DOCKET NO.: SA-517
EXHIBIT NO. 3FF

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

AOS MSAW BRIEFING
(13 Pages)

MSAW

Minimum Safe Altitude Warning

March 24, 1998

Minimum Safe Altitude Warning

- A function designed solely as a controller aid in detecting potentially unsafe aircraft proximity to terrain/obstructions.

- Generates an alert to the controller when a pilot is below, or is predicted to be below, a specified altitude.

- Must be adapted specifically for each one of the 193 Automated Radar Terminal Systems.
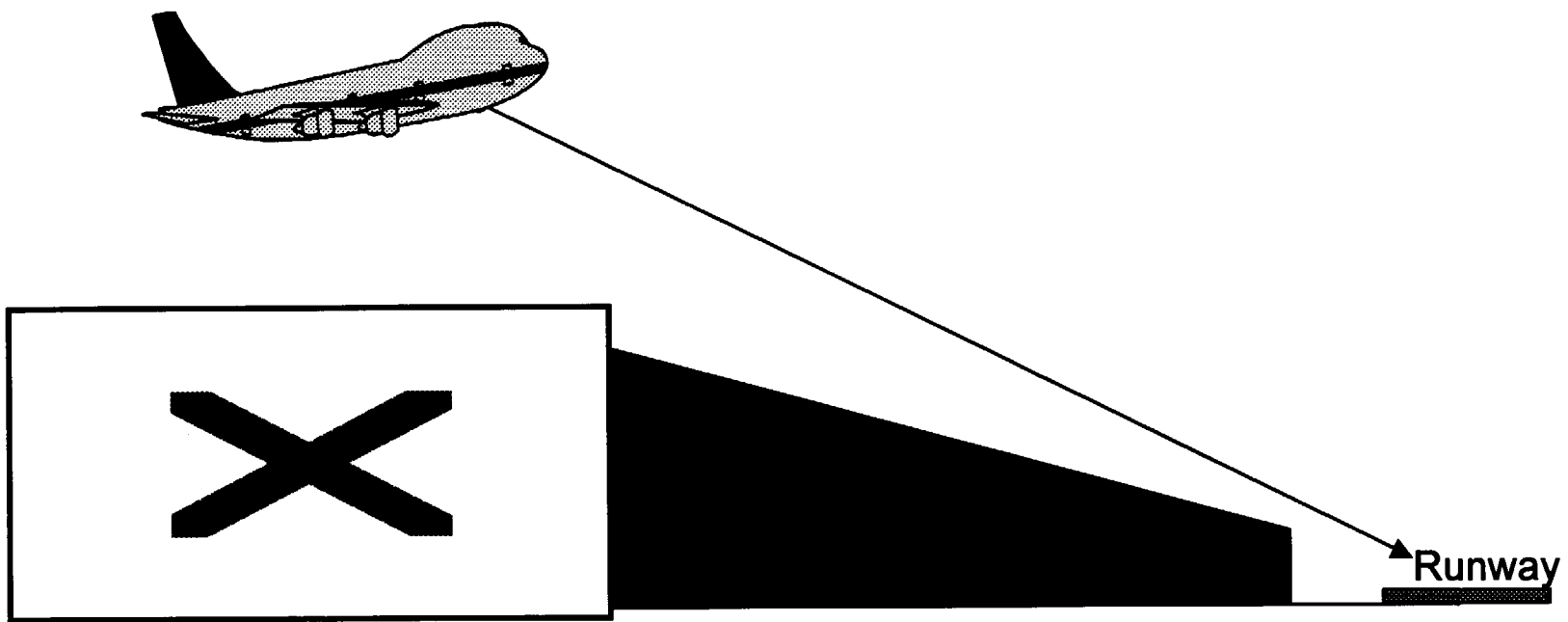
MSAW - HISTORY

- NTSB Safety Recommendation A-73-46 resulting from accident December 1972

  - 1977 - ARTS111 MSAW Implemented
  - 1990 - ARTSIIA MSAW Implemented

Types of MSAW Processing

General Terrain
Monitoring

Approach Path
Monitoring

Runway

General Terrain Monitoring

- Current Alarm
  - Presently less than 500 feet above terrain map.
- Prediction Alarm
  - Pilot will be less than 500 feet above terrain map within 30 seconds.
- Projection Alarm
  - Pilot will be unable to clear all obstacles within eight minutes flying time on present course at a five degree climb angle.
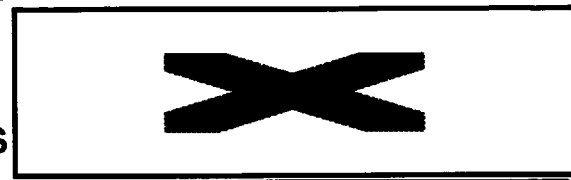
General Terrain Warning

0	0	0	188	333	488	419	712	899
0	0	211	512	619	778	912	1212	1422
0	200	390	490	712	855	899	899	1366
280	318	300	500	680	790	944	1180	1390

Prediction 30 Seconds   Projection 480 Seconds
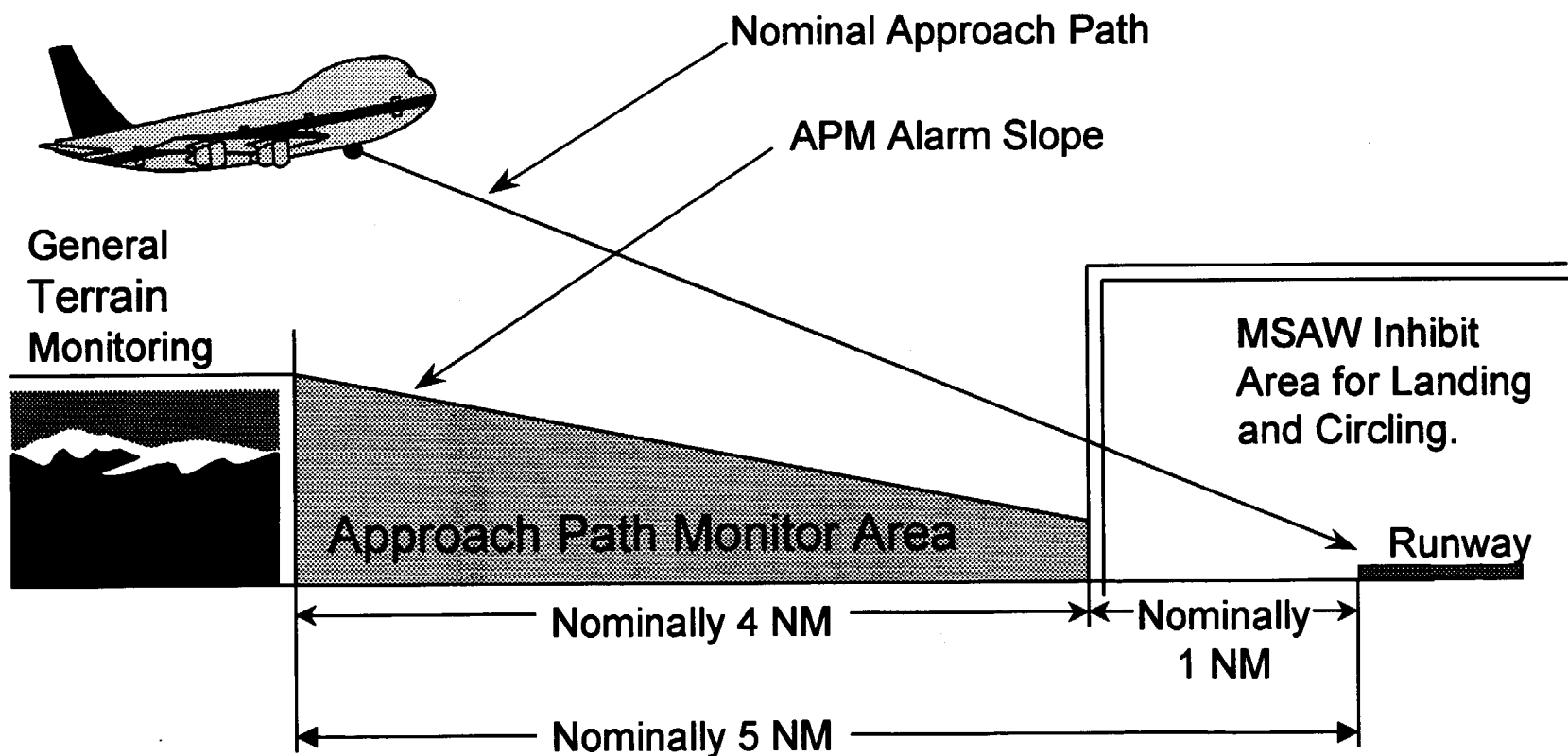
Approach Path Monitor

- Current
  - Pilot is currently below the calculated APM alarm slope altitude.

- Prediction
  - Pilot is predicted to be 100 feet below the calculated APM alarm slope altitude within the next 15 seconds.

Approach Path Monitor (APM)

Nominal Approach Path

APM Alarm Slope

General
Terrain
Monitoring

MSAW Inhibit
Area for Landing
and Circling.

Approach Path Monitor Area

Runway

←——————— Nominally 4 NM ———————→|←—Nominally——→|
1 NM

←————————————— Nominally 5 NM —————————————→

MSAW at Guam Before.

Guam After Re-adaptation.
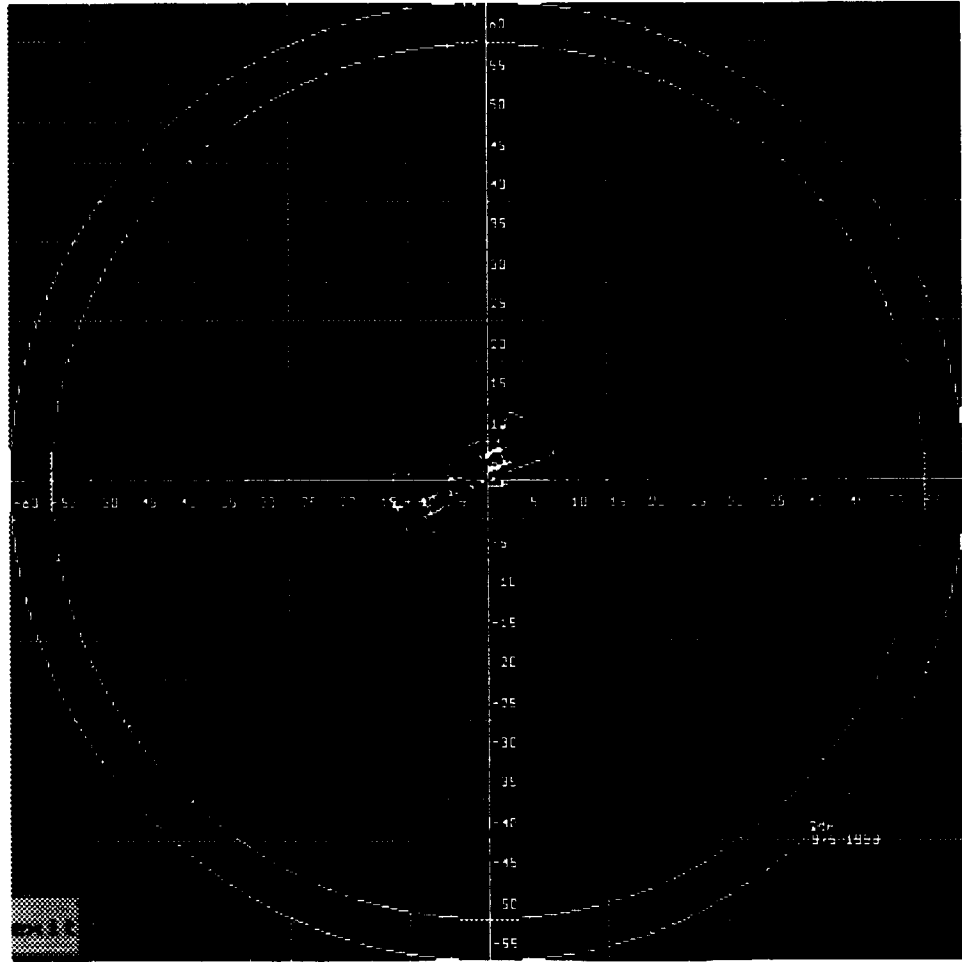
Policy for Software Management

- October 3, 1997 FAA established a method for strict configuration management of MSAW.
  - All modifications are now centrally maintained.
  - Established strict management oversight and control.
  - Developed guidelines and review processes (Quality Assurance)

MSAW Optimization process

- Assembled an interdisciplinary team.
- Set optimal standards and guidelines for each MSAW parameter.
- Developed a process to evaluate and enhance each site.
- Developed new tools.
- Readapted each of the 193 systems.
- Site specific functionality test scenario.

MSAW - optimization (cont.)

- Nationwide findings & fixes
  - Reduced amount of inhibited airspace.
  - Re-designed approach capture boxes.
  - Corrected Digital Terrain Map (DTM) altitudes.
  - Implemented graduated approach path adaptation.