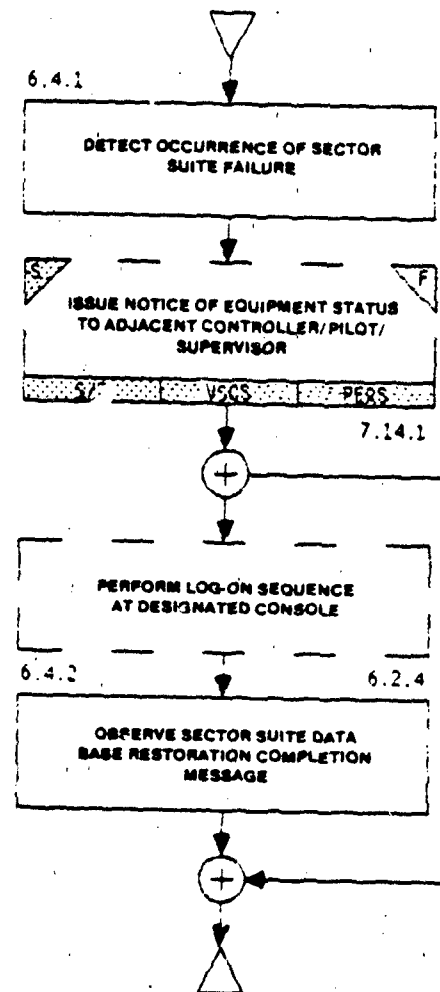
ASE

**IF REPEATED TRANSMISSIONS FAIL
[7.8.2] RECEIVE FLIGHT PLAN VERBALLY FORWARDED
END IF**

ASE

**IF REPEATED TRANSMISSIONS FAIL
[7.11.1] FORWARD FLIGHT PLAN AMENDMENT VERBALLY
END IF
END DO**

**SUB-ACTIVITY 6.4
EXECUTING BACKUP PROCEDURES
FOR SECTOR SUITE FAULTS**



SUB-ACTIVITY 6.4: EXECUTING BACKUP PROCEDURES FOR SECTOR SUITE FAULTS

INPUT = SECTOR SUITE FAULT

DO

(6.4.1) DETECT OCCURRENCE OF SECTOR SUITE FAILURE

**(7.14.1) ISSUE NOTICE OF EQUIPMENT STATUS TO ADJACENT CONTROLLER/PILOT/
SUPERVISOR**

IF RELOCATION REQUIRED

THEN DO

[6.2.4] PERFORM LOG-ON SEQUENCE AT DESIGNATED CONSOLE

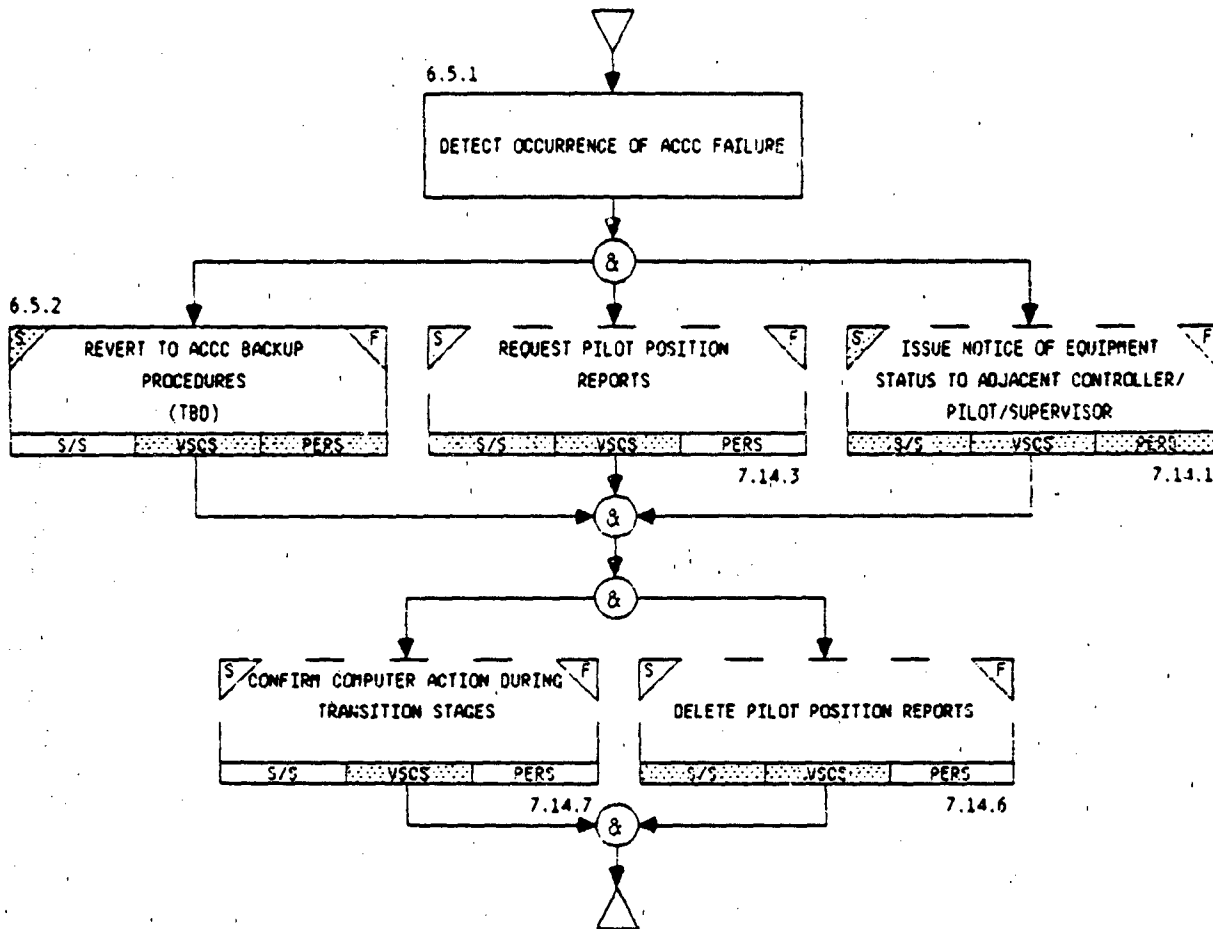
**(6.4.2) OBSERVE SECTOR SUITE DATA BASE RESTORATION COMPLETION
MESSAGE**

END DO

END IF

END DO

SUB-ACTIVITY 6.5
EXECUTING BACKUP PROCEDURES
FOR ACCC FAULTS



SUB-ACTIVITY 6.5: EXECUTING BACKUP PROCEDURES FOR ACCC FAULTS

**INPUT = BACKUP PROCEDURES, PILOT POSITION REPORTS, NOTICE OF EQUIPMENT
 STATUS**

DO

(6.5.1) DETECT OCCURRENCE OF ACCC FAILURE

**IF REQUIRED BY DIRECTIVE
THEN (6.5.2) REVERT TO ACCC BACKUP PROCEDURES
END IF**

ASE

**IF REQUIRED BY DIRECTIVE
THEN [7.14.3] REQUEST PILOT POSITION REPORTS
END IF**

ASE

**IF REQUIRED BY DIRECTIVE
THEN [7.14.1] ISSUE NOTICE OF EQUIPMENT STATUS TO ADJACENT CONTROLLER/PILOT/
SUPERVISOR**

END IF

(dp) EVALUATE NECESSITY TO CONFIRM COMPUTER ACTION OR DELETE REPORT

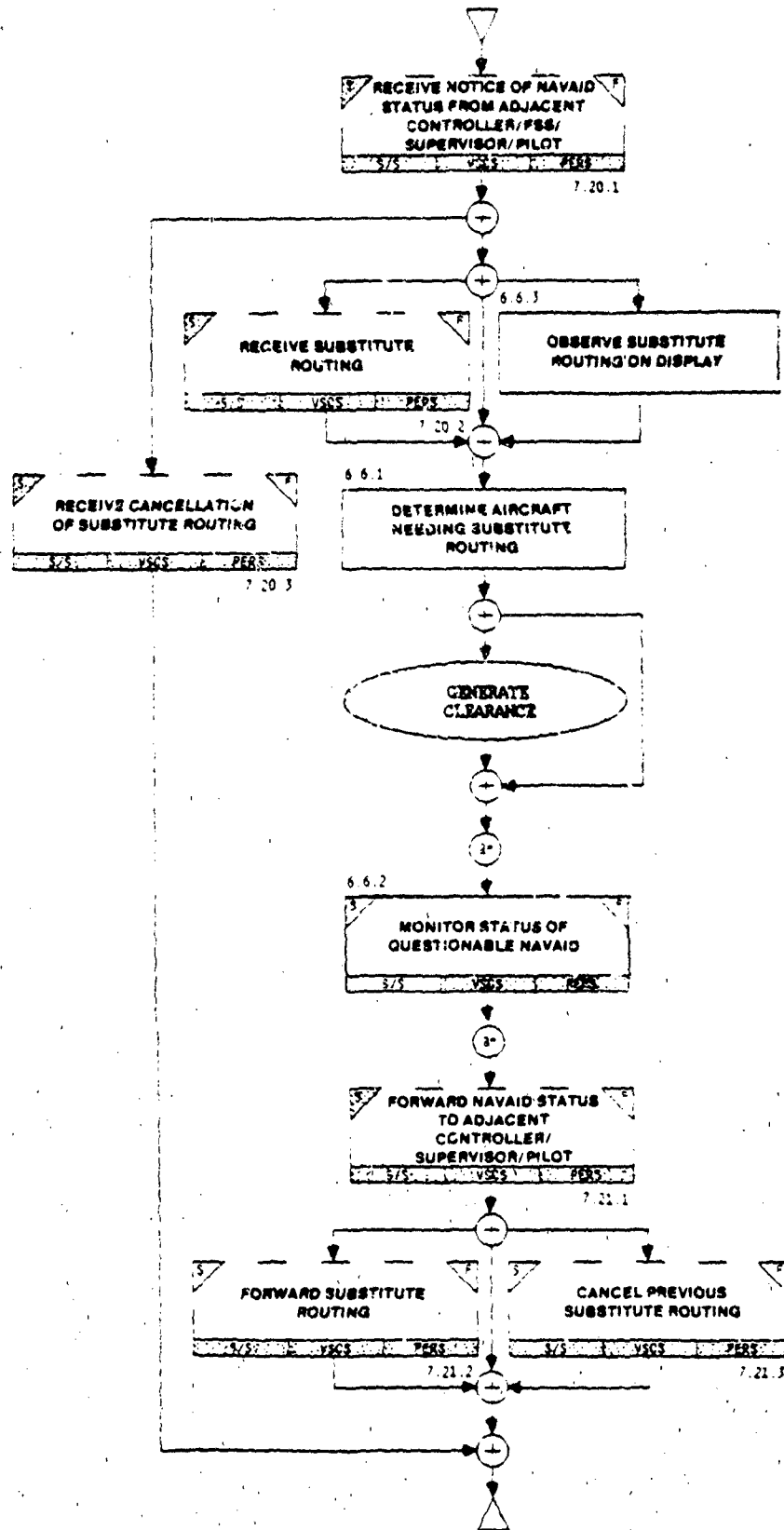
**IF REQUIRED BY DIRECTIVE
THEN [7.14.7] CONFIRM COMPUTER ACTION DURING TRANSITION STAGES
END IF**

ASE

**IF RADAR SERVICE IS BEING PROVIDED
THEN [7.14.6] DELETE PILOT POSITION REPORTS
END IF**

END DO

SUB-ACTIVITY 6.6 **EXECUTING BACKUP NAVAID** **PROCEDURES**



SUB-ACTIVITY 6.6: EXECUTING BACKUP NAVAID PROCEDURES

INPUT = NOTICE OF NAVAID STATUS

DO

**[7.20.1] RECEIVE NOTICE OF NAVAID STATUS FROM ADJACENT CONTROLLER/FSS/
SUPERVISOR/PILOT**

IF SUBSTITUTE ROUTING WAS NOT CANCELLED

THEN DO

(dp) EVALUATE NECESSITY TO OBSERVE OR RECEIVE SUBSTITUTE ROUTING

IF SUBSTITUTE ROUTING IS ON DISPLAY

THEN (6.6.3) OBSERVE SUBSTITUTE ROUTING ON DISPLAY

ELSE [7.20.2] RECEIVE SUBSTITUTE ROUTING

END IF

(6.6.1) DETERMINE AIRCRAFT NEEDING SUBSTITUTE ROUTING

IF REQUIRED BY DIRECTIVE

THEN GENERATE CLEARANCE

END IF

DO UNTIL NAVAID RETURNS TO SERVICE

(6.6.2) MONITOR STATUS OF QUESTIONABLE NAVAID

END DO

**[7.21.1] FORWARD NAVAID STATUS TO ADJACENT CONTROLLER/
SUPERVISOR/PILOT**

**(dp) EVALUATE NECESSITY TO FORWARD SUBSTITUTE ROUTING
OR CANCEL PREVIOUS SUBSTITUTE ROUTING**

IF REQUIRED BY DIRECTIVE

THEN [7.21.2] FORWARD SUBSTITUTE ROUTING

ELSE [7.21.3] CANCEL PREVIOUS SUBSTITUTE ROUTING

END IF

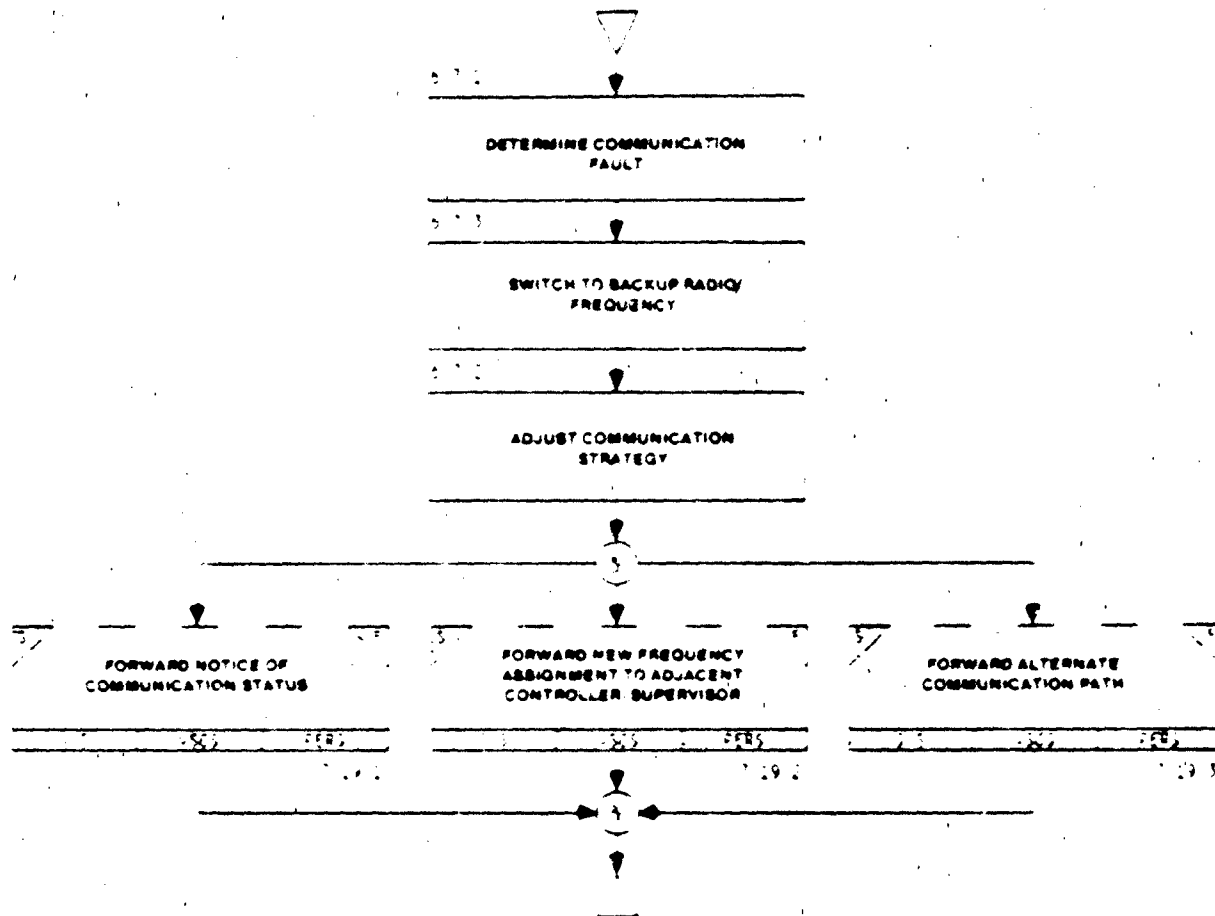
END DO

ELSE [7.20.3] RECEIVE CANCELLATION OF SUBSTITUTE ROUTING

END IF

END DO

SUB-ACTIVITY 6.7 **EXECUTING BACKUP PROCEDURES** **FOR COMMUNICATION FAULTS**



SUB-ACTIVITY 6.7: EXECUTING BACKUP PROCEDURES FOR COMMUNICATION FAULTS

INPUT = COMMUNICATION FAULTS

DO

(6.7.1) DETERMINE COMMUNICATION FAULT

(6.7.3) SWITCH TO BACKUP RADIO/FREQUENCY

(6.7.2) ADJUST COMMUNICATION STRATEGY

(dp) DETERMINE NECESSITY TO FORWARD INFORMATION

IF REQUIRED BY DIRECTIVE

THEN [7.19.1] FORWARD NOTICE OF COMMUNICATION STATUS

END IF

ASE

IF REQUIRED BY DIRECTIVE

THEN [7.19.3] FORWARD ALTERNATE COMMUNICATION PATH

END IF

ASE

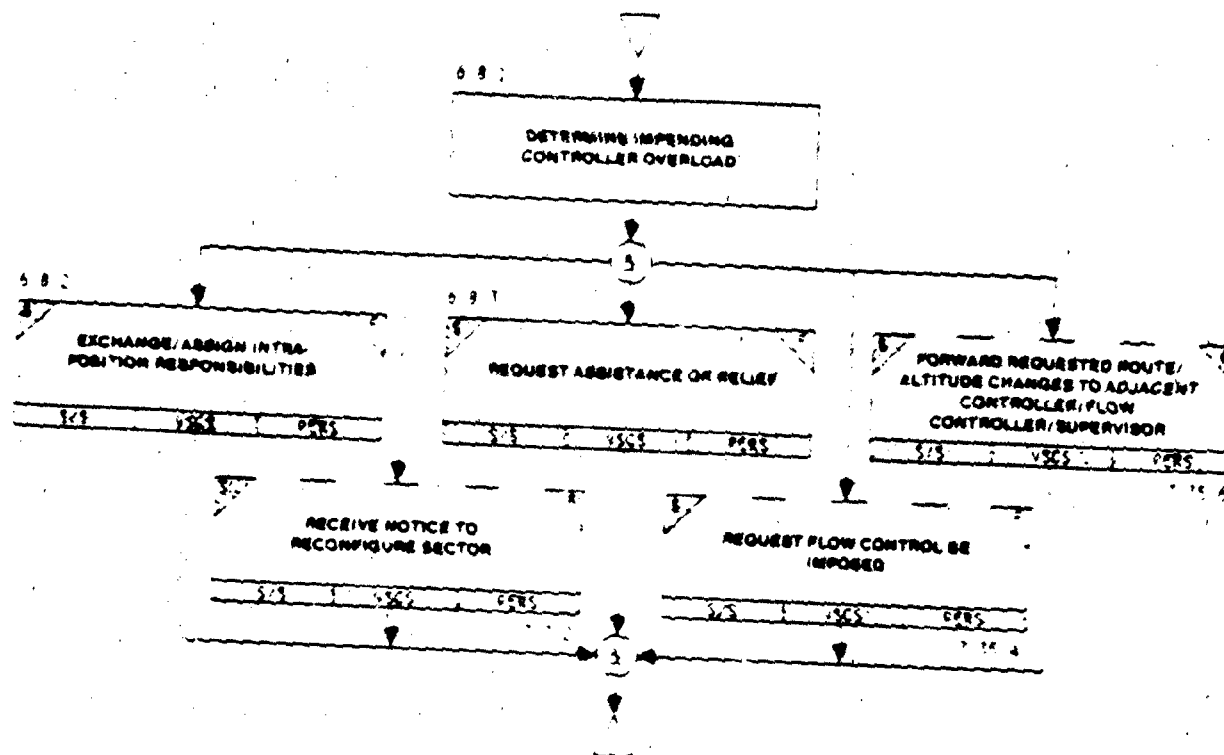
IF REQUIRED BY DIRECTIVE

**THEN [7.19.2] FORWARD NEW FREQUENCY ASSIGNMENT TO ADJACENT CONTROLLER/
SUPERVISOR**

END IF

END DO

SUB-ACTIVITY 6.8 MANAGING PERSONAL WORKLOAD



SUB-ACTIVITY 6.8: MANAGING PERSONAL WORKLOAD

INPUT = IMPENDING CONTROLLER OVERLOAD

DO

(6.8.1) DETERMINE IMPENDING CONTROLLER OVERLOAD

(dp) DETERMINE NECESSITY TO DO TASKS 6.8.2, 6.8.3, 7.35.6, 7.7.2, 7.35.4

**IF SUPERVISOR DETERMINES NEED TO CHANGE POSITIONS
THEN (6.8.2) EXCHANGE/ASSIGN INTRA-POSITION RESPONSIBILITIES
END IF**

ASE

**IF DEEMED NECESSARY BY CONTROLLER
THEN (6.8.3) REQUEST ASSISTANCE OR RELIEF
END IF**

ASE

**IF DEEMED NECESSARY BY CONTROLLER
THEN (7.35.6) FORWARD REQUESTED ROUTE/ALTITUDE CHANGES TO ADJACENT
CONTROLLER/FLOW CONTROLLER/SUPERVISOR
END IF**

ASE

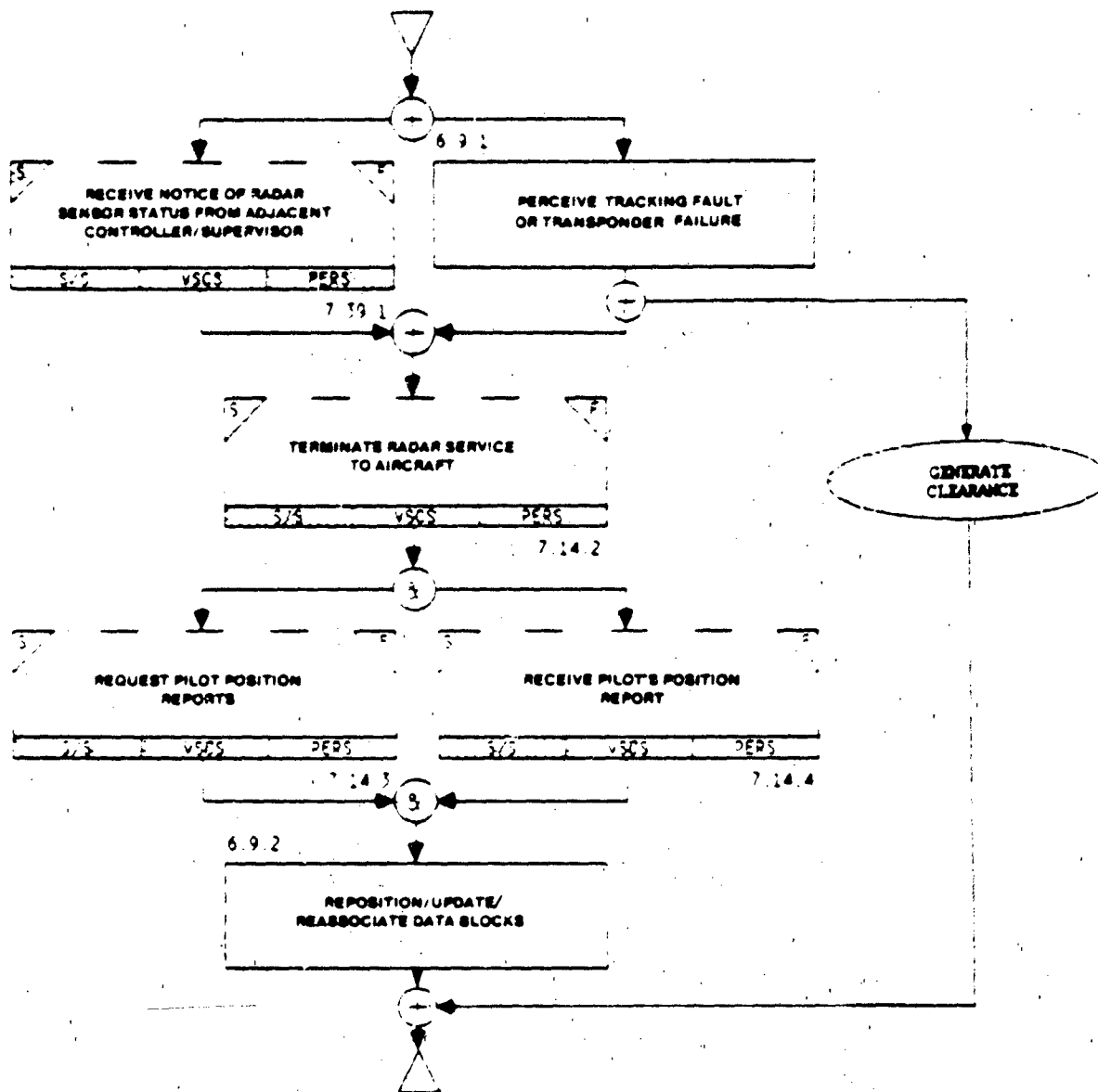
**IF SUPERVISOR DETERMINES RECONFIGURATION IS REQUIRED
THEN (7.7.2) RECEIVE NOTICE TO RECONFIGURE SECTOR
END IF**

ASE

**IF DEEMED NECESSARY BY CONTROLLER OR SUPERVISOR
THEN (7.35.4) REQUEST FLOW CONTROL BY IMPOSED
END IF**

END DO

**SUB-ACTIVITY 6.9
EXECUTING BACKUP PROCEDURES FOR
SENSOR OR TRACKING FAULTS**



SUB-ACTIVITY 6.9: EXECUTING BACKUP PROCEDURES FOR SENSOR OR TRACKING FAULTS

**INPUT = NOTICE OF RADAR SENSOR STATUS FROM ADJACENT CONTROLLER/
SUPERVISOR, TRACKING FAULT OR TRANSPONDER FAILURE**

DO

**IF INPUT IS NOTICE OF RADAR SENSOR STATUS FROM ADJACENT CONTROLLER/
SUPERVISOR**

**THEN [7.39.1] RECEIVE NOTICE OF RADAR SENSOR STATUS FROM ADJACENT
CONTROLLER/SUPERVISOR**

ELSE (6.9.1) PERCEIVE TRACKING FAULT OR TRANSPONDER FAILURE

END IF

IF CLEARANCE IS NOT REQUIRED

THEN DO

[7.14.2] TERMINATE RADAR SERVICE TO AIRCRAFT

IF REQUIRED BY DIRECTIVE

[7.14.3] REQUEST PILOT POSITION REPORTS

END IF

ASE

IF REQUIRED BY DIRECTIVE

[7.14.4] RECEIVE PILOT'S POSITION REPORT

END IF

(6.9.2) REPOSITION/UPDATE/REASSOCIATE DATA BLOCKS

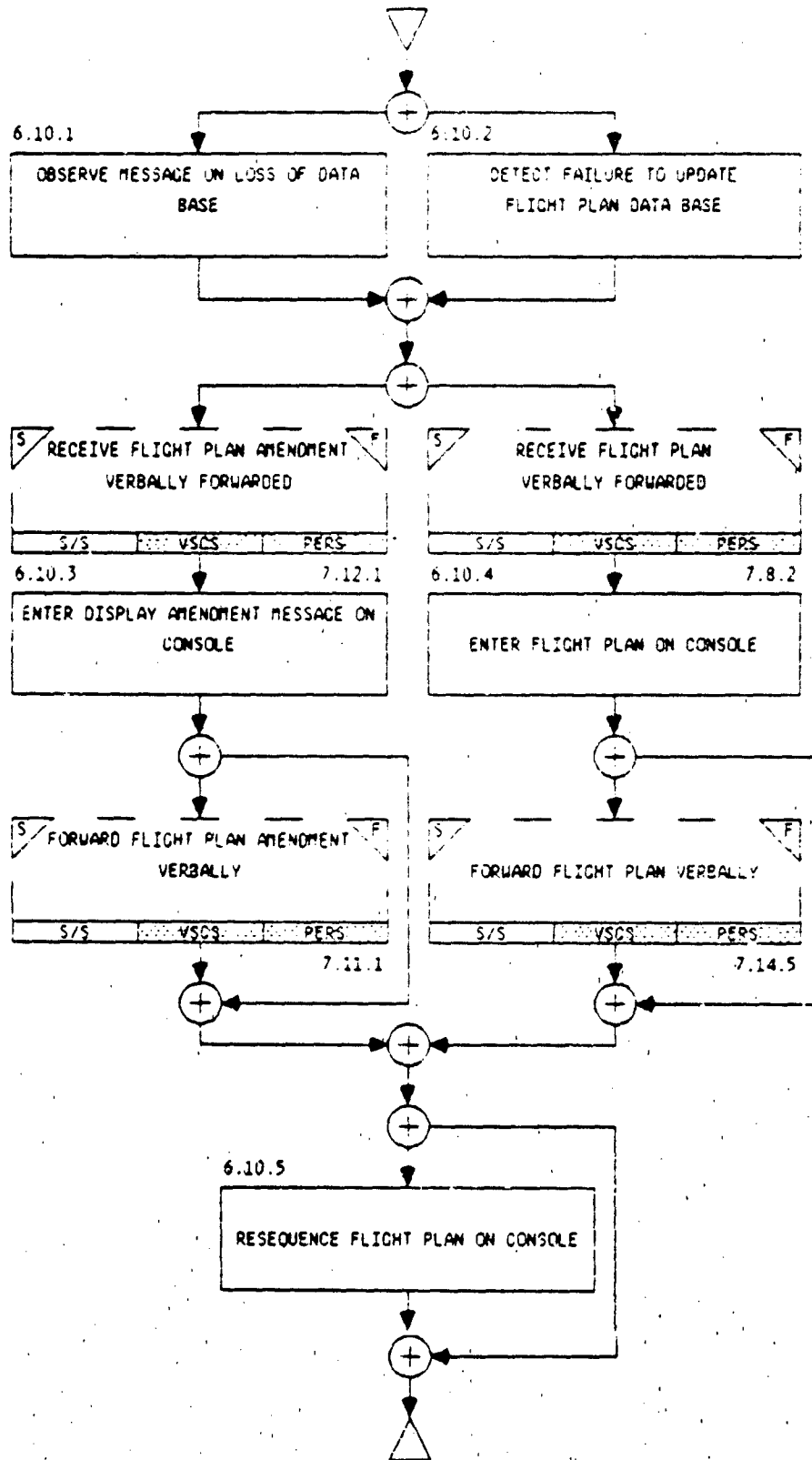
END DO

ELSE GENERATE CLEARANCE

END IF

END DO

SUB-ACTIVITY 6.10
EXECUTING BACKUP PROCEDURES FOR
LOSS OF FLIGHT PLAN DATA BASE



**SUB-ACTIVITY 6.10: EXECUTING BACKUP PROCEDURES FOR LOSS OF FLIGHT PLAN DATA
BASE**

**INPUT = MESSAGE ON LOSS OF DATA BASE, FAILURE TO UPDATE FLIGHT PLAN DATA
BASE**

DO

**IF INPUT IS MESSAGE ON LOSS OF DATA BASE
THEN (6.10.1) OBSERVE MESSAGE ON LOSS OF DATA BASE
ELSE (6.10.2) DETECT FAILURE TO UPDATE FLIGHT PLAN DATA BASE
END IF**

**IF FLIGHT PLAN AMENDMENT HAS BEEN VERBALLY FORWARDED
THEN DO**

**[7.12.1] RECEIVE FLIGHT PLAN AMENDMENT VERBALLY FORWARDED
(6.10.3) ENTER DISPLAY AMENDMENT MESSAGE ON CONSOLE
IF REPEATED TRANSMISSIONS FAIL
THEN [7.11.1] FORWARD FLIGHT PLAN AMENDMENT VERBALLY
END IF**

END DO

ELSE DO

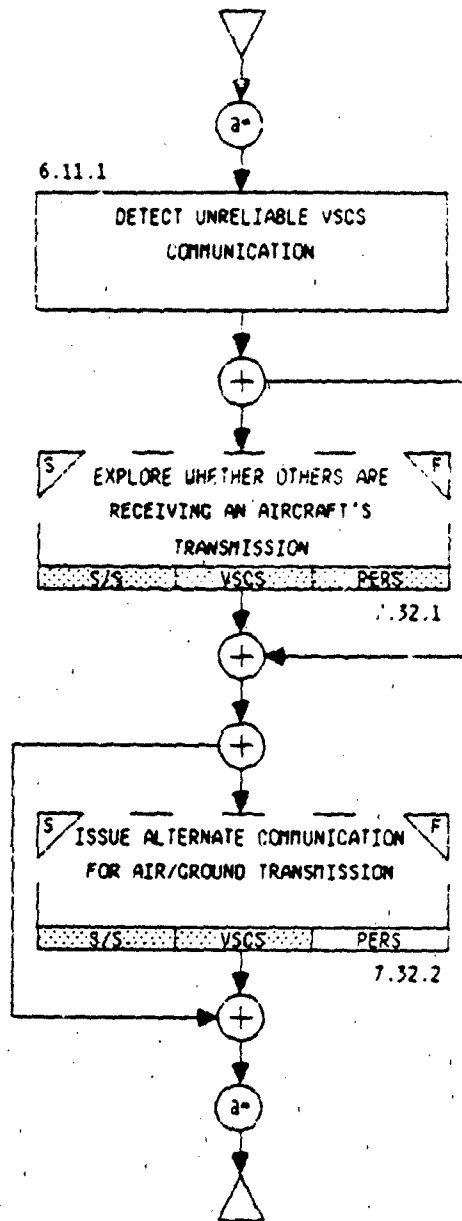
**[7.8.2] RECEIVE FLIGHT PLAN VERBALLY FORWARDED
(6.10.4) ENTER FLIGHT PLAN ON CONSOLE
IF REPEATED TRANSMISSIONS FAIL
THEN [7.14.5] FORWARD FLIGHT PLAN VERBALLY
END IF**

END DO

**IF DEEMED NECESSARY BY CONTROLLER
THEN (6.10.5) RESEQUENCE FLIGHT PLAN ON CONSOLE
END IF**

END DO

SUB-ACTIVITY 6.11
RESPONDING TO TRANSIENT VSCS FAULTS



SUB-ACTIVITY 6.11: RESPONDING TO TRANSIENT VSCS FAULTS

DO WHILE (TRANSIENT VSCS FAULT CONDITION EXISTS)

(6.11.1) DETECT UNRELIABLE VSCS COMMUNICATION

IF DEEMED NECESSARY BY CONTROLLER

**THEN [7.32.1] EXPLORE WHETHER OTHERS ARE RECEIVING AN AIRCRAFT'S
TRANSMISSION**

END IF

IF DEEMED NECESSARY BY CONTROLLER

THEN [7.32.2] ISSUE ALTERNATE COMMUNICATION FOR AIR/GROUND TRANSMISSION

END IF

END DO

PERFORM COORDINATION

7.0

ACTIVITY 7*

PERFORM COORDINATION

<u>SUB-ACTIVITIES</u>	<u>RELATED EVENTS</u>
7.1 Forwarding separation alerts	Aircraft-aircraft conflict, MSAW, impending airspace conflict, flight plan deviation observed.
7.2 Responding to separation alerts	Aircraft-aircraft conflict MSAW, impending airspace conflict, flight plan deviation observed.
7.3 Issuing pointouts	Aircraft to edge of sector.
7.4 Responding to pointouts	Pointout receipt, aircraft to edge of sector, airspace release.
7.5 Receiving notices of airspace restrictions	Impending airspace conflict, ALTRV/airspace reservation, restricted/warning/"hot" MOA, military training route.
7.6 Forwarding notices of airspace restrictions	Caution alert, ALTRV/airspace reservation, restricted/warning/"hot" MOA, military training route.
7.7 Responding to airspace reconfigurations	Airspace release, facility closure, Controller overload.
7.8 Processing flight plans	Filed flight plan, flight plan data base failure.
7.9 Responding to clearance requests	Clearance request, clearance delivery, amended altitude/route/destination, VFR TCA
7.10 Initiating clearance/approval requests	Clearance request, clearance delivery, amended altitude/route/destination, VFR TCA

*This activity displayed tabularly rather than graphically due to size.

ACTIVITY 7
PERFORM COORDINATION

SUB-ACTIVITIES

RELATED EVENTS

7.11	Forwarding amendment messages	Amended altitude/route/destination, flight plan data base failure.
7.12	Receiving amendment messages	Amended altitude/route/destination, flight plan data base failure.
7.13	Receiving departure messages	Initial contact.
7.14	Forwarding automation status	Sector Suite failure, ACCC failure, unreliable communications, flight plan data base failure.
7.15	Receiving notices of automation outages	Sector Suite failure, ACCC failure.
7.16	Forwarding Controller requested reroutes/altitude changes	Aircraft-aircraft conflict, change flow pattern.
7.17	Processing weather information	PIREP, display of severe weather, SIGMET/AIPMET advisory, visibility report, weather conflict.
7.18	Receive notices of communication outages	Communication failure.
7.19	Forwarding notices of communication outages	Communication failure.
7.20	Receiving notices of NAVAID outages	NAVAID failure.
7.21	Forwarding notices of NAVAID outages	NAVAID failure.

ACTIVITY 7 PERFORM COORDINATION

<u>SUB-ACTIVITIES</u>	<u>RELATED EVENTS</u>
7.22 Processing airspace intrusions	Caution alert, balloon/glider.
7.23 Receiving notices of runway use	Runway configuration change.
7.24 Forwarding notices of runway use	Runway configuration change.
7.25 Forwarding notices of contingencies	Fuel dumping/jettison, no radio, overdue aircraft, aircraft emergency, medical, hijack, bomb threat.
7.26 Receiving alert inhibit notices	Refueling/exercise/air show.
7.27 Briefing relieving Controllers	Position relief.
7.28 Receiving notices of special operations	Special interest flight, interceptor flight, military training route, DOE flight, above FL 600, lifeguard mission, experimental flight, law enforcement.
7.29 Forwarding notices of special operations	Special interest flight, interceptor flight, military training route, DOE flight, above FL 600, lifeguard mission, experimental flight, law enforcement.
7.30 Processing of aircraft without radio	No radio.
7.31 Processing overdue aircraft	Overdue aircraft.
7.32 Responding to intermittent radio communications	Unreliable communications.

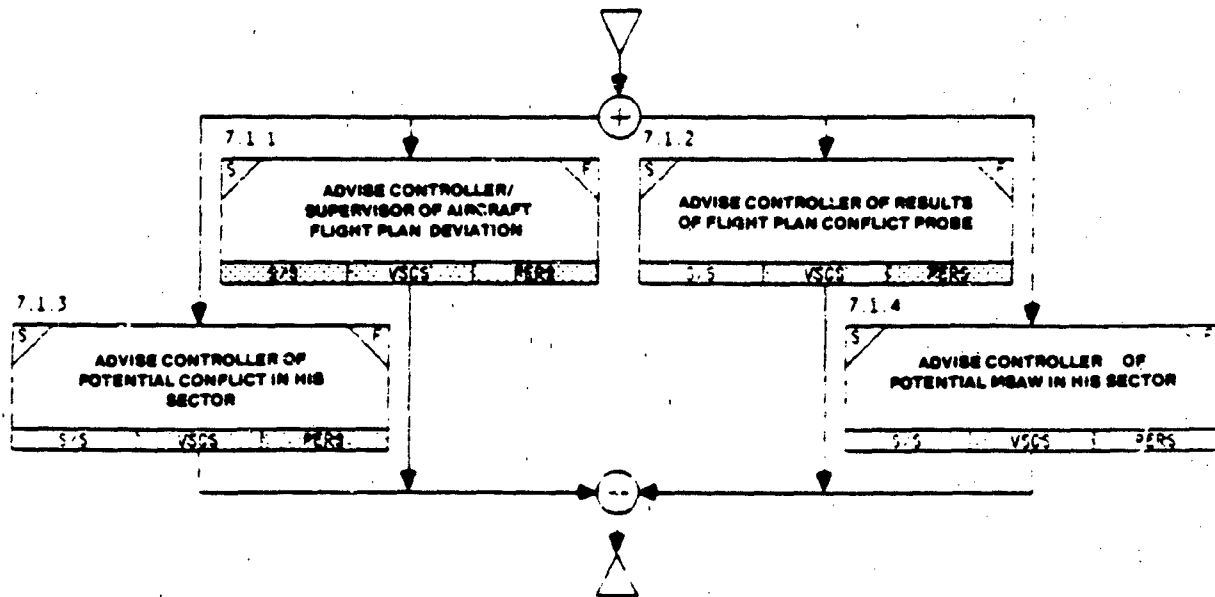
ACTIVITY 7 PERFORM COORDINATION

SUB-ACTIVITIES

RELATED EVENTS

7.33	Responding to flight following requests	Flight following, caution alert.
7.34	Processing FAD notices	Flow management required.
7.35	Processing flow control/metering notices	Entering/leaving hold, clearance request, flow management required, Controller
7.36	Issuing deviation advisories	Caution alert, flight plan deviation observed.
7.37	Receiving transfer of control	Initial contact, handoff receipt, aircraft to edge of sector.
7.38	Initiating transfer of control	Aircraft to edge of sector.
7.39	Receiving notices of radar sensor status	Sensor failure.
7.40	Forwarding notices of radar sensor status	Sensor failure.
7.41	Requesting temporary release of airspace	Aircraft to edge of sector, airspace release.
7.42	Responding to temporary release of airspace requests	Airspace release.

SUB-ACTIVITY 7.1 **FORWARDING SEPARATION ALERTS**



SUB-ACTIVITY 7.1: FORWARDING SEPARATION ALERTS

**INPUT = POTENTIAL CONFLICT IN ANOTHER CONTROLLER SECTOR, AIRCRAFT FLIGHT
PLAN DEVIATION AFFECTING ANOTHER CONTROLLER, RESULTS OF FLIGHT
PLAN CONFLICT PROBE AFFECTING ANOTHER CONTROLLER, POTENTIAL
MSAW IN ANOTHER CONTROLLER'S SECTOR**

DO

IF INPUT IS POTENTIAL CONFLICT IN ANOTHER CONTROLLER'S SECTOR

THEN (7.1.3) ADVISE CONTROLLER OF POTENTIAL CONFLICT IN HIS SECTOR

ELSE

**IF INPUT IS AIRCRAFT FLIGHT PLAN DEVIATION AFFECTING ANOTHER
CONTROLLER**

**THEN (7.1.1) ADVISE CONTROLLER/SUPERVISOR OF AIRCRAFT FLIGHT PLAN
DEVIATION**

ELSE

**IF INPUT IS RESULTS OF FLIGHT PLAN CONFLICT PROBE AFFECT-
ING ANOTHER CONTROLLER**

**THEN (7.1.2) ADVISE CONTROLLER OF RESULTS OF FLIGHT PLAN
CONFLICT PROBE**

ELSE

**IF INPUT IS POTENTIAL MSAW IN ANOTHER CONTROLLER'S
SECTOR**

**THEN (7.1.4) ADVISE CONTROLLER OF POTENTIAL MSAW IN
HIS SECTOR**

END IF

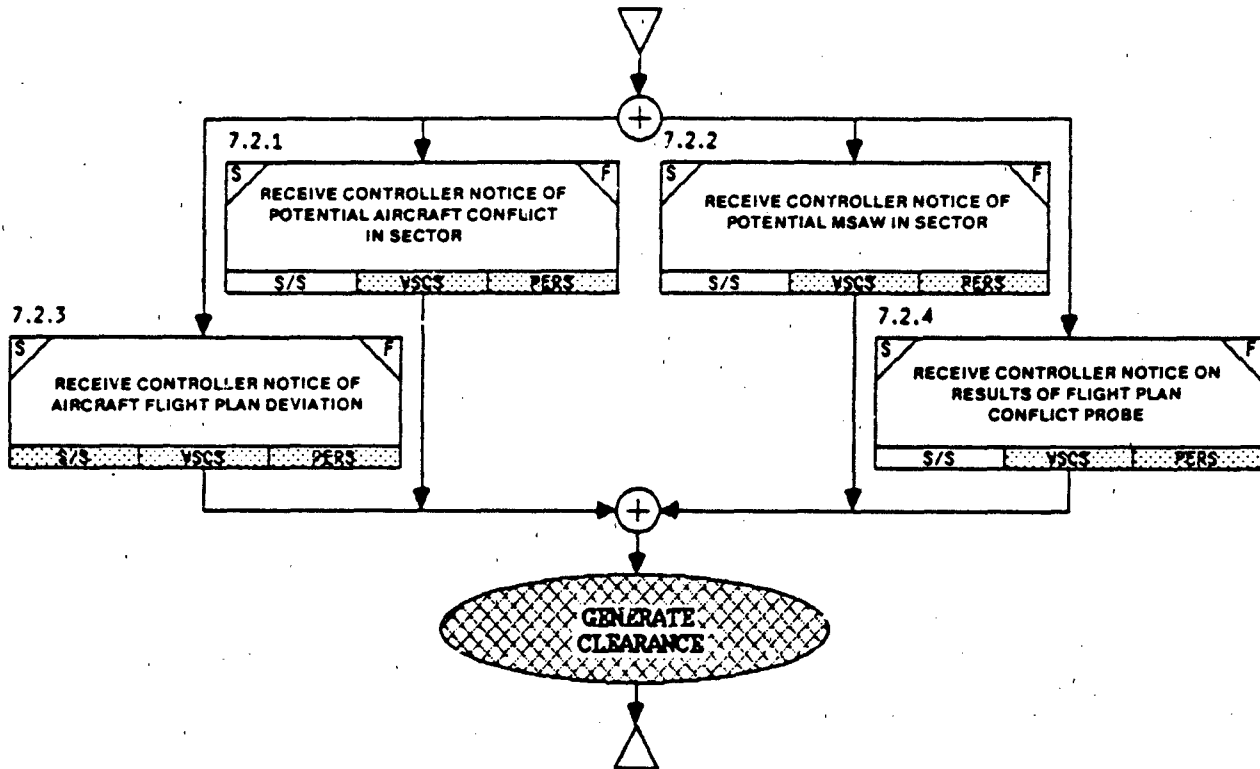
END IF

END IF

END IF

END DO

SUB-ACTIVITY 7.2
RESPONDING TO SEPARATION ALERTS



SUB-ACTIVITY 7.2: RESPONDING TO SEPARATION ALERTS

INPUT = CONTROLLER NOTICE OF AIRCRAFT FLIGHT PLAN DEVIATION, CONTROLLER
NOTICE OF POTENTIAL AIRCRAFT CONFLICT IN SECTOR, CONTROLLER NOTICE
OF POTENTIAL MSAW IN SECTOR, CONTROLLER NOTICE ON RESULTS OF
FLIGHT PLAN CONFLICT PROBE

DO

IF INPUT IS CONTROLLER NOTICE OF AIRCRAFT FLIGHT PLAN DEVIATION
THEN (7.2.3) RECEIVE CONTROLLER NOTICE OF AIRCRAFT FLIGHT PLAN DEVIATION
ELSE

IF INPUT IS CONTROLLER NOTICE OF POTENTIAL AIRCRAFT CONFLICT IN
SECTOR
THEN (7.2.1) RECEIVE CONTROLLER NOTICE OF POTENTIAL AIRCRAFT CON-
FLICT IN SECTOR
ELSE

IF INPUT IS CONTROLLER NOTICE OF POTENTIAL MSAW IN
SECTOR
THEN (7.2.2) RECEIVE CONTROLLER NOTICE OF POTENTIAL MSAW
IN SECTOR
ELSE

IF INPUT IS CONTROLLER NOTICE ON RESULTS OF FLIGHT
PLAN CONFLICT PROBE
THEN (7.2.4) RECEIVE CONTROLLER NOTICE ON RESULTS OF
FLIGHT PLAN CONFLICT PROBE
END IF

END IF

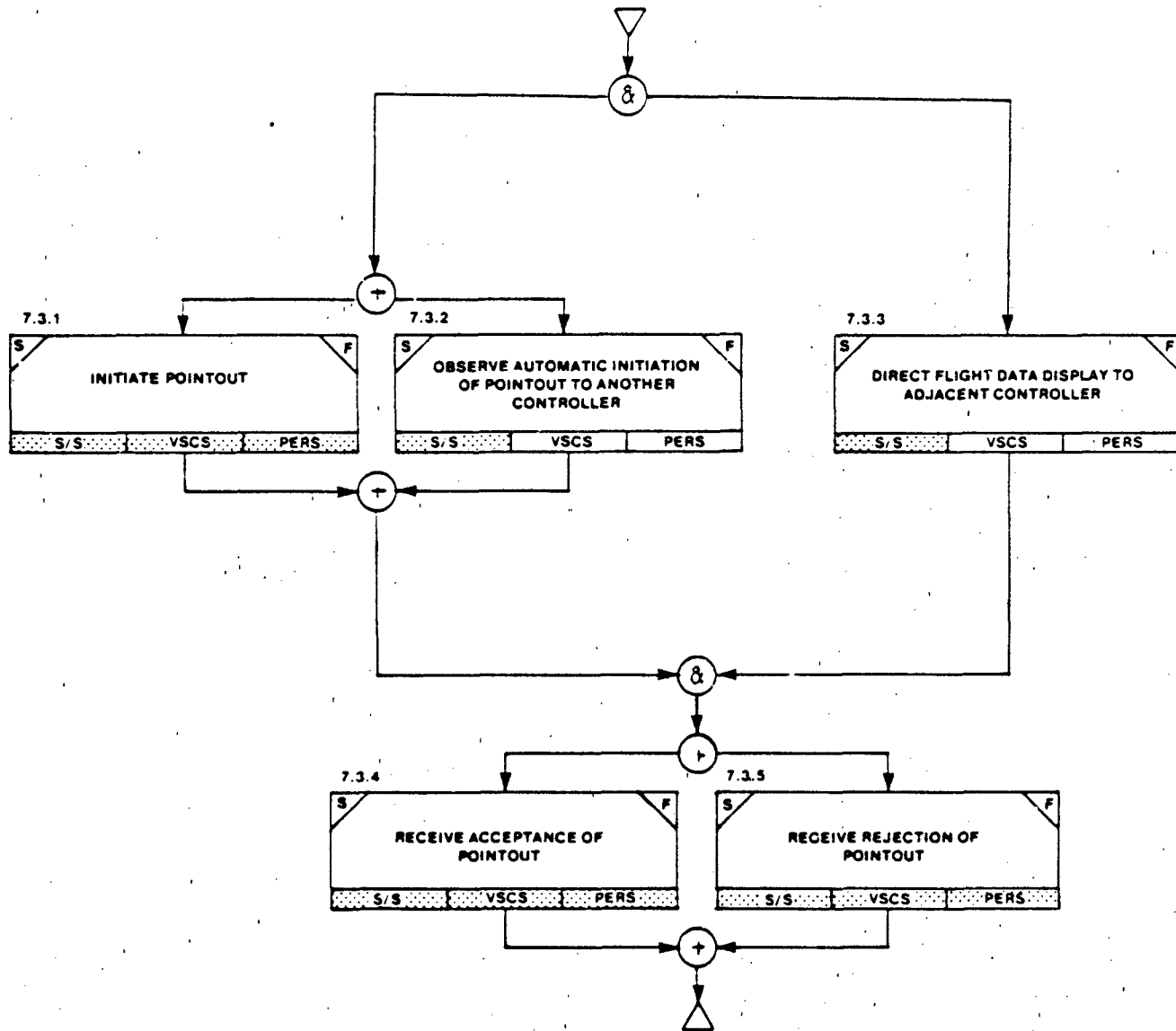
END IF

END IF

GENERATE CLEARANCE

END DO

SUB-ACTIVITY 7.3
ISSUING POINTOUTS



SUB-ACTIVITY 7.3: ISSUING POINTOUTS

INPUT = REQUIREMENT FOR TEMPORARY USE OF AIR SPACE

DO

(dp) DETERMINE WHETHER POINTOUT IS TO BE ISSUED

IF POINTOUT IS TO BE ISSUED

THEN (7.3.1) INITIATE POINTOUT

ELSE (7.3.2) OBSERVE AUTOMATIC INITIATION OF POINTOUT TO ANOTHER CONTROLLER

END IF

ASE

IF DATA DISPLAY IS TO BE FORCED

THEN (7.3.3) DIRECT FLIGHT DISPLAY TO ADJACENT CONTROLLER

END IF

(dp) DETERMINE IF ACCEPTANCE OF POINTOUT IS RECEIVED

IF POINTOUT IS ACCEPTED

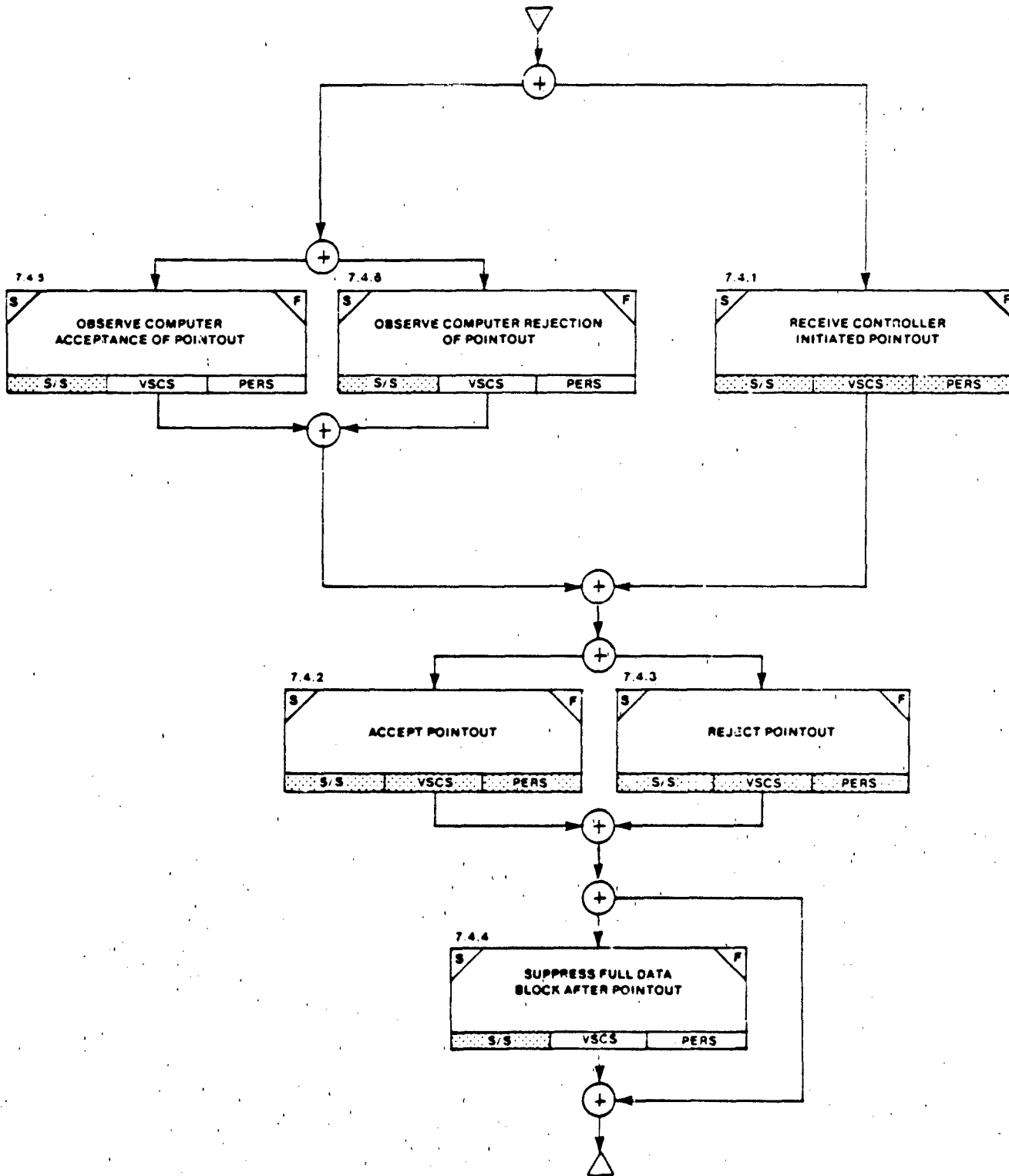
THEN (7.3.4) RECEIVE ACCEPTANCE OF POINTOUT

ELSE (7.3.5) RECEIVE REJECTION OF POINTOUT

END IF

END DO

SUB-ACTIVITY 7.4 **RESPONDING TO POINTOUTS**



SUB-ACTIVITY 7.4: RESPONDING TO POINTOUTS

INPUT = ISSUANCE OF POINTOUT

DO

(dp) DETERMINE WHETHER POINTOUT IS INITIATED BY THE CONTROLLER

IF POINTOUT IS INITIATED BY CONTROLLER

THEN (7.4.1) RECEIVE CONTROLLER-INITIATED POINTOUT

ELSE DO

IF POINTOUT IS INITIATED BY COMPUTER

THEN (7.4.5) OBSERVE COMPUTER ACCEPTANCE OF POINTOUT

ELSE (7.4.6) OBSERVE COMPUTER REJECTION OF POINTOUT

END IF

END DO

END IF

(dp) DETERMINE WHETHER POINTOUT WILL BE ACCEPTABLE

IF POINTOUT IS ACCEPTABLE

THEN (7.4.2) ACCEPT POINTOUT

ELSE (7.4.3) REJECT POINTOUT

END IF

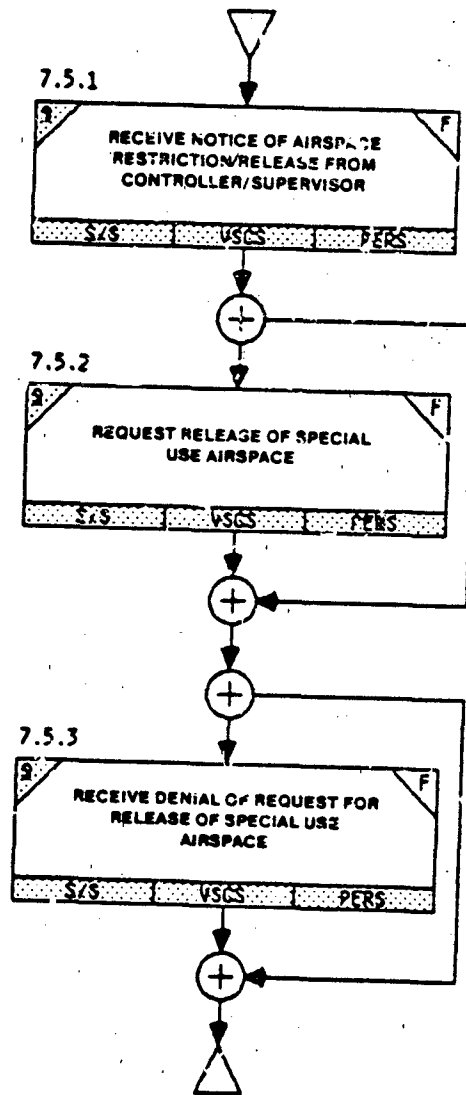
IF DEEMED NECESSARY BY CONTROLLER

THEN (7.4.4) SUPPRESS FULL DATA BLOCK AFTER POINTOUT

END IF

END DO

SUB-ACTIVITY 7.5
RECEIVING NOTICES OF
AIRSPACE RESTRICTIONS



SUB-ACTIVITY 7.5: RECEIVING NOTICES OF AIRSPACE RESTRICTIONS

**INPUT = NOTICE OF AIRSPACE RESTRICTION/RELEASE FROM CONTROLLER/
SUPERVISOR**

DO

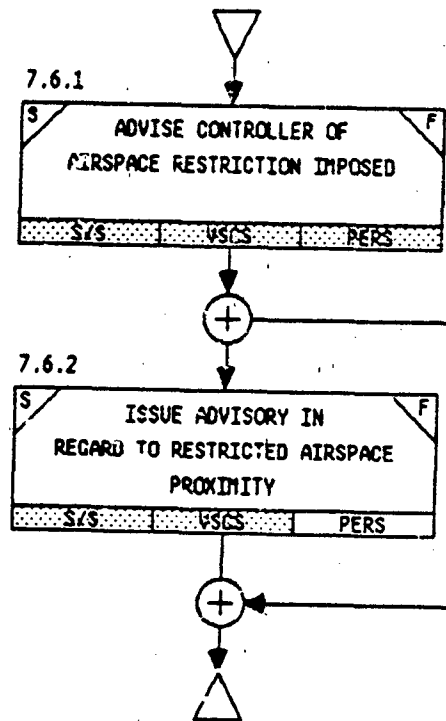
**(7.5.1) RECEIVE NOTICE OF AIRSPACE RESTRICTION/RELEASE FROM CONTROLLER/
SUPERVISOR**

**IF DEEMED NECESSARY BY CONTROLLER FOR OPERATIONAL NEEDS
THEN (7.5.2) REQUEST RELEASE OF SPECIAL USE AIRSPACE
END IF**

**IF DEEMED NECESSARY BY OTHER CONTROLLERS OR OTHER AIRSPACE USER/OWNER
THEN (7.5.3) RECEIVE DENIAL OF REQUEST FOR RELEASE OF SPECIAL USE AIRSPACE
END IF**

END DO

SUB-ACTIVITY 7.6
FORWARDING NOTICES OF
AIRSPACE RESTRICTIONS



SUB-ACTIVITY 7.6: FORWARDING NOTICES OF AIRSPACE RESTRICTIONS

INPUT = AIRSPACE RESTRICTION IMPOSED

DO

(7.6.1) ADVISE CONTROLLER OF AIRSPACE RESTRICTION IMPOSED

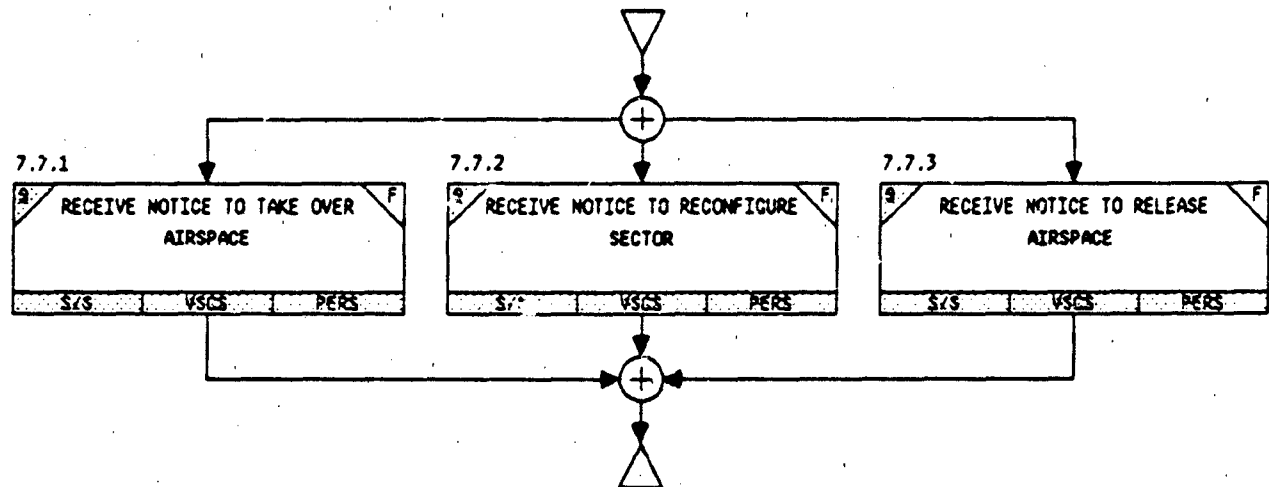
IF DEEMED NECESSARY BY CONTROLLER OR REQUIRED BY DIRECTIVE

THEN (7.6.2) ISSUE ADVISORY IN REGARD TO RESTRICTED AIRSPACE PROXIMITY

END IF

END DO

SUB-ACTIVITY 7.7
RESPONDING TO AIRSPACE
RECONFIGURATIONS



SUB-ACTIVITY 7.7: RESPONDING TO AIRSPACE RECONFIGURATIONS

INPUT = NOTICE TO TAKE OVER AIRSPACE, NOTICE TO RECONFIGURE SECTOR, NOTICE TO RELEASE AIRSPACE

DO

**IF INPUT IS NOTICE TO TAKE OVER AIRSPACE
THEN (7.7.1) RECEIVE NOTICE TO TAKE OVER AIRSPACE
ELSE**

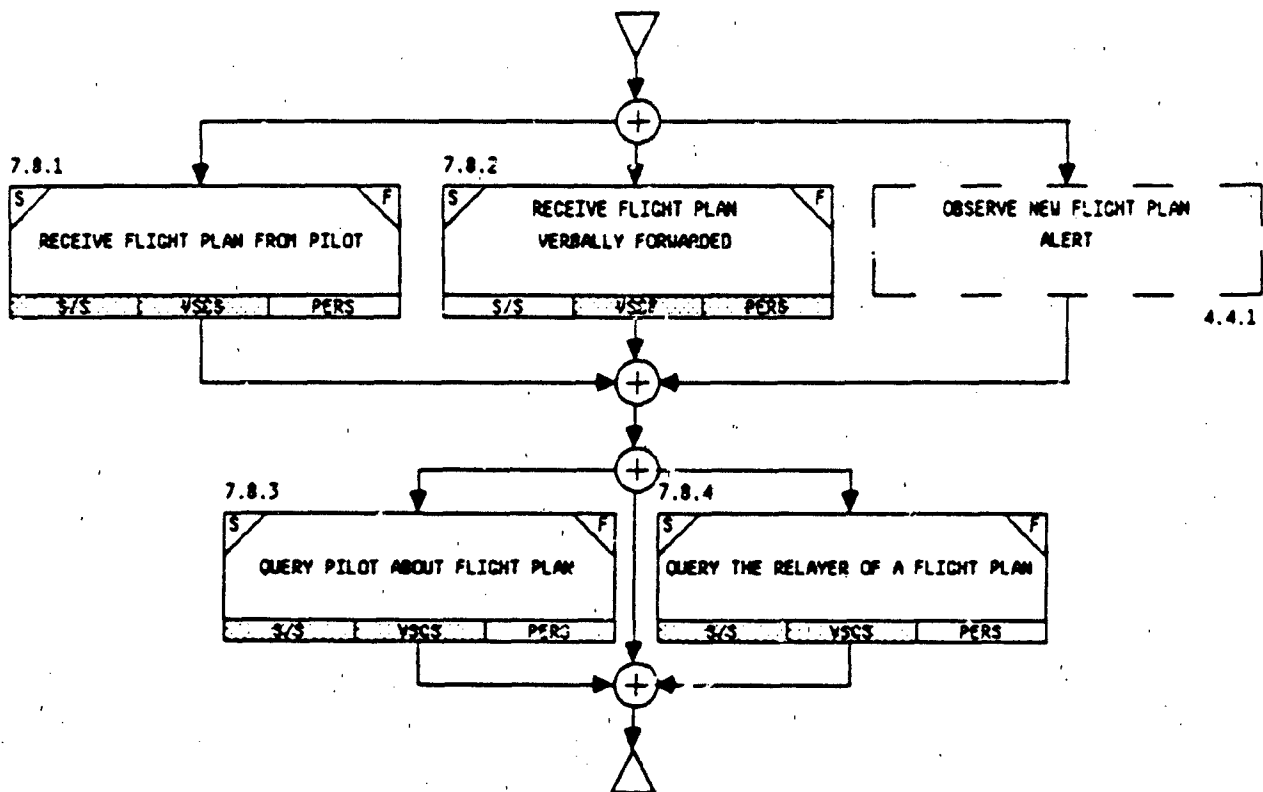
**IF INPUT IS NOTICE TO RECONFIGURE SECTOR
THEN (7.7.2) RECEIVE NOTICE TO RECONFIGURE SECTOR
ELSE**

**IF INPUT IS NOTICE TO RELEASE AIRSPACE
THEN (7.7.3) RECEIVE NOTICE TO RELEASE AIRSPACE
END IF**

END IF

**END IF
END DO**

SUB-ACTIVITY 7.8 **PROCESSING FLIGHT PLANS**



SUB-ACTIVITY 7.8: PROCESSING FLIGHT PLANS

INPUT = FLIGHT PLAN FROM PILOT, FLIGHT PLAN VERBALLY FORWARDED, NEW FLIGHT PLAN ALERT

DO

**IF INPUT IS FLIGHT PLAN FROM PILOT
THEN (7.8.1) RECEIVE FLIGHT PLAN FROM PILOT
ELSE**

**IF INPUT IS FLIGHT PLAN VERBALLY FORWARDED
THEN (7.8.2) RECEIVE FLIGHT PLAN VERBALLY FORWARDED
ELSE [4.4.1] OBSERVE NEW FLIGHT PLAN ALERT
END IF**

END IF

(dp) EVALUATE NECESSITY TO VALIDATE THE FLIGHT PLAN

IF NECESSARY TO VALIDATE THE FLIGHT PLAN

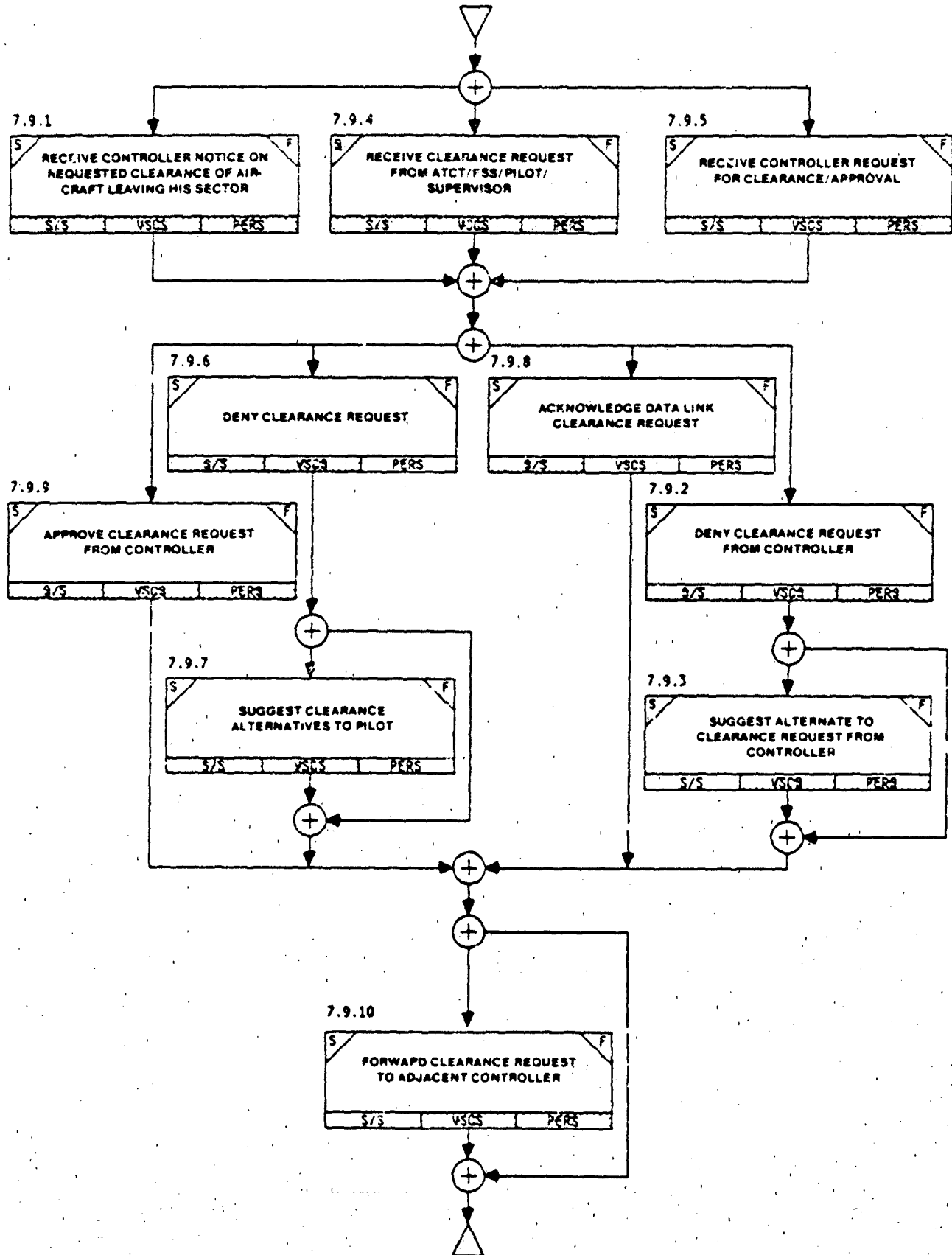
THEN (7.8.3) QUERY PILOT ABOUT FLIGHT PLAN

ELSE (7.8.4) QUERY THE RELAYER OF A FLIGHT PLAN

END IF

END DO

SUB-ACTIVITY 7.9
RESPONDING TO CLEARANCE
REQUESTS



SUB-ACTIVITY 7.9: RESPONDING TO CLEARANCE REQUESTS

**INPUT = CONTROLLER NOTICE ON REQUESTED CLEARANCE OF AIRCRAFT LEAVING
 HIS SECTOR, CLEARANCE REQUEST FROM ATCT/FSS/PILOT/SUPERVISOR,
 CONTROLLER REQUEST FOR CLEARANCE/APPROVAL**

DO

**IF INPUT IS CONTROLLER NOTICE ON REQUESTED CLEARANCE OF AIRCRAFT LEAVING
HIS SECTOR**

**THEN (7.9.1) RECEIVE CONTROLLER NOTICE ON REQUESTED CLEARANCE OF AIRCRAFT
LEAVING HIS SECTOR**

ELSE

IF INPUT IS CLEARANCE REQUEST FROM ATCT/FSS/PILOT/SUPERVISOR

**THEN (7.9.4) RECEIVE CLEARANCE REQUEST FROM ATCT/FSS/PILOT/
SUPERVISOR**

**ELSE (7.9.5) RECEIVE CONTROLLER REQUEST FOR CLEARANCE/APPROVAL
END IF**

END IF

(dp) DETERMINE WHETHER CLEARANCE REQUEST IS TO BE GRANTED

IF CLEARANCE REQUEST IS TO BE GRANTED

THEN DO

**(dp) DETERMINE WHETHER CLEARANCE REQUEST IS FROM ANOTHER
CONTROLLER**

IF CLEARANCE REQUEST IS FROM ANOTHER CONTROLLER

THEN (7.9.9) APPROVE CLEARANCE REQUEST FROM CONTROLLER

**ELSE (7.9.8) ACKNOWLEDGE DATA LINK CLEARANCE REQUEST
END IF**

END DO

ELSE DO

**(dp) DETERMINE WHETHER CLEARANCE REQUEST IF FROM ANOTHER
CONTROLLER**

IF CLEARANCE REQUEST IS FROM ANOTHER CONTROLLER

THEN DO

(7.9.2) DENY CLEARANCE REQUEST FROM CONTROLLER

IF DEEMED NECESSARY BY CONTROLLER

**THEN (7.9.3) SUGGEST ALTERNATE TO CLEARANCE REQUEST
FROM CONTROLLER**

END IF

END DO

ELSE DO

(7.9.6) DENY CLEARANCE REQUEST

IF DEEMED NECESSARY BY CONTROLLER

**THEN (7.9.7) SUGGEST CLEARANCE ALTERNATIVES TO PILOT
END IF**

END DO

END IF

END DO

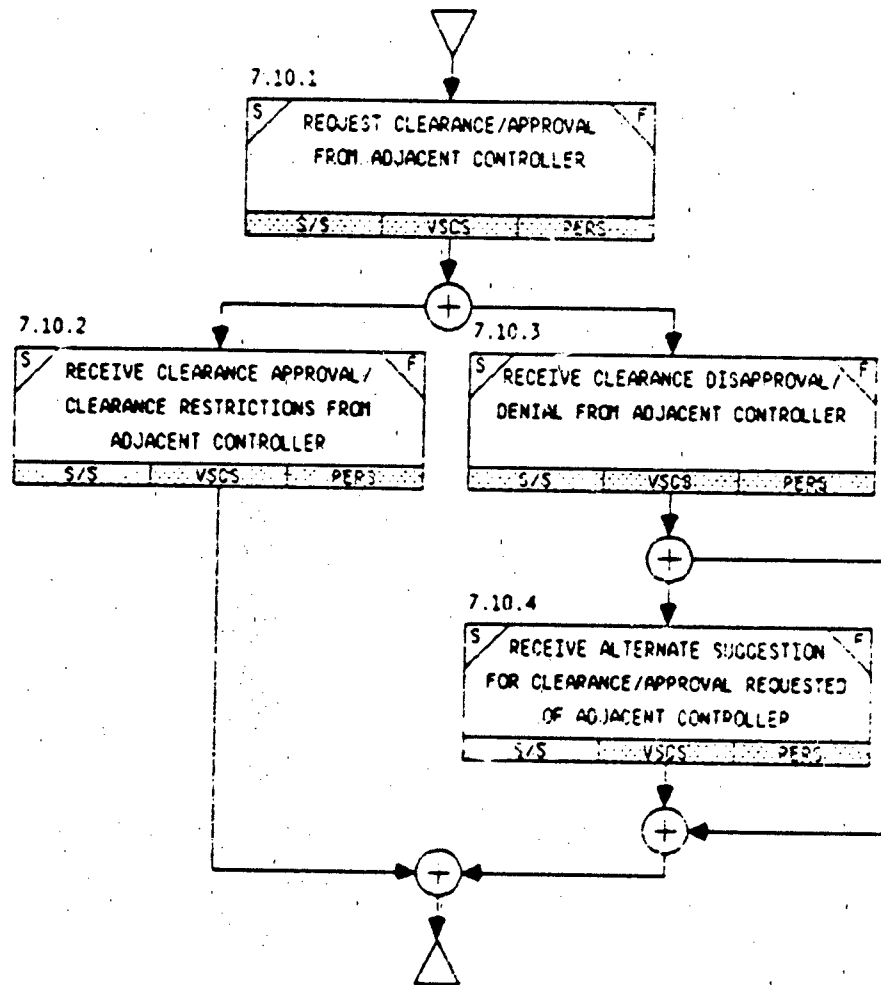
END IF

IF DEEMED NECESSARY BY CONTROLLER

**THEN (7.9.10) FORWARD CLEARANCE REQUEST TO ADJACENT CONTROLLER
END IF**

END DO

**SUB-ACTIVITY 710
INITIATING CLEARANCE/
APPROVAL REQUESTS**



SUB-ACTIVITY 7.10: INITIATING CLEARANCE/APPROVAL REQUESTS

INPUT = NEED FOR CLEARANCE/APPROVAL FROM ADJACENT CONTROLLER

DO

(7.10.1) REQUEST CLEARANCE/APPROVAL FROM ADJACENT CONTROLLER

(dp) DETERMINE WHETHER CLEARANCE REQUEST IS TO BE DISAPPROVED

IF CLEARANCE REQUEST IS TO BE DISAPPROVED

THEN (7.10.3)

RECEIVE CLEARANCE DISAPPROVAL/DENIAL FROM ADJACENT CONTROLLER

IF DEEMED NECESSARY BY OTHER CONTROLLER

THEN (7.10.4) RECEIVE ALTERNATE SUGGESTION FOR CLEARANCE/ APPROVAL REQUESTED OF ADJACENT CONTROLLER

END IF

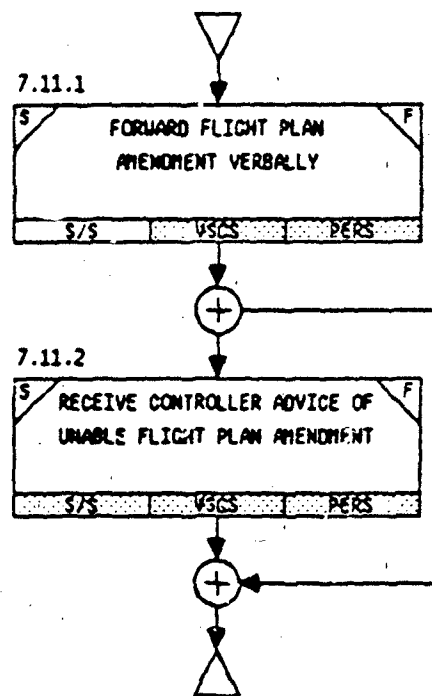
END DO

ELSE (7.10.2) RECEIVE CLEARANCE APPROVAL/CLEARANCE RESTRICTIONS FROM ADJACENT CONTROLLER

END IF

END DO

SUB-ACTIVITY 7.11
FORWARDING AMENDMENT MESSAGES



SUB-ACTIVITY 7.11: FORWARDING AMENDMENT MESSAGES

INPUT = NEED TO FORWARD FLIGHT PLAN AMENDMENT VERBALLY

DO

(7.11.1) FORWARD FLIGHT PLAN AMENDMENT VERBALLY

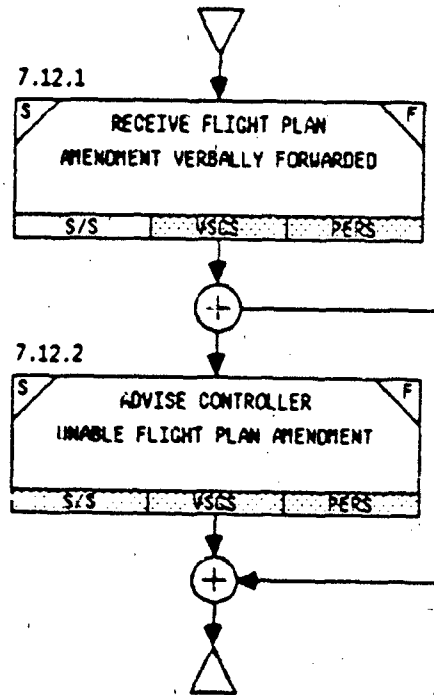
IF DEEMED NECESSARY BY CONTROLLER

**THEN (7.11.2) RECEIVE CONTROLLER ADVICE OF UNABLE FLIGHT PLAN
AMENDMENT**

END IF

END DO

SUB-ACTIVITY 7.12
RECEIVING AMENDMENT MESSAGES



SUB-ACTIVITY 7.12: RECEIVING AMENDMENT MESSAGES

INPUT = FLIGHT PLAN AMENDMENT VERBALLY FORWARDED

DO

(7.12.1) RECEIVE FLIGHT PLAN AMENDMENT VERBALLY FORWARDED

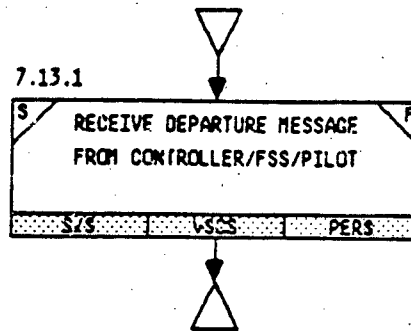
IF DEEMED NECESSARY BY CONTROLLER

THEN (7.12.2) ADVISE CONTROLLER UNABLE FLIGHT PLAN AMENDMENT

END IF

END DO

SUB-ACTIVITY 7.13
RECEIVING DEPARTURE MESSAGES



SUB-ACTIVITY 7.13: RECEIVING DEPARTURE MESSAGES

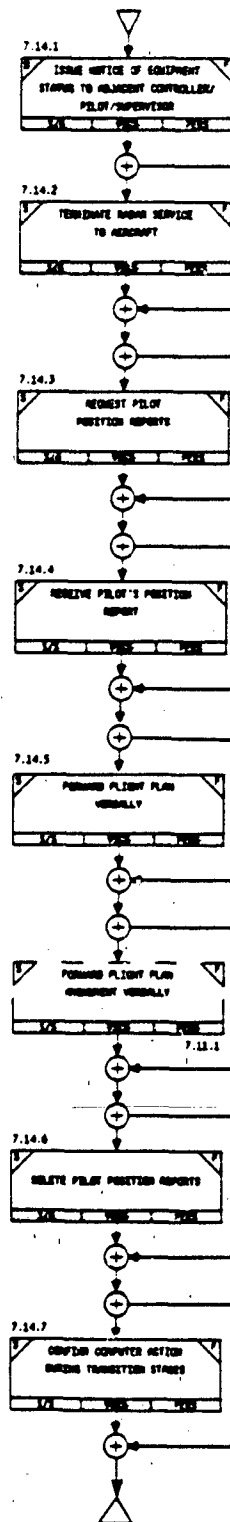
INPUT = DEPARTURE MESSAGE FROM CONTROLLER/FSS/PILOT.

DO

(7.13.1) RECEIVE DEPARTURE MESSAGE FROM CONTROLLER/FSS/PILOT

END DO

SUB-ACTIVITY 7.14 **FORWARDING AUTOMATION STATUS**



SUB-ACTIVITY 7.14: FORWARDING AUTOMATION STATUS

INPUT = NEED TO FORWARD AUTOMATION STATUS

DO

**(7.14.1) ISSUE NOTICE OF EQUIPMENT STATUS TO ADJACENT CONTROLLER/PILOT/
SUPERVISOR**

IF REQUIRED BY DIRECTIVE

THEN (7.14.2) TERMINATE RADAR SERVICE TO AIRCRAFT

END IF

IF REQUIRED BY DIRECTIVE

THEN (7.14.3) REQUEST PILOT POSITION REPORTS

END IF

IF REQUIRED BY DIRECTIVE

THEN (7.14.4) RECEIVE PILOT'S POSITION REPORT

END IF

IF REQUIRED BY DIRECTIVE

THEN (7.14.5) FORWARD FLIGHT PLAN VERBALLY

END IF

IF REQUIRED BY DIRECTIVE

THEN (7.11.1) FORWARD FLIGHT PLAN AMENDMENT VERBALLY

END IF

IF REQUIRED BY DIRECTIVE

THEN (7.14.6) DETECT PILOT POSITION REPORTS

END IF

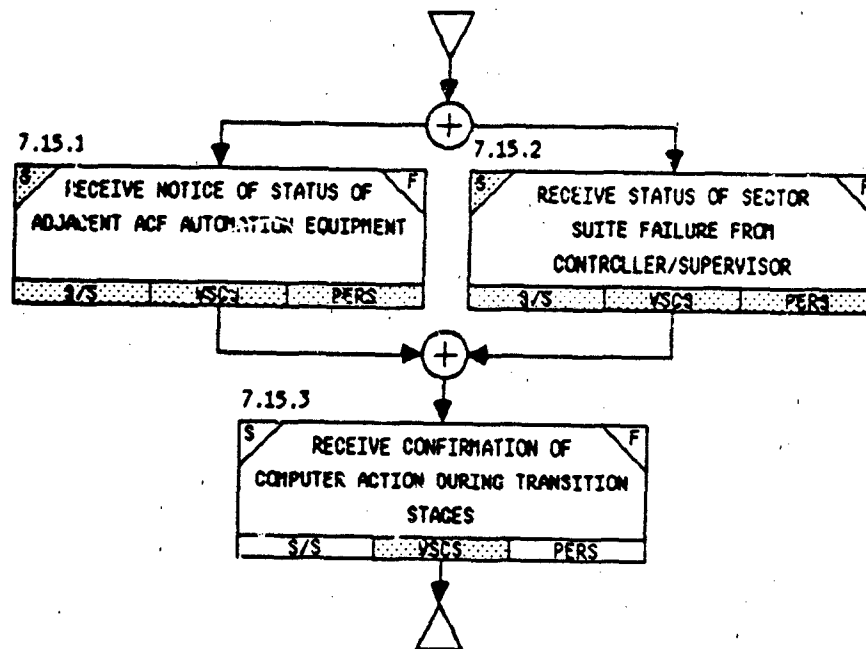
IF REQUIRED BY DIRECTIVE

THEN (7.14.7) CONFIRM COMPUTER ACTION DURING TRANSITION STAGES

END IF

END DO

SUB-ACTIVITY 7.15
RECEIVING NOTICES OF AUTOMATION OUTAGES



SUB-ACTIVITY 7.15: RECEIVING NOTICES OF AUTOMATION OUTAGES

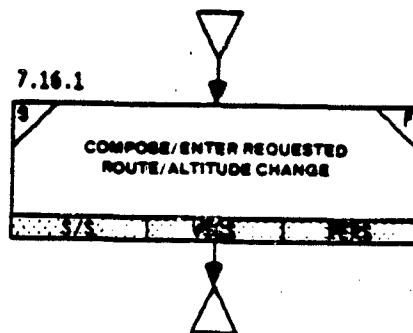
**INPUT = NOTICE OF STATUS OF ADJACENT ACF AUTOMATION EQUIPMENT, STATUS
OF SECTOR SUITE FAILURE FROM CONTROLLER/SUPERVISOR**

DO

**IF INPUT IS NOTICE OF STATUS OF ADJACENT ACF AUTOMATION EQUIPMENT
THEN (7.15.1) RECEIVE NOTICE OF STATUS OF ADJACENT ACF AUTOMATION EQUIPMENT
ELSE (7.15.2) RECEIVE STATUS OF SECTOR SUITE FAILURE FROM CONTROLLER/
SUPERVISOR
END IF**

**(7.15.3) RECEIVE CONFIRMATION OF COMPUTER ACTION DURING TRANSITION STAGES
END DO**

SUB-ACTIVITY 7.16
FORWARDING CONTROLLER REQUESTED
REROUTES/ALTITUDE CHANGES



SUB-ACTIVITY 7.16: FORWARDING CONTROLLER REQUESTED REROUTES/ALTITUDE CHANGES

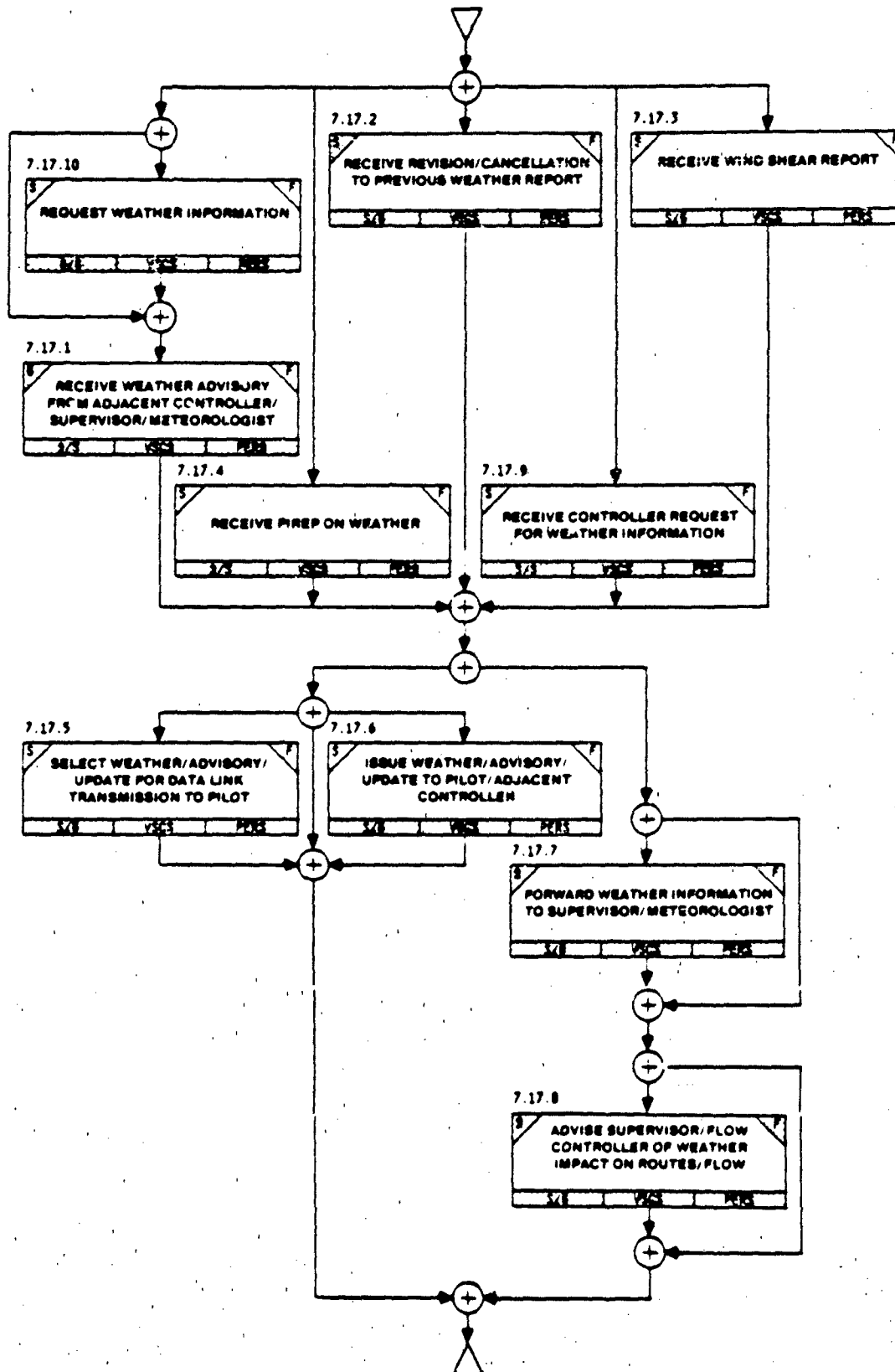
INPUT = ROUTE/ALTITUDE CHANGE REQUEST

DO

(7.16.1) COMPOSE/ENTER REQUESTED ROUTE/ALTITUDE CHANGE

END DO

SUB-ACTIVITY 7.17 **PROCESSING WEATHER INFORMATION**



SUB-ACTIVITY 7.17: PROCESSING WEATHER INFORMATION

INPUT = WEATHER ADVISORY FROM ADJACENT CONTROLLER/SUPERVISOR/METEOROLOGIST, NEED TO REQUEST WEATHER INFORMATION FROM ANOTHER CONTROLLER, REVISION/CANCELLATION TO PREVIOUS WEATHER REPORT, WIND SHEAR REPORT, PIREP ON WEATHER, CONTROLLER REQUEST FOR WEATHER INFORMATION

DO
IF INPUT IS WEATHER ADVISORY FROM ADJACENT CONTROLLER/SUPERVISOR/METEOROLOGIST OR NEED TO REQUEST WEATHER INFORMATION FROM ANOTHER CONTROLLER
THEN DO

IF DEEMED NECESSARY BY CONTROLLER
THEN (7.17.10) REQUEST WEATHER INFORMATION
END IF

(7.17.1) RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER/SUPERVISOR/METEOROLOGIST
END DO
ELSE

IF INPUT IS REVISION/CANCELLATION TO PREVIOUS WEATHER REPORT
THEN (7.17.2) RECEIVE REVISION/CANCELLATION TO PREVIOUS WEATHER REPORT
ELSE

IF INPUT IS PIREP ON WEATHER
THEN (7.17.4) RECEIVE PIREP ON WEATHER
ELSE

IF INPUT IS WIND SHEAR REPORT
THEN (7.17.3) RECEIVE WIND SHEAR REPORT
ELSE (7.17.9) RECEIVE CONTROLLER REQUEST FOR WEATHER INFORMATION
END IF

END IF

END IF

END IF

(dp) DETERMINE WHETHER TO FORWARD WEATHER ADVISORY OR ADVISE SUPERVISOR
IF NECESSARY
THEN DO

IF DEEMED NECESSARY BY CONTROLLER
THEN (7.17.7) FORWARD WEATHER INFORMATION TO SUPERVISOR/METEOROLOGIST
END IF

IF DEEMED NECESSARY BY CONTROLLER
THEN (7.17.8) ADVISE SUPERVISOR/FLOW CONTROLLER OF WEATHER IMPACT ON ROUTES/FLOW
END IF

END DO
ELSE DO

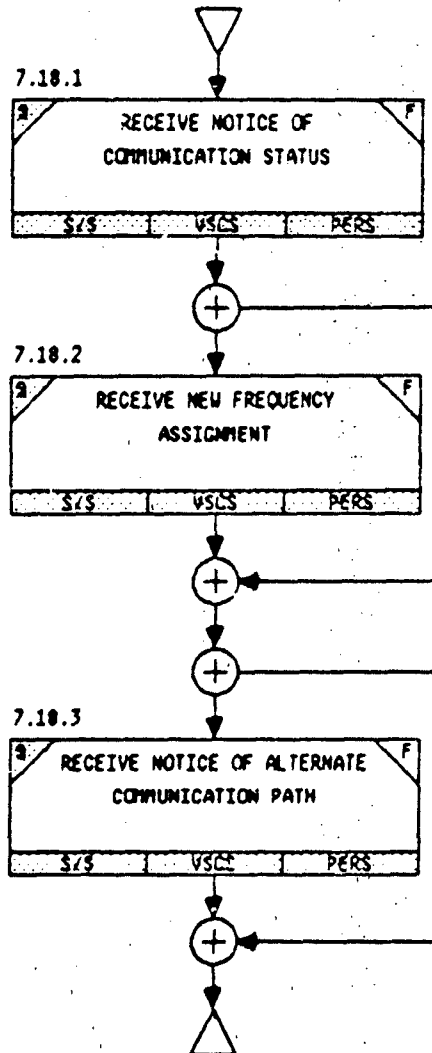
(dp) EVALUATE NECESSITY TO ISSUE WEATHER/ADVISORY/UPDATE TO PILOT/ADJACENT CONTROLLER

IF DEEMED NECESSARY BY CONTROLLER AND IF REQUIRED BY DIRECTIVE
THEN (7.17.6) ISSUE WEATHER/ADVISORY/UPDATE TO PILOT/ADJACENT CONTROLLER

ELSE (7.17.5) SELECT WEATHER/ADVISORY/UPDATE FOR DATA LINK TRANSMISSION TO PILOT
END IF

END DO
END IF
END DO

SUB-ACTIVITY 7.18
RECEIVING NOTICES OF COMMUNICATION
OUTAGES



SUB-ACTIVITY 7.18: RECEIVING NOTICES OF COMMUNICATION OUTAGES

INPUT = NOTICE OF COMMUNICATION STATUS

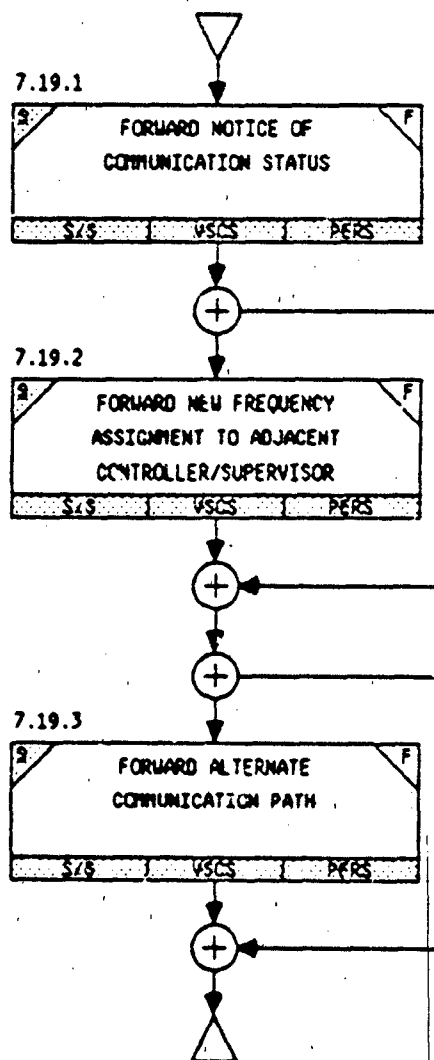
DO

(7.18.1) RECEIVE NOTICE OF COMMUNICATION STATUS

**IF DEEMED NECESSARY BY OTHER CONTROLLER
THEN (7.18.2) RECEIVE NEW FREQUENCY ASSIGNMENT
END IF**

**IF DEEMED NECESSARY BY OTHER CONTROLLER
THEN (7.18.3) RECEIVE NOTICE OF ALTERNATE COMMUNICATION PATH
END IF
END DO**

SUB-ACTIVITY 7.19
FORWARDING NOTICES OF COMMUNICATION
OUTAGES



SUB-ACTIVITY 7.19: FORWARDING NOTICES OF COMMUNICATION OUTAGES

INPUT = NEED TO FORWARD NOTICE OF COMMUNICATION OUTAGES

DO

(7.19.1) FORWARD NOTICE OF COMMUNICATION STATUS

IF DEEMED NECESSARY BY OTHER CONTROLLER

**THEN (7.19.2) FORWARD NEW FREQUENCY ASSIGNMENT TO ADJACENT CONTROLLER/
SUPERVISOR**

END IF

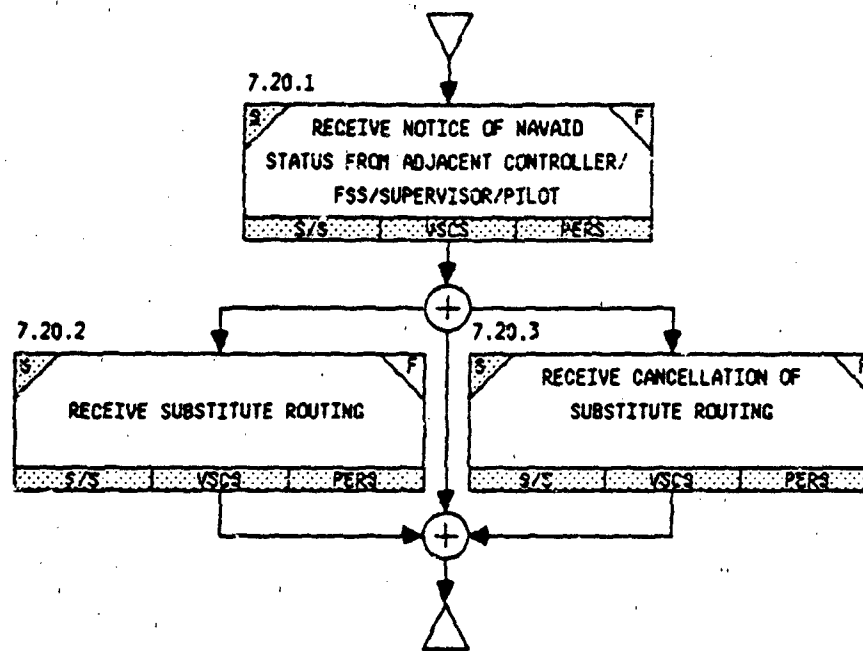
IF DEEMED NECESSARY BY CONTROLLER

THEN (7.19.3) FORWARD ALTERNATE COMMUNICATION PATH

END IF

END DO

SUB-ACTIVITY 7.20
RECEIVING NOTICES OF NAVAID OUTAGES



SUB-ACTIVITY 7.20: RECEIVING NOTICES OF NAVAID OUTAGES

INPUT = NOTICE OF NAVAID STATUS

DO

**(7.20.1) RECEIVE NOTICE OF NAVAID STATUS FROM ADJACENT CONTROLLER/FSS/
SUPERVISOR/PILOT**

(dp) EVALUATE NECESSITY TO RECEIVE SUBSTITUTE ROUTING OR CANCELLATION

IF REQUIRED BY DIRECTIVE

THEN DO

**(dp) DETERMINE WHETHER SUBSTITUTE ROUTING HAS BEEN CANCELLED
IF CANCELLED**

THEN (7.20.3) RECEIVE CANCELLATION OF SUBSTITUTE ROUTING

ELSE (7.20.2) RECEIVE SUBSTITUTE ROUTING

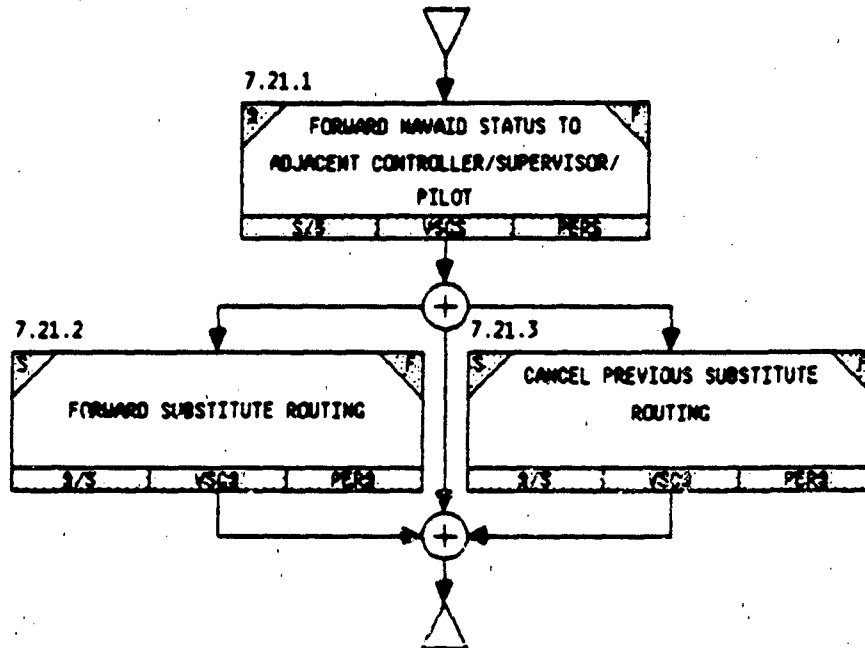
END IF

END DO

END IF

END DO

SUB-ACTIVITY 7.21
FORWARDING NOTICES OF NAVAID OUTAGES



SUB-ACTIVITY 7.21: FORWARDING NOTICES OF NAVAID OUTAGES

INPUT = NEED TO FORWARD NAVAID STATUS

DO

(7.21.1) FORWARD NAVAID STATUS TO ADJACENT CONTROLLER/SUPERVISOR/PILOT

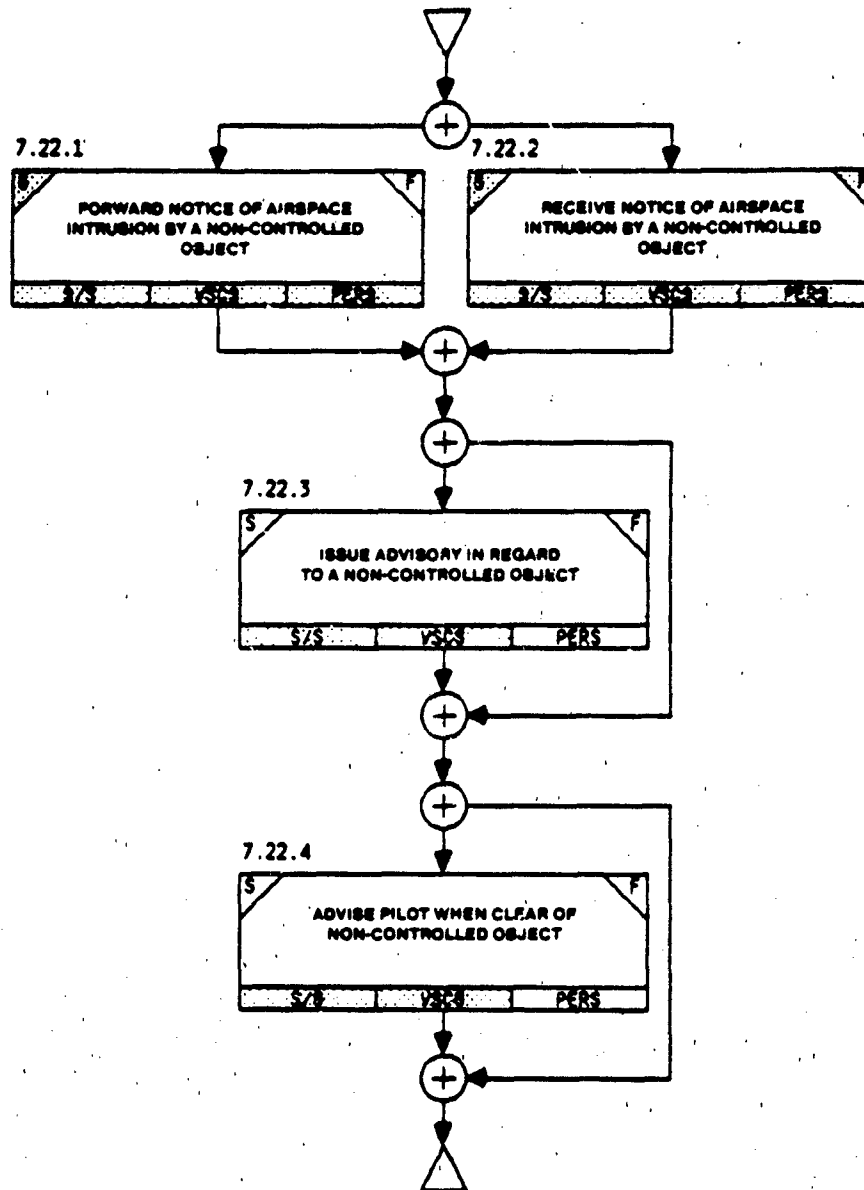
**(dp) EVALUATE NECESSITY TO CANCEL OR FORWARD SUBSTITUTE ROUTING
IF REQUIRED BY DIRECTIVE
THEN DO**

**(dp) EVALUATE NECESSITY TO CANCEL SUBSTITUTE ROUTING
IF REQUIRED BY DIRECTIVE
THEN (7.21.3) CANCEL PREVIOUS SUBSTITUTE ROUTING
ELSE (7.21.2) FORWARD SUBSTITUTE ROUTING
END IF**

**END DO
END IF**

END DO

SUB-ACTIVITY 7.22 **PROCESSING AIRSPACE INTRUSIONS**



SUB-ACTIVITY 7.22: PROCESSING AIRSPACE INTRUSIONS

INPUT = NEED TO FORWARD NOTICE OF AIRSPACE INTRUSION BY A NON-CONTROLLED OBJECT

DO

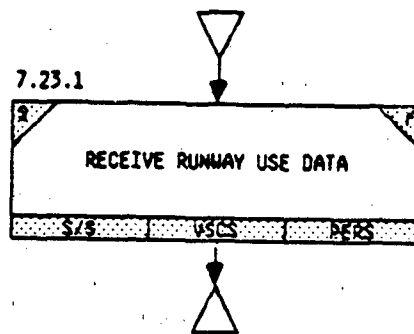
**IF INPUT IS NOTICE OF AIRSPACE INTRUSION BY A NON-CONTROLLED OBJECT
THEN (7.22.2) RECEIVE NOTICE OF AIRSPACE INTRUSION BY A NON-CONTROLLED OBJECT
ELSE (7.22.1) FORWARD NOTICE OF AIRSPACE INTRUSION BY A NON-CONTROLLED OBJECT
END IF**

**IF DEEMED NECESSARY BY CONTROLLER
THEN (7.22.3) ISSUE ADVISORY IN REGARD TO A NON-CONTROLLED OBJECT
END IF**

**IF NOT SIGHTED BY PILOT
THEN (7.22.4) ADVISE PILOT WHEN CLEAR OF NON-CONTROLLED OBJECT
END IF**

END DO

SUB-ACTIVITY 7.23
RECEIVING NOTICES OF RUNWAY USE



SUB-ACTIVITY 7.23: RECEIVING NOTICES OF RUNWAY USE

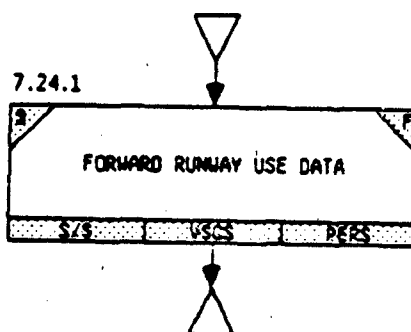
INPUT = RUNWAY USE DATA

DO

(7.23.1) RECEIVE RUNWAY USE DATA

END DO

SUB-ACTIVITY 7.24
FORWARDING NOTICES OF RUNWAY USE



SUB-ACTIVITY 7.24: FORWARDING NOTICES OF RUNWAY USE

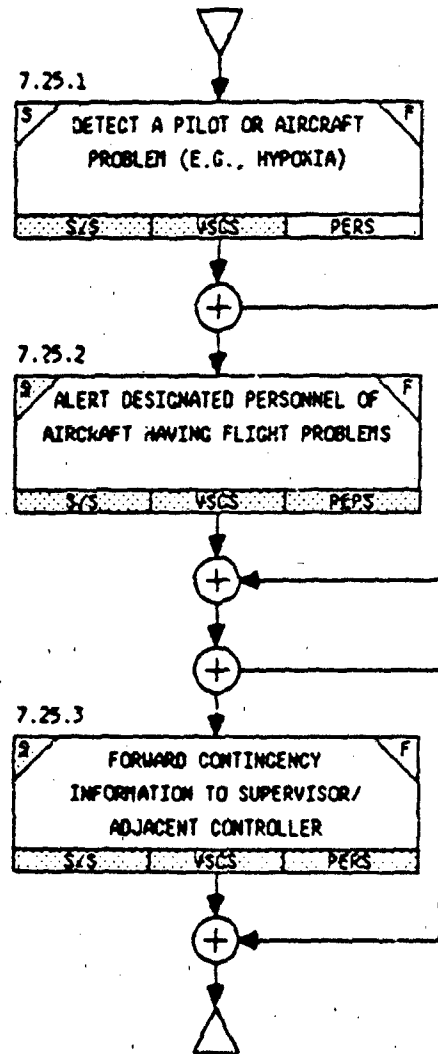
INPUT = NEED TO FORWARD RUNWAY USE DATA

DO

(7.24.1) FORWARD RUNWAY USE DATA

END DO

SUB-ACTIVITY 7.25
FORWARDING NOTICES OF CONTINGENCIES



SUB-ACTIVITY 7.25: FORWARDING NOTICES OF CONTINGENCIES

INPUT = A PILOT OR AIRCRAFT PROBLEM

DO

(7.25.1) DETECT A PILOT OR AIRCRAFT PROBLEM (e.g., HYPOXIA)

IF DEEMED NECESSARY BY CONTROLLER

THEN (7.25.2) ALERT DESIGNATED PERSONNEL OF AIRCRAFT HAVING FLIGHT PROBLEMS

END IF

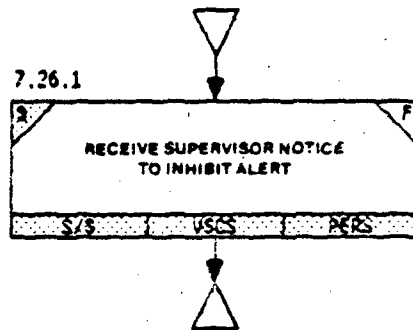
IF DEEMED NECESSARY BY CONTROLLER OR REQUIRED BY DIRECTIVE

THEN (7.25.3) FORWARD CONTINGENCY INFORMATION TO SUPERVISOR/ADJACENT CONTROLLER

END IF

END DO

SUB-ACTIVITY 7.26
RECEIVING ALERT INHIBIT NOTICES



SUB-ACTIVITY 7.26: RECEIVING ALERT INHIBIT NOTICES

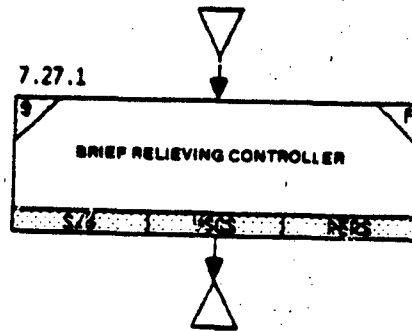
INPUT = ALERT INHIBIT NOTICE

DO

(7.26.1) RECEIVE SUPERVISOR NOTICE TO INHIBIT ALERT

END DO

SUB-ACTIVITY 7.27
BRIEFING RELIEVING CONTROLLERS



SUB-ACTIVITY 7.27: BRIEFING RELIEVING CONTROLLERS

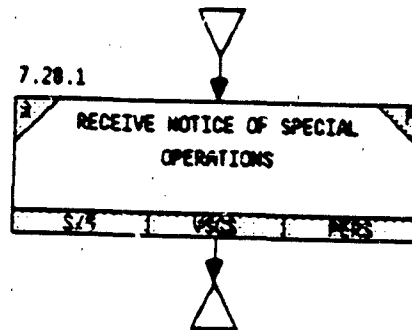
INPUT = NEED TO BRIEF RELIEVING CONTROLLER

DO

(7.27.1) BRIEF RELIEVING CONTROLLER

END DO

SUB-ACTIVITY 7.28
RECEIVING NOTICES OF SPECIAL OPERATIONS



SUB-ACTIVITY 7.28: RECEIVING NOTICES OF SPECIAL OPERATIONS

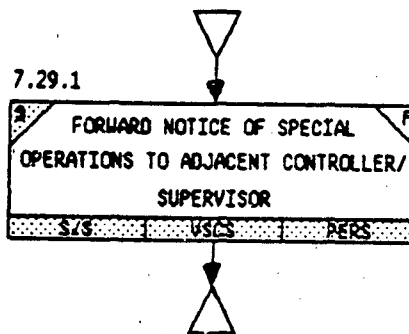
INPUT = NOTICE OF SPECIAL OPERATIONS

DO

(7.28.1) RECEIVE NOTICE OF SPECIAL OPERATIONS

END DO

SUB-ACTIVITY 7.29
FORWARDING NOTICES OF
SPECIAL OPERATIONS



SUB-ACTIVITY 7.29: FORWARDING NOTICES OF SPECIAL OPERATIONS

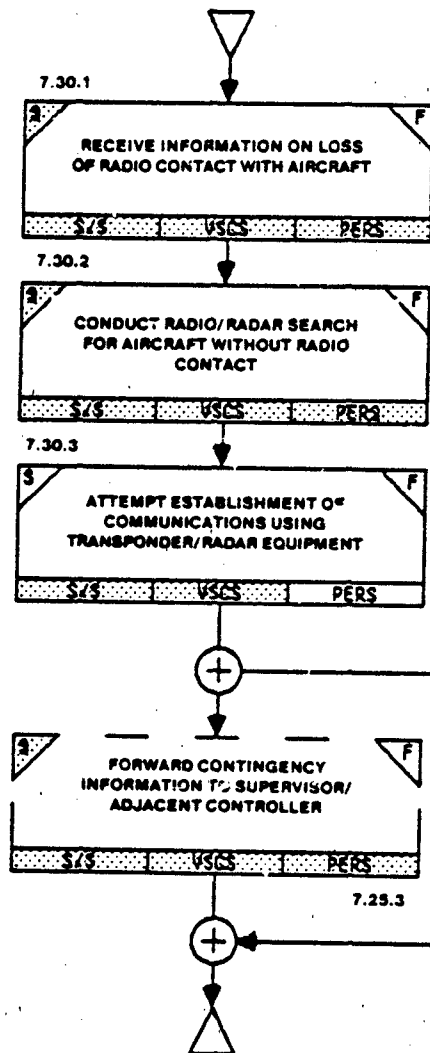
INPUT = NEED TO FORWARD NOTICE OF SPECIAL OPERATIONS

DO

**(7.29.1) FORWARD NOTICE OF SPECIAL OPERATIONS TO ADJACENT CONTROLLER/
SUPERVISOR**

END DO

SUB-ACTIVITY 7.30 **PROCESSING OF AIRCRAFT WITHOUT RADIO**



SUB-ACTIVITY 7.30: PROCESSING OF AIRCRAFT WITHOUT RADIO

INPUT = INFORMATION ON LOSS OF RADIO CONTACT WITH AIRCRAFT

DO

(7.30.1) RECEIVE INFORMATION ON LOSS OF RADIO CONTACT WITH AIRCRAFT

(7.30.2) CONDUCT RADIO/RADAR SEARCH FOR AIRCRAFT WITHOUT RADIO CONTACT

(7.30.3) ATTEMPT ESTABLISHMENT OF COMMUNICATIONS USING TRANSPONDER/RADAR EQUIPMENT

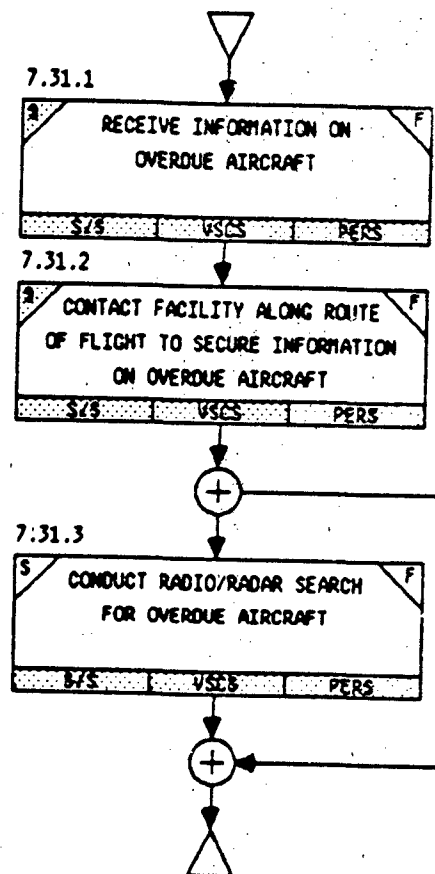
IF DEEMED NECESSARY BY CONTROLLERS

THEN [7.25.3] FORWARD CONTINGENCY INFORMATION TO SUPERVISOR/ADJACENT CONTROLLER

END IF

END DO

SUB-ACTIVITY 7.31
PROCESSING OVERDUE AIRCRAFT



SUB-ACTIVITY 7.31: PROCESSING OVERDUE AIRCRAFT

INPUT = INFORMATION ON OVERDUE AIRCRAFT

DO

(7.31.1) RECEIVE INFORMATION ON OVERDUE AIRCRAFT

**(7.31.2) CONTACT FACILITY ALONG ROUTE OF FLIGHT TO SECURE INFORMATION ON
OVERDUE AIRCRAFT**

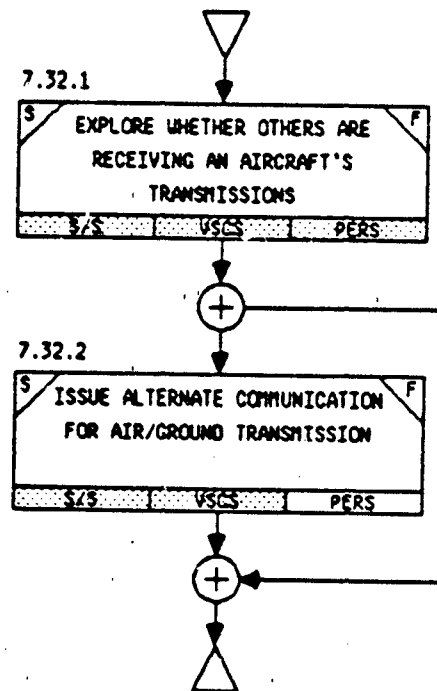
IF REQUIRED BY DIRECTIVE

THEN (7.31.3) CONDUCT RADIO/RADAR SEARCH FOR OVERDUE AIRCRAFT

END IF

END DO

SUB-ACTIVITY 7.32
RESPONDING TO INTERMITTENT RADIO
COMMUNICATIONS



SUB-ACTIVITY 7.32: RESPONDING TO INTERMITTENT RADIO COMMUNICATIONS

INPUT = INTERMITTENT RADIO COMMUNICATIONS

DO

(7.32.1) EXPLORE WHETHER OTHERS ARE RECEIVING AN AIRCRAFT'S TRANSMISSIONS

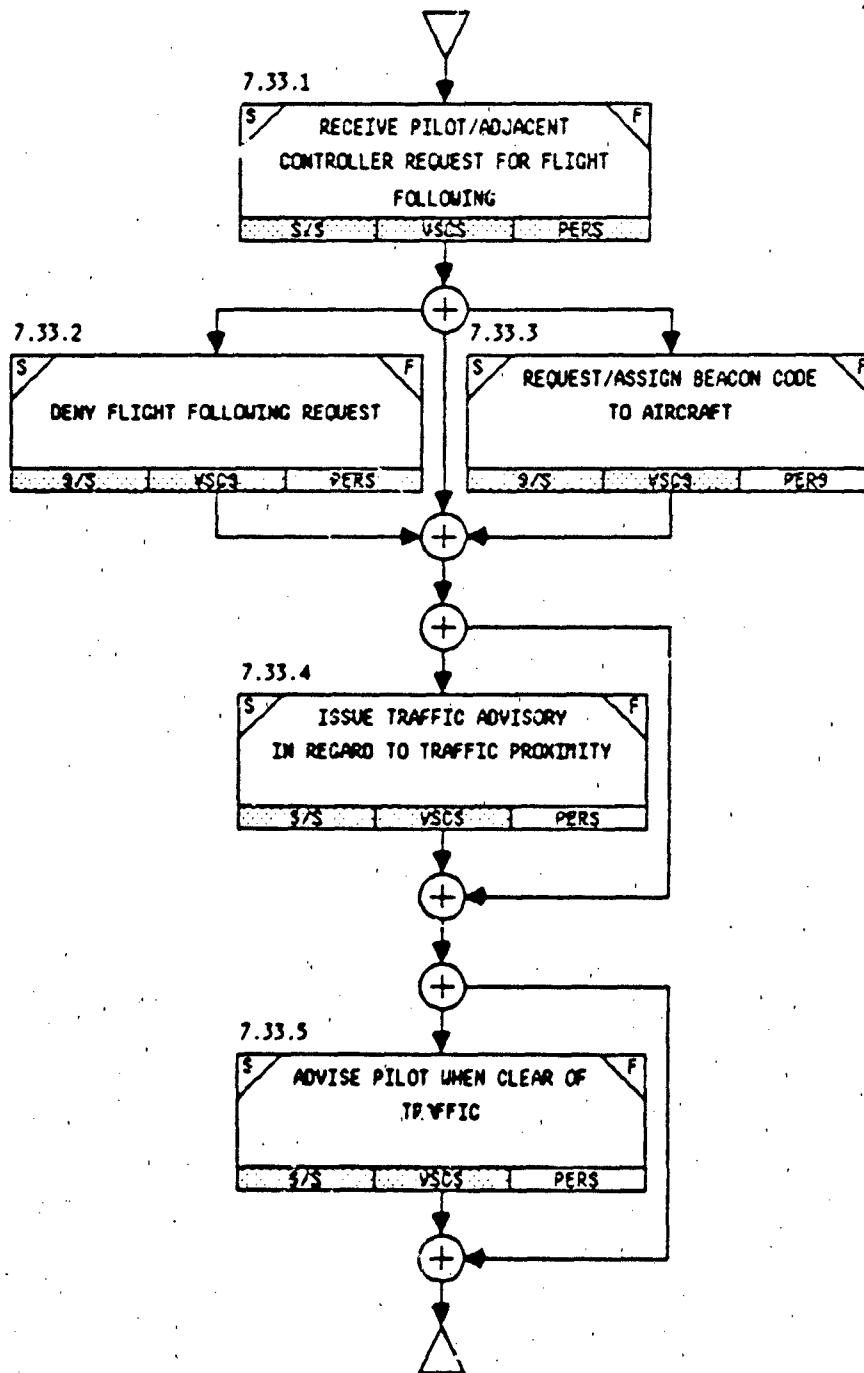
IF DEEMED NECESSARY BY CONTROLLER

THEN (7.32.2) ISSUE ALTERNATE COMMUNICATIONS FOR AIR/GROUND TRANSMISSION

END IF

END DO

SUB-ACTIVITY 7.33
RESPONDING TO FLIGHT FOLLOWING
REQUESTS



SUB-ACTIVITY 7.33: RESPONDING TO FLIGHT FOLLOWING REQUESTS

INPUT = PILOT/ADJACENT CONTROLLER REQUEST FOR FLIGHT FOLLOWING

DO

(7.33.1) RECEIVE PILOT/ADJACENT CONTROLLER REQUEST FOR FLIGHT FOLLOWING

(dp) DETERMINE ABILITY TO GRANT REQUEST FOR FLIGHT FOLOWING

IF REQUEST IS TO BE GRANTED

THEN (7.33.3) REQUEST/ASSIGN BEACON CODE TO AIRCRAFT

ELSE (7.33.2) DENY FLIGHT FOLLOWING REQUEST

END IF

IF REQUIRED BY DIRECTIVE

THEN (7.33.4) ISSUE TRAFFIC ADVISORY IN REGARD TO TRAFFIC PROXIMITY

END IF

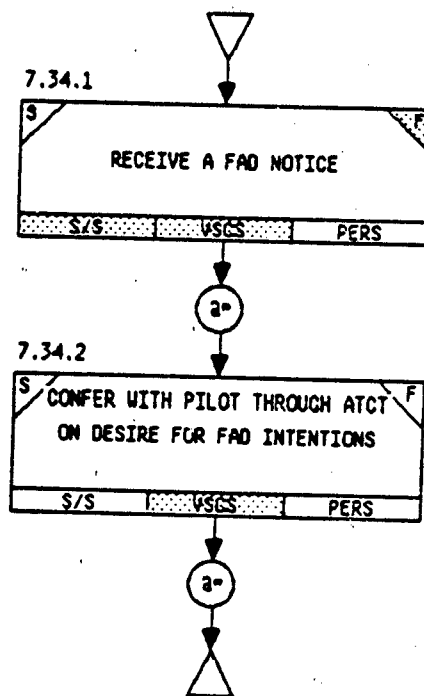
IF REQUIRED BY DIRECTIVE

THEN (7.33.5) ADVISE PILOT WHEN CLEAR OF TRAFFIC

END IF

END DO

SUB-ACTIVITY 7.34
PROCESSING FAD NOTICES



SUB-ACTIVITY 7.34: PROCESSING FAD NOTICES

INPUT = FAD NOTICE

DO

(7.34.1) RECEIVE A FAD NOTICE

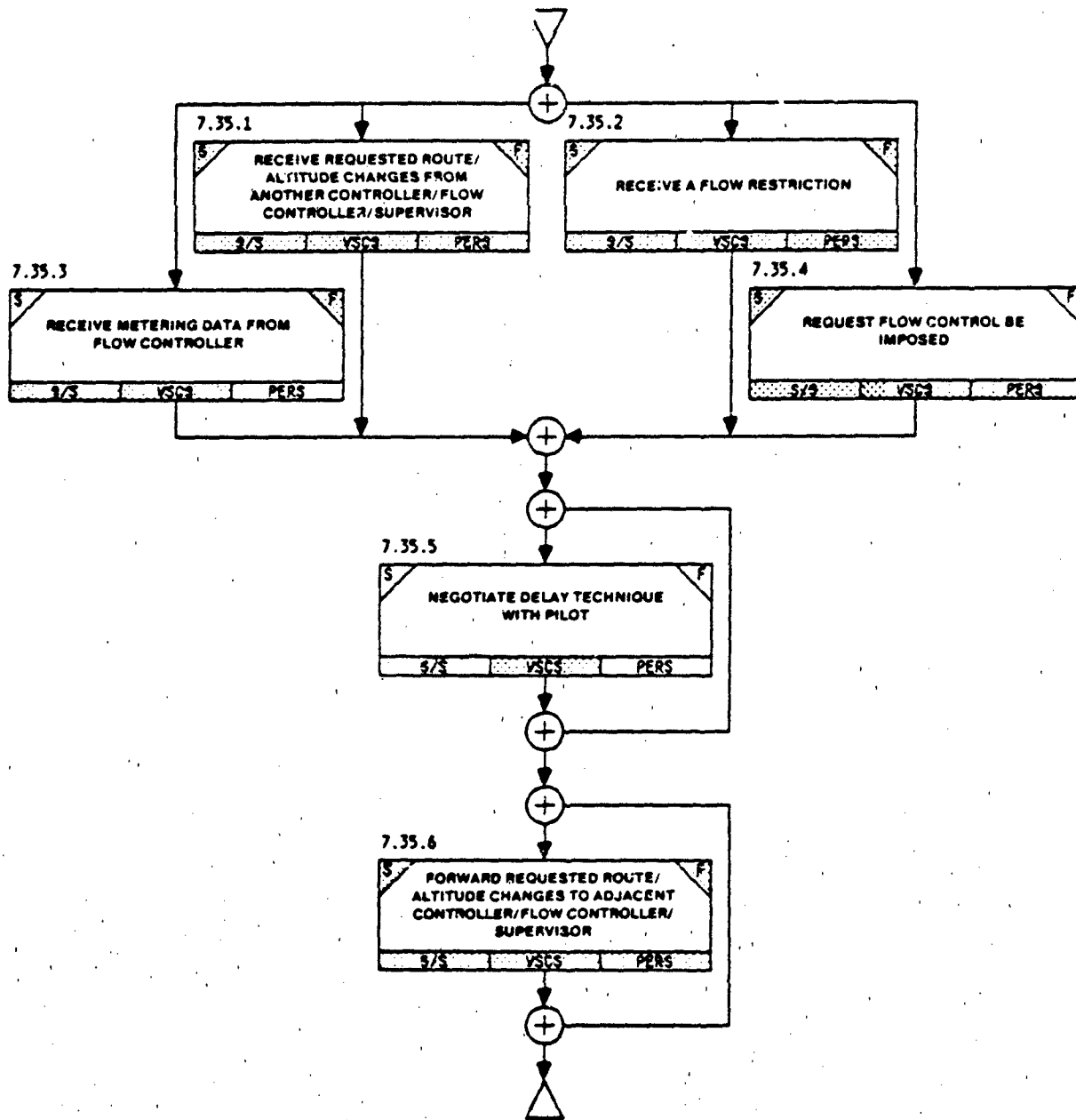
DO WHILE (CONDITION EXISTS)

(7.34.2) CONFER WITH PILOT THROUGH ATCT ON DESIRE FOR FAD INTENTIONS

END DO

END DO

**SUB-ACTIVITY 7.35
PROCESSING FLOW CONTROL/METERING NOTICES**



SUB-ACTIVITY 7.35: PROCESSING FLOW CONTROL/METERING NOTICES

**INPUT = REQUESTED ROUTE/ALTITUDE CHANGES FROM ANOTHER CONTROLLER/
FLOW CONTROLLER/SUPERVISOR, FLOW RESTRICTION, METERING DATA
FROM FLOW CONTROLLER, NEED TO IMPOSE FLOW CONTROL**

DO

**IF INPUT IS REQUESTED ROUTE/ALTITUDE CHANGES FROM ANOTHER CONTROLLER/FLOW
CONTROLLER/SUPERVISOR**

**THEN (7.35.1) RECEIVE REQUESTED ROUTE/ALTITUDE CHANGES FROM ANOTHER
CONTROLLER/FLOW CONTROLLER/SUPERVISOR**

ELSE

IF INPUT IS FLOW RESTRICTION

THEN (7.35.2) RECEIVE A FLOW RESTRICTION

ELSE

IF INPUT IS METERING DATA FROM FLOW CONTROLLER

**THEN (7.35.3) RECEIVE METERING DATA FROM FLOW
CONTROLLER**

ELSE (7.35.4) REQUEST FLOW CONTROL BE IMPOSED

END IF

END IF

END IF

IF DEEMED NECESSARY BY CONTROLLER

THEN (7.35.5) NEGOTIATE DELAY TECHNIQUE WITH PILOT

END IF

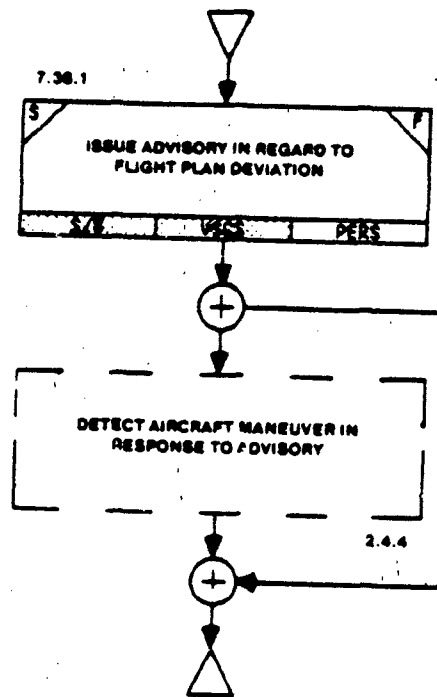
IF DEEMED NECESSARY BY CONTROLLER

**THEN (7.35.6) FORWARD REQUESTED ROUTE/ALTITUDE CHANGES TO ADJACENT
CONTROLLER/FLOW CONTROLLER/SUPERVISOR**

END IF

END DO

SUB-ACTIVITY 7.36 **ISSUING DEVIATION ADVISORIES**



SUB-ACTIVITY 7.36: ISSUING DEVIATION ADVISORIES

INPUT = NEED TO ISSUE ADVISORY

DO

(7.36.1) ISSUE ADVISORY IN REGARD TO FLIGHT PLAN DEVIATION

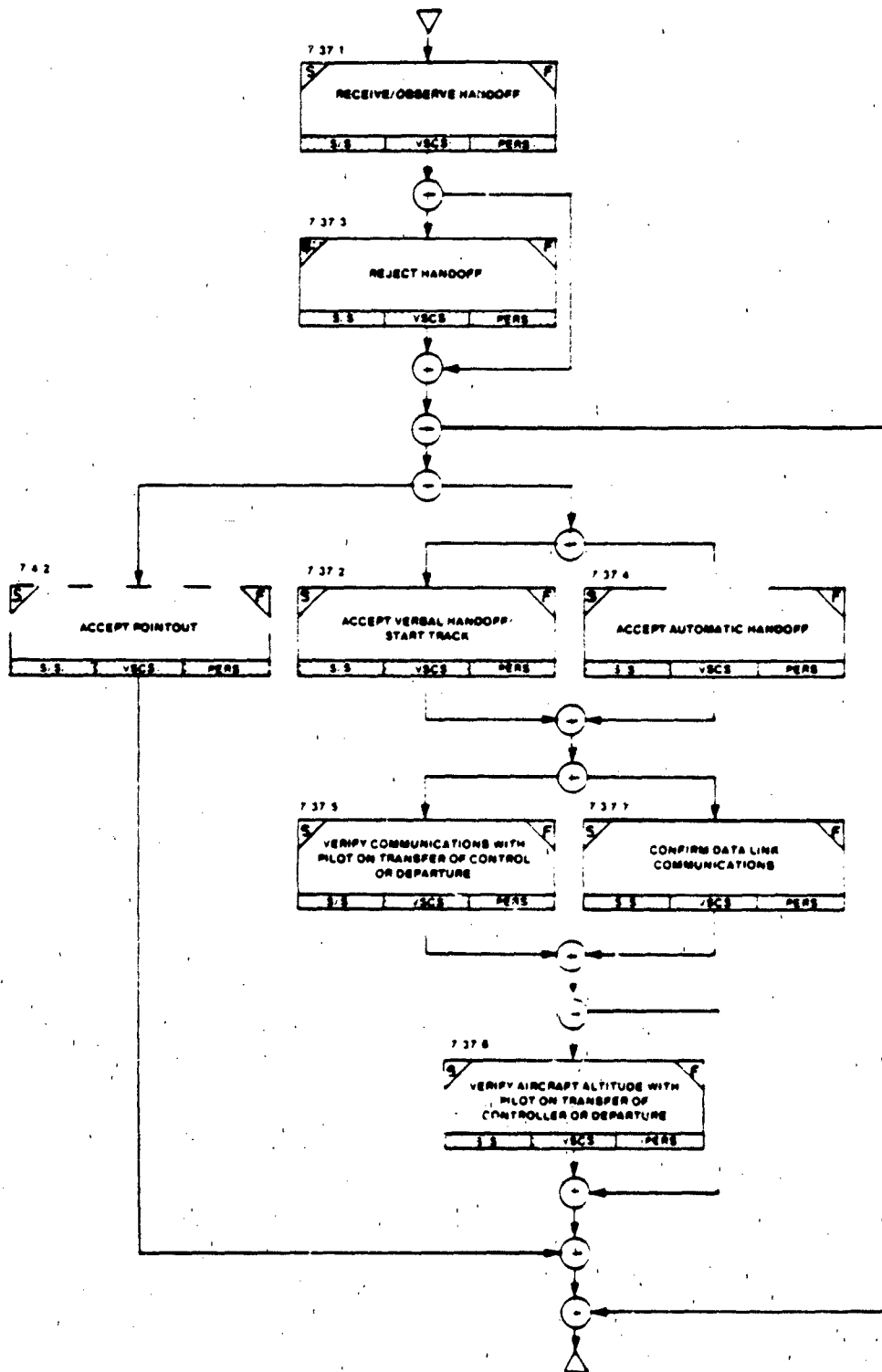
IF DEEMED NECESSARY BY CONTROLLER

THEN [2.4.4] DETECT AIRCRAFT MANEUVER IN RESPONSE TO ADVISORY

END IF

END DO

SUB-ACTIVITY 7.37 **RECEIVING TRANSFER OF CONTROL**



SUB-ACTIVITY 7.37: RECEIVING TRANSFER OF CONTROL

INPUT = HANDOFF

DO

(7.37.1) RECEIVE/OBSERVE HANDOFF

**IF OPERATIONS NECESSITATE
THEN (7.37.3) REJECT HANDOFF
END IF**

**(dp) DETERMINE WHETHER POINTOUT, VERBAL HANDOFF, OR AUTOMATIC HANDOFF IS
TO BE ACCEPTED
IF THERE IS ACCEPTANCE
THEN DO**

**(dp) DETERMINE WHETHER POINTOUT IS PREFERRED
IF POINTOUT IS PREFERRED
THEN (7.4.2) ACCEPT POINTOUT
ELSE DO**

**(dp) DETERMINE WHETHER THERE IS AN AUTOMATIC HANDOFF
IF HANDOFF IS AUTOMATIC
THEN (7.37.4) ACCEPT AUTOMATIC HANDOFF
ELSE (7.37.2) ACCEPT VERBAL HANDOFF/START TRACK
END IF**

**END DO
END IF**

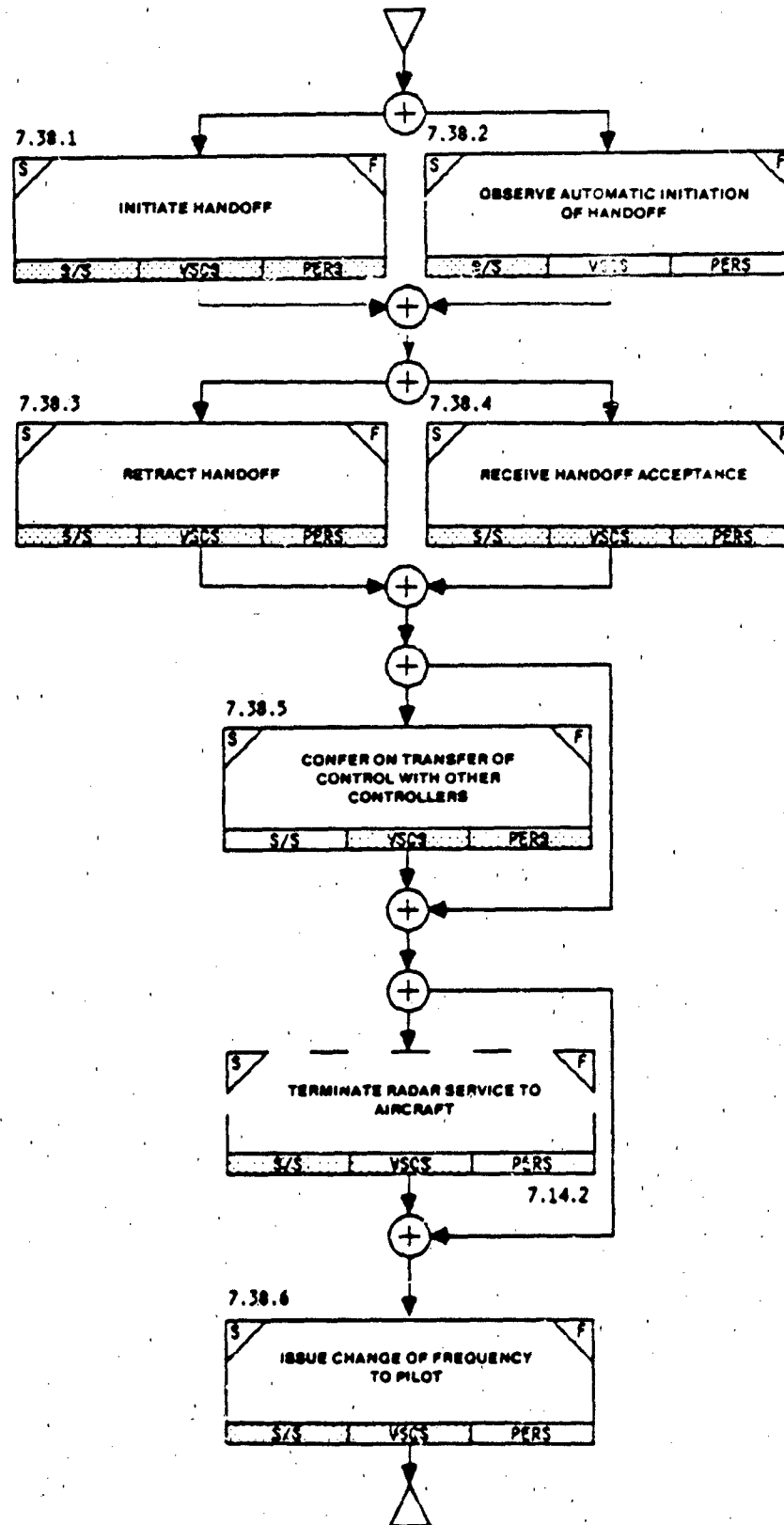
**(dp) DETERMINE IF COMMUNICATING DIRECTLY WITH PILOT
IF COMMUNICATING DIRECTLY WITH PILOT
THEN (7.37.5) VERIFY COMMUNICATIONS WITH PILOT ON TRANSFER OF CONTROL OR
DEPARTURE
ELSE (7.37.7) CONFIRM DATA LINK COMMUNICATIONS
END IF**

**IF REQUIRED BY DIRECTIVE
THEN (7.37.6) VERIFY AIRCRAFT ALTITUDE WITH PILOT ON TRANSFER OF CONTROL OR
DEPARTURE
END IF**

**END DO
END IF**

END DO

SUB-ACTIVITY 7.38
INITIATING TRANSFER OF CONTROL



SUB-ACTIVITY 7.38: INITIATING TRANSFER OF CONTROL

INPUT = NEED TO TRANSFER CONTROL

DO

**(dp) EVALUATE NECESSITY TO OBSERVE AUTOMATIC INITIATION OF HANDOFF
IF REQUIRED BY DIRECTIVE**

THEN (7.38.2) OBSERVE AUTOMATIC INITIATION OF HANDOFF

ELSE (7.38.1) INITIATE HANDOFF

END IF

(dp) EVALUATE NECESSITY TO RETRACT HANDOFF

IF DEEMED NECESSARY BY CONTROLLER

THEN (7.38.3) RETRACT HANDOFF

ELSE (7.38.4) RECEIVE HANDOFF ACCEPTANCE

END IF

IF REQUIRED BY DIRECTIVE

THEN (7.38.5) CONFER ON TRANSFER OF CONTROL WITH OTHER CONTROLLER

END IF

IF REQUIRED BY DIRECTIVE

THEN (7.14.2) TERMINATE RADAR SERVICE TO AIRCRAFT

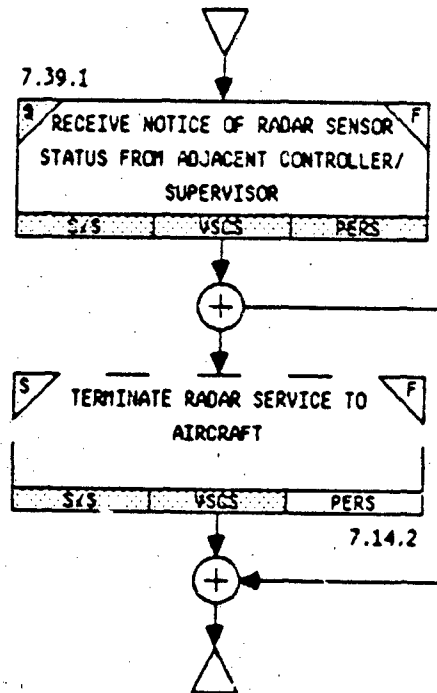
END IF

(7.38.6) ISSUE CHANGE OF FREQUENCY TO PILOT

END IF

END DO

SUB-ACTIVITY 7.39
RECEIVING NOTICES OF RADAR
SENSOR STATUS



SUB-ACTIVITY 7.39: RECEIVING NOTICES OF RADAR SENSOR STATUS

**INPUT = NOTICE OF RADAR SENSOR STATUS FROM ADJACENT CONTROLLER/
SUPERVISOR**

DO

**(7.39.1) RECEIVE NOTICE OF RADAR SENSOR STATUS FROM ADJACENT CONTROLLER/
SUPERVISOR**

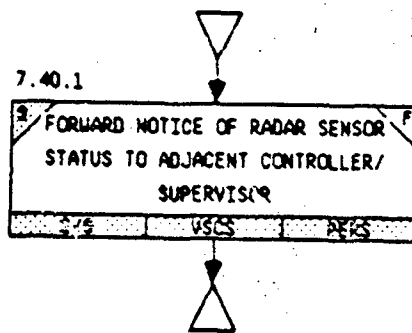
IF REQUIRED BY DIRECTIVE

THEN [7.14.2] TERMINATE RADAR SERVICE TO AIRCRAFT

END IF

END DO

SUB-ACTIVITY 7.40
FORWARDING NOTICES OF RADAR
SENSOR STATUS



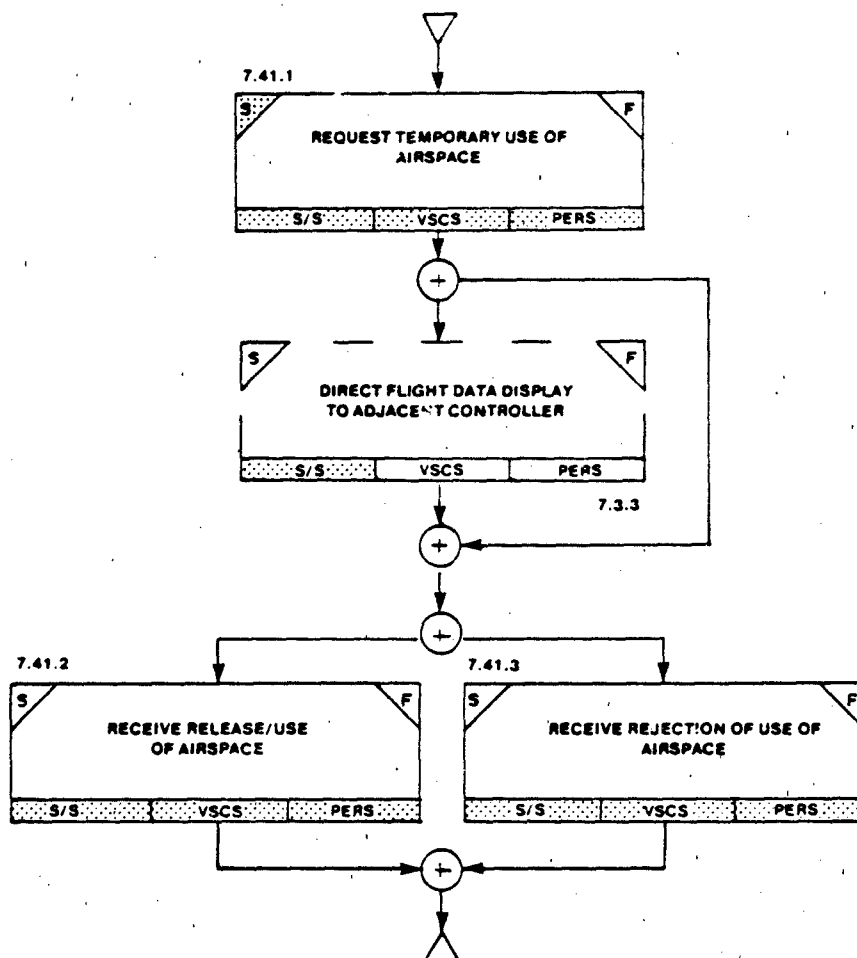
SUB-ACTIVITY 7.40: FORWARDING NOTICES OF RADAR SENSOR STATUS

INPUT = NEED TO FORWARD RADAR SENSOR STATUS

DO

**(7.40.1) FORWARD NOTICE OF RADAR SENSOR STATUS TO ADJACENT CONTROLLER/
SUPERVISOR
END DO**

SUB-ACTIVITY 7.41 **REQUESTING TEMPORARY RELEASE OF AIRSPACE**



SUB-ACTIVITY 7.41: REQUESTING TEMPORARY RELEASE OF AIRSPACE

INPUT = NEED FOR RELEASE OF AIRSPACE

DO

(7.41.1) REQUEST TEMPORARY USE OF AIRSPACE

IF DEEMED NECESSARY BY CONTROLLER

THEN (7.3.3) DIRECT FLIGHT DATA DISPLAY TO ADJACENT CONTROLLER

END IF

(dp) DETERMINE WHETHER USE OF AIRSPACE IS APPROVED

IF RELEASE OF AIRSPACE IS RECEIVED

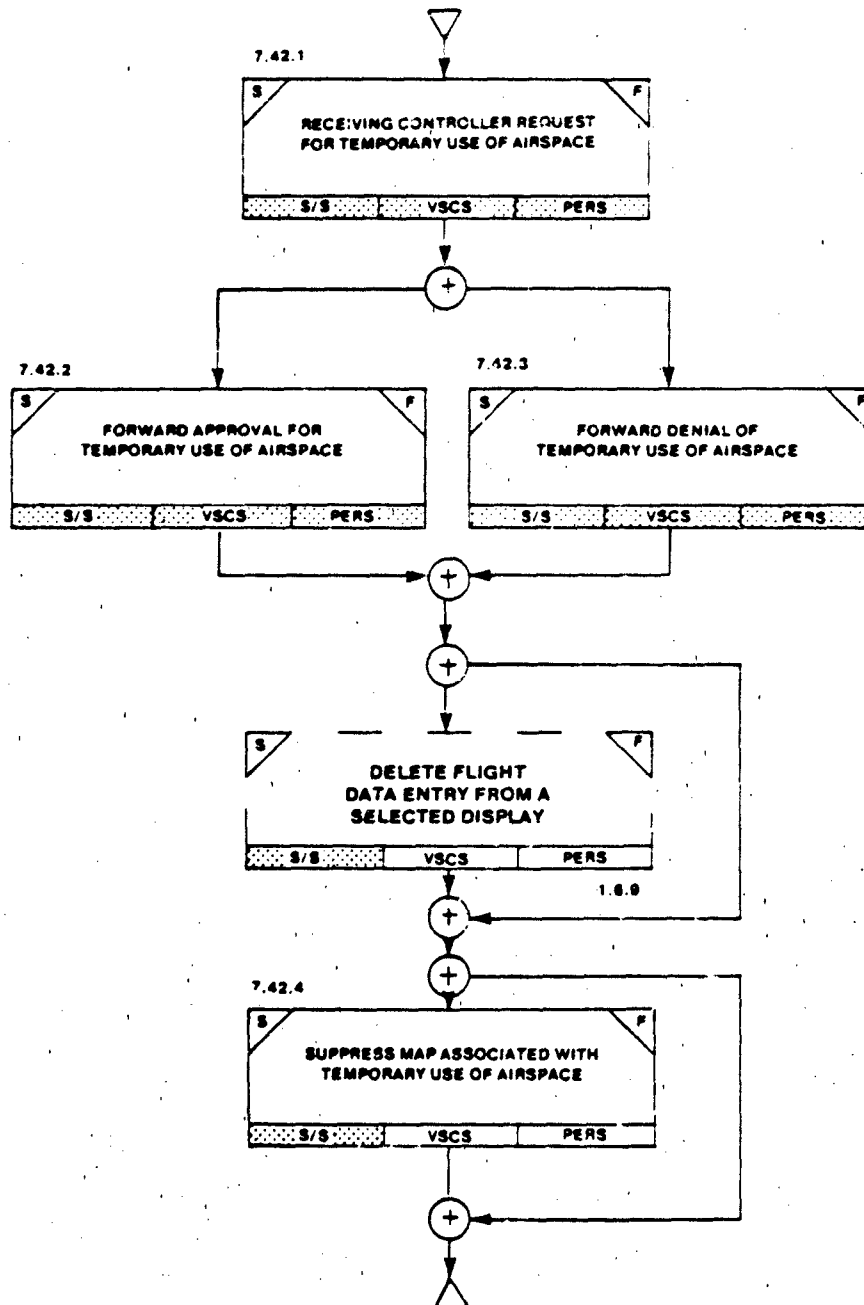
THEN (7.41.2) RECEIVE RELEASE/USE OF AIRSPACE

ELSE (7.41.3) RECEIVE REJECTION OF USE OF AIRSPACE

END IF

END DO

**SUB-ACTIVITY 7.42
RESPONDING TO TEMPORARY RELEASE OF AIRSPACE REQUESTS**



SUB-ACTIVITY 7.42: RESPONDING TO TEMPORARY RELEASE OF AIRSPACE REQUESTS

INPUT = CONTROLLER REQUEST FOR RELEASE/USE OF AIRSPACE

DO

(7.42.1) RECEIVE CONTROLLER REQUEST FOR TEMPORARY USE OF AIRSPACE

**(dp) DETERMINE WHETHER TO APPROVE REQUEST FOR TEMPORARY USE OF AIRSPACE
IF RELEASE IS TO BE APPROVED**

THEN (7.42.2) FORWARD APPROVAL FOR TEMPORARY USE OF AIRSPACE

ELSE (7.42.3) FORWARD DENIAL OF TEMPORARY USE OF AIRSPACE

END IF

IF DEEMED NECESSARY BY CONTROLLER

THEN (1.6.9) DELETE FLIGHT DATA ENTRY FROM A SELECTED DISPLAY

END IF

IF DEEMED NECESSARY BY CONTROLLER

THEN (7.42.4) SUPPRESS MAP ASSOCIATED WITH TEMPORARY USE OF AIRSPACE

END IF

END DO

APPENDIX B — CONTROLLER ACTIVITIES, SUB-ACTIVITIES AND INFORMATION PROCESSING TASKS

- 1.0 PERFORM SITUATION MONITORING
 - 1.1 CHECKING/EVALUATING SEPARATION
 - 1.1.1 REVIEW FLIGHT PLAN DISPLAY FOR PRESENT AND/OR FUTURE AIRCRAFT SEPARATION
 - 1.1.2 REVIEW SITUATION DISPLAY FOR POTENTIAL VIOLATION OF SEPARATION STANDARDS
 - 1.1.3 REVIEW FLIGHT PLAN CONFLICT PROBE RESULTS
 - 1.1.4 PROJECT AIRCRAFT FUTURE POSITION/ALTITUDE/PATH
 - 1.1.5 READ-OUT RANGE/BEARING/TIME FOR AN AIRCRAFT TO A FIX OR GEOGRAPHIC POINT
 - 1.1.6 FORCE/QUICK-LOOK FULL DATA BLOCK/S TO EXAMINE TRACK INFORMATION ON AIRCRAFT
 - 1.1.7 DETERMINE WHETHER AIRCRAFT WILL BE SEPARATED BY LESS THAN PRESCRIBED MINIMA
 - 1.1.8 SELECT FDE SORTING PRIORITY SCHEME
 - 1.2 RECEIVING SYSTEM STATUS INFORMATION
 - 1.2.1 OBSERVE DISPLAY OF NEW/CHANGED EQUIPMENT/OPERATIONAL STATUS
 - 1.2.2 OBSERVE DISPLAY OF NEW/CHANGED TRAFFIC FLOW CONTROL MANAGEMENT
 - 1.3 ANALYZING REQUESTS FOR CLEARANCES
 - 1.3.1 SEARCH DISPLAY FOR INACTIVE FLIGHT PLAN ON CLEARANCE REQUEST
 - 1.3.2 PROJECT MANUAL FLIGHT PLAN PROBE
 - 1.3.3 REQUEST LIMITED/STANDARD FLIGHT PLAN DISPLAY
 - 1.3.4 REQUEST FULL FLIGHT PLAN READOUT
 - 1.3.5 ENTER TRIAL DEPARTURE TIME
 - 1.4 PROCESSING DEPARTURE TIME INFORMATION
 - 1.4.1 ENTER DEPARTURE MESSAGE
 - 1.4.2 START TRACK MANUALLY
 - 1.4.3 OBSERVE AUTOMATIC TRACK START
 - 1.5 PROCESSING REQUESTS FOR FLIGHT FOLLOWING
 - 1.5.1 ANALYZE CONDITIONS FOR PROVIDING FLIGHT FOLLOWING
 - 1.6 HOUSEKEEPING
 - 1.6.1 OFFSET A DATA BLOCK
 - 1.6.2 UPDATE/REVISE INPUT REMINDER NOTE (ELECTRONIC MEMORANDA)
 - 1.6.3 REMOVE FLIGHT DATA ENTRIES AND FULL DATA BLOCKS FROM ACCC SYSTEM
 - 1.6.4 REMOVE FLIGHT DATA ENTRIES AND FULL DATA BLOCKS FROM INTERNAL ACCC SYSTEM
 - 1.6.5 SUSPEND DISPLAY OF FLIGHT DATA ENTRIES AND FULL DATA BLOCKS
 - 1.6.6 SUSPEND TRACK
 - 1.6.7 DELETE FULL DATA BLOCK FROM OWN DISPLAY
 - 1.6.8 SUPPRESS FULL DATA BLOCK FROM OWN DISPLAY
 - 1.6.9 DELETE FLIGHT DATA ENTRY FROM A SELECTED DISPLAY
- 2.0 RESOLVE AIRCRAFT CONFLICTS
 - 2.1 PERFORMING CONFLICT RESOLUTION
 - 2.1.1 DETECT AIRCRAFT CONFLICT ALERT INDICATION
 - 2.1.2 DETERMINE VALIDITY OF CONFLICT ALERT NOTICE OR INDICATION
 - 2.2 PERFORMING MINIMUM SAFE ALTITUDE WARNING PROCESSING
 - 2.2.1 DETECT MSAW INDICATION OR ALARM
 - 2.2.2 DETERMINE VALIDITY OF MSAW NOTICE OR INDICATION
 - 2.3 PERFORMING AIRSPACE CONFLICT PROCESSING
 - 2.3.1 DETERMINE NEED FOR AIRSPACE PROXIMITY PROBE
 - 2.3.2 DETERMINE VALIDITY OF SPECIAL USE AIRSPACE PROBE RESULTS
 - 2.4 ISSUING ADVISORIES
 - 2.4.1 OBSERVE DISPLAY FOR FIXED OBSTRUCTIONS AND NON-CONTROLLED AIRBORNE OBJECTS THAT MAY INTERFERE WITH AIRCRAFT FLIGHT
 - 2.4.2 EVALUATE CONFLICT RESOLUTION ADVISORIES
 - 2.4.3 FORMULATE ADVISORY/RESOLUTION CONTENT
 - 2.4.4 DETECT AIRCRAFT MANEUVER IN RESPONSE TO ADVISORY

- 2.5 INHIBITTING ALERTS
 - 2.5.1 DETERMINE VALIDITY/APPROPRIATENESS OF USE OF AN ALERT DISPLAY
 - 2.5.2 INHIBIT CONFLICT ALERT FOR PAIRED AIRCRAFT
 - 2.5.3 INHIBIT CONFLICT ALERT FOR GROUP SUPPRESSION
 - 2.5.4 INHIBIT CONFLICT ALERT IN SPECIFIED AREA
 - 2.5.5 INHIBIT MSAA FUNCTION IN SPECIFIED AREA
 - 2.5.6 INHIBIT MSAA FUNCTION FOR SPECIFIED AIRCRAFT
 - 2.5.7 RESTORE SPECIFIC ALERT FUNCTION TO NORMAL
- 3.0 MANAGE AIR TRAFFIC SEQUENCES
 - 3.1 RESPONDING TO FLOW CONSTRAINTS
 - 3.1.1 EVALUATE CONSTRAINT EFFECT ON FLOW
 - 3.1.2 CHOOSE DESIRED SEQUENCE
 - 3.1.3 SELECT NEW FLOW SEQUENCE
 - 3.1.4 DETERMINE THE TECHNIQUE FOR A DELAY
 - 3.2 PROCESSING DEVIATIONS
 - 3.2.1 PERCEIVE AN ALTITUDE OR ROUTE DEVIATION
 - 3.2.2 OBSERVE AIRCRAFT RESUMING NORMAL FLIGHT PLAN
 - 3.2.3 DETERMINE MANEUVER TO ESTABLISH/RESTORE FLIGHT PLAN CONFORMANCE
 - 3.3 RESPONDING TO SPECIAL USE AIRSPACE EVENTS
 - 3.3.1 REQUEST AIRSPACE PROXIMITY PROBE
 - 3.3.2 DESIGNATE/DELETE AN AREA IN USE
 - 3.3.3 DETERMINE WHETHER ATC CONTROLS SPECIAL USE AIRSPACE
 - 3.3.4 RESTRICT AIRCRAFT ACTIVITY IN AREA BY ALTITUDE OR SEGMENT
 - 3.3.5 OBSERVE DISPLAY OF AIRSPACE RESTRICTION STATUS CHANGE
 - 3.4 ESTABLISHING ARRIVAL PATTERNS
 - 3.4.1 DETERMINE DESCENT TIME OR POINT
 - 3.4.2 PROJECT TRAFFIC SEQUENCE TO ESTABLISH/MODIFY APPROACH FLOW TO AIRPORT OR SECTOR
 - 3.4.3 OBSERVE RANGE/BEARING BETWEEN AIRCRAFT
 - 3.5 MANAGING DEPARTURE PATTERNS
 - 3.6 MONITORING NON-CONTROLLED OBJECTS
 - 3.6.1 OBSERVE AIRSPACE INTRUSION BY A NON-CONTROLLED OBJECT
 - 3.6.2 COMPOSE/ENTER REMINDER NOTE OF AIRSPACE INTRUSION
 - 3.6.3 FLIGHT-FOLLOW AN OBSERVED NON-CONTROLLED OBJECT
- 4.0 ROUTE/PLAN FLIGHTS
 - 4.1 PLANNING/ISSUING CLEARANCES
 - 4.1.1 ENTER TRAIL FLIGHT PLAN AMENDMENT
 - 4.1.2 REVIEW POTENTIAL IMPEDIMENTS FOR IMPACT ON PROPOSED CLEARANCE
 - 4.1.3 SELECT CONFLICT RESOLUTION ADVISORY OPTION
 - 4.1.4 FORMULATE A CLEARANCE WITH APPROPRIATE INSTRUCTIONS
 - 4.1.5 QUERY PILOT REGARDING COMPLIANCE WITH CLEARANCE
 - 4.1.6 ISSUE CLEARANCE AND INSTRUCTIONS TO PILOT
 - 4.1.7 ISSUE CLEARANCE THRU ATCT/FSS FOR RELAY TO PILOT
 - 4.1.8 VERIFY AIRCRAFT COMPLIANCE WITH CLEARANCE
 - 4.2 RESPONDING TO CONTINGENCIES
 - 4.2.1 DECLARE EMERGENCY EVENT AND INVOKE CONTINGENCY PLAN
 - 4.3 BECOMING AWARE OF SPECIAL OPERATIONS
 - 4.3.1 PERCEIVE PRESENCE OF SPECIAL OPERATIONS
 - 4.4 REVIEWING FLIGHT PLANS
 - 4.4.1 OBSERVE NEW FLIGHT PLAN ALERT
 - 4.4.2 REVIEW FLIGHT PLAN FOR COMPLETENESS
 - 4.4.3 COMPOSE/ENTER FLIGHT PLAN
 - 4.4.4 DELETE NEW FLIGHT PLAN ALERT
 - 4.4.5 REVIEW FLIGHT PLAN FOR ERRORS/DATA LIST SEQUENCE
 - 4.5 PROCESSING FLIGHT PLAN AMENDMENTS
 - 4.5.1 RECEIVE FLIGHT PLAN AMENDMENT FROM COMPUTER
 - 4.5.2 HIGHLIGHT FLIGHT PLAN POSTING FOR REMINDER ACTION
 - 4.5.3 COMPOSE/ENTER FLIGHT PLAN AMENDMENT
 - 4.5.4 ENTER PILOT'S POSITION REPORT IN SYSTEM
 - 4.5.5 DELETE FLIGHT PLAN AMENDMENT HIGHLIGHTING

- 5.0 ASSESS WEATHER IMPACT
 - 5.1 RESPONDING TO SIGNIFICANT WEATHER INFORMATION
 - 5.1.1 OBSERVE DISPLAY OF WEATHER LINE/INTENSITY/BASE/HEIGHT/MOVEMENT
 - 5.1.2 RECEIVE SIGMET/AIRMET
 - 5.1.3 RECEIVE WEATHER BRIEFING FROM METEOROLOGIST
 - 5.1.4 ENTER PIREP INTO SYSTEM
 - 5.1.5 DETERMINE WHETHER ADJACENT CONTROLLER OR PILOT NEEDS WEATHER ADVISORY
 - 5.1.6 DETERMINE WEATHER IMPACT ON ROUTES/FLOW
 - 5.1.7 DETERMINE ALTITUDE/ROUTE CHANGE TO BYPASS SEVERE WEATHER
 - 5.2 PROCESSING WEATHER REPORTS
 - 5.2.1 RECEIVE WEATHER SEQUENCE
 - 5.2.2 RECEIVE WEATHER REPORT UPDATE
 - 5.2.3 DETERMINE WHETHER USABLE FLIGHT LEVEL HAS CHANGED
 - 5.2.4 DETERMINE WHETHER RUNWAY CONDITIONS HAVE CHANGED
 - 5.2.5 DETERMINE WHETHER CONTROL ZONE IS IFR/VFR
- 6.0 MANAGE SECTOR POSITION RESOURCES
 - 6.1 MANAGING CONTROLLED AIRSPACE RESOURCES
 - 6.2 SETTING-UP WORKSTATION HARDWARE/SOFTWARE CONFIGURATION
 - 6.2.1 REVIEW SYSTEM STATUS
 - 6.2.2 REVIEW TRAFFIC STATUS/WEATHER
 - 6.2.3 VERIFY THAT ALL REQUIRED DISPLAY AND COMMUNICATION SWITCHES ARE IN PROPER LOCATION
 - 6.2.4 PERFORM LOG-ON SEQUENCE AT DESIGNATED CONSOLE
 - 6.2.5 ADJUST PARAMETERS AND DISPLAY TO PERSONAL PREFERENCE
 - 6.2.6 CHECK DISPLAY FOR PROPER ALIGNMENT, USABILITY, AND SATISFACTORY STATUS
 - 6.2.7 SET-UP WORKSTATION ADAPTION PARAMETERS
 - 6.3 RESPONDING TO TRANSIENT COMPUTER FAULTS
 - 6.3.1 DETECT NON-ACCEPTANCE OF INPUT DATA
 - 6.4 EXECUTING BACKUP PROCEDURES FOR SECTOR SUITE FAULTS
 - 6.4.1 DETECT OCCURRENCE OF SECTOR SUITE FAILURE
 - 6.4.2 OBSERVE SECTOR SUITE DATA BASE RESTORATION COMPLETION MESSAGE
 - 6.5 EXECUTING BACKUP PROCEDURES FOR ACCC FAULTS
 - 6.5.1 DETECT OCCURRENCE OF ACCC FAILURE
 - 6.5.2 REVERT TO ACCC BACKUP PROCEDURES (TBD)
 - 6.6 EXECUTING BACKUP NAVAID PROCEDURES
 - 6.6.1 DETERMINE AIRCRAFT NEEDING SUBSTITUTE ROUTING
 - 6.6.2 MONITOR STATUS OF QUESTIONABLE NAVAID
 - 6.6.3 OBSERVE SUBSTITUTE ROUTING ON DISPLAY
 - 6.7 EXECUTING BACKUP PROCEDURES FOR COMMUNICATION FAULTS
 - 6.7.1 DETERMINE COMMUNICATION FAULT
 - 6.7.2 ADJUST COMMUNICATION STRATEGY
 - 6.7.3 SWITCH TO BACKUP RADIO/FREQUENCY
 - 6.8 MANAGING PERSONAL WORKLOAD
 - 6.8.1 DETERMINE IMPENDING CONTROLLER OVERLOAD
 - 6.8.2 EXCHANGE/ASSIGN INTRA-POSITION RESPONSIBILITIES
 - 6.8.3 REQUEST ASSISTANCE OR RELIEF
 - 6.9 EXECUTING BACKUP PROCEDURES FOR SENSOR OR TRACKING FAULTS
 - 6.9.1 PERCEIVE TRACKING FAULT OR TRANSPONDER FAILURE
 - 6.9.2 REPOSITION/UPDATE/REASSOCIATE DATA BLOCKS
 - 6.10 EXECUTING BACKUP PROCEDURES FOR LOSS OF FLIGHT PLAN DATA BASE
 - 6.10.1 OBSERVE MESSAGE ON LOSS OF DATA BASE
 - 6.10.2 DETECT FAILURE TO UPDATE FLIGHT PLAN DATA BASE
 - 6.10.3 ENTER DISPLAY AMENDMENT MESSAGE ON CONSOLE
 - 6.10.4 ENTER FLIGHT PLAN ON CONSOLE
 - 6.10.5 RESEQUENCE FLIGHT PLAN ON CONSOLE
 - 6.11 RESPONDING TO TRANSIENT VSCS FAULTS
 - 6.11.1 DETECT UNRELIABLE VSCS COMMUNICATION
- 7.0 PERFORM COORDINATION
 - 7.1 FORWARDING SEPARATION ALERTS

- 7.1.1 ADVISE CONTROLLER/SUPERVISOR OF AIRCRAFT FLIGHT PLAN DEVIATION
- 7.1.2 ADVISE CONTROLLER OF RESULTS OF FLIGHT PLAN CONFLICT PRBE
- 7.1.3 ADVISE CONTROLLER OF POTENTIAL CONFLICT IN HIS SECTOR
- 7.1.4 ADVISE CONTROLLER OF POTENTIAL MSAW IN HIS SECTOR
- 7.2 RESPONDING TO SEPARATION ALERTS
 - 7.2.1 RECEIVE CONTROLLER NOTICE OF POTENTIAL AIRCRAFT CONFLICT IN SECTOR
 - 7.2.2 RECEIVE CONTROLLER NOTICE OF POTENTIAL MSAW IN SECTOR
 - 7.2.3 RECEIVE CONTROLLER NOTICE OF AIRCRAFT FLIGHT PLAN DEVIATION
 - 7.2.4 RECEIVE CONTROLLER NOTICE ON RESULTS OF FLIGHT PLAN CONFLICT PRBE
- 7.3 ISSUING POINTOUTS
 - 7.3.1 ISSUE POINTOUT
 - 7.3.2 OBSERVE AUTOMATIC INITIATION OF POINTOUT TO ANOTHER CONTROLLER
 - 7.3.3 DIRECT FLIGHT DATA DISPLAY TO ADJACENT CONTROLLER
 - 7.3.4 RECEIVE ACCEPTANCE OF POINTOUT
 - 7.3.5 RECEIVE REJECTION OF POINTOUT
- 7.4 RESPONDING TO POINTOUTS
 - 7.4.1 RECEIVE CONTROLLER INITIATED POINTOUT
 - 7.4.2 ACCEPT POINTOUT
 - 7.4.3 REJECT POINTOUT
 - 7.4.4 SUPPRESS FULL DATA BLOCK AFTER POINTOUT
- 7.5 RECEIVING NOTICES OF AIRSPACE RESTRICTIONS
 - 7.5.1 RECEIVE NOTICE OF AIRSPACE RESTRICTION/RELEASE FROM CONTROLLER/SUPERVISOR
 - 7.5.2 REQUEST RELEASE OF SPECIAL USE AIRSPACE
 - 7.5.3 RECEIVE DENIAL OF REQUEST FOR RELEASE OF SPECIAL USE AIRSPACE
- 7.6 FORWARDING NOTICES OF AIRSPACE RESTRICTIONS
 - 7.6.1 ADVISE CONTROLLER OF AIRSPACE RESTRICTION IMPOSED
 - 7.6.2 ISSUE ADVISORY IN REGARD TO RESTRICTED AIRSPACE PROXIMITY
- 7.7 RESPONDING TO AIRSPACE RECONFIGURATIONS
 - 7.7.1 RECEIVE NOTICE TO TAKE OVER AIRSPACE
 - 7.7.2 RECEIVE NOTICE TO RECONFIGURE SECTOR
 - 7.7.3 RECEIVE NOTICE TO RELEASE AIRSPACE
- 7.8 PROCESSING FLIGHT PLANS
 - 7.8.1 RECEIVE FLIGHT PLAN FROM PILOT
 - 7.8.2 RECEIVE FLIGHT PLAN VERBALLY FORWARDED
 - 7.8.3 QUERY PILOT ABOUT FLIGHT PLAN
 - 7.8.4 QUERY THE RELAYER OF A FLIGHT PLAN
- 7.9 RESPONDING TO CLEARANCE REQUESTS
 - 7.9.1 RECEIVE CONTROLLER NOTICE ON REQUESTED CLEARANCE OF AIRCRAFT LEAVING HIS SECTOR
 - 7.9.2 DENY CLEARANCE REQUEST FROM CONTROLLER
 - 7.9.3 SUGGEST ALTERNATE TO CLEARANCE REQUEST FROM CONTROLLER
 - 7.9.4 RECEIVE CLEARANCE REQUEST FROM ATCT/FSS/PILOT SUPERVISOR
 - 7.9.5 RECEIVE CONTROLLER REQUEST FOR CLEARANCE APPROVAL
 - 7.9.6 DENY CLEARANCE REQUEST
 - 7.9.7 SUGGEST CLEARANCE ALTERNATIVES TO PILOT
 - 7.9.8 ACKNOWLEDGE DATA LINK CLEARANCE REQUEST
 - 7.9.9 APPROVE CLEARANCE REQUEST FROM CONTROLLER
 - 7.9.10 FORWARD CLEARANCE REQUEST TO ADJACENT CONTROLLER
- 7.10 INITIATING CLEARANCE/APPROVAL REQUESTS
 - 7.10.1 REQUEST CLEARANCE/APPROVAL FROM ADJACENT CONTROLLER
 - 7.10.2 RECEIVE CLEARANCE APPROVAL/CLEARANCE RESTRICTIONS FROM ADJACENT CONTROLLER
 - 7.10.3 RECEIVE CLEARANCE DISAPPROVAL/DENIAL FROM ADJACENT CONTROLLER
 - 7.10.4 RECEIVE ALTERNATE SUGGESTION FOR CLEARANCE/APPROVAL REQUESTED OF ADJACENT CONTROLLER
- 7.11 FORWARDING AMENDMENT MESSAGES
 - 7.11.1 FORWARD FLIGHT PLAN AMENDMENT VERBALLY
 - 7.11.2 RECEIVE CONTROLLER ADVICE OF UNABLE FLIGHT PLAN AMENDMENT

- 7.12 RECEIVING AMENDMENT MESSAGES
 - 7.12.1 RECEIVE FLIGHT PLAN AMENDMENT VERBALLY FORWARDED
 - 7.12.2 ADVISE CONTROLLER UNABLE FLIGHT PLAN AMENDMENT
- 7.13 RECEIVING DEPARTURE MESSAGES
 - 7.13.1 RECEIVE DEPARTURE MESSAGE FROM CONTROLLER/FSS/PILOT
- 7.14 FORWARDING AUTOMATION STATUS
 - 7.14.1 ISSUE NOTICE OF EQUIPMENT STATUS TO ADJACENT CONTROLLER/PILOT/SUPERVISOR
 - 7.14.2 TERMINATE RADAR SERVICE TO AIRCRAFT
 - 7.14.3 REQUEST PILOT POSITION REPORTS
 - 7.14.4 RECEIVE PILOT'S POSITION REPORT
 - 7.14.5 FORWARD FLIGHT PLAN VERBALLY
 - 7.14.6 DELETE PILOT POSITION REPORTS
 - 7.14.7 CONFIRM COMPUTER ACTION DURING TRANSITION STAGES
- 7.15 RECEIVING NOTICES OF AUTOMATION OUTAGES
 - 7.15.1 RECEIVE NOTICE OF STATUS OF ADJACENT ACF AUTOMATION EQUIPMENT
 - 7.15.2 RECEIVE STATUS OF SECTOR SUITE FAILURE FROM CONTROLLER/SUPERVISOR
 - 7.15.3 RECEIVE CONFIRMATION OF COMPUTER ACTION DURING TRANSITION STAGES
- 7.16 FORWARDING CONTROLLER REQUESTED REROUTES/ALTITUDE CHANGES
 - 7.16.1 COMPOSE/ENTER REQUESTED ROUTE/ALTITUDE CHANGE
- 7.17 PROCESSING WEATHER INFORMATION
 - 7.17.1 RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER/SUPERVISOR/METEOROLOGIST
 - 7.17.2 RECEIVE REVISION/CANCELLATION TO PREVIOUS WEATHER REPORT
 - 7.17.3 RECEIVE WIND SHEAR REPORT
 - 7.17.4 RECEIVE PIREP ON WEATHER
 - 7.17.5 SELECT WEATHER/ADVISORY/UPDATE FOR DATA LINK TRANSMISSION TO PILOT
 - 7.17.6 ISSUE WEATHER/ADVISORY/UPDATE TO PILOT/ADJACENT CONTROLLER
 - 7.17.7 FORWARD WEATHER INFORMATION TO SUPERVISOR/METEOROLOGIST
 - 7.17.8 ADVISE SUPERVISOR/FLOW CONTROLLER OF WEATHER IMPACT ON ROUTES/FLOW
 - 7.17.9 RECEIVE CONTROLLER REQUEST FOR WEATHER INFORMATION
 - 7.17.10 REQUEST WEATHER INFORMATION
- 7.18 RECEIVING NOTICES OF COMMUNICATION OUTAGES
 - 7.18.1 RECEIVE NOTICE OF COMMUNICATION STATUS
 - 7.18.2 RECEIVE NEW FREQUENCY ASSIGNMENT
 - 7.18.3 RECEIVE NOTICE OF ALTERNATE COMMUNICATION PATH
- 7.19 FORWARDING NOTICES OF COMMUNICATION OUTAGES
 - 7.19.1 FORWARD NOTICE OF COMMUNICATION STATUS
 - 7.19.2 FORWARD NEW FREQUENCY ASSIGNMENT TO ADJACENT CONTROLLER/SUPERVISOR
 - 7.19.3 FORWARD ALTERNATE COMMUNICATION PATH
- 7.20 RECEIVING NOTICES OF NAVAID OUTAGES
 - 7.20.1 RECEIVE NOTICE OF NAVAID STATUS FROM ADJACENT CONTROLLER/FSS/SUPERVISOR/PILOT
 - 7.20.2 RECEIVE SUBSTITUTE ROUTING
 - 7.20.3 RECEIVE CANCELLATION OF SUBSTITUTE ROUTING
- 7.21 FORWARDING NOTICES OF NAVAID OUTAGES
 - 7.21.1 FORWARD NAVAID STATUS TO ADJACENT CONTROLLER/SUPERVISOR/PILOT
 - 7.21.2 FORWARD SUBSTITUTE ROUTING
 - 7.21.3 CANCEL PREVIOUS SUBSTITUTE ROUTING
- 7.22 PROCESSING AIRSPACE INTRUSIONS
 - 7.22.1 FORWARD NOTICE OF AIRSPACE INTRUSION BY A NON-CONTROLLED OBJECT
 - 7.22.2 RECEIVE NOTICE OF AIRSPACE INTRUSION BY A NON-CONTROLLED OBJECT
 - 7.22.3 ISSUE ADVISORY IN REGARD TO A NON-CONTROLLED OBJECT
 - 7.22.4 ADVISE PILOT WHEN CLEAR OF NON-CONTROLLED OBJECT
- 7.23 RECEIVING NOTICES OF RUNWAY USE
 - 7.23.1 RECEIVE RUNWAY USE DATA
- 7.24 FORWARDING NOTICES OF RUNWAY USE
 - 7.24.1 FORWARD RUNWAY USE DATA

- 7.25 FORWARDING NOTICES OF CONTINGENCIES
 - 7.25.1 DETECT A PILOT OR AIRCRAFT PROBLEM (E.G., HYPOXIA)
 - 7.25.2 ALERT DESIGNATED PERSONNEL OF AIRCRAFT HAVING FLIGHT PROBLEMS
 - 7.25.3 FORWARD CONTINGENCY INFORMATION TO SUPERVISOR/ADJACENT CONTROLLER
- 7.26 RECEIVING ALERT INHIBIT NOTICES
 - 7.26.1 RECEIVE SUPERVISOR NOTICE TO INHIBIT ALERT
- 7.27 BRIEFING RELIEVING CONTROLLERS
 - 7.27.1 BRIEF RELIEVING CONTROLLER
- 7.28 RECEIVING NOTICES OF SPECIAL OPERATIONS
 - 7.28.1 RECEIVE NOTICE OF SPECIAL OPERATIONS
- 7.29 FORWARDING NOTICES OF SPECIAL OPERATIONS
 - 7.29.1 FORWARD NOTICE OF SPECIAL OPERATIONS TO ADJACENT CONTROLLER/SUPERVISOR
- 7.30 PROCESSING OF AIRCRAFT WITHOUT RADIO
 - 7.30.1 RECEIVE INFORMATION ON LOSS OF RADIO CONTACT WITH AIRCRAFT
 - 7.30.2 CONDUCT RADIO/RADAR SEARCH FOR AIRCRAFT WITHOUT RADIO CONTACT
 - 7.30.3 ATTEMPT ESTABLISHMENT OF COMMUNICATIONS USING TRANSPONDER/RADAR EQUIPMENT
- 7.31 PROCESSING OVERDUE AIRCRAFT
 - 7.31.1 RECEIVE INFORMATION ON OVERDUE AIRCRAFT
 - 7.31.2 CONTACT FACILITY ALONG ROUTE OF FLIGHT TO SECURE INFORMATION ON OVERDUE AIRCRAFT
 - 7.31.3 CONDUCT RADIO/RADAR SEARCH FOR OVERDUE AIRCRAFT
- 7.32 RESPONDING TO INTERMITTENT RADIO COMMUNICATIONS
 - 7.32.1 EXPLORE WHETHER OTHERS ARE RECEIVING AN AIRCRAFT'S TRANSMISSIONS
 - 7.32.2 ISSUE ALTERNATE COMMUNICATION FOR AIR/GROUND TRANSMISSION
- 7.33 RESPONDING TO FLIGHT FOLLOWING REQUESTS
 - 7.33.1 RECEIVE PILOT/ADJACENT CONTROLLER REQUEST FOR FLIGHT FOLLOWING
 - 7.33.2 DENY FLIGHT FOLLOWING REQUEST
 - 7.33.3 REQUEST/ASSIGN BEACON CODE TO AIRCRAFT
 - 7.33.4 ISSUE TRAFFIC ADVISORY IN REGARD TO TRAFFIC PROXIMITY
 - 7.33.5 ADVISE PILOT WHEN CLEAR OF TRAFFIC
- 7.34 PROCESSING FAD NOTICES
 - 7.34.1 RECEIVE A FAD NOTICE
 - 7.34.2 CONFER WITH PILOT THRU ATCT ON DESIRE FOR FAD INTENTIONS
- 7.35 PROCESSING FLOW CONTROL/METERING NOTICES
 - 7.35.1 RECEIVE REQUESTED ROUTE/ALTITUDE CHANGES FROM ANOTHER CONTROLLER/FLOW CONTROLLER/SUPERVISOR
 - 7.35.2 RECEIVE A FLOW RESTRICTION
 - 7.35.3 RECEIVE METERING DATA FROM FLOW CONTROLLER
 - 7.35.4 REQUEST FLOW CONTROL BE IMPOSED
 - 7.35.5 NEGOTIATE DELAY TECHNIQUE WITH PILOT
 - 7.35.6 FORWARD REQUESTED ROUTE/ALTITUDE CHANGES TO ADJACENT CONTROLLER/FLOW CONTROLLER/SUPERVISOR
- 7.36 ISSUING DEVIATION ADVISORIES
 - 7.36.1 ISSUE ADVISORY IN REGARD TO FLIGHT PLAN DEVIATION
- 7.37 RECEIVING TRANSFER OF CONTROL
 - 7.37.1 RECEIVE/OBSERVE HANDOFF
 - 7.37.2 ACCEPT VERBAL HANDOFF/START TRACK
 - 7.37.3 REJECT HANDOFF
 - 7.37.4 ACCEPT AUTOMATIC HANDOFF
 - 7.37.5 VERIFY COMMUNICATIONS WITH PILOT ON TRANSFER OF CONTROL OR DEPARTURE
 - 7.37.6 VERIFY AIRCRAFT ALTITUDE WITH PILOT ON TRANSFER OF CONTROL OR DEPARTURE
 - 7.37.7 CONFIRM DATA LINK COMMUNICATIONS
- 7.38 INITIATING TRANSFER OF CONTROL
 - 7.38.1 INITIATE HANDOFF
 - 7.38.2 OBSERVE AUTOMATIC INITIATION OF HANDOFF
 - 7.38.3 RETRACT HANDOFF
 - 7.38.4 RECEIVE HANDOFF ACCEPTANCE
 - 7.38.5 CONFER ON TRANSFER OF CONTROL WITH OTHER CONTROLLER

- 7.38.6 ISSUE CHANGE OF FREQUENCY TO PILOT
- 7.39 RECEIVING NOTICES OF RADAR SENSOR STATUS
 - 7.39.1 RECEIVE NOTICE OF RADAR SENSOR STATUS FROM ADJACENT CONTROLLER/
SUPERVISOR
- 7.40 FORWARDING NOTICES OF RADAR SENSOR STATUS
 - 7.40.1 FORWARD NOTICE OF RADAR SENSOR STATUS TO ADJACENT CONTROLLER/
SUPERVISOR
- 7.41 REQUESTING TEMPORARY RELEASE OF AIRSPACE
 - 7.41.1 REQUEST TEMPORARY USE OF AIRSPACE
 - 7.41.2 RECEIVE RELEASE/USE OF AIRSPACE
 - 7.41.3 RECEIVE REJECTION OF USE OF AIRSPACE
- 7.42 RESPONDING TO TEMPORARY RELEASE OF AIRSPACE REQUESTS
 - 7.42.1 RECEIVE CONTROLLER REQUEST FOR TEMPORARY USE OF AIRSPACE
 - 7.42.2 FORWARD APPROVAL FOR TEMPORARY USE OF AIRSPACE
 - 7.42.3 FORWARD DENIAL OF TEMPORARY USE OF AIRSPACE
 - 7.42.4 SUPPRESS MAP ASSOCIATED WITH TEMPORARY USE OF AIRSPACE

APPENDIX C—TRACEABILITY MATRIX

From CDRL A004		From CDRL A002		AAS SYSTEM-LEVEL SPECIFICATION
SUBNO	SUBPROCESS DESCRIPTION	TASKNO	TASK DEFINITION	
1.22.3	RECEIVE STROBE MESSAGE	1.2.1	OBSERVE DISPLAY OF NEW CHANGED EQUIPMENT OPERATIONAL STATUS	
1.23.3	RECEIVE ERROR REPORTS	1.2.1	OBSERVE DISPLAY OF NEW CHANGED EQUIPMENT OPERATIONAL STATUS	3.7.1.1.3.1.2
		6.9.1	PERCEIVE TRACKING FAULT OR TRANSPONDER FAILURE	3.7.1.1.3.1.2
2.3.1	RECEIVE FORWARD WEATHER DATA REQUESTS	7.17.9	RECEIVE CONTROLLER REQUEST FOR WEATHER INFORMATION	3.7.1.1.3.6.3
2.4.1	REQUEST/RECEIVE WEATHER DATA	7.17.10	REQUEST WEATHER INFORMATION	3.7.1.1.3.6.3
		5.2.2	RECEIVE WEATHER REPORT UPDATE	3.7.1.1.3.6.3
		7.17.1	RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER/SUPERVISOR/METEOROLOGIST	3.7.1.1.3.6.3
		7.17.2	RECEIVE REVISION/CANCELLATION TO PREVIOUS WEATHER REPORT	3.7.1.1.3.6.3
		5.2.1	RECEIVE WEATHER SEQUENCE	3.7.1.1.3.6.3
		5.1.3	RECEIVE SIGMET ALERT	3.7.1.1.3.6.3
		5.1.3	RECEIVE WEATHER BRIEFING FROM METEOROLOGIST	3.7.1.1.3.6.3
		5.1.4	ENTER PIREP INTO SYSTEM	3.7.1.1.3.6.3
		7.17.3	RECEIVE WIND SHEAR REPORT	3.7.1.1.3.6.3
		7.17.4	RECEIVE PIREP ON WEATHER	3.7.1.1.3.6.3
		7.17.7	FORWARD WEATHER INFORMATION TO SUPERVISOR/METEOROLOGIST	3.7.1.1.3.6.3
2.7.1	ASSESS WEATHER CONDITIONS	5.2.4	DETERMINE WHETHER RUNWAY CONDITIONS HAVE CHANGED	3.7.1.1.3.6.2
		5.1.1	OBSERVE DISPLAY OF WEATHER	3.7.1.1.3.6.2
		5.1.6	DETERMINE WHETHER IMPACT ON ROUTES/FLOW	3.7.1.1.3.6.2
		5.2.3	DETERMINE WHETHER USABLE FLIGHT LEVEL HAS CHANGED	3.7.1.1.3.6.2
		5.2.5	DETERMINE WHETHER CONTROL ZONE IS IFR/VR LEVEL	3.7.1.1.3.6.2
		7.17.8	ADVISE SUPERVISOR/FLOW CONTROLLER OF WEATHER IMPACT ON ROUTES/FLOW	3.7.1.1.3.6.2
2.7.2	VERIFY ALTIMETER SETTING	7.37.6	VERIFY AIRCRAFT ALTITUDE WITH PILOT ON TRANSFER OF CONTROL OR DEPARTURE	
2.8.3	ISSUE WEATHER ADVISORIES	7.17.6	ISSUE WEATHER ADVISORY UPDATE TO PILOT/ADJACENT CONTROLLER	
		5.1.5	DETERMINE WHETHER ADJACENT CONTROLLER OR PILOT NEEDS WEATHER ADVISORY	
		5.1.7	DETERMINE ALTITUDE ROUTE CHANGE TO BYPASS SEVERE WEATHER	
		7.17.5	SELECT WEATHER ADVISORY/UPDATE FOR DATA LINK TRANSMISSION TO PILOT	
3.1.1	RECEIVE FORWARD PROPOSED FLIGHT PLANS	4.4.3	COMPOSE/ENTER FLIGHT PLAN	3.7.1.1.3.3.1
		4.4.4	DELETE NEW FLIGHT PLAN ALERT	3.7.1.1.3.3.1
		4.4.5	REVIEW FLIGHT PLAN FOR ERRORS/DATA LIST SEQUENCE	3.7.1.1.3.3.1
	FLIGHT PLANS	4.4.2	REVIEW FLIGHT PLAN FOR COMPLETENESS	3.7.1.1.3.3.1
		4.4.1	OBSERVE NEW FLIGHT PLAN ALERT	3.7.1.1.3.3.1
		4.1.9	SELECT FCZ SORTING PRIORITY SCHEME	3.7.1.1.3.3.1
		7.9.1	RECEIVE FLIGHT PLAN FROM PILOT	3.7.1.1.3.3.1
		7.10.4	ENTER FLIGHT PLAN ON CONSOLE	3.7.1.1.3.3.1
		7.9.3	QUERY PILOT ABOUT FLIGHT PLAN	3.7.1.1.3.3.1
		7.9.2	RECEIVE FLIGHT PLAN VERBALLY FORWARDED	3.7.1.1.3.3.1
		7.9.4	QUERY THE DELAY OF A FLIGHT PLAN	3.7.1.1.3.3.1
		7.12.1	RECEIVE FLIGHT PLAN AMENDMENT VERBALLY FORWARDED	3.7.1.1.3.3.2
3.1.2	RECEIVE FORWARD FLIGHT PLAN AMENDMENTS	4.5.3	COMPOSE/ENTER FLIGHT PLAN AMENDMENT	3.7.1.1.3.3.2
		7.12.1	FORWARD FLIGHT PLAN AMENDMENT VERBALLY	3.7.1.1.3.3.2
		4.4.4	DELETE NEW FLIGHT PLAN ALERT	3.7.1.1.3.3.2
		4.5.1	RECEIVE FLIGHT PLAN AMENDMENT FROM COMPUTER	3.7.1.1.3.3.2
		7.12.2	ADVISE CONTROLLER UNABLE FLIGHT PLAN AMENDMENT	3.7.1.1.3.3.2
3.3.2	PROCESS DEPARTURE TIME INFORMATION	7.37.1	RECEIVE DEPARTURE MESSAGE FROM CONTROLLER/FSB PILOT	
		7.37.6	VERIFY AIRCRAFT ALTITUDE WITH PILOT ON TRANSFER OF CONTROL OR DEPARTURE	
		7.37.5	ENTER TRIAL DEPARTURE TIME	
		7.4.1	ENTER DEPARTURE MESSAGE	
3.7.3	RECEIVE FORWARD FLIGHT PLAN DATA	7.13.4	REQUEST FULL FLIGHT PLAN READOUT	3.7.1.1.3.3.9
		7.13.9	REQUEST QUICK LOOK DATA BLOCK 4 TO EXAMINE TRACK INFORMATION ON AIRCRAFT	3.7.1.1.3.3.9
		7.13.3	REQUEST LIMITED STANDARD FLIGHT PLAN DISPLAY	3.7.1.1.3.3.9

From CDRL A004		From CDRL A002		AAS SYSTEM-LEVEL SPECIFICATION
SUBNO	SUBPROCESS DESCRIPTION	TASKNO	TASK DEFINITION	
		1.14.3	REQUEST PILOT POSITION REPORTS	1.7.1.1.3.2.9
		1.14.4	RECEIVE PILOT POSITION REPORT	1.7.1.1.3.2.9
		1.14.5	FORWARD FLIGHT PLAN VERBALLY	1.7.1.1.3.2.9
		1.14.6	DELETE PILOT POSITION REPORTS	1.7.1.1.3.2.9
		1.15.1	REMOVE FLIGHT DATA ENTRIES AND FULL DATA BLOCKS FROM AAS SYSTEM	1.7.1.1.3.2.9
		1.15.4	REMOVE FLIGHT DATA ENTRIES AND FULL DATA BLOCKS FROM INTERNAL AAS SYSTEM	1.7.1.1.3.2.9
		4.5.4	ENTER PILOT POSITION REPORT IN SYSTEM	
4.1.1	INITIATE TRACK	1.4.1	START TRACK MANUALLY	1.7.1.1.3.2.2
4.4.1	FORCE TRACK-TO-PP PAIRING REQUESTS	1.1.6	FORCE FULL DATA BLOCK TO EXAMINE TRACK INFORMATION IN AIRCRAFT	1.7.1.1.3.2.3
4.14.1	TERMINATE/SUSPEND TRACKS	1.6.6	SUSPEND TRACK	1.7.1.1.3.2.11
4.17.3	REQUEST/RECEIVE TRACK OUTPUT DATA	1.1.6	FORCE FULL DATA BLOCKS TO EXAMINE TRACK INFORMATION IN AIRCRAFT	1.7.1.1.3.2.10
		1.4.3	OBSERVE AUTOMATIC TRACK START	1.7.1.1.3.2.10
		1.6.1	OFFSET A DATA BLOCK	1.7.1.1.3.2.10
		6.9.2	REPOSITION/DELETE/REASSOCIATE DATA BLOCKS	1.7.1.1.3.2.10
5.4.3	RECEIVE FORWARD NON-CONFORMANCE NOTICES	3.2.1	PERCEIVE AN ALTITUDE OR ROUTE DEVIATION	1.7.1.1.3.2.7
		7.1.3	RECEIVE CONTROLLER NOTICE OF AIRCRAFT FLIGHT PLAN DEVIATION	1.7.1.1.3.2.7
		7.1.1	ADVISE CONTROLLER/SUPERVISOR OF AIRCRAFT FLIGHT PLAN DEVIATION	1.7.1.1.3.2.7
		7.36.1	ISSUE ADVISORY IN REGARD TO FLIGHT PLAN DEVIATION	1.7.1.1.3.2.7
5.5.3	RECEIVE TRACK STATUS UPDATES	3.2.1	PERCEIVE AN ALTITUDE OR ROUTE DEVIATION	1.7.1.1.3.2.6
5.6	COORDINATE WITH AIRCRAFT TO DETERMINE REASONS FOR NON-CONFORMANCE	4.1.5	VERIFY FLIGHT REGARDING COMPLIANCE WITH CLEARANCE	
		4.1.9	VERIFY AIRCRAFT COMPLIANCE WITH CLEARANCE	
5.10.2	FORWARD NON-CONFORMANCE CORRECTION TO AIRCRAFT	3.2.2	ADVISE AIRCRAFT RESUMING NORMAL FLIGHT PLAN	
		7.36.1	ISSUE ADVISORY IN REGARD TO FLIGHT PLAN DEVIATION	
		3.2.3	DETERMINE MANEUVER TO ESTABLISH/RESTORE FLIGHT PLAN COMPLIANCE	
6.5.2	PERCEIVE MSAM CONFLICT	7.1.4	ADVISE CONTROLLER OF POTENTIAL MSAM IN HIS SETTOR	1.7.1.1.3.5.2
		2.2.1	DETECT MSAM INDICATION OR ALARM	1.7.1.1.3.5.2
		7.1.2	RECEIVE CONTROLLER NOTICE OF POTENTIAL MSAM IN SETTOR	1.7.1.1.3.5.2
		2.4.1	OBSERVE DISPLAY FOR OTHER INSTRUCTIONS AND NON-CONTROLLED AIRSPACE BEINGS THAT MAY INTERFERE WITH AIRCRAFT FLIGHT	1.7.1.1.3.5.2
		2.5.5	INHIBIT MSAM FUNCTION IN SPECIFIED AREA	1.7.1.1.3.5.2
		2.5.6	INHIBIT MSAM FUNCTION FOR SPECIFIED AIRCRAFT	1.7.1.1.3.5.2
		2.5.7	RESTORE SPECIFIC ALERT FUNCTION TO NORMAL	1.7.1.1.3.5.2
		2.2.2	REVIEW SITUATION DISPLAY FOR POTENTIAL VIOLATION OF SEPARATION STANDARDS	1.7.1.1.3.5.2
		2.2.3	DETERMINE VALIDITY OF MSAM NOTICE OR INDICATION	1.7.1.1.3.5.2
6.6.2	PERCEIVE TRACK/AIRSPACE CONFLICTS	2.5.4	INHIBIT CONFLICT ALERT IN SPECIFIED AREA	1.7.1.1.3.5.1
		2.2.2	REVIEW SITUATION DISPLAY FOR POTENTIAL VIOLATION OF SEPARATION STANDARDS	1.7.1.1.3.5.1
		2.5.7	RESTORE SPECIFIC ALERT FUNCTION TO NORMAL	1.7.1.1.3.5.1
6.6.2	PERCEIVE TRACK/AIRSPACE CONFLICTS	2.1.4	PROJECT AIRCRAFT FUTURE POSITION/ALTITUDE/PATH	1.7.1.1.3.5.1
6.7.2	PERCEIVE TRACK/NON-CONTROLLED OBJECT CONFLICTS	1.6.3	FLIGHT FOLLOW AN OBSERVED NON-CONTROLLED OBJECT	
		1.6.1	RECEIVE AIRSPACE INTERUSION BY A NON-CONTROLLED OBJECT	
		7.12.2	RECEIVE NOTICE OF AIRSPACE INTERUSION BY A NON-CONTROLLED OBJECT	
6.7.2	PERCEIVE TRACK/NON-CONTROLLED OBJECT CONFLICTS CONT	7.12.1	FORWARD NOTICE OF AIRSPACE INTERUSION BY A NON-CONTROLLED OBJECT	
		1.6.1	RECEIVE ENTER REMINDER NOTE OF AIRSPACE INTERUSION	
		7.12.3	ISSUE ADVISORY IN REGARD TO A NON-CONTROLLED OBJECT	
6.9.2	ENABLE/DISABLE ALERTS	2.5.6	INHIBIT MSAM FUNCTION FOR SPECIFIED AIRCRAFT	

From CDRL A004		From CDRL A002		AAS SYSTEM-LEVEL SPECIFICATION
SUBNO	SUBPROCESS DESCRIPTION	TASKNO	TASK DEFINITION	
6.11.1	PERCEIVE CONFLICT ALERTS	6.11.1.1	INHIBIT CONFLICT ALERT FOR PAIRED AIRCRAFT	
		6.11.1.2	INHIBIT CONFLICT ALERT IN SPECIFIED AREA	
		6.11.1.3	INHIBIT CONFLICT ALERT FOR GROUP SUPPRESSION	
		6.11.1.4	RECEIVE SUPERVISOR NOTICE TO INHIBIT ALERT	
		6.11.1.5	RESET RE SPECIFIC ALERT FUNCTION TO NORMAL	
		6.11.1.6	INHIBIT MSAW FUNCTION IN SPECIFIED AREA	
		6.11.1.7	INHIBIT CONFLICT ALERT FOR GROUP SUPPRESSION	3.7.1.1.3.5.1
		6.11.1.8	RESTORE SPECIFIED ALERT FUNCTION TO NORMAL	3.7.1.1.3.5.1
		6.11.1.9	ADVISE CONTROLLER OF POTENTIAL CONFLICT	3.7.1.1.3.5.1
		6.11.1.10	ALERT IN HIS SECTOR	
		6.11.1.11	DETERMINE WHETHER AIRCRAFT WILL BE SEPARATED BY LESS THAN PRESCRIBED MINIMA	3.7.1.1.3.5.1
		6.11.1.12	DETECT AIRCRAFT CONFLICT ALERT INDICATION	3.7.1.1.3.5.1
		6.11.1.13	DETERMINE VALIDITY OF CONFLICT ALERT NOTICE OR INDICATION	3.7.1.1.3.5.1
		6.11.1.14	DETERMINE VALIDITY APPROPRIATENESS OF USE OF AN ALERT DISPLAY	3.7.1.1.3.5.1
		6.11.1.15	INHIBIT CONFLICT ALERT FOR PAIRED AIRCRAFT	3.7.1.1.3.5.1
		6.11.1.16	REVIEW SITUATION DISPLAY FOR POTENTIAL VIOLATION OF SEPARATION STANDARDS	3.7.1.1.3.5.1
		6.11.1.17	PROJECT AIRCRAFT FUTURE POSITION ALTITUDE PATH	3.7.1.1.3.5.1
		6.11.1.18	FEAROUT RANGE BEARING TIME FOR AN AIRCRAFT TO A FIX OR GEOGRAPHIC POINT	3.7.1.1.3.5.1
		6.11.1.19	REVIEW FLIGHT PLAN DISPLAY FOR PRESENT AND/OR FUTURE AIRCRAFT SEPARATION	3.7.1.1.3.5.1
		6.11.1.20	RECEIVE CONTROLLER NOTICE OF POTENTIAL AIRCRAFT CONFLICT IN SECTOR	3.7.1.1.3.5.1
7.1.1	RECEIVE FORWARD REQUESTS FOR CLEARANCE	7.1.1.1	SEARCH DISPLAY FOR INACTIVE FLIGHT PLAN OR CLEARANCE REQUEST	
		7.1.1.2	REQUEST CLEARANCE APPROVAL FROM ADJACENT CONTROLLER	
		7.1.1.3	FORWARD CLEARANCE REQUEST TO ADJACENT CONTROLLER	
7.1.1	RECEIVE FORWARD REQUESTS FOR CLEARANCE	7.1.1.4	RECEIVE CLEARANCE APPROVAL CLEARANCE RESTRICTIONS FROM ADJACENT CONTROLLER	
		7.1.1.5	RECEIVE SUBSTITUTE ROUTING	
		7.1.1.6	RECEIVE CANCELLATION OF SUBSTITUTE ROUTING	
		7.1.1.7	RECEIVE CONTROLLER NOTICE IN REQUESTED CLEARANCE OF AIRCRAFT LEAVING HIS SECTOR	
		7.1.1.8	RECEIVE CLEARANCE REQUEST FROM ATOT FSS PILOT SUPERVISOR	
		7.1.1.9	ACKNOWLEDGE DATA LINK CLEARANCE REQUEST	
		7.1.1.10	CANCEL PREVIOUS SUBSTITUTE ROUTING	
		7.1.1.11	FORWARD SUBSTITUTE ROUTING	
		7.1.1.12	RECEIVE PILOT ADJACENT CONTROLLER REQUEST FOR FLIGHT FOLLOWING	
7.1.1	RECEIVE RESTRICTED AIRSPACE INFORMATION	7.1.1.13	DETERMINE VALIDITY OF SPECIAL USE AIRSPACE FOR REQUEST	
		7.1.1.14	RECEIVE NOTICE OF AIRSPACE RESTRICTION RELEASE FROM ATOT FSS PILOT SUPERVISOR	
		7.1.1.15	DETERMINE WHETHER ATOT CONTROLS SPECIAL USE AIRSPACE	
7.1	ASSESS IMPACT OF CLEARANCE REQUEST	7.1.1.16	PROJECT MANUAL FLIGHT PLAN PROBE	
		7.1.1.17	REVIEW POTENTIAL IMPEDIMENTS FOR IMPACT ON PROPOSED CLEARANCE	
		7.1.1.18	ANALYZE CONDITIONS FOR PROVIDING FLIGHT FOLLOWING	
		7.1.1.19	SEARCH DISPLAY FOR INACTIVE FLIGHT PLAN OR CLEARANCE REQUEST	
		7.1.1.20	RECEIVE FLIGHT PLAN REQUEST	
		7.1.1.21	PROJECT LIMITED STANDARD FLIGHT PLAN DISPLAY	
		7.1.1.22	RECEIVE CLEARANCE DISAPPROVAL/DENIAL FROM ADJACENT CONTROLLER	
		7.1.1.23	ENTER TRAIL DEPARTURE TIME	
		7.1.1.24	RECEIVE CLEARANCE APPROVAL CLEARANCE RESTRICTIONS FROM ADJACENT CONTROLLER	
7.1.1	RECEIVE PERCEIVE ALTERNATIVES	7.1.1.25	PROJECT ALTERNATE TO CLEARANCE REQUEST FROM CONTROLLER	
		7.1.1.26	PROJECT ALTERNATE INDICATION FOR CLEARANCE APPROVAL REQUESTED OF ADJACENT CONTROLLER	
7.1.1	CONSIDER CONFLICT RESOLUTION OPTIONS	7.1.1.27	EVALUATE CONFLICT RESOLUTION ADVISORIES	
7.1.1	CONSIDER DEPARTURE PATTERN	7.1.1.28	RECEIVE DEPARTURE MESSAGE FROM CONTROLLER FOR PILOT	

From CDRL A004		From CDRL A002		AAS SYSTEM-LEVEL SPECIFICATION
SUBNO	SUBPROCESS DESCRIPTION	TASKNO	TASK DEFINITION	
7.7.3	CONSIDER ARRIVAL PATTERN	3.4.1 3.4.2 7.35.4	DETERMINE DESCENT TIME OR POINT PROJECT TRAFFIC SEQUENCE TO ESTABLISH/MODIFY APPROACH FLOW TO AIRPORT OR SECTOR REQUEST FLOW CONTROL BE IMPOSED	
7.7.4	CONSIDER WEATHER CHANGES	5.1.6 5.1.5 5.1.3 5.1.7 5.2.4	DETERMINE WEATHER IMPACT ON ROUTES/FLOW OBSERVE CONTROL ZONE FOR WEATHER CONDITIONS DETERMINE WHETHER USABLE FLIGHT LEVEL HAS CHANGED DETERMINE ALTITUDE/ROUTE CHANGE TO BYPASS SEVERE WEATHER DETERMINE WHETHER RUNWAY CONDITIONS HAVE CHANGED	
7.7.5	CONSIDER FLOW CONTROL CONSTRAINTS	3.1.1 3.1.3 3.1.4 7.34.1 7.35.5	EVALUATE CONSTRAINT EFFECT ON FLOW SELECT NEW FLOW SEQUENCE DETERMINE THE TECHNIQUE FOR A DELAY CONFER WITH PILOT THRU ATCT ON DESIRE FOR FAD ATTENTIONS NEGOTIATE DELAY TECHNIQUE WITH PILOT	
7.7.6	CONSIDER AIR TRAFFIC DEVIATIONS	3.1.2	DETERMINE MANEUVER TO ESTABLISH/RESTORE SEQUENCE	
7.7.7	CONSIDER AIRSPACE RESTRICTIONS	7.5.1 3.1.5 3.1.4 7.41.1 7.5.3 7.5.1 7.42.1 7.42.2 3.3.2 7.42.3 7.41.2 7.5.1 7.41.3	REQUEST RELEASE OF SPECIAL USE AIRSPACE OBSERVE DISPLAY OF AIRSPACE RESTRICTION RESTRICT AIRCRAFT ACTIVITY IN AREA BY ALTITUDE OR SEGMENT REQUEST TEMPORARY USE OF AIRSPACE RECEIVE DENIAL OF REQUEST FOR RELEASE OF SPECIAL USE AIRSPACE ADVISE CONTROLLER OF AIRSPACE RESTRICTION IMPOSED RECEIVE CONTROLLER REQUEST FOR TEMPORARY USE OF AIRSPACE ACCEPT POINTOUT/RELEASE AIRSPACE FOR TEMPORARY USE DESIGNATE AN AREA IN USE DENY REQUEST FOR TEMPORARY USE OF AIRSPACE RECEIVE RELEASE USE OF AIRSPACE ASSOCIATED WITH TRACK RECEIVE NOTICE OF AIRSPACE RESTRICTION FROM CONTROLLER/SUPERVISOR RECEIVE REJECTION OF USE OF AIRSPACE ASSOCIATED WITH TRACK	
7.7.9	SELECT AN ALTERNATIVE	4.1.3	SELECT CONFLICT RESOLUTION ADVISORY OPTION	
7.8.2	FORWARD PLANNED ACTIONS TO FPCP	4.1.1	ENTER TRAIL FLIGHT PLAN AMENDMENT	
7.9	DETERMINE COURSE OF ACTION	4.1.3	SELECT CONFLICT RESOLUTION ADVISORY OPTION	
7.11.1	ISSUE CLEARANCE, CLEARANCE REJECTIONS, ADVISORIES	7.36.1 4.1.2 7.9.6 7.9.2 7.4.4 4.1.7 4.1.8 7.4.3 7.6.2 7.32.4 4.1.4 4.1.5 4.1.6 7.9.9 7.13.1 7.13.4 7.33.5 7.16.1 7.12.1	ISSUE ADVISORY IN REGARD TO ROUTE ALTITUDE/SPEED DEVIATION ADVISE OBSTACLES FOR IMPACT ON PROPOSED CLEARANCE DENY CLEARANCE REQUEST DISAPPROVE CLEARANCE REQUEST FROM CONTROLLER DETECT AIRCRAFT MANEUVER IN RESPONSE TO ADVISORY ISSUE CLEARANCE THRU ATCT/FSS FOR RELAY TO PILOT VERIFY AIRCRAFT COMPLIANCE WITH CLEARANCE FORMULATE ADVISORY RESOLUTION CONTENT ISSUE ADVISORY IN REGARD TO RESTRICTED AIRSPACE PROXIMITY ADVISE PILOT WHEN CLEAR OF OBSTRUCTION FORMULATE A CLEARANCE WITH APPROPRIATE INSTRUCTIONS QUERY PILOT REGARDING COMPLIANCE WITH CLEARANCE ISSUE CLEARANCE AND INSTRUCTIONS TO PILOT APPROVE CLEARANCE REQUEST FROM CONTROLLER DENY FLIGHT FOLLOWING REQUEST ISSUE TRAFFIC ADVISORY IN REGARD TO TRAFFIC PROXIMITY ADVISE PILOT WHEN CLEAR OF TRAFFIC COMPOSE/ENTER REQUESTED ROUTE ALTITUDE CHANGE RECEIVE FP AMENDMENT VERBALLY FORWARDED	
7.12.1	GENERATE FP AMENDMENT/ AMENDMENT REJECTION			

From CDRL A004		From CDRL A002		AAS SYSTEM-LEVEL SPECIFICATION
SUBNO	SUBPROCESS DESCRIPTION	TASKNO	TASK DEFINITION	
		7.12.2 7.11.1 7.11.2	ADVISE CONTROLLER UNABLE FP AMENDMENT FORWARD FP AMENDMENT VERBALLY RECEIVE CONTROLLER ADVISE OF UNABLE FP AMENDMENT	
7.13.2	RECEIVE FPCP RESULTS REPORT	2.3.2 7.1.2 7.2.4 1.1.3	DETERMINE VALIDITY OF SPECIAL USE AIRSPACE PROBE RESULTS ADVISE CONTROLLER OF RESULTS OF FLIGHT PLAN CONFLICT PROBE RECEIVE CONTROLLER NOTICE ON RESULTS OF FLIGHT PLAN CONFLICT PROBE REVIEW FLIGHT PLAN CONFLICT PROBE RESULTS	3.7.1.1.4.2 3.7.1.1.4.2 3.7.1.1.4.2 3.7.1.1.4.2
7.14.2	RECEIVE FLOW CONTROL INFORMATION	7.35.1 7.35.6 7.35.2 7.35.3 7.34.1	RECEIVE TRAFFIC FLOW DATA FROM APPROPRIATE CONTROLLER/FLOW CONTROLLER/SUPERVISOR FORWARD TRAFFIC FLOW DATA TO ADJACENT CONTROLLER/FLOW CONTROLLER/SUPERVISOR RECEIVE A FLOW RESTRICTION RECEIVE METERING DATA FROM FLOW CONTROLLER RECEIVE A PAD NOTICE	3.7.1.1.3.4.4 3.7.1.1.3.4.4 3.7.1.1.3.4.4 3.7.1.1.3.4.4 3.7.1.1.3.4.4
8.6.3	RECEIVE/FORWARD RUNWAY CONFIGURATION INFORMATION	7.24.1 7.23.1	FORWARD RUNWAY USE DATA RECEIVE RUNWAY USE DATA	
8.7.3	RECEIVE/FORWARD TMS RESTRICTIONS	7.35.3 7.35.2 1.6.5 7.34.1 7.35.1 1.2.2 7.35.6	RECEIVE METERING DATA FROM FLOW CONTROLLER RECEIVE A FLOW RESTRICTION ADJUST TRAFFIC COUNT RECEIVE A PAD NOTICE RECEIVE TRAFFIC FLOW DATA FROM APPROPRIATE CONTROLLER/FLOW CONTROLLER/SUPERVISOR OBSERVE DISPLAY OF NEW/CHANGED TRAFFIC FLOW CONTROL MANAGEMENT FORWARD TRAFFIC FLOW DATA TO ANOTHER CONTROLLER/FLOW CONTROLLER/SUPERVISOR	3.7.1.1.3.4.4 3.7.1.1.3.4.4 3.7.1.1.3.4.4 3.7.1.1.3.4.4 3.7.1.1.3.4.4 3.7.1.1.3.4.4 3.7.1.1.3.4.4
8.9.1	MAINTAIN DEPARTURES/ARRIVALS	7.35.3 3.4.2 3.1.3 7.35.1 3.4.1 3.2.3 3.1.2	RECEIVE METERING DATA FROM FLOW CONTROLLER PROJECT TRAFFIC SEQUENCE TO ESTABLISH/MODIFY APPROACH FLOW TO AIRPORT OR SECTOR SELECT NEW FLOW SEQUENCE RECEIVE TRAFFIC FLOW DATA FROM APPROPRIATE CONTROLLER/FLOW CONTROLLER/SUPERVISOR DETERMINE DESCENT TIME OR POINT DETERMINE MANEUVER TO ESTABLISH/RESTORE SEQUENCE CHOOSE DESIRED SEQUENCE	
8.10.2	PERCEIVE PROBLEM CONDITIONS	1.2.2 6.2.2	OBSERVE DISPLAY OF NEW/CHANGED TRAFFIC FLOW CONTROL MANAGEMENT REVIEW TRAFFIC STATUS/WEATHER	
8.11.1	REQUEST FLOW CONSTRAINTS	3.1.1 7.35.4	EVALUATE CONSTRAINT EFFECT ON FLOW REQUEST FLOW CONTROL BE IMPOSED	
8.12	FORMULATE/COORDINATE DELAY OPTIONS	3.1.4 7.35.5 7.34.2	DETERMINE THE TECHNIQUE FOR A DELAY NEGOTIATE DELAY TECHNIQUE WITH PILOT CONFIRM WITH PILOT THRU ATCT ON DESIRE FOR PAD INTENTIONS	3.7.1.1.3.4.5 3.7.1.1.3.4.5 3.7.1.1.3.4.5
9.1.1	ISSUE FPCP REQUESTS	3.3.1 2.3.1	REQUEST SPECIAL USE AIRSPACE PROBE DETERMINE NEED FOR AIRSPACE PROBE	3.7.1.1.4.2 3.7.1.1.4.2
10.1.3	TERMINATE RADAR SERVICE	7.14.3	REQUEST PILOT POSITION REPORTS	
10.2.3	SEND/RECEIVE WEATHER INFORMATION	5.1.4 5.1.5 5.1.2 5.1.3 7.17.5 7.17.4 7.17.1 7.17.8 7.17.7 7.17.6	ENTER PIREP INTO SYSTEM DETERMINE WHETHER ADJACENT CONTROLLER OR PILOT NEEDS WEATHER ADVISORY RECEIVE SIGMET AIRMET RECEIVE WEATHER BRIEFING FROM METEOROLOGIST SELECT WEATHER FOR DATA LINK TRANSMISSION TO PILOT RECEIVE PIREP ON WEATHER RECEIVE WEATHER ADVISORY FROM ADJACENT CONTROLLER/SUPERVISOR/METEOROLOGIST ADVISE SUPERVISOR/FLOW CONTROLLER OF WEATHER IMPACT ON ROUTES FLOW FORWARD WEATHER ADVISORY UPDATE TO ADJACENT CONTROLLER/SUPERVISOR/METEOROLOGIST ISSUE WEATHER ADVISORY TO PILOT/ADJACENT CONTROLLER	
10.3.3	SEND/RECEIVE FLIGHT PLAN	7.11.1	FORWARD FLIGHT PLAN AMENDMENT VERBALLY	

From CDRL A004		From CDRL A002		AAS SYSTEM-LEVEL SPECIFICATION
SUBNO	SUBPROCESS DESCRIPTION	TASKNO	TASK DEFINITION	
	DATA PROCESSING	7.8.4 7.8.1 7.8.2 7.8.3 7.12.1 7.14.5 7.11.2 7.12.1	QUERY THE RELAYER OF A FLIGHT PLAN RECEIVE FLIGHT PLAN FROM PILOT RECEIVE FLIGHT PLAN VERBALLY FORWARDED QUERY PILOT ABOUT FLIGHT PLAN ADVISE CONTROLLER UNABLE FLIGHT PLAN AMENDMENT FORWARD FLIGHT PLAN VERBALLY RECEIVE CONTROLLER ADVICE OF UNABLE FLIGHT PLAN AMENDMENT RECEIVE FLIGHT PLAN AMENDMENT VERBALLY FORWARDED	
10.4.3	RECEIVE/FORWARD DEPARTURE MESSAGE	7.13.1	RECEIVE DEPARTURE MESSAGE FROM CONTROLLER/FSS/PILOT	
10.5.3	PROCESS DEVIATIONS	7.26.1	ISSUE ADVISORY IN REGARD TO ROUTE/ALTITUDE/SPEED DEVIATION	
10.6.2	COORDINATE SEPARATION ASSURANCE MONITORING	7.1.1 7.1.2 7.5.1 7.5.2 7.1.3 7.1.4 7.2.1 7.2.2 7.2.3 7.2.4 7.22.4 7.22.1 7.5.3 7.6.1 7.6.2 7.22.3	ADVISE CONTROLLER OF AIRCRAFT ROUTE/ALTITUDE/SPEED DEVIATION ADVISE CONTROLLER OF RESULTS OF FLIGHT PLAN CONFLICT PROBE RECEIVE NOTICE OF AIRSPACE RESTRICTION FROM CONTROLLER/SUPERVISOR REQUEST RELEASE OF SPECIAL USE AIRSPACE ADVISE CONTROLLER OF CONFLICT ALERT IN HIS SECTOR ADVISE CONTROLLER OF MSAM IN HIS SECTOR RECEIVE CONTROLLER NOTICE OF AIRCRAFT CONFLICT IN SECTOR RECEIVE CONTROLLER NOTICE OF MSAM IN SECTOR RECEIVE CONTROLLER NOTICE OF AIRCRAFT ROUTE/ALTITUDE/SPEED DEVIATION RECEIVE CONTROLLER NOTICE ON RESULTS OF FLIGHT PLAN CONFLICT PROBE ADVISE PILOT WHEN CLEAR OF OBSTRUCTION FORWARD NOTICE OF AIRSPACE INTRUSION BY A NON-CONTROLLED OBJECT RECEIVE DENIAL OF REQUEST FOR RELEASE OF SPECIAL USE AIRSPACE ADVISE CONTROLLER OF AIRSPACE RESTRICTION IMPOSED ISSUE ADVISORY IN REGARD TO RESTRICTED AIRSPACE PROXIMITY ISSUE ADVISORY IN REGARD TO A NON-CONTROLLED	
10.6.2	COORDINATION SEPARATION ASSURANCE MONITORING	7.5.1 7.6.1 7.6.2 7.5.2 7.5.3 7.9.1 7.9.4 7.9.3 7.9.2 7.10.1 7.10.2 7.10.3 7.10.4 7.11.1 7.11.2 7.12.1 7.12.2 7.33.1 7.33.2 7.33.3 7.33.4	RECEIVE NOTICE OF AIRSPACE RESTRICTION FROM CONTROLLER/SUPERVISOR ADVISE CONTROLLER OF AIRSPACE RESTRICTION IMPOSED ISSUE ADVISORY IN REGARD TO RESTRICTED AIRSPACE PROXIMITY REQUEST RELEASE OF SPECIAL USE AIRSPACE RECEIVE DENIAL OF REQUEST FOR RELEASE OF SPECIAL USE AIRSPACE RECEIVE CONTROLLER NOTICE ON REQUESTED CLEARANCE OF AIRCRAFT LEAVING HIS SECTOR RECEIVE CLEARANCE REQUEST FROM ATTN: FSS/PILOT/SUPERVISOR SUGGEST ALTERNATE TO CLEARANCE REQUEST FROM CONTROLLER DISAPPROVE CLEARANCE REQUEST FROM CONTROLLER REQUEST CLEARANCE/APPROVAL FROM ADJACENT CONTROLLER RECEIVE CLEARANCE APPROVAL/CLEARANCE RESTRICTIONS FROM ADJACENT CONTROLLER RECEIVE CLEARANCE DISAPPROVAL/DENIAL FROM ADJACENT CONTROLLER RECEIVE ALTERNATE SUGGESTION FOR CLEARANCE/APPROVAL REQUESTED OF ADJACENT CONTROLLER FORWARD FLIGHT PLAN AMENDMENT VERBALLY RECEIVE CONTROLLER ADVICE OF UNABLE FLIGHT PLAN AMENDMENT RECEIVE FLIGHT PLAN AMENDMENT VERBALLY FORWARDED ADVISE CONTROLLER UNABLE FLIGHT PLAN AMENDMENT RECEIVE PILOT/ADJACENT CONTROLLER REQUEST FOR FLIGHT FOLLOWING DENY FLIGHT FOLLOWING REQUEST REQUEST/ASSIGN BEACON CODE TO AIRCRAFT ISSUE TRAFFIC ADVISORY IN REGARD TO TRAFFIC PROXIMITY	
10.7.3	INITIATE/RESPOND TO CLEARANCE REQUESTS			

From CDRL A004		From CDRL A002		AAS SYSTEM-LEVEL SPECIFICATION
SUBNO	SUBPROCESS DESCRIPTION	TASKNO	TASK DEFINITION	
10.7.3	INITIATE/RESPOND TO CLEARANCE REQUESTS (CONT.)	7.33.5 7.34.1 7.34.2 7.34.10 7.34.7 7.34.8 7.34.5 7.34.6 7.34.9	ADVISE PILOT WHEN CLEAR OF TRAFFIC RECEIVE A FAD NOTICE CONFER WITH PILOT THRU ATCT ON DESIRE FOR FAD INTENTIONS FORWARD CLEARANCE REQUEST TO ADJACENT CONTROLLER SUGGEST CLEARANCE ALTERNATIVES TO PILOT ACKNOWLEDGE DATA LINK CLEARANCE REQUEST RECEIVE CONTROLLER REQUEST FOR CLEARANCE APPROVAL DENY CLEARANCE REQUEST APPROVE CLEARANCE REQUEST FROM CONTROLLER	
10.8.3	SEND/RECEIVE FLOW INFORMATION, COORDINATE FADS	7.34.1 7.34.1 7.35.5 7.35.6 7.35.3 7.34.2 7.35.1 7.35.2 7.23.1	RECEIVE A FAD NOTICE FORWARD RUNWAY USE DATA NEGOTIATE DELAY TECHNIQUE WITH PILOT FORWARD TRAFFIC FLOW DATA TO ADJACENT CONTROLLER FLOW CONTROLLER SUPERVISOR RECEIVE METERING DATA FROM FLOW CONTROLLER CONFER WITH PILOT THRU ATCT ON DESIRE FOR FAD INTENTIONS RECEIVE TRAFFIC FLOW DATA FROM APPROPRIATE CONTROLLER FLOW CONTROLLER SUPERVISOR RECEIVE A FLOW RESTRICTION RECEIVE RUNWAY USE DATA	
10.8.3	SEND/RECEIVE FLOW INFORMATION, COORDINATE FADS	7.35.4	REQUEST FLOW CONTROL BE IMPOSED	
10.9.2	COORDINATE FPCP	1.1.1 1.1.6 1.1.7	REVIEW FLIGHT PLAN CONFLICT PROBE RESULTS FORCE FAD DATA BLOCK TO EXAMINE TRACK INFORMATION ON AIRCRAFT DETERMINE WHETHER AIRCRAFT WILL BE SEPARATED BY LESS THAN PRESCRIBED MINIMA	
10.10.1	INITIATE/RESPOND TO POINTOUTS, HANDOFFS	7.37.1 7.37.2 7.37.3 7.37.4 7.37.5 7.37.2 7.38.2 7.38.3 7.38.4 7.38.5 7.38.6 7.37.3 7.37.4 7.37.5 7.37.6 7.38.1 7.37.4 7.37.5 7.4.1 7.4.4 7.4.2 7.4.3 7.37.1 7.37.2	ISSUE POINTOUT OBSERVE AUTOMATIC INITIATION OF POINTOUT TO ANOTHER CONTROLLER FORCE DATA DISPLAY ON ADJACENT CONTROLLER OBSERVE COMPUTER-INITIATED MESSAGE ON RELEASE OF AIRSPACE REQUEST TEMPORARY USE OF AIRSPACE OBSERVE AUTOMATIC INITIATION OF HANDOFF RETRACT HANDOFF RECEIVE HANDOFF ACCEPTANCE COORDINATE TRANSFER OF CONTROL ISSUE CHANGE OF FREQUENCY TO PILOT REJECT HANDOFF OBSERVE ACCEPT AUTOMATIC HANDOFF MESSAGE VERIFY COMMUNICATIONS WITH PILOT ON TRANSFER OF CONTROL OR DEPARTURE VERIFY/VALIDATE AIRCRAFT ALTITUDE WITH PILOT ON TRANSFER OF CONTROL OR DEPARTURE INITIATE HANDOFF RECEIVE RELEASE USE OF AIRSPACE ASSOCIATED WITH TRACK RECEIVE REJECTION OF USE OF AIRSPACE ASSOCIATED WITH TRACK RECEIVE ISSUANCE OF POINTOUT SUPPRESS FLIGHT DATA BLOCK AFTER POINTOUT ACCEPT POINTOUT DENY REQUEST FOR TEMPORARY USE OF AIRSPACE RECEIVE OBSERVE HANDOFF ACCEPT NON-AUTOMATIC HANDOFF START TRACK	
10.11.1	RECONFIGURE SECTOR, BRIEF RELIEVING CONTROLLER	7.37.1 7.37.2 7.37.3 7.37.4	RECEIVE NOTICE TO TAKE OVER AIRSPACE OF ATCT RECEIVE NOTICE TO RECONFIGURE SECTOR RECEIVE NOTICE TO RELEASE AIRSPACE TO ATCT BRIEF RELIEVING CONTROLLER	
10.12.2	PROCESS COMMUNICATIONS FAILURES	7.19.1 7.19.2 7.19.3 7.19.4 7.19.5 7.19.6	RECEIVE NOTICE OF COMMUNICATION STATUS RECEIVE NEW FREQUENCY ASSIGNMENT TRANSMIT ALTERNATE COMMUNICATION FOR AIR/GROUND TRANSMISSION RECEIVE NOTICE OF ALTERNATE COMMUNICATION PATH FORWARD NOTICE OF COMMUNICATION STATUS FORWARD NEW FREQUENCY ASSIGNMENT TO ADJACENT	

From CDRL A004		From CDRL A002		AAS SYSTEM-LEVEL SPECIFICATION
SUBNO	SUBPROCESS DESCRIPTION	TASKNO	TASK DEFINITION	
		7.19.3 7.32.1	CONTROLLER/SUPERVISOR FORWARD ALTERNATE COMMUNICATION PATH EXPLORE WHETHER OTHERS ARE RECEIVING AN AIRCRAFT'S TRANSMISSIONS	
11.1.1	PERFORM LOCAL FLOW CONTROL	3.1.1 3.1.2 3.1.3 3.1.4 3.4.2	EVALUATE CONSTRAINT EFFECT ON FLOW CHOOSE DESIRED SEQUENCE SELECT NEW FLOW SEQUENCE DETERMINE THE TECHNIQUE FOR A DELAY PROJECT TRAFFIC SEQUENCE TO ESTABLISH/MODIFY APPROACH FLOW TO AIRPORT OR SECTOR	3.7.1.2.1.1.5 3.7.1.2.1.1.5 3.7.1.2.1.1.5 3.7.1.2.1.1.5 3.7.1.2.1.1.5
11.4.2	MANAGE PERSONAL WORKLOAD	6.8.1 6.8.2 6.8.3	DETERMINE IMPENDING CONTROLLER OVERLOAD EXCHANGE/ASSIGN INTRA-POSITION RESPONSIBILITIES REQUEST ASSISTANCE OR RELIEF	
11.5.2	BRIEF RELIEVING CONTROLLER	7.41.1	BRIEF RELIEVING CONTROLLER	
12.1.1	ENTER ATC DATA, ATC DATA REQUESTS	4.5.2 4.5.5 6.2.4 6.2.5 6.2.6 6.2.7 6.2.8 6.10.5	HIGHLIGHT FLIGHT PLAN POSTING FOR REMINDER ACTION DELETE FLIGHT PLAN AMENDMENT HIGHLIGHTING PERFORM LOG-ON SEQUENCE AT DESIGNATED CONSOLE ADJUST PARAMETERS AND DISPLAY TO PERSONAL PREFERENCE CHECK DISPLAY FOR PROPER ALIGNMENT, USABILITY AND SATISFACTORY STATUS SET-UP WORKSTATION ADAPTION PARAMETERS VERIFY THAT ALL REQUIRED DISPLAY AND COMMUNICATION SWITCHES ARE IN PROPER LOCATION RESEQUENCE FLIGHT PLAN ON CONSOLE	
12.2.1	OBSERVE ATC INFORMATION	3.4.3 6.6.2 6.2.1	OBSERVE RANGE/BEARING BETWEEN AIRCRAFT MONITOR STATUS OF QUESTIONABLE NAVAID REVIEW SYSTEM STATUS	
13.1.2	PERCEIVE EXTERNAL FAILURE	6.3.1 6.5.1 6.10.1 6.10.2 7.15.1 7.20.1 7.21.1 7.39.1 7.40.1	DETECT NON-ACCEPTANCE OF INPUT DATA DETECT OCCURRENCE OF ACCC FAILURE OBSERVE MESSAGE ON LOSS OF DATA BASE DETECT FAILURE TO UPDATE FLIGHT PLAN DATA BASE RECEIVE NOTICE OF STATUS OF ADJACENT ACT AUTOMATION EQUIPMENT RECEIVE NOTICE OF NAVAID STATUS FROM ADJACENT CONTROLLER/FSS/SUPERVISOR/PILOT FORWARD NAVAID STATUS TO ADJACENT CONTROLLER/SUPERVISOR/PILOT RECEIVE NOTICE OF RADAR SENSOR STATUS FROM ADJACENT CONTROLLER/SUPERVISOR FORWARD NOTICE OF RADAR SENSOR STATUS TO ADJACENT CONTROLLER/SUPERVISOR	
13.2.1	PERCEIVE SECTOR SUITE COMMUNICATIONS FAILURE	6.4.1 6.11.1 7.14.8 6.7.1 7.15.2	DETECT OCCURRENCE OF SECTOR SUITE FAILURE DETECT UNRELIABLE VSCS COMMUNICATION INFORM SUPERVISOR OF OCCURRENCE OF SECTOR SUITE FAULT DETERMINE COMMUNICATION FAULT RECEIVE STATUS OF SECTOR SUITE FAILURE FROM CONTROLLER/SUPERVISOR	
13.4	DIAGNOSE ERROR	7.14.1	ISSUE NOTICE OF EQUIPMENT STATUS TO ADJACENT CONTROLLER/PILOT/SUPERVISOR	3.7.1.1.1.3.3
13.14.3	EXECUTE BACKUP PROCEDURES	6.4.2 6.5.2 6.7.2 6.7.3 6.10.3 6.6.2 6.6.3 7.14.2 7.14.7 7.15.3	OBSERVE ACCC DATA BASE RESTORATION COMPLETION MESSAGE REVERT TO ACCC BACKUP PROCEDURES (TBD) ADJUST COMMUNICATION STRATEGY SWITCH TO BACKUP FREQUENCY ENTER DISPLAY AMENDMENT MESSAGE ON CONSOLE MONITOR STATUS OF QUESTIONABLE NAVAID OBSERVE SUBSTITUTE ROUTING ON DISPLAY TERMINATE RADAR SERVICE TO AIRCRAFT CONFIRM COMPUTER ACTION DURING TRANSITION STAGES RECEIVE CONFIRMATION OF COMPUTER ACTION DURING TRANSITION STAGES	

From CDRL A004		From CDRL A002		AAS SYSTEM-LEVEL SPECIFICATION
SUBNO	SUBPROCESS DESCRIPTION	TASKNO	TASK DEFINITION	
UNMAFFED TASKS				
		4 000	DECLARE EMERGENCY EVENT AND INVOKE CONTINGENCY PLAN	
		4 010	PERCEIVE NECESSITY FOR SPECIAL OPERATIONS	
		7 050.0	DETECT A PILOT OR AIRCRAFT PROBLEM (E.G., HYPOXIA)	
		7 050.1	ALERT DESIGNATED PERSONNEL OF AIRCRAFT HAVING FLIGHT PROBLEMS	
		7 050.2	FORWARD CONTINGENCY INFORMATION TO SUPERVISOR/ADJACENT CONTROLLER	
		7 080.0	RECEIVE NOTICE OF SPECIAL OPERATIONS	
		7 090.0	FORWARD NOTICE OF SPECIAL OPERATIONS TO ADJACENT CONTROLLER/SUPERVISOR	
		7 300.0	RECEIVE INFORMATION ON LOSS OF RADIO CONTACT WITH AIRCRAFT	
		7 300.1	CONDUCT RADIO/RADAR SEARCH FOR AIRCRAFT WITHOUT RADIO CONTACT	
		7 300.2	ATTEMPT ESTABLISHMENT OF COMMUNICATIONS USING TRANSPONDER EQUIPMENT	
		7 310.0	RECEIVE INFORMATION ON OVERDUE AIRCRAFT	
		7 310.1	CONTACT FACILITY ALONG ROUTE OF FLIGHT TO SECURE INFORMATION ON OVERDUE AIRCRAFT	
		7 310.2	CONDUCT RADIO/RADAR SEARCH FOR OVERDUE AIRCRAFT	

APPENDIX D GLOSSARY OF TERMS

ACTIVE FLIGHT PLAN—A flight having met certain parameters or certain events, such as becoming airborne, requiring action on the flight, taking it from an inactive to active state.

ACTIVE SECTOR—A sector providing air traffic control in one or more assigned fix-posting areas.

ADAPTATION—Unique site-dependent data required by the operational program to provide the flexible capability necessary to allow it to function at individual sites.

ADDITIONAL AIRWAYS—Adaptation capability available in the Area Control Facility for designating a class type function for displaying airway data which normally are not observed at the particular position. For example, a low altitude sector desires to observe the high altitude airways which could be displayed by dashed lines instead of the usual solid lines.

ADJACENT FACILITY—A facility whose assigned airspace borders that of the facility being discussed.

ADVANCED AUTOMATION SYSTEM (AAS)—The system to replace all existing en route and terminal ATC systems, as well as provide automation in airport control towers.

ADVISORY—Advice and information provided to assist pilots in the safe conduct of flight and aircraft movement.

AERONAUTICAL AND METEOROLOGICAL (A&M) DATA DISPLAY—A Logical Display that contains weather and other information in tabular format that affect flight operations but are not directly related to a flight.

AERONAUTICAL RADIO INCORPORATED (ARINC)—The company formed by the major airline companies to provide air ground radio communications for dispatching information. Communications included are: push back time, departure and arrival time, gate time and data, progress reports to the company dispatcher, and weather information.

AIRCRAFT CLASSES—For the purposes of Wake Turbulence Separation Minima, ATC classifies aircraft as Heavy, Large, and Small.

AIRMAN'S METEOROLOGICAL INFORMATION (AIRMET)—In-flight weather advisories issued only to amend the area forecast concerning weather phenomena which are of operational interest to all aircraft and potentially hazardous to aircraft having limited capability because of lack of equipment, instrumentation, or pilot qualifications. AIRMETs concern weather of less severity than that covered by SIGMETs or Convective SIGMETs. AIRMETs cover moderate icing, moderate turbulence, sustained winds of 30 knots or more at the surface, widespread areas of ceilings less than 1,000 feet and/or visibility less than 3 miles, and extensive mountain obscurement.

AIR NAVIGATION FACILITY (NAVAID)—Any facility used in, available for use in, or designated for use in aid of air navigation. Included are landing areas, lights, any apparatus or equipment for disseminating weather information, for signaling, for radio direction-finding, or for radio or other electronic communication, and any other structure or mechanism having a similar purpose for guiding or controlling flight in the air or the landing or take-off of aircraft.

AIRPORT ENVIRONMENTAL DATA DISPLAY—A Logical Display that contains data from airport environmental sensors.

GLOSSARY OF TERMS

(continued)

AIRPORT PROXIMITY PROBE—The automatic detection of the intersection of any flight plan with special use airspace which may not be freely used by aircraft.

AIR TRAFFIC CONTROL TOWER (ATCT)—A facility providing airport traffic control service. There will be approximately 300 ATCTs, each with a Tower Control Computer Complex (TCCC). The TCCC shall support three types of ATCTs:

- (a) Towers with environmental, flight data, and surveillance displays.
- (b) Towers with environmental and flight data displays.
- (c) Towers with only environmental displays.

AIR TRAFFIC CLEARANCE—An authorization by Air Traffic Control, for the purpose of preventing collision between known aircraft, for an aircraft to proceed under specified traffic conditions within controlled airspace.

AIR TRAFFIC CONTROL (ATC)—A service that promotes the safe, orderly, and expeditious flow of air traffic, including airport, approach, and en route air traffic control.

AIR TRAFFIC CONTROL FACILITY—A facility that provides air traffic control service.

AIR TRAFFIC CONTROL RADAR BEACON SYSTEM (ATCRBS)—See Radar Beacon ATCRBS (Secondary Radar).

AIR TRAFFIC CONTROLLER—A person authorized to provide air traffic service. Refers to en route and terminal control personnel.

AIRWAY—A control area or portion thereof established in the form of a corridor, the outline of which is defined by radio navigation aids.

ALERT AND RESOLUTION DISPLAY—A Logical Display that contains information for the Controllers' immediate attention.

ALTITUDE SETTING—The barometric pressure reading used to adjust a pressure altimeter for variations in existing atmospheric pressure or to the standard altimeter setting (29.92).

ALTITUDE RESERVATION (ALTRV)—Airspace utilization under prescribed conditions normally employed for the mass movement of aircraft or other special user requirements which cannot otherwise be accomplished. ALTRVs are approved by the appropriate FAA facility.

ALTITUDE RESTRICTION—An altitude or altitudes stated in the order flown which are to be maintained until reaching a specific point or time. Altitude restrictions may be issued by ATC due to traffic, terrain, or other airspace considerations.

AREA CONTROL COMPUTER COMPLEX (ACCC)—The common automation system equipment and software that support control of aircraft in a specific area, and which is located within each Area Control Facility. The ACCC is one portion of the AAS.

AREA CONTROL FACILITY (ACF)—The planned 23 facilities that will result from consolidation of existing ARTCC and TRACON/TRACAB facilities. An ACF may be formed from an existing ARTCC or may be created in a new building. The number, location, and implementation dates of ACFs will be in accordance with the National Airspace System Plan. There would be 20 CONUS ACFs converted from ARTCCs; plus Honolulu, Anchorage, and the New York TRACON. Each will eventually accomplish all en route and approach/departure control.

GLOSSARY OF TERMS

(continued)

AREA SUPERVISOR—Supervises the operations and the Control positions of a designated area of the facility's airspace. Directly responsible to the Area Manager during the watch.

ASSIGNED ALTITUDE—The current authorized altitude for an active flight.

ASSOCIATION—The process whereby a track position is compared with a position interpolated from the flight plan to determine whether the flight is in conformance with the flight plan.

AUTOMATED EN ROUTE AIR TRAFFIC CONTROL (AERA)—The enhanced ATC automation system of the future.

AUTOMATED RADAR TERMINAL SYSTEM (ARTS)—Computer-aided radar display subsystems capable of associating alphanumeric data with radar returns. Systems with varying functional capability, determined by the type of automation equipment and software, are denoted by a number-letter suffix following the name abbreviation.

BASE OPERATIONS (BASOPS)—The military equivalent to a combined airline dispatch office and FAA flight service station. BASOPS provides flight plan filing, weather briefings, and other pilot related services.

CENTER WEATHER PROCESSOR (CWP)—A system that will process current weather radar, alphanumeric, and graphic weather data for use in ATC facilities.

CLEARANCE APPROVAL—An originating sector may coordinate a clearance for the approval of an adjacent sector if the flight will presently enter the adjacent sector's airspace.

COMBINING/DECOMBINING—Adapting to traffic loading. At least two, but usually not more than three sectors, are combined when converting from day to night watches or to adjust Controller workload. This is a short-term operational rearrangement of sectors and does not involve any change in wiring to the positions.

CONFLICT ALERT—A function of certain air traffic control automated systems designed to alert radar Controllers to existing or pending situations recognized by the program parameters that require his immediate attention/action.

CONTROLLED AIRCRAFT—Aircraft that are participating and receiving traffic separation service from the ATC system.

CONTROL SECTOR—An airspace area of defined horizontal and vertical dimensions for which a Controller or group of Controllers, has air traffic control responsibility. Sectors are established based on predominant traffic flows, altitude strata, and Controller workload. Pilot-Controller communications during operations within a sector are normally maintained on discrete frequencies assigned to the sector.

DATA BLOCK OFFSET—The distance and direction the data block is placed with respect to the target. The data block is attached to the corresponding target by a line called a leader. An automatic data block offset algorithm will be implemented in the AAS.

DISCRETE BEACON CODE—A unique train of electronic pulses transmitted by an aircraft transponder in reply to a radar beacon interrogator. A four-digit octal code in which one or both of the last two digits is other than zero.

FAILSOFT—An ACCC Mode in which a reduced set of services are provided when failures have reduced the quantity of operational elements needed for Operational Mode.

GLOSSARY OF TERMS

(continued)

FIX—A point on an airway used for aircraft navigation and/or position reporting.

FIX POSTING AREA (FPA)—A volume of airspace, bounded by a series of connected line segments with altitudes, which is assigned to a sector.

FLIGHT DATA DISPLAY—A Logical Display that contains flight information for aircraft of interest to Controller positions assigned to the sector.

FLIGHT DATA ENTRY (FDE)—A set of flight data for one aircraft shown on the Flight Data Display. One FDE is analogous to one paper flight progress strip in the current system.

FLIGHT DATA READOUT—Flight data on one particular flight that is chosen by the Controller and is displayed in the Flight Data Readout Area.

FLIGHT LEVEL (FL)—A level of constant atmospheric pressure related to a reference datum of 29.92 inches of mercury. Each is stated in three digits that represent hundreds of feet. For example, flight level 250 represents a barometric altimeter indication of 25,000 feet.

FLIGHT PLAN—Specified information relating to an intended flight of an aircraft that is filed either orally or in writing with an air traffic control facility or Flight Service Station (FSS).

FLIGHT PLAN CONFLICT PROBE (FPCP)—A strategic conflict probe based on flight plan trajectory information.

FLIGHT SERVICE STATION (FSS)—A facility which provides pilot briefings, receives and processes IFR flight plans, relays air traffic control clearances, broadcasts weather information and notices to airmen, and VFR search and rescue services.

FLOW CONTROL—Measure designed to adjust the flow of traffic into a given airspace, along a given airport, or bound for a given route, or bound for a given airport so as to ensure the most effective utilization of airspace.

FLOW CONTROL POSITION—1) A Control position that implements Flow Control whenever it best serves the ATC system and its users. Analyzes the general traffic flow in the area, weather data, and available system status data, and recommends changes in traffic patterns to reduce traffic congestions. Issues restrictions and route changes to implement his recommendations. This position will assume the duties of the Weather Coordinator and Metering position at certain times.

FUEL ADVISORY DEPARTURE (FAD)—Procedures to minimize engine running time for aircraft destined for an airport experiencing prolonged arrival delays.

FULL DATA BLOCK—A block of alphanumeric associated with a target shown on the Situation Display. Full Data Blocks are shown for aircraft under the control of the sector or of particular interest to the sector.

FULL PERFORMANCE LEVEL (FPL) CONTROLLER—An Air Traffic Control Specialist at the highest Controller grade in a particular facility who has been certified to operate all positions required for reaching that grade level in that facility. An FPL Controller is sometimes called a Journeyman Controller.

HANDOFF—A Controller action taken to transfer the radar identification of an aircraft from one Controller to another if the aircraft will enter the receiving Controller's airspace and radio communications with the aircraft will be transferred.

GLOSSARY OF TERMS

(continued)

INSTRUMENT FLIGHT RULES (IFR)—Federal Aviation Regulations (FAR) that govern the procedures for conducting instrument flight (FAR Part 91).

INTERFACILITY—Between adjacent facilities; for example, between ACF and ACF, or between ACF and ATCT, as contrasted with Intrafacility.

INTERIM ALTITUDE—An altitude clearance which is a temporary altitude assignment prior to the issuance of a final altitude clearance. It is used to stop an aircraft's climb or descent in traffic.

INTRAFACILITY—Within a single facility; for example, between two sectors within the same ACF, as contrasted with Interfacility.

LIMITED DATA BLOCK—A block of alphanumerics associated with a target shown on the Situation Display. Limited Data Blocks are shown for aircraft in a sector or of interest to a sector but not under control of the sector. They contain only beacon code, altitude, and ground speed.

LIMITED STANDARD FLIGHT PLAN DISPLAY—A Flight Data Entry/Entries which may be displayed in an abbreviated or normal fashion depending on whether the flight is actively being controlled by the sector. Standard flight plan display contains all normal elements of a Flight Data Entry but may have the route portion presented in a truncated or tailored fashion. Further abbreviation or deletion of elements may occur after the associated track is displayed by the sector.

LOCAL COMMUNICATION NETWORK (LCN)—A Communication System used to interface devices and Sector Suites within the ACF.

LOGICAL DISPLAY—A set of information displayed at a position as a single entity. The following Logical Displays for Controllers are specified in the AAS:

- Situation Display
- Flight Data Display
- Aeronautical and Meteorological Data Display
- Alert and Resolution Display
- Special Lists
- Message Composition and Response Display
- Airport Environmental Data Display
- System Status Display
- Static Information Display
- Weather Display

MESSAGE COMPOSITION AND RESPONSE DISPLAY—A Logical Display that contains menus for the composition of messages and an area for the system's response.

METERING AND SEQUENCING—Control of aircraft in a manner that provides a stream of properly spaced aircraft arriving at a fix or airport at a rate which can be accepted by adjacent ATC facilities or airports.

MINIMUM ASSIGNABLE FLIGHT LEVEL—The minimum allowable flight level that a Controller can give an aircraft. It is calculated from the current Barometric Pressure.

MINIMUM SAFE ALTITUDE WARNING (MSAW)—A function of the computer that aids the Controller by alerting him when a tracked Mode C equipped aircraft is below or is predicted by the computer to go below a predetermined minimum safe altitude.

GLOSSARY OF TERMS (continued)

MODE C—An interrogation mode in which a beacon radar transponder automatically reports altitude when interrogated by a ground station.

MODE 3/A—An interrogation mode in which a beacon radar transponder automatically reports identification when interrogated by a ground station. There are 4096 possible identification codes.

MODE S—A surveillance system which will also provide a digital data link with properly equipped aircraft.

MODES OF ACCC OPERATION:

- (a) **Operational Mode**—ACCC performs all designated functions for its designated airspace.
- (b) **Failsafe Mode**—May temporarily discontinue some functions when not enough processing power is available to sustain the operational mode.
- (c) **Emergency Mode**—A contingency mode used to give continuity during transition to facility backup.

NATIONAL AIRSPACE DATA INTERCHANGE NETWORK (NADIN)—A communication network between various types of ATC facilities. Will involve decommissioning of the existing low-speed teletypewriter networks.

NATIONAL AIRSPACE SYSTEM (NAS)—The common network of U.S. airspace; air navigation facilities, equipment, and services; airports or landing areas; aeronautical charts, information, and services; rules, regulations, and procedures; technical information, manpower, and material. Included are system components shared jointly with the military.

NON-CONTROLLED AIRCRAFT—Those aircraft not participating in or receiving traffic separation service from the ATC system. This term does not include those flights receiving control service from control towers having only visual surveillance in performing control service.

NON-DISCRETE CODE—A radar beacon Mode 3/A assigned to more than one aircraft within a specific geographic area. Currently, a four octal digit code in which the last two digits are zeros.

NOTICE TO AIRMEN (NOTAM)—A notice containing information (not known sufficiently in advance to publicize by other means) concerning the establishment, condition, or change in any component (facility, service, or procedure of, or hazard in the National Airspace System), the timely knowledge of which is essential to personnel concerned with flight operations.

OCEANIC CONTROL POSITION—1) A Control position that provides Air Traffic Control services to aircraft operating in Oceanic Airspace under U.S. jurisdiction. A Sector Suite adapted to support an Oceanic Control position.

OCEANIC DISPLAY AND PLANNING SYSTEM (ODAPS)—A proposed system consisting of a flight data processor and displays for use at two ARTCCs which engage in control of aircraft over the ocean. The ACCC will have processing and display equipment which will replace ODAPS.

PAIRING—The process whereby it is determined that both a flight plan and a track exist for a flight.

PARENT ACF—The ACF which is exchanging ATC operational data with an ATCT. It is also the ACF which is providing approach/departure services for the ATCT's airport.

GLOSSARY OF TERMS (continued)

PILOT WEATHER REPORT (PIREP)—A report of meteorological phenomena encountered by aircraft in flight.

POSITION—Location of aircraft. Different types of positions are defined below:

- (a) Flight Plan Position is the position determined from filed speed converted to estimated ground speed using wind data, route of flight, and elapsed time since the flight became active.
- (b) Target Position is that reported by the common digitizer (or MODE S). It is received in polar coordinates (range and azimuth) and converted to the stereographic grid and then to display coordinates.
- (c) Track Position is the position which is predicted for the next scan radar return by the tracking algorithm.

PROGRESS REPORT—A report over a known location as transmitted by an aircraft to ATC.

QUICK LOOK—A feature which provides the Controller the capability to display data blocks of tracked aircraft from other control positions. A quick look function may be designed for Flow Control in the future.

RADAR BEACON—A radar receiver-transmitter aboard an aircraft that transmits a coded signal whenever its receiver is triggered by an interrogating radar. The coded reply can be used to determine position in terms of range and bearing from the beacon. Also called beacon, radar, and radar transponder.

RADAR BEACON ATCRBS (SECONDARY RADAR)—A radar system in which the object to be detected is fitted with cooperative equipment in the form of a radar receiver/transmitter (transponder). Radar pulses transmitted from the searching transmitter/receiver (interrogator) site are received in the cooperative equipment and used to trigger a distinctive transmission from the transponder. This latter transmission, rather than a reflected signal, is then received back at the transmitter/receiver site for processing and display at an Air Traffic Control facility.

RADAR POINT OUT (POINTOUT)—Used between Controllers to indicate radar handoff action where the initiating Controller plans to retain communications with an aircraft penetrating the other Controller's airspace and additional coordination is required.

RADAR SERVICE—A term which encompasses one or more of the following services based on the use of radar which can be provided by a Controller to a radar-identified aircraft.

- (a) Radar Separation. Radar spacing of aircraft in accordance with established minima.
- (b) Radar Navigational Guidance. Vectoring aircraft to provide course guidance.
- (c) Radar Monitoring. The radar flight-following of an aircraft whose primary navigation is being performed by its pilot to observe and note deviations from its authorized flight path, airway, or route. This includes noting the aircraft's position relative to approach fixes.

REQUESTED ALTITUDE—An altitude requested by the pilot if filing an IFR flight plan or an altitude change requested while en route.

RESTRICTED AREA—Airspace designated under Part 73 of the Federal Aviation Regulations within which the flight of aircraft, while not wholly prohibited, is subject to restrictions.

GLOSSARY OF TERMS

(continued)

SECTOR SUITE (S.S.)—Refers to the composition of functions which directly comprise either the Controller MMI or Sector Suite Console Support processing elements.

SECTOR SUITE WORKSTATION—A group of consoles containing displays and input devices whereby ATC specialists (Controllers or supervisors) interface with the ACF.

SEPARATION—In air traffic control, the spacing of aircraft to achieve their safe and orderly movement in flight and while landing and taking off.

SIGNIFICANT METEOROLOGICAL INFORMATION (SIGMET)—A weather advisory issued concerning weather significant to the safety of all aircraft. SIGMET advisories cover severe and extreme turbulence, severe icing, and widespread dust or sandstorms that reduce visibility to less than 3 miles.

SITUATION DISPLAY—A Logical Display that contains the plan view of a sector and some adjacent airspace. Contains real-time positions of target and weather.

SPECIAL LIST3—A Logical Display that contains several lists of information in a compact and concise manner. Each Special List can be independently displayed and positioned at the Sector Suite. The lists at each position are tailored to the airspace and traffic of interest to that position.

SPECIAL USE AIRSPACE—See FAA Order 7110.65, Air Traffic Control Handbook, Pilot/Controller Glossary.

SQUAWK (MODE, CODE, FUNCTION)—Activate specific modes/codes/functions on the aircraft transponder, e.g., "Squawk three/alpha, two one zero five, low."

START TRACK—A message which requires the computer to track an aircraft and display a full data block.

STATIC INFORMATION DISPLAY—A Logical Display that contains graphic and tabular data that are updated infrequently, such as area charts and letters of agreement.

SYSTEM STATUS DATA DISPLAY—A Logical Display that contains dynamic information on status of ATC equipment, operational areas, airports, etc.

TARGET—The indication shown as a radar display resulting from a primary radar return or a radar beacon reply.

TRACK—A set of predicted points correlated with the radar returns for the flight.

TRACKING—A process which uses primary/beacon radar data and paired flight data (if any) to determine the actual position and velocity of a flight. Radar target identification through manual or automatic means; positional agreement of a radar target and the computer predicted position; computation of the difference between the predicted position and the actual position of the radar target.

TRAFFIC—

1. A term used by a Controller to transfer radar identification of an aircraft to another Controller for the purpose of coordinating separation action. Traffic is normally issued (a) in response to a handoff or pointout, (b) in anticipation of a handoff or pointout, or (c) in conjunction with a request for control of an aircraft.
2. A term used by ATC to refer to one or more aircraft.

GLOSSARY OF TERMS

(continued)

TRAFFIC ADVISORIES—Advisories issued to alert pilots to other known or observed air traffic which may be in such proximity to the position or intended route of flight of their aircraft to warrant attention.

TRANSFER OF CONTROL—The action whereby control responsibility for an aircraft is transferred from one Controller to another.

TRANSFERRING CONTROLLER FACILITY—A Controller facility transferring control of an aircraft to another Controller facility.

TRANSIENT FAULT—An intermittent failure or a temporary interference.

TRANSITION ALTITUDE—A MODE C altitude determined by the program to be a reported altitude for a descending or ascending flight.

TRANSPONDER—The airborne radar beacon receiver/transmitter portion of the Air Traffic Control Radar Beacon System (ATCRBS) which automatically receives radio signals from interrogators on ground, and selectively replies with a specific reply pulse or pulse group only to those interrogations being received on the mode to which it is set to respond.

VECTOR—A heading issued to an aircraft to provide navigational guidance, by radar.

VISUAL FLIGHT RULES (VFR)—Visual flight in which avoidance of collision with other aircraft is dependent upon every pilot seeing other aircraft and avoiding them. To enable pilots to perform the collision avoidance function, the rules take certain weather conditions into account, and specify basic "rules of the air."

VISUAL METEOROLOGICAL CONDITIONS (VMC)—Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling equal to or better than specified minima.

VOICE SWITCHING AND CONTROL SYSTEM (VSCS)—A system which will control voice ground-to-ground communications in the same facility (intercom) and between facilities (interphone), and ground-to-air communications between air traffic Controllers and pilots (radio).

WEATHER DISPLAY—A Logical Display that contains graphic weather products from National Weather Service radars or meteorologists.

WIND SHEAR—A change in wind speed and/or wind direction in a short distance resulting in a tearing or shearing effect. It can exist in a horizontal or vertical direction and occasionally in both.

APPENDIX E GLOSSARY OF CONTROLLER TASK ACTION VERBS

INTRODUCTION

This section contains a glossary of the action verbs used to state Controller tasks. In stating Controller tasks a distinction is generally made between **what the Controller does** and **what gets done**. Statements of what the Controller does are called "worker-oriented" statements. Statements of what gets done by a Controller are called "job-oriented" statements. For the most part, tasks should be "job-oriented," providing a more functional description of Controller action without specifying the design details of how that action gets done. In fact, particularly for tasks involving the transmission of information, more than one procedure is expected to be available for Controller use (e.g., via Sector Suite and VSCS). Some tasks employ two action verbs to express these dual procedures especially available with automation (e.g., receive/observe).

It may also be noted that some statements can infer both a worker and a job orientation. In other instances the statement of a job-oriented task, through a reader's familiarity with the action, will readily imply a well-defined notion of what the Controller is actually doing. The distinction between job- and worker-oriented actions should not be emphasized too rigidly, but be of general guidance in stating tasks. The distinction is a conceptually complex one, and not readily applied in all instances. Interpretation of the specific work activity in many instances is dependent upon the sub-activity context in which the task is a component. Tasks state what gets done to a machine or system, and do not state what a machine or system does.

There are 69 action verbs used in this report. Ten of these verbs are associated with 63% of the task statements (166 of 262 tasks). Thirty-eight (54%) of the verbs occur only once with a task. Thus, while some attention is given to standardizing verb usage, conformance is not mandatory if another verb fits the action more naturally or conforms to Controller terminology. The ten most frequently used verbs are:

Advise	Forward	Receive
Detect	Issue	Request
Determine	Observe	Review
Enter		

At first glance, some pairs of verbs may appear synonymous, as in the verbs "Choose" and "Select." "Choose" implies a mental generation of something (in Task 3.1.2, choose desired sequence). "Select" on the other hand, implies the availability of a set of options or alternatives from which a choice is made. For the verbs "Initiate" and "Start," the distinction is based on Controller terminology in Tasks 1.4.2; Start Track, and 7.38.1; Initiate Handoff.

Other cases of similar appearing actions may not be as clearly distinguished, as in:

Advise - Alert - Contact - Forward - Issue - Suggest
(in transmitting information to another)

Detect - Observe - Perceive - Review - Search
(generally in acquiring information from a visual display)

The task context will be particularly useful in distinguishing the verb usage for actions employing such verbs.

VERB EXPLANATIONS

ACCEPT—Response to an originating Controller or computer that the receiving Controller has received or observed the aircraft data being coordinated and assumes complete or partial responsibility for the action as appropriate.

ACKNOWLEDGE—Response to a request without further commitment as to what action will be taken.

ADJUST—Changing or fine tuning of the data base, adaptation, display, and/or communication controls.

ADVISE—Offer advice or counsel to another person of information and/or data that the originating Controller deems necessary to pass to the receiver.

ALERT—Notification of others that a critical situation may be approaching or impacting the receiver, as in alerting airport facility of an aircraft having flight difficulties.

ANALYZE—Examine individual items to make a judgment on the entire situation, such as conditions that influence ability to provide flight following. (Similar to "Review," but suggests a one-time effort rather than a more repetitious action.)

APPROVE—Respond favorably to a request, as in approving a clearance request.

ATTEMPT—Try a course of action without predicting the results, as when trying to establish communications with an aircraft.

BRIEF—Give concise preparatory information concerning all sector activities to another Controller.

CANCEL—Remove data from the computer or rescind information passed to another. (Comparable to "Delete.")

CHECK—Visually examine a hardware item for its operational state or condition.

CHOOSE—Make a decision on a course of action, such as in choosing a desired sequence.

COMPOSE/ENTER—The act of making up a message, including all required elements of the message, and providing the message, as in composing and entering a flight plan amendment, to the computer.

CONDUCT—A series of related actions, designed to achieve a result, as in conducting radio/radar search.

CONFER—Holding a discussion without necessarily negotiating.

CONFIRM—Make certain that what should have occurred, did in fact occur, as in confirming computer action during transition stages.

CONTACT—Establish communications via VSCS with another, informing or discussing matters of concern, as in contacting an overdue aircraft.

DECLARE—State with emphasis that a situation exists, as in declaring the existence of an emergency event.

DELETE—Erase or cancel information or a previous action, as in deleting the highlighting of an item on a display, or completely deleting full data blocks.

DENY—Refuse a request.

DESIGNATE DELETE—A marking or specifying an area on a display, as in designating airspace in use; and the action of removing such area display.

DETECT—Visually or auditorily discerning a fact or item, usually from a display, such as an alarm indicator or action of an aircraft; but also includes noting the occurrence of events or situations such as pilot problems or equipment failures.

DETERMINE—Process information mentally to reach a decision about a situation, state of affairs, or timing of an action.

DIRECT—Cause a flight data display to appear at another's workstation.

ENTER—Insert data or text into the computer system.

EVALUATE—Examine and judge the merits of an action or alternative.

EXCHANGE ASSIGN—Replace, transfer or modify personnel responsibilities; designate a Controller to a position.

EXPLORE—Investigate systematically, perhaps by a variety of actions, such as when determining whether other Controllers are receiving an aircraft's transmissions.

FLIGHT FOLLOW—Provide advice and information to assist pilots in conduct of a flight not being otherwise controlled, to include tracking that flight on the Situation Display.

FORCE QUICK LOOK—Compel or produce a result on own display, as in forcing a Full Data Block that would not otherwise be presented.

FORMULATE—Mentally devise or prepare the content of a message according to a specific formula, standard, or procedures, such as an advisory or clearance.

FORWARD—Send information verbally or by machine action on to another position.

HIGHLIGHT—Provide prominence to an item on a display.

INHIBIT—Prevent the occurrence of a machine action, as in inhibiting an alert function.

INITIATE—Begin an action involving the concurrence of another Controller, as in initiating a handoff.

ISSUE—Distribute or communicate information, typically involving a pilot or an aircraft, as in issuing clearances or advisories.

MONITOR—Check periodically, keep track of or scrutinize the status of an item of equipment, such as in monitoring the status of a questionable NAVAID.

NEGOTIATE—Discuss in order to come to a mutually acceptable agreement, as when negotiating with a pilot the technique to be used for accomplishing a flight delay.

OBSERVE—Notice or watch attentively a visual display for a message or event, or the occurrence, status, or location of something. (A here-and-now observation, as opposed to Perceive, an evolving process observation.)

OFFSET—Reassociate or colocate a data block and a target on the display.

PERCEIVE—Become aware of an action as it evolves over time, such as an aircraft deviation or a tracking fault.

PERFORM—Carry out a standard procedure or operation, such as logging on at the Sector Suite workstation.

PROJECT—Mentally extend the position and or path of one or more aircraft in time and space.

QUERY—Inquire of another person or machine to remove doubt, as in querying about some element of a flight plan.

READ OUT—Acquire information from the computer on a specified item, such as range bearing time for an aircraft to a fix.

RECEIVE—Acquire transmitted information by seeing or listening.

RECEIVE OBSERVE—Acquire by listening to another Controller or by seeing the presentation of computer data on a handoff, without necessarily taking action to express approval.

REJECT—Refuse to accept a usually accepted item, like a handoff.

REMOVE—Cancel information in the computer. (Comparable to "Delete.")

REPOSITION UPDATE REASSOCIATE—Reassociate or relocate a data block and a target and provide current data on the data block.

REQUEST—Ask another for information on or approval on an item.

REQUEST ASSIGN—Ask another for an item, such as a beacon code for assignment to an aircraft, and commit the result.

RESEQUENCE—Rearrange the order of flight plans displayed.

RESTORE—Bring back into being, remove an inhibit of a function such as MSAW.

RESTRICT—Provide limits to an activity, such as air traffic in an area.

RETRACT—Take back negate withdraw the start of an action such as a handoff.

REVERT—Go to the use of another procedure, such as backup operations.

REVIEW—Look over and study conditions or situation, or examine something again, as in reviewing the completeness of a flight plan.

SEARCH—Scan look over a display to find something, such as a particular flight plan.

SELECT—Single out an item in preference to others, or pick one from several available options or items, such as a flight plan sorting priority scheme.

SET UP—Adjust equipment for proper functioning.

START—Controller terminology in the task "Start Track," to begin the display of the track of a target on the Situation Display.

SUGGEST—Offer for consideration another course of action, when a request is not feasible, such as clearance alternatives to a clearance request.

SUPPRESS—Curtail or inhibit the display of an item, for a parameter time such as a full data block after a pointout.

SUSPEND—Stop the display of an item for an indefinite period, until recalled, such as in "Suspend Track."

SWITCH—Change a given system condition to another available condition, as when switching communications to a backup frequency.

TERMINATE—Bring an activity to an end, as in terminating radar service to an aircraft. (A Controller term used with pilots, but comparable to "Cancel.")

UPDATE REVISE—Change or modify text to bring it more up-to-date, as in updating electronic notes memoranda.

VERIFY—Prove the truth of an activity or matter by confirmation, as in verifying communication contact with an aircraft.