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MICROPROCESSOR EN ROUTE AUTOMATED RADAR TRACKING SYSTEM (MICRO-EARTS)
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MICROPROCESSOR EN ROUTE AUTOMATED RADAR TRACKING SYSTEM (Micro-EARTS)

MSAW AND ALTITUDE TRACKING AND RESTRICTED AIRSPACE MONITORING

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National Terminal Systems Engineering Division, AOS-400
William J. Hughes Technical Center
Atlantic City International Airport, New Jersey 08405

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CHANGE HISTORY

Change levels and applicable dates are indicated below

Level	*Date*	*Version*
CA/MSAW	August 1985	Preliminary
CA/MSAW	January 1986	Interim
Original	June 1988	A4.05
1	September 1990	A4.06
2	November 1990	A4.06 (MIFC) (Delivered under SPB5 (R4), no technical changes)
3	May 1992	A4.07
4.0	April 1996	M4.07 (Micro-EARTS)
5.0	October 1996	M4.08 (Micro -EARTS)

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1.0 INTRODUCTION

1.1 OVERVIEW

This document contains a functional description of the Minimum Safe Altitude Warning (MSAW) function and the Altitude Tracking function. MSAW shall monitor aircraft terrain and obstruction separation generating, when activated, both aural and visual alarms, thus alerting controllers to advise aircraft of evasive actions necessary to resolve potential conflicts. The MSAW function shall use aircraft three dimensional position and velocities in determining the warning criteria to enable an alert. Altitude Tracking derives estimates of the aircraft's situation in the vertical dimension (altitude and altitude change rate) from Mode-C reports and pilot reported altitudes.

MSAW shall logically separate into two monitoring elements:

1. General Terrain Monitor

2. Approach Path Monitor

   a. The General Terrain Monitor shall monitor all non-approach aircraft, generating an appropriate controller alert when an aircraft is either at or below its geographic minimum safe altitude (MSA) or in close proximity of an obstruction. It accomplishes this by monitoring the tracks reported and predicted altitude along a path, making altitude comparisons for each defined polygon and grid bin the track path traverses. Each polygon shall have an altitude assignment and shall be convex in design. The track path shall begin with a current position check and, using the aircraft's current heading/velocity, predict ahead to determine the path end.

   b. The Approach Path Monitor shall monitor approach aircraft within an approach capture box, generating an appropriate controller alert if the aircraft is (or predicted to be) at or below a minimum safe altitude. Eligibility shall be based on the aircraft's relative position to a runway threshold and final approach course centerline. Approach aircraft shall be monitored based on their current or predicted altitude as compared to the lowest minimum descent altitude (MDA) for the approach.

The Restricted Airspace Monitoring function will monitor current and predicted aircraft positions for intrusion into adapted volumes of airspace and provide aural and visual controller alerts.

2.0 ENVIRONMENT

2.1 DIGITAL TERRAIN MAP

The terrain encompassed by the EARTS system is defined in terms of geographic regions (areas) for use by the MSAW algorithms. The highest terrain feature or obstruction in an area defines its minimum safe altitude.

An area is defined as a convex polygon having 255 or fewer vertices and usually centered about its high point. The location of each vertex is specified by its latitude and longitude. Two polygons may describe disjoint arena, partially overlap, or one may be a sub-region completely contained within the other. In the latter case the altitude of the inner region is taken to represent that of the common area and must be greater than the altitude of the outer polygon.

The off-line adaptation program (AD) converts the specified area and altitude data to a digital form that facilitates processing by the MSAW algorithms. The basis of the Data Base organization is a grid of 32x32 nautical mile (SP) granularity, superimposed upon and aligned with the system plane. Each grid box is identified with all of the polygons it intersects. Each grid box may have an altitude assigned to it. This altitude must be less than or equal to the altitude of any polygon intersecting the grid. ADAPT stores the Digital Terrain Map on disk to be read into main memory by the operational program at startup.

2.2 ELIGIBILITY REGIONS

MSAW processing will be performed on all associated aircraft. The processing performed will be dependent on the geographic region in which the aircraft is located. The eligibility regions for MSAW processing are defined as follows:

a. Approach path monitor capture box: This is a rectangular area surrounding a runway and the final approach course for the runway. Aircraft located in this area will be processed by the approach path monitor algorithm. These areas must be defined within a terminal area.

b. Terminal area general terrain region: This is a cylindrical area surrounding a terminal area for which EARTS provides approach/departure control. The area is defined with a latitude/longitude representing the center of the cylinder, a range indicating the cylinder radius and an altitude representing the ceiling. Aircraft in this area and not within an approach path monitor capture box are processed by the general terrain monitor algorithm. The prediction time used in this area will be one minute (SP).

c. En route area general terrain region This is the area not included in any terminal area. Aircraft not located in any terminal area are considered to be in the enroute area and will be processed by the general terrain monitor algorithm. The prediction time used in this area will be two minutes (SP).

2.3 **AURAL ALARMS**

Aircraft determined to be in an MSAW alert condition will generate an aural alarm warning. The aural alarm sounded will be at the controlling display.

2.4 DATA FLOW FOR MSAW/ALTITUDE TRACKING

Figure 2-1 is a data flow diagram for the MSAW and Altitude Tracking function.

2.5 RESTRICTED AIRSPACE VOLUMES

Restricted Airspace Volumes are defined as convex polygons with a floor altitude and a ceiling altitude, Multiple restricted airspace volumes may be adapted.

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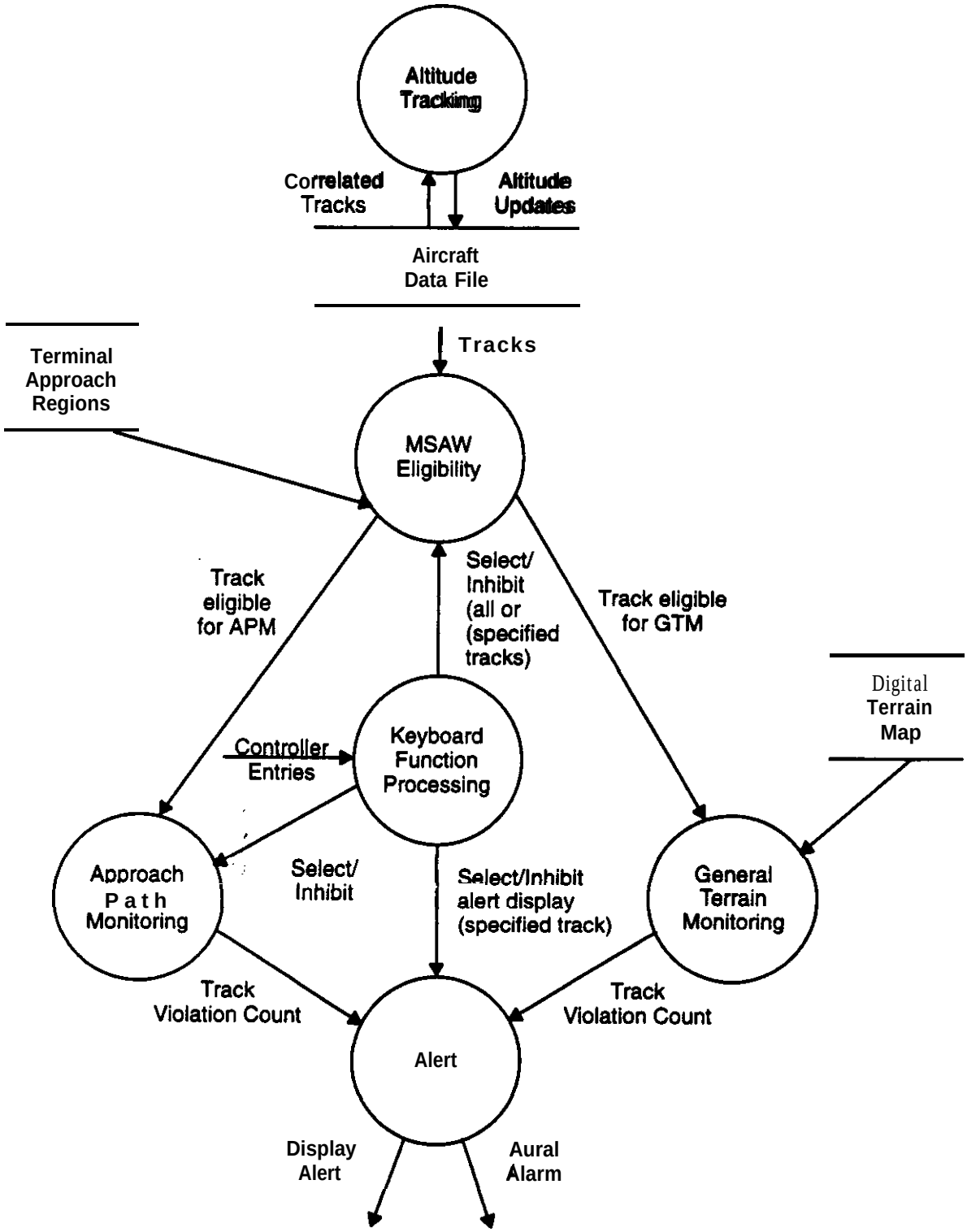

FIGURE 2-1. MSAW/ALTITUDE TRACKING DATA FLOW DIAGRAM

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3.0 FUNCTIONAL CAPABILITIES

3.1 ALTITUDE TRACKING

The altitude tracking function maintains an established (current) altitude and vertical change rate for all system tracks having reliable altitude data. This information is used principally by the MSAW and CA functions in determining unsafe conditions.

9.1.1 Input

The sources of established altitude are as follows

- When the established altitude is determined by correlating Mode C beacon target reports, it is referred to as a Mode C-derived established altitude. The Mode C reported altitude is pressure altitude referenced to MSL under standard conditions (29.92 inches Hg at 16 degrees C). The established altitude derived from Mode C reported altitude shall be corrected for local barometric pressure. The correction factor shall be applied only between settings of 27.00 and 31.00.

- When the established altitude is determined by pilot reported altitude (PRA), it is referred to as a PRA-derived established altitude. The PRA is not subject to barometric pressure correction.

Altitude Tracking is performed for each aircraft after its supporting slant range track has been correlated or coasted on the current scan by Sensor Tracking (NAS-MD-677). Mode C altitude is obtained from the correlating beacon report, if any. The associated flight plan, if it exists, contains pertinent PRA information.

Definitions:

- A reported Mode C altitude is “valid” if its reported validity is greater than or equal to the Altitude Validity Criterion (SP).

- A valid reported Mode C altitude is “reasonable” if

  it is between the Gross Low Altitude Limit (SP) and the Gross High Altitude Limit (5P)
  AND
  the difference between it and the lest reasonable altitude represents a climb or descent rate not greater than the Reasonable Altitude Change Rate Maximum (site variable). See paragraph 3.1.4.

- "Unacceptable" Mode C data is that which is

  missing (none reported)
  OR
  reported, but not valid
  OR
  reported and valid, but not reasonable.

3.1.2 Establishment Rules

The rules for altitude establishment may be conceptualized by defining three states for the altitude track

1. Non-established. The altitude track does not exist (Void state).

2. Established Mode C. The altitude track exists and its established altitude is Mode C derived.

3. Established PRA. The altitude track exists and its established altitude is PRA derived.

The rules for transitioning between these states are described below. A state diagram is shown in Figure 3-3.

1. If a valid PRA is entered, then the established altitude is set to PRA (A valid entry is non-zero and between gross altitude limits (SP).)

2. If an established altitude does not exist and a valid Mode C report is received, then either of the following occurs:

   € for unassociated tracks — the established altitude is set to the reported altitude.

   € for associated tracks — if the reason for the non-established state is unreasonable altitude, then the state remains non-established until a controller action occurs. Otherwise, the established altitude is set to the reported altitude.

   (A valid Mode C report has validity >= 2 (SP) and altitude between gross altitude limits (SP).)

3. If an established altitude exists that is derived from PRA and control is terminated or the PRA is cancelled (zero PRA entered), then the altitude track is terminated (becomes non-established).

4. If an established altitude exists that is derived from PRA and a sequence of valid Mode C altitude reports is received that conforms to the established altitude, then the altitude is re-established as the Mode C altitude and the PRA is invalidated. A Mode C altitude conforms to the established altitude if their absolute difference is less then the Mode C Conformance Tolerance (SP).

5. If an established Mode-C derived altitude exists, the altitude profile is updated each scan.

   If the track correlated with a reasonable Mode-C report, the track altitude is established at the reported altitude.

   If the track did not correlate with a reasonable Mode-C report, the track is coasted and the predicted altitude becomes the established altitude.

   The track remains in the established Mode-C state by this continued process until one of the following events takes place:

   — Termination Events —

   a. The current scan has unacceptable Mode-C data (missing, invalid, or unreasonable) and the altitude track is not coasted. (Sac paragraph 3. 1.6), The altitude profile becomes non-established.

   b. The maximum allowable time since the previous update (SP) is exceeded. The altitude profile becomes non-established.

   c. A valid but unreasonable Mode-C report is received and the time since the last reasonable altitude exceeds the Unreasonable Altitude Monitor Time Period (site variable). The altitude becomes non-established.

   — PRA Establishment Event —

   d. A valid PRA is entered. The altitude profile becomes established PRA derived

3.1.3 Altitude Profile Initiation

An altitude profile is initiated upon receipt of a valid Mode C report or a valid PRA per Rule 1 or 2 above.

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An aircraft for which the established altitude is derived from PRA is assumed to be flying level at the entered altitude. Consequently, its altitude change rate (velocity) is constantly zero. This information is available to CA/MSAW immediately after track initiation.

The remainder of 3.1 pertains to Mode C derived altitude tracks. Mode C altitude information is not made available to CA/MSAW until two valid Mode C reports have been received, from which an estimate of the altitude velocity can be determined.

3.1.4 Mode C Reasonableness

A valid reported Mode C altitude must pess tests for reasonableness to qualify for use in altitude track initiation and maintenance.

1. Mode C altitude must be between gross low and high altitude limits (SP).

2. The current Mode C altitude must not deviate from the established track to an extent that represents an excessive change in altitude or altitude velocity A reported altitude is considered reasonable if the altitude change since the last reasonable altitude represents en average climb (or descent) rate less than 4,500 feet per minute (site variable). If the time since the last reasonable altitude exceeds the Unreasonable Altitude Monitor Time Period (site variable), the altitude profile is declared non-established, and unreasonable monitoring is terminated until the altitude profile is re-established.

3.1.5 **Altitude Profile Maintenance**

The current Mode C altitude will be used in conjunction with track characteristics of the previous scan to derive smoothed and predicted values of altitude and altitude velocity. Predictions are used to determine deviation of the next scan's reported altitude and as estimates during short periods when reported data is missing.

Variable smoothing coefficients shall be used to produce a responsive tracker. This will be achieved by smoothing least when successive reports indicate a change from level flight, measured by a difference which exceeds (SP) feet. Otherwise, the amount of smoothing increases to its maximum with each reasonable altitude received. The output of the smoothing recursion will be limited to feasible values determined by the raw data bounds of altitude reports (±50 feet (SP)).

An aircraft in level flight may report altitude toggling between two adjacent quantization levels. The altitude tracker shall be able to detect this rendition and not assume when it does that the aircraft is departing from level flight. Toggle sensing begins when consecutive altitude reports first differ by 100 feet. A toggle occurs when the next deviation by 100 feet is in the opposite direction, causing the smoothed altitude velocity to be set to zero. Toggle sensing is reset when there is an altitude change of more then 100 feet.

3.1.6 No Acceptable Mode C Data

If Mode C data is unacceptable (that is, missing, invalid or unreasonable on the current scan, then a history of previous Mode C correlation will be examined to determine whether to coast, terminate or reinitialize the track.

A track is coasted on:

1. a single scan of unacceptable data if there were acceptable reported altitudes for at least two of the three preceding scans; or

2. the second consecutive scan of unacceptable data if there were acceptable reported altitudes for at least two of the three preceding scans; or

3. the third and following cconsecutive scans of unacceptable data, if the track is associated and the current scan's reported altitude is unreasonable.

If a track is not coasted, then it will be dropped in accordance with Rule 6, paragraph 3.1.2. If a track is terminated and the current reported altitude is valid, then the altitude profile will be re-initialized with the reported altitude.

3.1.7 Altitude Tracking Parameters

3.1.7.1 Site Parameters

- Reasonable Altitude Change Rate Maximum
- Unreasonable Altitude Monitor Time Period

3.1.7.2 System Parameters

- Gross High Altitude Limit
- Gross Low Altitude Limit
- Altitude (Mode C) Validity Criterion
- Maximum Time Since Last Update
- Mode C Conformance Tolerance.

3.2 MSAW

3.2.1 MSAW Eligibility

MSAW processing shall be performed after the system tracking function for each aircraft being tracked each scan. MSAW eligibility for each track shall be determined through the following series of checks:

- The track shall be enabled for MSAW processing.
- The track shall have a valid altitude (Mode-C or controller entered reported) below the MSAW site parameter gross high altitude.
- The track shall be associated with an EARTS controller.
- The track shall have a beacon code not within either of two site adapted MSAW Inhibit Beacon Code segments.
- The track shall have a firmness greater than or equal to a system parameter.
- A track in suspend statue shall be eligible based on site adaptation.

Tracks which meet these criteria shall be considered for approach monitoring and general terrain monitoring in that order.

3.2.1.1 Approach Monitor Eligibility. Approach monitor eligibility shall be determined through the following checks:

- The track shall have arrival status.

Tracks qualified for approach monitoring shall be considered for all adapted approaches. Individual approach monitoring eligibility shall be determined by the following checks:

- The track's heading shall be within 90 degrees of the currently considered approach.

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- The track shall be within the capture box for the currently considered approach.

Special logic shall be employed to resolve any ambiguity caused by overlapping capture hexes. Where final approach courses intersect, the final approach course closest to the aircraft's heading shall determine the appropriate capture box.

Tracks which fail to qualify for any capture box shall be considered for general terrain monitoring.

3.2.1.2 General Terrain Monitoring Eligibility. Eligibility for general terrain monitoring shall be determined by the following checks:

- The track shall not be within a general terrain inhibit volume.
- The track shall not have been eligible for Approach Path Monitor.
- The track shall not be inhibited by the departure inhibit function. Tracks with departure status are inhibited from general terrain alerts within an adapted MSAW departure inhibit area MSAW departure inhibit areas are defined by means of a convex polygon.

3.2.2 Monitoring Elements

3.2.2.1 General Terrain Monitor. The general terrain monitor (GTM) shall observe all non-approach aircraft in the terminal and enroute areas for possible terrain/obstruction hazards generating a timely determination of potential conflicts. GTM shall accomplish this by monitoring the track's reported and predicted altitude along a predicted path, making altitude comparisons for each polygon and grid box the path traverses. The path shall begin with the current track position and end with a predicted track position. An MSAW violation occurs when the track altitude is less than the polygon altitude or grid box altitude at any point along the path.

The general terrain map shall be modeled by convex polygons (each with an associated altitude) overlaying the controlled airspace area of interest. One polygon may partially or totally overlap another; in which case the higher of the two associated altitudes shall prevail in the common region.

The current track position and the predicted track position shall be used to identify the polygons to be used for altitude comparison. The predicted track position shall be baaed on the current track position, current track velocity and look-ahead time which is parameterized for terminal and enroute areas. If the track's altitude profile is determined by Mode-C reports, system parameterpads shall be subtracted from the polygon or grid box altitude for the current and predicted checks.

3.2.2.2 Approach Path Monitor. All MSAW eligible aircraft within the vicinity of an airport shall be monitored by the approach path monitor algorithm. Eligibility shall be based on the aircraft's position relative to a runway threshold and final approach course centerline. The track must be within the limits of the approach capture box and in arrival status. An aircraft which fails to qualify for approach path monitoring shall be considered for general terrain monitoring.

The approach capture box shall be defined as an area designated for approach monitoring (Figure 3-1). The approach capture box includes the approach monitor inhibit area and the approach monitor area. The lateral limits of the approach capture box shall be defined as a box two NM (SP) wide (one NM either side of final approach course centerline) extending from the defined runway endpoint out to the final approach fix (FAF). The vertical limit of the capture box shall be defined by adaptation for the particular runway. The approach monitor inhibit areaportion of the capture box shall be from the runway end point to the monitor cutoff point. The approach monitor area shall be from the monitor cutoff point to the FAF (see figure 3-2).

When an aircraft is within the approach capture box and qualified for approach monitoring, it shall be eligible for approach path monitor violation only. Approach path aircraft shall be monitored based on their current established altitude as compared to the lowest minimum descent altitude (MDA) for the published

non-precision approaches defined for the particular runway. If the aircraft's current established altitude is equal to or less than the MDA, the approach violation count shall be incremented by two. If the aircraft has not violated the approach altitude boundary, it shall be predicted ahead 15 (SP) seconds where if the aircraft's predicted altitude is equal to or less than the MDA minus a (SP) pad, the approach violation count shall be incremented by two. The purpose of the pad during prediction is to minimize the probability of a nuisance alarm due to changes in aircraft descent rate during an approach. If no violation is detected or the aircraft becomes ineligible for monitoring, the approach violation count shell be decremented by one (to a minimum of zero). Approach monitoring shall continue until the approach monitor cutoff point defined by a (SP) distance from runway threshold (approximately two NM). The approach monitor inhibit area is designed to minimize nuisance alerts for aircraft operating in the vicinity of the airport or making circling approaches to a different runway at the airport.

Special logic shall be employed to resolve any ambiguity caused by overlapping capture boxes. Where final approach courses intersect, the final approach course closest to the aircraft's heading shall determine the appropriate capture box.

3.2.3 MSAW Alerts

3.2.3.1 Violation Count. A violation count shall be maintained by the MSAW program. When the track qualifies for a violation declaration, the count shall be incremented by two. When a track is either not eligible for monitoring or does not receive a violation declaration, the count shall be decremented by one (SP). when the value is less than 2 (SP), the alert shall be terminated. At any time the violation count is equal to or greater then two (SP) for current altitude checks or three (SP) for predicted altitude checks, MSAW alerts shall be activated for the track. This alert shall be declared each scan to generate the display of the appropriate warning full data black message.

3.2.3.2 Alarm Presentation. The controller alerts declared by MSAW shall be presented both aurally and visually. An alert warning shall consist of an aural alarm for five (SP) seconds, the word “LA” displayed above the ACID in field zero of the remote display FDB, the word “MSAW” displayed below the ACID in field seven of the local display full data block, and an entry in the "LA/CA/RA ALERT” tabular list on the active controller's display. In addition, for general terrain monitoring, a vector shall be drawn from the track position to the violation area. The violation altitude shall be depicted (blinking) at the violation location. Tracks inhibited from MSAW by alphanumeric keyboard entry or special beacon code shall continuously display the appropriate characters so specified in NAS-MD-679.

3.2.4 Operator Control

MSAW shall provide the various functional capabilities through specific controller, supervisor, or System Monitor Console (SMC) entry Refer to NAS-MD-678 and NAS-MD-685.

3.2.5 MSAW Data Base

The MSAW data base shall be site adaptable in the same manner as the operational data base. Various site and system parameters shall be combined either at assembly or program preset time to generate or initialize the MSAW data base for a particular site. The MSAW data base shall outline the definition of the polygons and the associated altitude

3.2.5.1 Site Parameters

3.2.5.1.1 General parameters

- MSAW gross high altitudes specifies the altitude above which MSAW shall not process tracks.
- Approach capture box specifies the area in which tracks shall be eligible for MSAW approach monitoring.
- MSAW inhibit code segments specifies the beacon codes for tracks which should be automatically inhibited from MSAW processing.

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- MSAW polygons: specifies the altitude assignment of areas for MSAW processing.
- € Suspend track eligibility for MSAW processing.

3.2.5.1.2 Approach Monitor Parameters

- € Final Approach Course
- € Runway Length
- Runway Designation
- € Runway Threshold Coordinates
- € Monitor Initiate Distance
- € Monitor Cutoff Point
- € Approach Lowest Minimum Descent Altitude (feet MSL)

3.2.6.2 System Parameters

3.2.5.2.1 General Parameter

- Track Eligibility Firmness
- Polygon Altitude Pad for Current Check
- Polygon Altitude Pad for Predicted Check

3.2.5.2.2 General Terrain Monitor Parameters

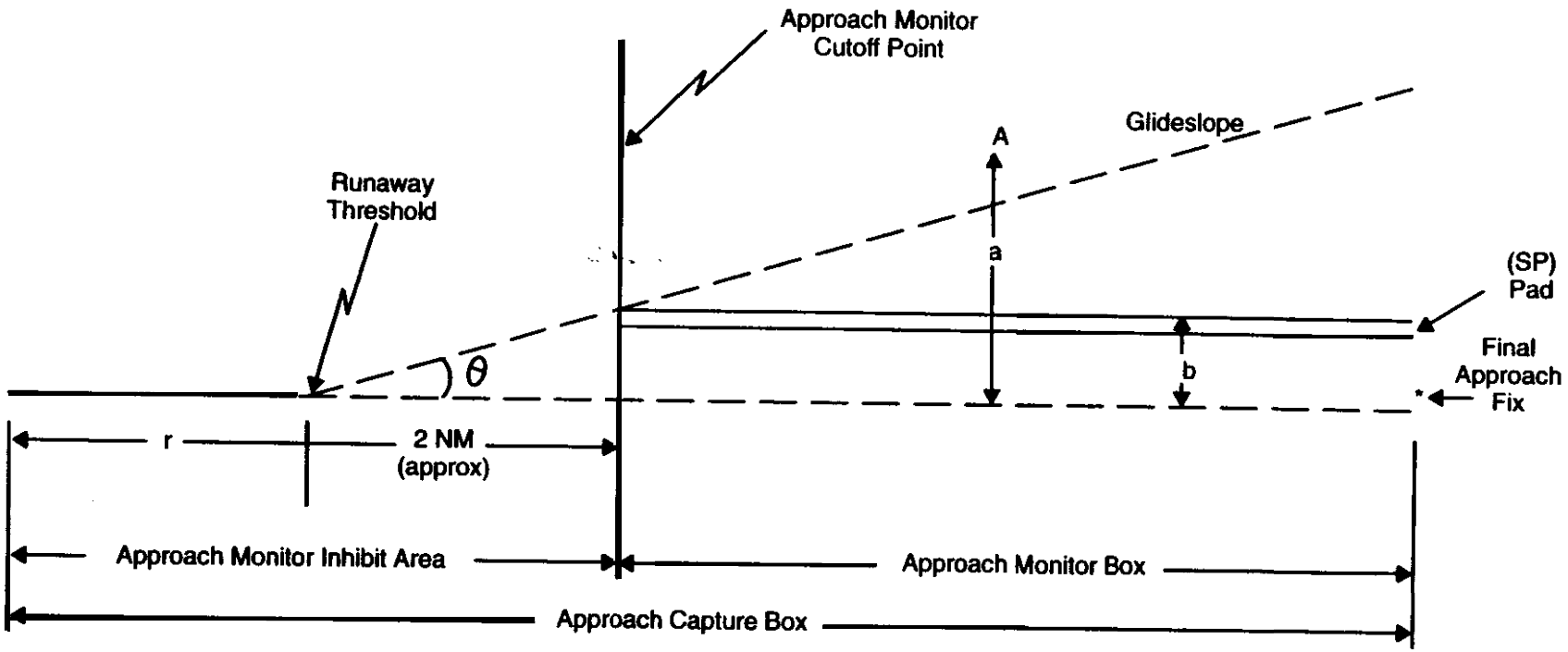
- Pilot/controller response time (predict time) (seconds) (Terminal and En Route)

3.2.5.2.3 Alert Display/Aural Alarm Parameter

- Count to initiate current GTM alert
- Count to initiate current approach path alert
- Count to initiate predicted GTM alert
- Count to initiate predicted approach path alert
- Count to cease alert
- Maximum consecutive violation count (per track)
- System time to disable aural alarm (seconds)

3.2.5.2.4 Approach Monitor Parameters

- Predicted altitude violation pad (feet)
- Prediction time (seconds)



θ = Glideslope Angle
r = Runway Length
a = Aircraft reported altitude (or valid predicted) (MSL) calculated at Point A
b = Lowest minimum descent altitude
A = Aircraft Position

FIGURE 3–1. APPROACH CAPTURE BOX (VERTICAL VIEW)

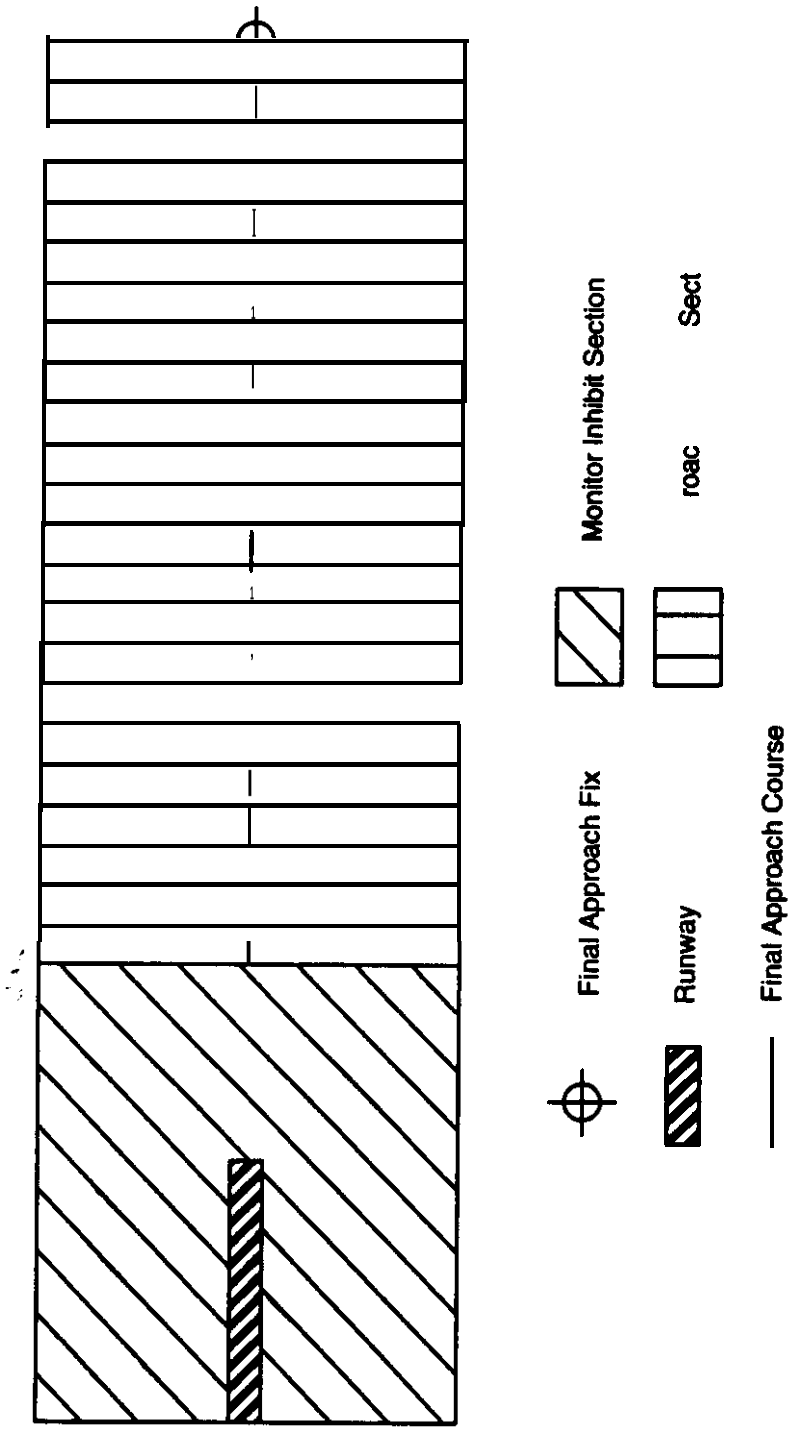
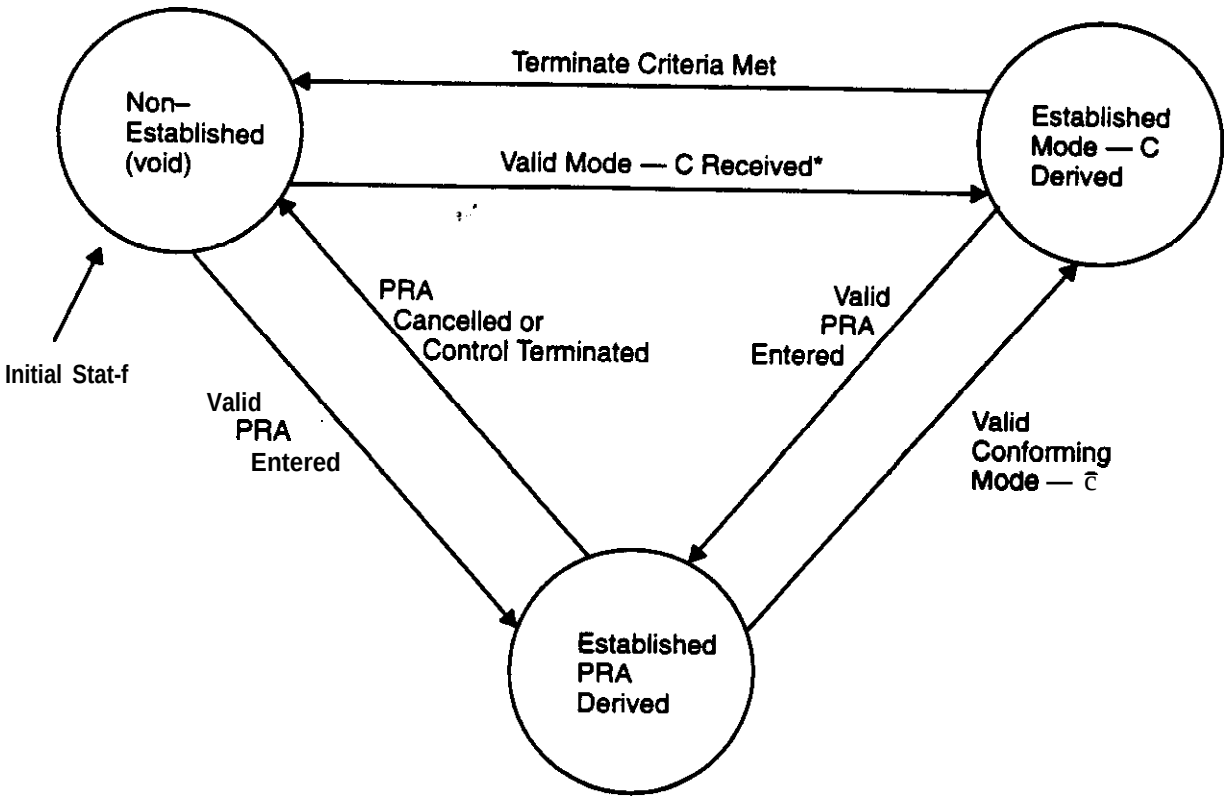


FIGURE 3-2. APPROACH CAPTURE BOX (HORIZONTAL VIEW)



* Controller action is required to transition from Void to Established Mode — C Derived for association tracks with unreasonable altitude.

FIGURE 3-3. STATE DIAGRAM FOR ALTITUDE ESTABLISHMENT

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3.3 RESTRICTED AIRSPACE MONITORING

3.3.1 Overview

This document contains a functional description of the Restricted Airspace Monitoring (RAM) function. RAM shall evaluate aircraft in the Micro-EARTS system for possible restricted airspace violations. RAM will accomplish this by monitoring the track's current and predicted position. A RAM violation will occur when the track altitude is equal to or less than the ceiling altitude assigned to the region, equal to or greater than the floor altitude, and the lateral position is within the region. The RAM function shall use aircraft three dimensional position and velocities in determining the warning criteria to enable an alert.

3.3.2 RAM Processing

3.3.2.1 RAM Eligibility. RAM processing shall be performed after the system tracking function for each aircraft being tracked each scan. RAM eligibility for each track shall be determined through the following series of checks:

- The track will be enabled for RAM processing.
- If adapted, only associated tracks will be eligible for RAM processing. Otherwise, all tracks will be eligible.
- If adapted, the track will have a valid altitude (Mode-C or pilot reported) to be eligible. Otherwise, tracks with no altitide will also be eligible and violation determined by lateral criteria only.
- The track will have a firmness greater than or equal to a system parameter.

Tracks which meet those criteria will be considered for restricted airspace monitoring.

3.3.2.2 RAM Processing. Aircraft eligible for RAM will be monitored for current or predicted intrusion into adapted RAM polygons. A RAM violation will occur when the track altitude is equal to or less than the ceiling altitude assigned to the region, equal to or greater then the floor altitude, and the lateral position is within the region. The RAM function shall use aircraft three dimensional position and velocities in determining the warning criteria to enable an alert.

3.3.2.3 RAM Alerts

3.3.2.3.1 RAM Sliding Window. A RAM sliding window will be maintained by the RAM program. The RAM sliding window maintains a violation statue history of the most recent update intervals. The sliding window is updated by throwing out the oldest update interval violation status and saving the current violation status. A RAM alert is declared when the last M out of N window values indicate a RAM violation. Two pairs of sliding window parameters (M,N) are defied for RAM. The update interval determines which of the parameter pairs is used for alert declaration.

3.3.2.3.2 Alarm Presentation. The controller alerts declared by RAM will be presented both aurally and visually. An alert warning will consist of an aural alarm for five (SP) seconds, the word "RA" displayed above the ACID in field zero of the remote display FDB, the word "RAV" displayed below the ACID in field seven of the local display full data block, and en entry in the "LA/CA/RA ALERT" tabular list on the active controller's display. Adaptation will designate where aural alarms are provided.

4.0 SPECIAL CONSIDERATIONS

4.1 USE OF ASSIGNED ALTITUDE IN GENERAL TERRAINPROCESSING

MSAW general terrain alerts shall not be generated unless the aircraft is currently below or predicted to be below the bin/polygon altitude. Furthermore, the issuance of an alert shall be inhibited while all of the following conditions exist

1. The track has an assigned altitude.

NOTE

In the case of EARTS facilities that interface with a FDP, assigned altitude refers to either the temporary or permanent assigned altitude. If available, the temporary assigned altitude will be used, otherwise the permanent assigned altitude will be used.

NOTE

The block altitude lower limit is used as an assigned altitude for MSAW purpose. Furthermore, if the aircraft is cleared for approach, the polygon altitude is considered to be a block altitude lower limit.

2. The assigned altitude is greater than or equal to the violation altitude.
3. The altitude profile is determined by Mode-C reports (as opposed to a Pilot Reported Altitude).
4. The track is not eligible for approach monitoring,

and either of the following renditions exist:

5. The Mode-C altitude is in conformance with the assigned altitude and an unreasonable altitude velocity deceleration is not necessary to remain in conformance.
6. The track is predicted to have reached the assigned altitude by the time the violation is predicted to occur and leveling off at the assigned altitude does not require an unreasonable altitude velocity deceleration.

4.3 MSAW DEPARTURE INHIBIT AREA PROCESSING

Upon auto acquisition, a departure track will have its status changed to arrival, if it is determined that the destination airport is an EARTS adapted arrival airport, while still in the MSAW departure inhibit area. Normally, this would make the track eligible for MSAW processing. However, special logic will process the track as a departure even though it has arrival status. Once the track has left the departure inhibit area, normal MSAW eligibility proceeding resumes. This allows for auto termination at the destination airport for a track that never leaves the EARTS coverage. It also provides for the inhibit of MSAW alerts for departure tracks which are still within the MSAW departure inhibit area.

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