

# Final Monitor Aid

**UNISYS**

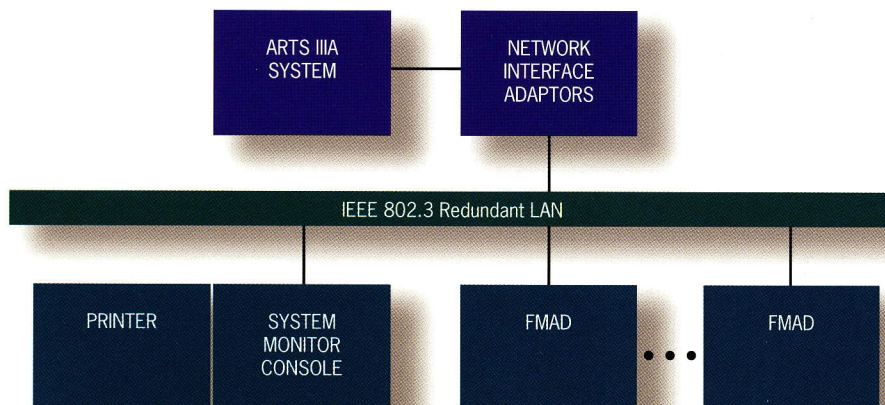


The Final Monitor Aid (FMA) system provides monitor controllers with a clear, accurate presentation of aircraft conducting independent precision approaches into triple parallel runways in all weather conditions at the new Denver International Airport (DIA).

The requirement for an FMA for the new DIA was identified in late 1992 to allow independent parallel operations for the new airport. Development, installation and testing of operational FMA displays in conjunction with the existing ARTS IIIA system was completed by the joint FAA and Unisys team by September 30, 1993.

The DIA ARTS IIIA system has been expanded to include Network Interface Adapters (NIAs), IEEE 802.3 Local Area Networks (LANs), FMA Displays (FMADs), System Monitor Consoles (SMCs) and Printers. The hardware incorporated into this system is primarily off-the-shelf FAA ARTS IIIE equipment and commercial-off-the-shelf (COTS) equipment. The FMA Display is made up of COTS equipment repackaged to match the form factor of the ARTS displays.

## DIA FMA System Block Diagram



### ARTS Data Extraction

The FMA system extracts data from the ARTS central track store and processes this data for display on the FMADs. Extracted data consists of track reported position, data block information, and system warnings and status. Tracks within the FMA monitor zone are displayed with standard ARTS full or limited data blocks.

### Track Prediction

After each sensor update, the FMA software checks each track in the monitor zone to:

- Detect blunder maneuvers which threaten to intrude on a Non-Transgression Zone (NTZ) or Navigational Error Zone (NEZ)
- Provide a velocity vector allowing the controller to see track predicted position for an operator-selectable period after the current update
- Determine track stability relative to the approach course centerline prior to performing a test for possible wrong runway assignment
- Detect coast situations which may indicate sensor failure for a track.

### Alert Generation

The FMA system displays alerts to the controller for the following conditions:

- Caution - When a track is predicted to enter the NTZ or NEZ within a site parameter period
- Wrong Runway - When a track is detected lining up on the wrong approach course
- Surveillance Failure - When track update data has been lost for a site parameter number of scans
- Warning - When a track reported position is in the NTZ.

Each of these alerts also produces a voice message.

### Display Mapping

Each FMAD contains four NOAA supplied digital maps based on the local area for DIA. These maps include NTZs, NEZs and reference lines spaced at 200-foot intervals relative to the approach course centerline. Operator controls allow for activating/deactivating runways, NTZs and NEZs.

### Operator Interface

The FMA Computer Human Interface provides the operator with control menus for set-up and operation of the FMADs. All defined operator-selectable para-

meters are accessible via trackball input, with the exception of the manual alert volume control. FMA control functions include:

- Alert Functions Enable/Disable
- Track Display
- History Trails
- Data Block Control
- Character Size
- Approach Map Selection
- NTZ/NEZ Selection
- Range, Offset & Magnification
- Intensity Control (16 Objects).

### System Data

A movable window containing system data is provided displaying:

- System Time
- Barometric Pressure
- ARTS, SMC and Voice Status
- Keyboard/Trackball Status
- Track Data Base Utilization.

### System Features

- 50 Track Capacity (Inside Monitor Zone)
- 3 Operational and 1 Maintenance FMAD on IEEE Redundant LAN
- Displays ARTS LA/CA as well as FMA Alerts
- Minimal track update delay to screen (average 50 mSec, Max 125 mSec)
- Fully Independent Displays.

### Hardware Features

- MC 68020 based Display Processor
- High Resolution, 2048 X 2048, color display
- 60 Hz CRT Refresh
- Barco CX3500 Graphics Engine
- Voice Alert System.

*For further information, contact:  
Christopher M. Francis  
Air Traffic Control Systems  
Unisys Corporation  
P.O. Box 64525  
St. Paul, MN 55164-0525  
Telephone: (612) 456-7767*