Aircraft Flight Track and Noise Data Collection

Los Angeles World Airports

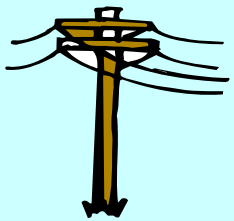
Environmental Management Division

Noise Management Section

October 2000

Data Collection and Processing

LAX



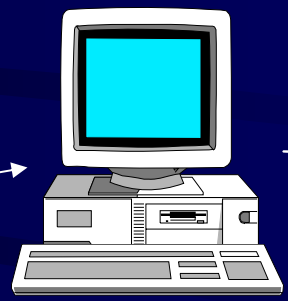
- 25 Noise Monitoring Stations
- Weather Monitoring Stations
- Integrated Audio Recorder

FAA

ACES & ARTS Flight Track data in San Diego (7 nm and 30 nm radar coverage)

Data automatically transmitted and stored

LAX NOMAD SYSTEM



Noise data correlated with flight track data

Tool to Query and Display Flight Track and Noise Data

Reports

Data Loaded

Oracle Database

Origin of Radar Signal

- FAA ASR-9 radar at each airport (two sensors at LAX) sends out radar interrogations and detects radar returns from all aircraft.
- ASR-9 data is collected in real-time by the FAA ARTS computer.
- ASR-9 determines the range and bearing of the aircraft based on the radar return, and receives altitude (as sensed by the aircraft's altimeter) and transponder code from the aircraft.

Origin of Flight Identification

- FAA central computers collect flight plan information filed by airlines/pilots, and package this in an interfacility message (IFM) sent to the ARTS computer.
- IFM contains assigned transponder code, aircraft identification, aircraft type, scheduled time of operation, and other information.

ARTS Merges Data Streams

- By matching transponder codes, the ARTS computer in San Diego merges the ASR-9 aircraft positional data with the IFM aircraft informational data.
- ARTS data is displayed for Air Traffic Control personnel in maintaining safe and efficient flight operations.
- ARTS data is sent, via LAN, to an ARTS Gateway computer that serves as an access to authorized outside agencies.

ARTS Gateway

- LAWA has a Memorandum of Agreement with the FAA to obtain the ARTS data.
- LAWA computers in San Diego interface directly with the FAA computers in real-time via the ARTS Gateway.

LAWA ARTS Collection

- LAWA Noise Management Section's ARTS Collection and Editing System (ACES) was designed and installed by Dimensions International, Inc.
- A Bulk Collection Subsystem (BCS) in San Diego extracts data directly from the ARTS Gateway and converts polar positional coordinates to Cartesian coordinates (typical for airport noise monitoring systems).

LAWA ARTS Transfer

- A Display and Editing Subsystem (DES) in San Diego
  - gathers data collected by the BCS every day,
  - retains the data for three days (MOA-required aging period),
  - removes certain operations (e.g., military), and
  - filters based on range and altitude.
- The DES calls the Playback Only System (POS) at LAX every night, and sends the releasable data files for three LAWA airports.

Sample Text View of a POS Releasable File

- File includes these fields:
  - Date/Time,
  - Aircraft ID,
  - Transponder code,
  - East-west and north-south distances from radar (in nautical miles),
  - Altitude (in hundreds of feet), and
  - Aircraft type

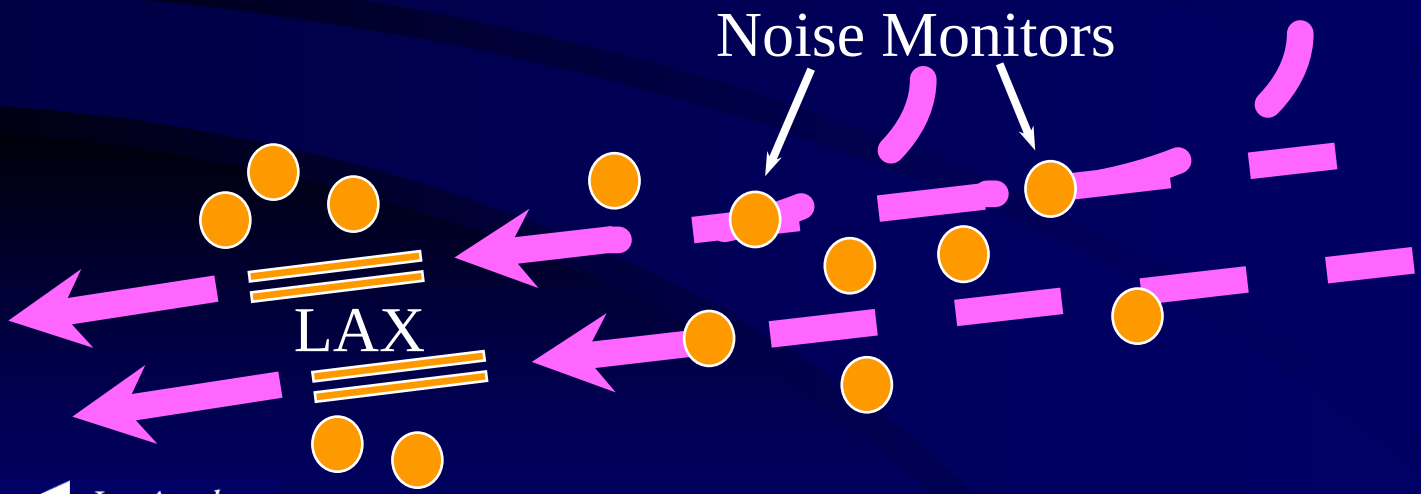
DATE/TIME	ACID	TRANS	"X"	"Y"	"Z"	ACTYPE
1999/091/07:00:00.3	USC727	4643	-0.48	-1.48	39	C310
1999/091/07:00:00.8	NWA338	7245	-2.31	-2.23	17	B752
1999/091/07:00:00.8	SKW7909	4727	-5.1	-1.36	35	E120
1999/091/07:00:01.8	SKW7949	4735	-17.91	7.88	39	E120
1999/091/07:00:01.8	UAL2073	3301	-6.57	2.99	80	B735
1999/091/07:00:02.3		1200	-7	3.09	22	
1999/091/07:00:02.3		1200	-3.63	3.47	26	
1999/091/07:00:02.8		1200	-0.07	11.06	13	
1999/091/07:00:03.4	AWE51	7231	21.51	12.19	193	A320
1999/091/07:00:03.4	NWA651	3665	10.84	4.11	39	B752
1999/091/07:00:03.4	SWA1665	4706	16.54	6.35	69	B737
1999/091/07:00:03.4	LRC690	1074	6.09	2.26	22	A320
1999/091/07:00:03.4	USA9	4152	22.8	8.63	89	B752
1999/091/07:00:03.4	ROA574	4772	1.5	0.3	6	MD80
1999/091/07:00:03.9	KHA35	2614	4.16	0.4	14	LJ25
1999/091/07:00:03.9		4747	0.24	-0.05	1	
1999/091/07:00:03.9		1200	6.45	2.89	6	
1999/091/07:00:03.9	DAL188	7256	22.25	-17.3	149	L101
1999/091/07:00:03.9		1200	10.2	0.25	5	
1999/091/07:00:04.4	SKW493	4746	4.07	-5.81	113	E120
1999/091/07:00:04.4	AAL74	1076	11.51	-15.82	117	DC10
1999/091/07:00:04.4	SKW7950	4745	2.91	-4.38	37	E120
1999/091/07:00:04.4		4734	0.74	-0.9	0	
1999/091/07:00:04.4		5500	13.48	-6.91	5	
1999/091/07:00:04.9		1200	23.7	-10.9	0	
1999/091/07:00:05.4	USC727	4643	-0.69	-1.37	39	C310
1999/091/07:00:05.4	NWA338	7245	-2.44	-2.46	18	B752
1999/091/07:00:05.4	SKW7909	4727	-5.35	-1.39	37	E120
1999/091/07:00:06.4	SKW7949	4735	-18.05	8.02	39	E120
1999/091/07:00:06.4	UAL2073	3301	-6.17	3.02	79	B735

LAWA ARTS Loading

- LAWA's Noise and Operations Monitoring and Analysis Display (NOMAD) software gathers the POS releasable data and loads the ARTS data into a searchable, viewable database.
- Separate LAWA computers are needed to manage "short-range" and "long-range" ARTS data due to the significant volume of data.

Noise Levels are Monitored Every Day

- Los Angeles World Airports has twenty-five noise monitors installed around the airport.
- The noise monitors measure noise 24 hours per day, 365 days per year.
- Noise data is collected by the NOMAD system and is matched to FAA radar data to determine which aircraft made which noise.



Noise Monitoring Station

Noise Data Collection

- NOMAD software contacts each noise monitor via modem, starting at midnight, to download previous day's noise data.
- Site to site noise and ARTS flight track correlation performed.
- Data exported to Oracle Database for report generation.

NOMAD

(Noise and Operations Monitoring and Analysis Display)

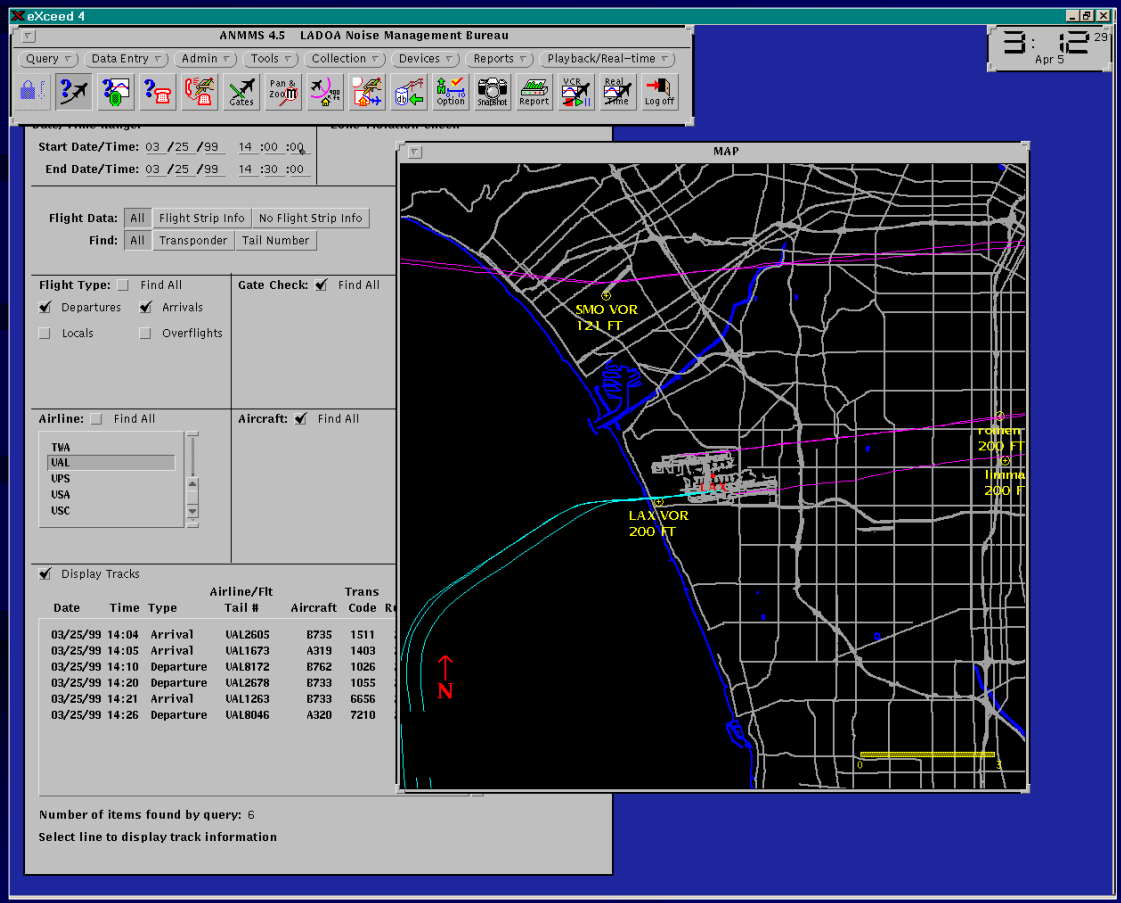
- Access aircraft operations, noise and complaint information
- On-screen review of available data
- User-defined filters for flexibility in analyzing data
- Standardized graphical environment
- Runs on high-speed UNIX workstation and emulated on PC

Data Availability

- Noise Data: 6 months maximum on-line; older data stored on tape--reload if necessary

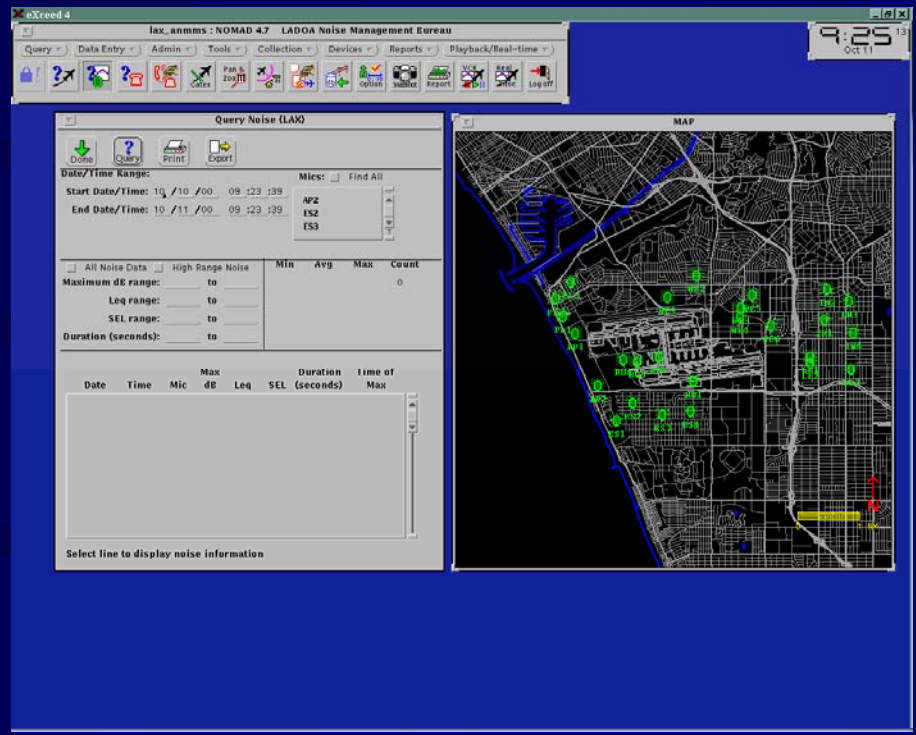
- Flight Data:
  - 7 nm data: 6 months maximum on-line; for older data, only header/ID data exported and stored on tape
  - 30 nm data: 3 months maximum on-line; for older data, only raw ARTS 3E files stored on tape

NOMAD Main Screen



NOMAD Noise Query

- Noise Query allows NOMAD users to search for noise events that meet different criteria:
  - date/time of event
  - all or specific noise monitoring stations
  - all noise data or specific range, duration

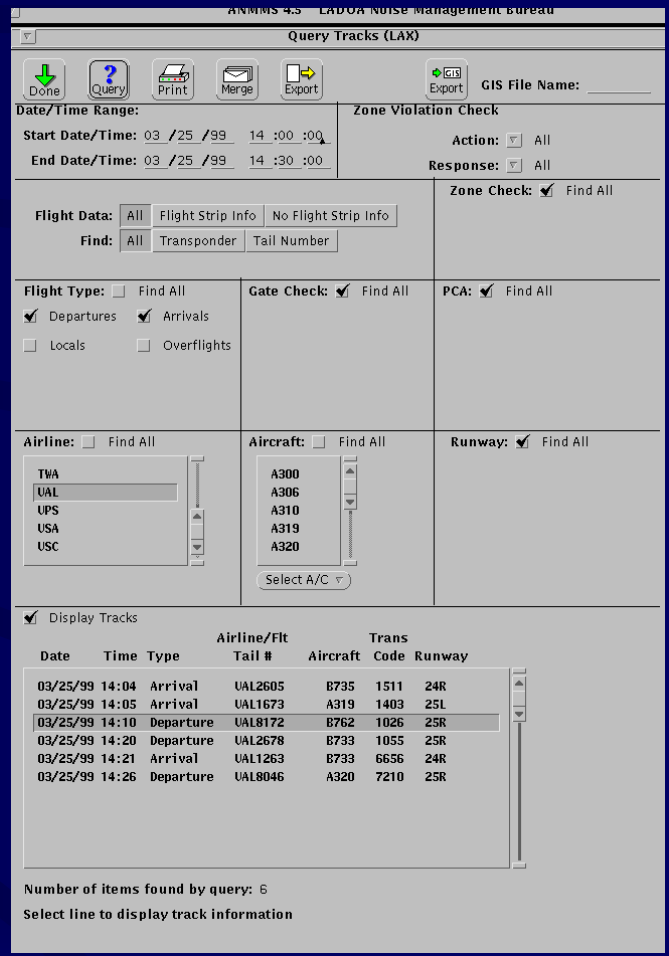


NOMAD Noise Detail

- Noise Detail allows NOMAD users to view detailed information for particular noise events, including associated flights

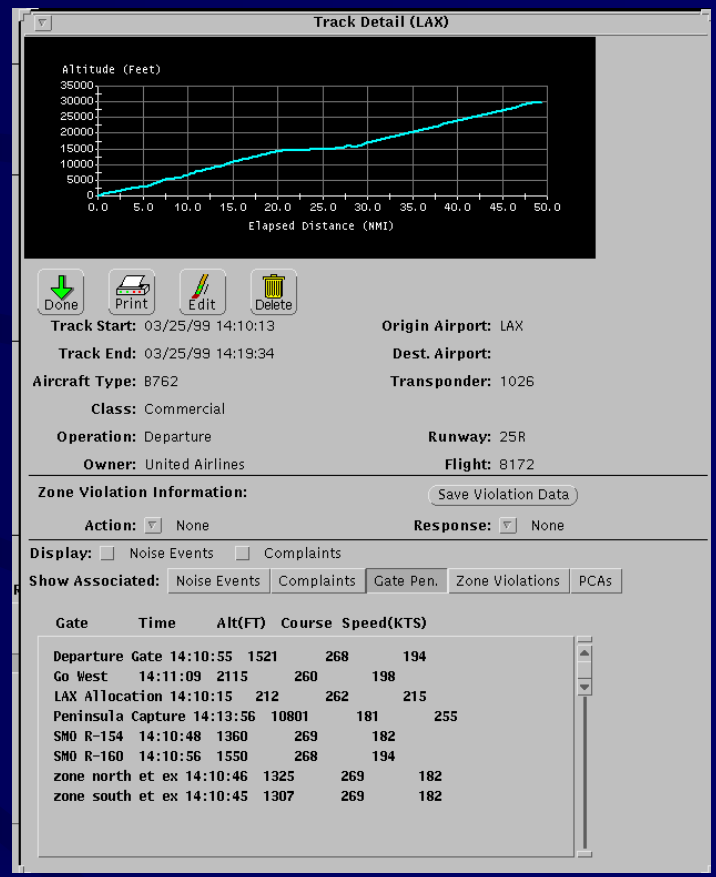
NOMAD Track Query

- Track Query allows NOMAD users to search for flights that meet different criteria:
  - date/time of operation
  - departure/arrival/overflight
  - specific runway(s)
  - gate(s) penetrated
  - specific airline(s)
  - specific aircraft type(s)

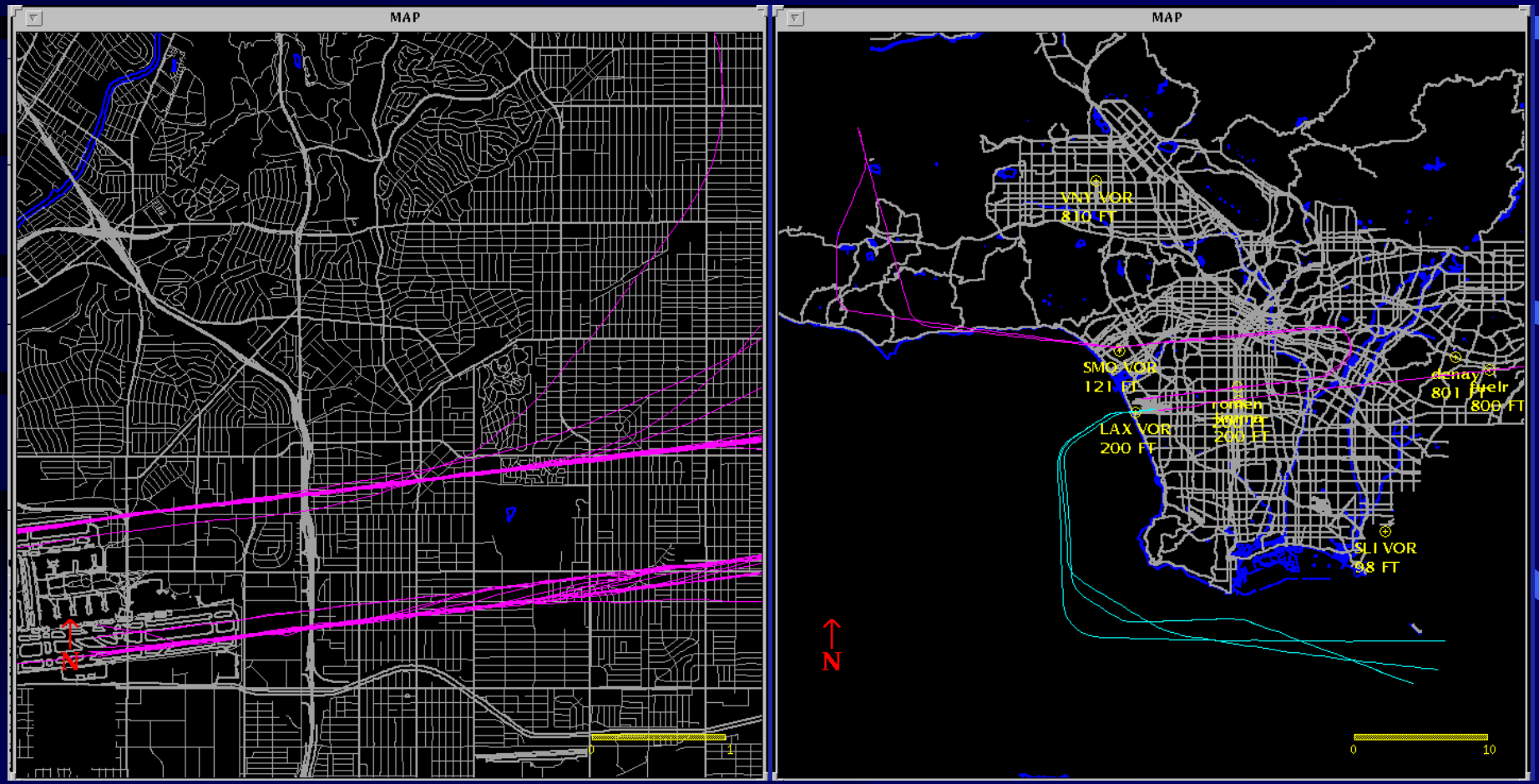


NOMAD Track Detail

- Track Detail allows NOMAD users to view detailed information for particular flights, including altitude profile

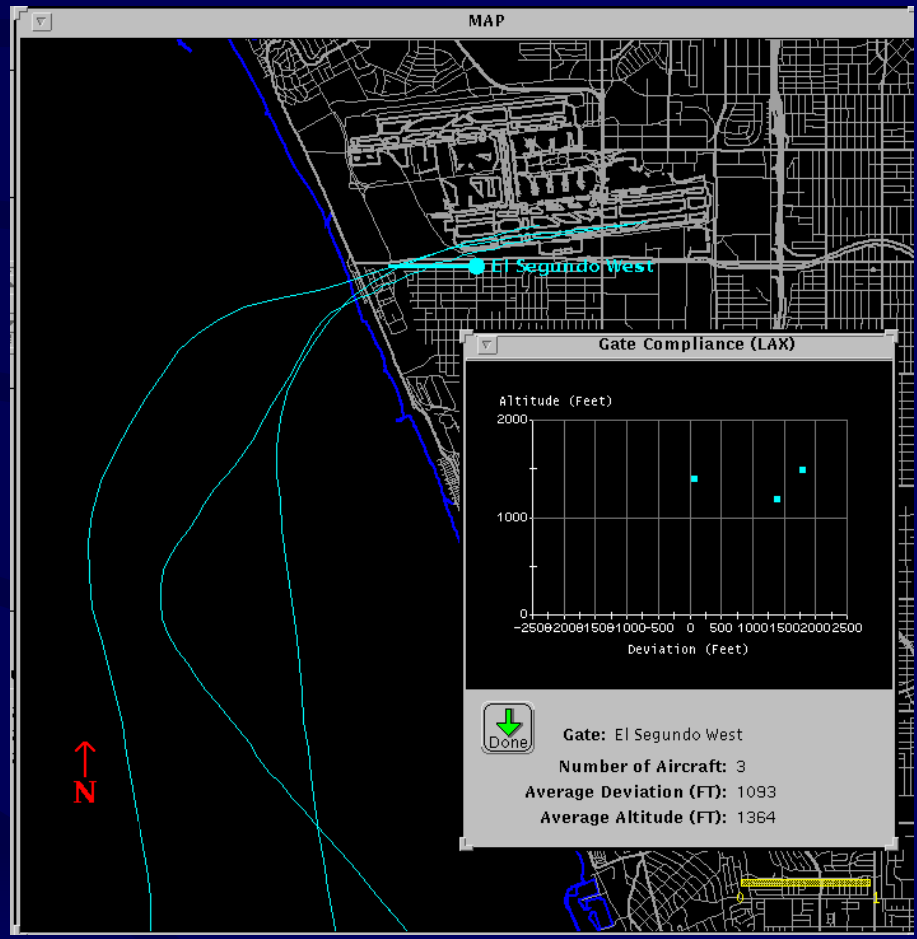


NOMAD Map Display

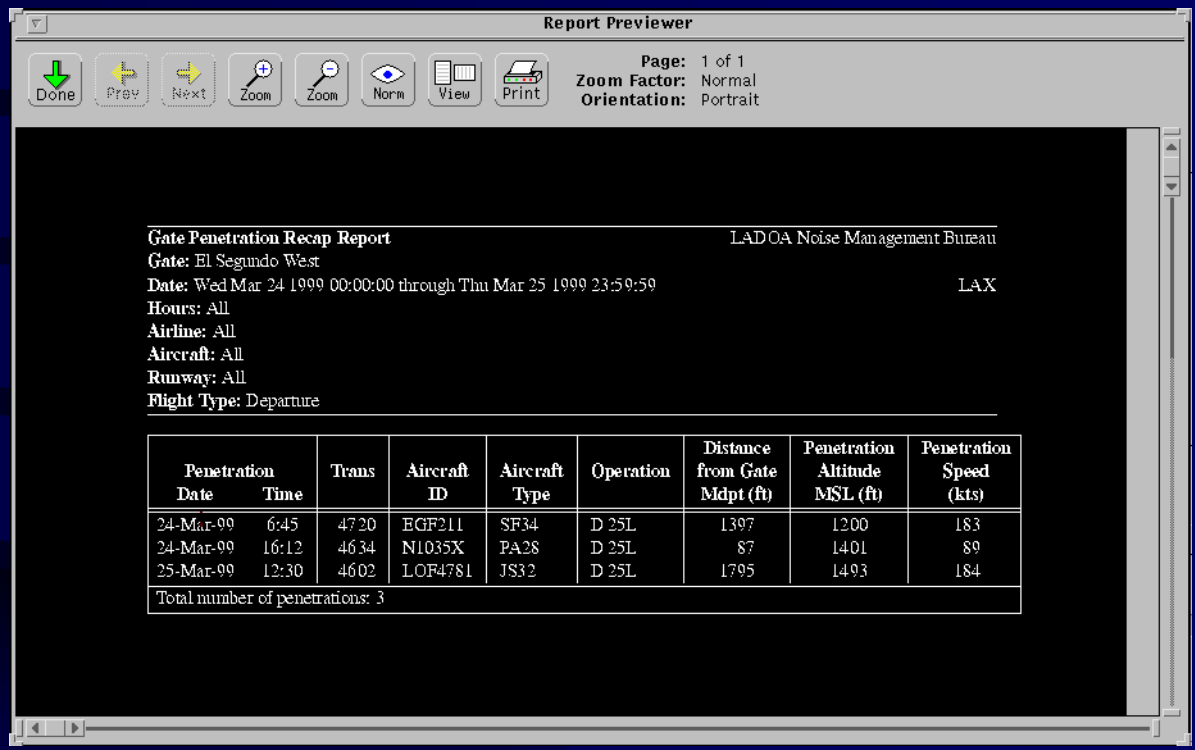


NOMAD Gate Query

- Use of two-dimensional gates allows NOMAD users to detect aircraft flying over particular neighborhoods and/or at a particular altitude



NOMAD Reports

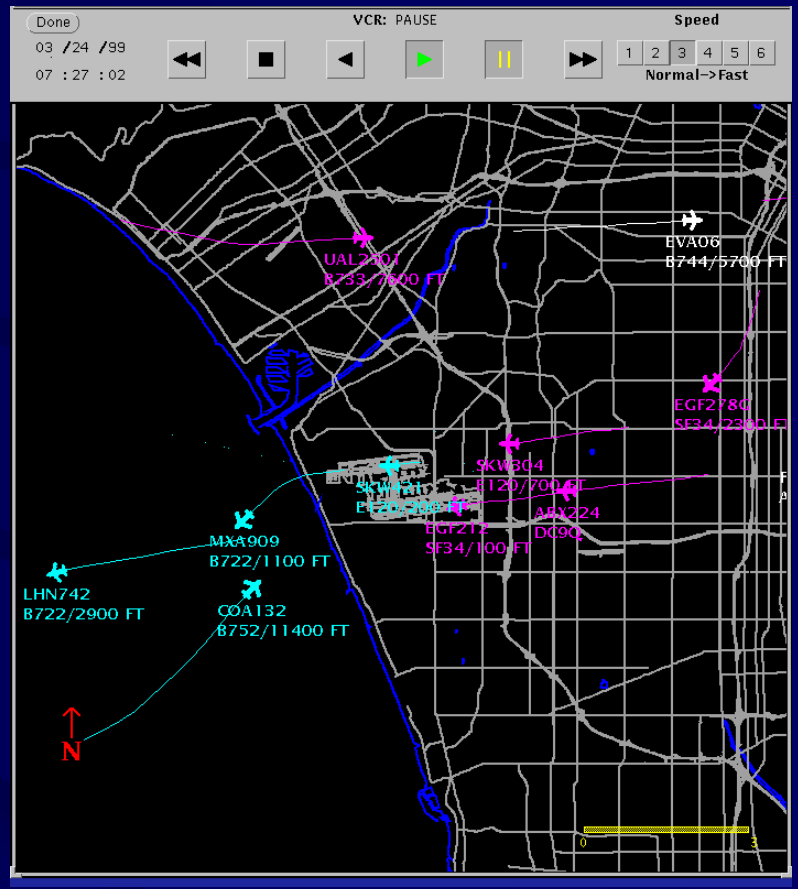


Gate Penetration Recap Report LADOA Noise Management Bureau
Gate: El Segundo West
Date: Wed Mar 24 1999 00:00:00 through Thu Mar 25 1999 23:59:59 LAX
Hours: All
Airline: All
Aircraft: All
Runway: All
Flight Type: Departure

Penetration Date	Time	Trans	Aircraft ID	Aircraft Type	Operation	Distance from Gate Mdpt (ft)	Penetration Altitude MSL (ft)	Penetration Speed (kts)
24-Mar-99	6:45	4720	EGF211	SF34	D 25L	1397	1200	183
24-Mar-99	16:12	4634	N1035X	PA28	D 25L	87	1401	89
25-Mar-99	12:30	4602	LOF4781	JS32	D 25L	1795	1493	184
Total number of penetrations: 3								

NOMAD "VCR" Tool

- VCR-style playback allows NMB to review all previous flight activity at any specific time of day.



Conclusion