LORAL
Air Traffic Control

ARTS IIIE
Automated Radar
Terminal System

ARTS IIIE
Supporting the Future

The Automated Radar Terminal System (ARTS) IIIE provides air traffic control (ATC) functional capabilities to meet current and future terminal automation requirements. Increasing traffic loads and the addition of new ATC automation tools means that high-capacity ATC systems require greater processing and system performance. The ARTS IIIE system was originally designed and developed to meet the needs of the world's busiest airspace – the New York TRACON. That system has performed flawlessly since its commissioning in May 1990. The ARTS IIIE has recently been upgraded to provide even greater capacity and functionality.

ARTS IIIE was designed and developed by Loral for the Federal Aviation Administration (FAA) to provide a modern, fully distributed local area network (LAN)-based processing system with intelligent display terminals. The ARTS IIIE system architecture permits new functionality such as TATCA, AMASS, and Terminal Data Link, to be added easily without disrupting service or controller performance.

By combining proven air space management disciplines with advanced technology, ARTS IIIE has improved air traffic controller productivity, expanded system capability, and enhanced system reliability.

A Continuing Commitment

ARTS IIIE represents Loral's continuing commitment to the FAA and the National Airspace System (NAS). Loral has served the FAA for more than 30 years by designing, delivering, and supporting the world's most advanced air traffic control systems. Our partnership with the FAA has enabled Loral to develop a keen understanding of the FAA's needs, and confirms our continuing commitment to perform with excellence. From the beginning of terminal automation, Loral has been a key participant in modernizing the nation's 200 busiest airports.

A "Common ARTS" Solution for All the Nation's Airports

The ARTS IIIE provides the baseline architecture for "Common ARTS," a system scaled to meet the processing and display requirements for all of the nation's terminal areas. Common ARTS provides a modular solution with the same proven hardware and software designs that are adaptable to the full range of air traffic control requirements in low, medium, and high density traffic management areas.

Loral and the FAA are currently upgrading the ARTS IIIE system to the Common ARTS baseline that will support all of the ARTS IIIE sites, and replace the existing ARTS IIA processing subsystems with modern commercial-off-the-shelf (COTS) hardware and software products. The Common ARTS baseline is also fully capable of providing an upgraded automation system for the nation's ARTS IIIA facilities.

The design of the ARTS IIIE – four independent processing subsystems that communicate via an IEEE 802.3 local area network – and the use of state-of-the-art COTS processors provides significant performance improvements at a fraction of the cost of older systems. The system not only satisfies projected capacity needs at the highest density TRACONs, but also permits the FAA to consolidate the terminal airspace at the metroplex control facilities, delivers new functionality, and significantly reduces NAS operational support costs.

The ARTS IIIE system architecture includes Track Processing, Common Processing, System Monitoring, and Display Processing subsystems.

The **Track Processing** subsystem provides the interface to all ATC surveillance subsystems in the FAA's inventory and performs the tracking functions for the system.

ARTS IIIE offers controllers increased margins of safety at the world's busiest airports.

Capabilities	ARTS IIA	ARTS IIIA	ARTS IIIE (NY TRACON)	Common ARTS
Sensors	1-2	1-3	5	>15
Displays	11	25	52	>225
Tracks	256	1050	2800	>10,000

ARTS IIIE represents a significant expansion of ATC system capabilities.

The **Common Processing** subsystem provides the interface to the ARTCC and performs conflict alert, minimum safe altitude warning, interfacility, and system keyboard processing. The Common Processing subsystem also provides the automated altimeter and traffic management interfaces.

The **System Monitoring** subsystem with its user-friendly graphical user interface (GUI), performs all monitoring and control functions as well as data recording for the system. This subsystem includes the processors, mass storage devices, and printers necessary to support on-line and off-line maintenance.

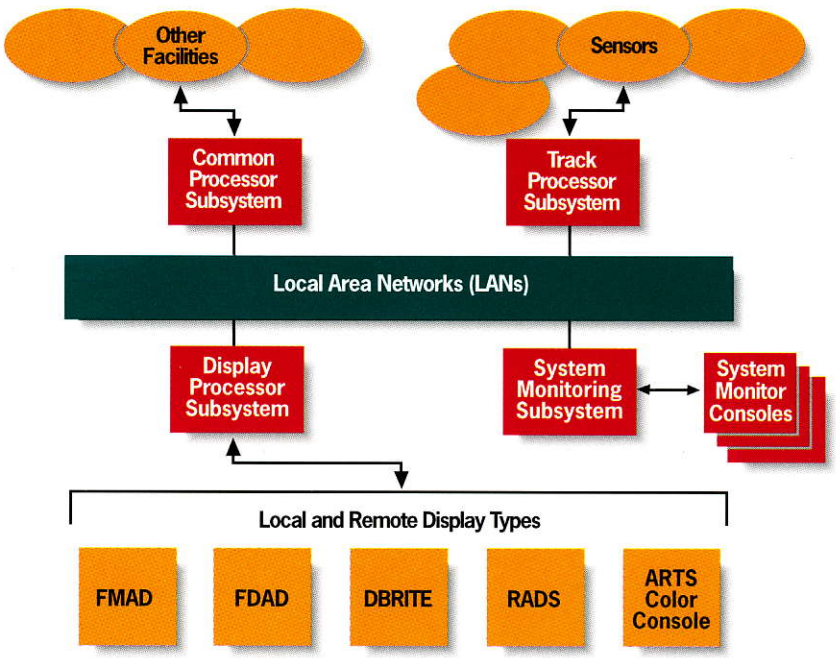
The **Display Processing** subsystem includes ATC controller displays in the TRACON and at local and remote towers. The ARTS IIIE currently interfaces with the Full Digital ARTS displays in the TRACON and to local and remote configurations of the DBRITE in the towers. For Common ARTS, the Display Processing subsystem is improved to interface with the ARTS IIA display subsystem. ARTS IIIE also interfaces with the new ARTS Color Console.

All four subsystems are connected via four IEEE 802.3 LANs configured for redundant operational and maintenance network trunks. The distributed processing architecture provides for improved system availability and maintainability.

Comprehensive Terminal Control and Processing Functions

The ARTS IIIE automation system provides a full set of terminal control functions including:

- Radar and beacon tracking
- Interface to long- and short-range radars
- Minimum safe altitude warning
- Conflict alert and Mode C intruder
- TRACON display and data entry
- Tower display and data entry
- Real-time quality control
- Interfacility communications
- Automated flight plan association
- Data recording and playback
- Simulation
- Automatic system recovery
- Performance monitoring
- Modern site adaptation
- GUI monitoring and control.



ARTS IIIE Technology — New Capacity, Capabilities

Application of modern hardware and software technology provides added capacity, added functionality, improved human interfaces and improved system availability.

Display Types

The Common ARTS system architecture supports a variety of display types in order to ease transition.

Full Digital ARTS Display (FDAD)
- The current display used in ARTS IIIE and many ARTS IIIA sites provides full digital and time share operational modes.

Final Monitor Aid Display (FMAD)
- The 2k x 2k color raster scan display with a state-of-the-art graphics processor provided in an FDAD compatible form factor.

ARTS Color Console
- The 2k x 2k color raster display with the form factor chosen for DSR and STARS.

Digital Bright (DBRITE)
- The full digital high brightness display used in local or remote tower cabs.

(RADS)
- The display currently used in the ARTS IIA terminal automation system.

Local Area Network (LAN)

Commercial-off-the-shelf (COTS) local area network provides a communication channel allowing extensive expandability. It is configured to provide extremely high availability.

IEEE 802.3 standard
- 4 redundant data paths
- 2 operational channels
- 2 maintenance channels
- Interchangeability of operational and maintenance channels

- 10 megabits per second per channel
- Simulcast protocol
- Real-time operation
- Guaranteed message delivery
- UDP/IP

Microprocessor-Based Nodes

High-performance standard microprocessors provide needed processing and reserves. Easy future technology insertion.

- Standard VME-bus architecture
- MC 680X0 processor family compatibility

- 32-bit addressing
- 32-bit data processing

ARTS IIIE Software

Field-proven software provides for high availability and ease of transition.

- Designed and developed to DOD-STD-2167A C language

- Expanded system capacities
- Expanded system functions

Real-Time Distributed System Architecture

Functional distributed architecture allows automated recovery and expansion.

- Track processing subsystem
- Common processing subsystem
- Display processing subsystem

- System monitor console (SMC) subsystem
- Subsystem interface LAN

System Monitor Console Subsystem

New system monitor nodes and consoles provide real-time system status information, improved human interface for configuration control and improved continuous data recording capabilities.

- Graphical user interface
- Microprocessor nodes

- Modern mass storage devices for recording
- WWV-B external time reference provided

System Operating Modes

Four levels of operating capability maximize automation support during equipment outages.

- Normal (full system available)
- Fail-safe (redundant hardware used to maintain full operational capability)

- Backup (direct tracking to display capabilities)
- Broadband (radar analog video display only)

LORAL
Air Traffic Control

Loral
Air Traffic Control
P.O. Box 64525
St. Paul, MN 55164-0525
(612) 456-7767

4000100 9/95