NOISE MAPPER

ENVIRONMENTAL NOISE MONITORING SYSTEM

CONTINUOUS SURVEILLANCE WITH REAL TIME DATA

NOISE MAPPER-RT
REMOTE TERMINAL

For continuous monitoring of:

- Urban areas
- Roads, highways, railroad tracks
- Airports and heliports
- Industrial zones
- Civil works

GENERAL DESCRIPTION OF THE NOISE MAPPER SYSTEM

The Noise Mapper System has been designed to monitor the environmental noise or acoustic contamination produced by road traffic in cities and roads, airplanes and railway traffic, or noise produced in construction sites. It applies to the monitoring of any other source of noise disrupting the welfare of the inhabitants.

Geonica, established in 1974, has accumulated a large experience in the design of data acquisition and transmission remote terminals for the monitoring of environmental parameters.

This allowed us to develop an advanced environmental noise monitoring system with real-time data transmission, generating dynamic noise maps covering areas of interest.

The Noise Mapper Remote Terminal–RT acquires, stores and transmits the noise levels and other meteorological parameters of each location to a Central Station where the data is received, processed and displayed.
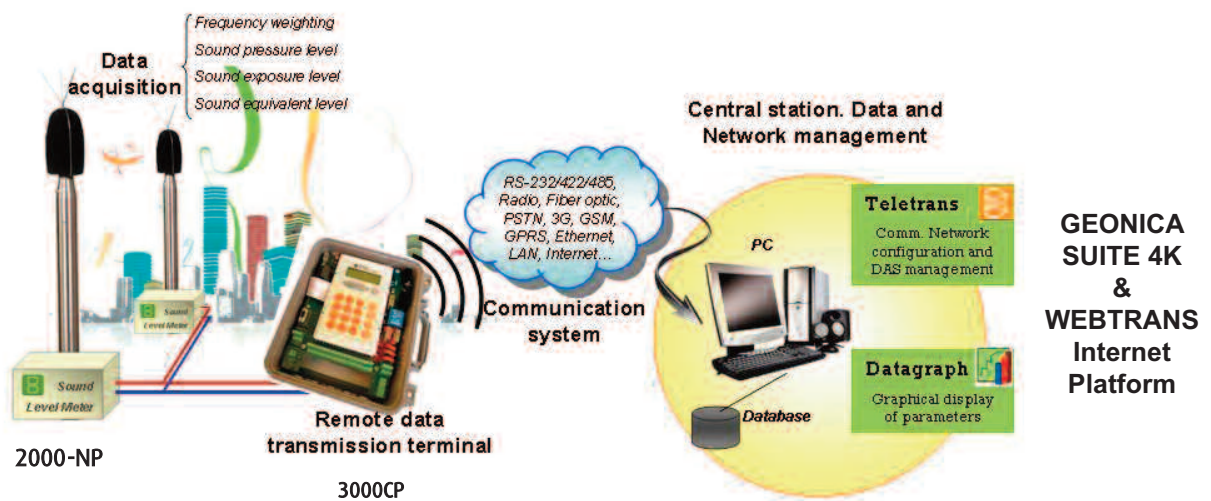
NOISE MAPPER REMOTE TERMINAL-RT DESCRIPTION

The Noise Mapper Remote Terminal consists of the following elements:

- **Outdoor microphone Models 41AM (0º) or 41CN (90º).** See brochure No 9752 0001
- **Sound Level Processor/Analyzer Model 2000-NP.** See brochure No 9752 0005
- **Data Recording and Transmission Unit Model 3000CP**

SOUND LEVEL PROCESSOR/ANALYZER MODEL 2000-NP DESCRIPTION

- Class 1. IEC 61672 Standard
- Frequency range: 10 Hz-20 kHz
- Dynamic span: 117 dB (A)
- Noise Floor: < 18 dB (A)
- Resolution: 0.1 dB (A)
- Operating temperature range: -40ºC to +60ºC
- Humidity: up to 100% RH
- IP67 (NEMA 6) protection (Terminal enclosure)
- Electromagnetic compatibility compliance 89/336/EEC
- Protected against electromagnetic discharges.

Automatic calbration. The system is equipped with a built-in electrostatic actuator to enable rapid calibration checks in-situ. It checks the entire data stream from the microphone membrane to the telemetry data transmission.

Calibration is performed on daily basis activated with routine received from the central station. Routine can be manually triggered or scheduled by the user.

The processor/analyzer includes an extra diagnosis function for troubleshooting purposes to identify the malfunctioning element in case of failure. If the actuator auto-check function doesn't behave correctly, the troubleshooting function provides a report of the status of each of the system components, including the actuator. The function can be activated locally at the 2000-NP.

The user can select a threshold for the noise level. Noise levels above the configured threshold will trigger the corresponding alarm.

With the below acoustic parameters, frequency and time weighting levels, the analyzer provides the following magnitudes, more than enough to study noise behavior:

- L_{AF} (F. Weig. A, Fast)
- L_{AS} (F. Weig. A, Slow)
- L_{Aeq} (F. Weig. A, Equivalent)
- L_{AFmax}
- L_{ASmax}
- L_{AFmin}
- L_{ASmin}
- L_{ASavg}
- L_{An1} (Percentile 1, F. Weig. A)
- L_{An2} (Percentile 2, F. Weig. A)
- L_{An3} (Percentile 3, F. Weig. A)
- L_{CF}
- L_{CS}
- L_{Ceq}
- L_{CFmax}
- L_{CSmax}
- L_{CFmin}
- L_{CSmin}
- L_{Cpeak}
- L_{Cn1} (Percentile 1, F. Weig. C)
- L_{Cn2} (Percentile 2, F. Weig. C)
- L_{Cn3} (Percentile 3, F. Weig. C)

It is also possible to select only the levels of interest, however it is recommended to receive at least Leq, Lmax, frequency weighting "A" and "C" and time weighting SLOW and FAST.

Sampling Rate (independent for each channel): Short L_{eq} time history user selectable from 125ms, 1s, 2s, 10s, etc. L_{eq}, L_{max}, L_{dn}, L_n, L_{peak} and LA/LC periods adjustable between 1 minute and 1 hour.

Additionally to these parameters, at Central Station other parameters are calculated, stored in a database and displayed. See Central Station for the detailed list of parameters.

Data transmission is done in parallel with data acquisition and processing. Nevertheless, since the system is multifunction, there is no interference between the two of them.

GEONICA provides an optional functionality of data storage with a 2GB SD removable memory card. The 2GB card is capable of **storing 1Hz raw data for up to 5 months**. The data can be downloaded anytime upon request. **Note:** 2GB (binary) is 8GB ASCII equivalent.
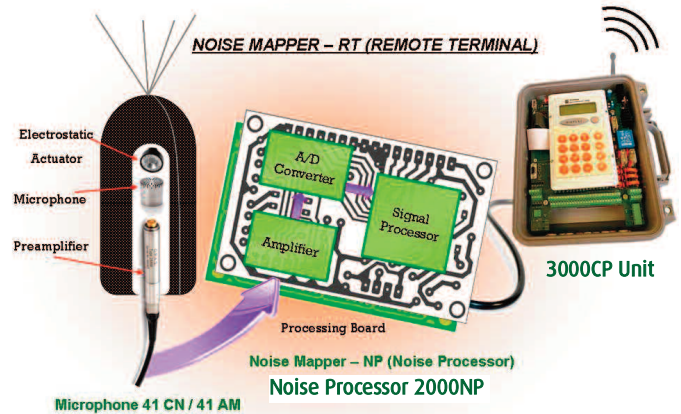
DATA ACQUISITION AND TRANSMISSION UNIT MODEL 3000CP

The third main component of the remote terminal Noise Mapper RT is the Data Acquisition and Transmission Unit Model 3000CP.

The unit is connected to the 2000-NP through a RS232 or RS485 port. Bus 485 allows connecting one or two 2000-NP units to a single 3000CP unit. In this way the storage capacity and communications to the Central Station are optimized. RS485 port allows cable length up to 1200m.

Noise Processor 2000-NP can be mounted externally or inside 3000C Unit.

3000CP Unit main features are summarized below:

Communication ports (4 basic and up to 6 optional):
- **Com 1:** General purpose RS232 serial port
- **Com 2:** Serial port exclusively for development
- **Com 3:** General purpose, programmable RS232/ RS422/RS485 serial port
- **Com 4:** Serial port for connection to modems GSM, GPRS, PSTN, etc.
- **Com 5/6:** Additional optional serial ports for RS232/RS422/RS485/UART/SDI12/ Ethernet 10/100 Mbit/s

Internal Clock Accuracy
±60 seconds/month. Optional ±12 seconds/month

Logic channels   24

Storage memory
- 64 MB internal memory.
- Optionally, 2GB SD removable card (8GB ASCII equiv.)

Inputs and Outputs
- **8** analog differential inputs for (optional) meteorological sensors with analog output. Resolution 20 bit A/D converter.
- **4** digital inputs of 16 bits for frequency or impulsive signal (pluviometer, anemometer, etc).
- **2** opto-relay input with 4000V galvanic isolation (e.g. tamper switch signal).
- **2** opto-relay output with 4000V galvanic isolation.
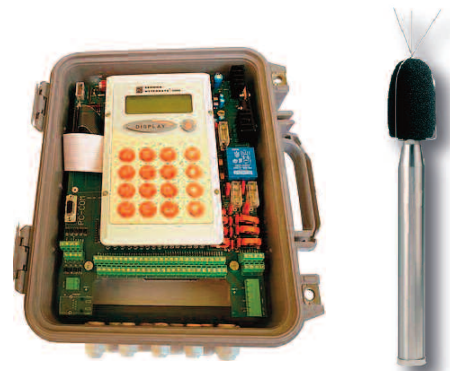
Such flexibility on the communication ports, inputs and outputs and memory capacity allows the system to be connected to a large number of different sensors like wind, temperature, humidity, etc, and also vehicle counters or digital cameras for image acquisition and transmission.

Depending on the user requirements, Unit 3000CP is capable of transmitting the data to the central facility in either way.

All information coming from the Noise analyzer, but also data from other sensors if any, are stored in the 3000CP unit in configurable time periods of 1, 2, 5, 10, 15, 30 or 60 minutes. This includes statistical data such as average, max and min values for each parameter.

Data transmission options
- Serial port RS232/422/485/USB
- GSM/GPRS/CDMA/3G
- Ethernet/PSTN/Internet
- Radio link
- Fiber optic
- Wi-Fi/Bluetooth
- Satellite (INMARSAT, INSAT, VSAT, etc.)

Display and Keyboard for onsite service & maintenance
High brightness and angle viewing alphanumeric display (LCD) of 4 lines per 20 character, with integrated 18-key membrane keypad mounted on a front internal door.

ENVIRONMENTAL NOISE MONITORING NETWORK WITH DATA AND STILL IMAGES TRANSMISSION IN REAL-TIME
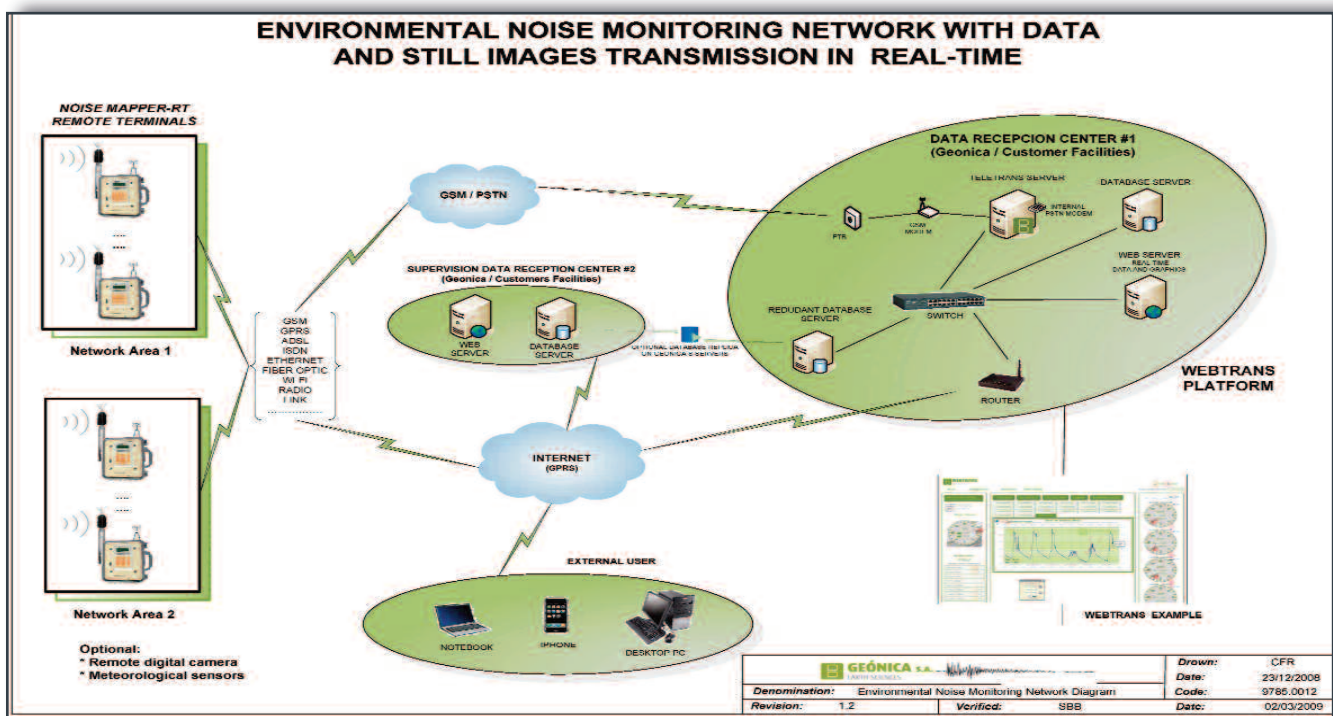
POWER SUPPLY AND BATTERY LIFE

The Noise Mapper -RT (Remote Terminal) consisting on the microphone, analyzer and data acquisition and transmission unit, is supplied with batteries included in the 3000 CP unit. The single PCB (printed circuit board) inside the 3000 CP contains the power supply to be connected to the mains power (100/220V 50-60Hz) or to a solar panel.

Ultra low power consumption of the 3000CP unit **10mA@12V** and of the rest of the components, allows the system to operate with internal 2 x 9 Ah batteries recharging from main power or solar panel giving a high autonomy.

OPTIONAL METEOROLOGICAL SENSORS

Optional meteo sensors can also be connected directly to the MTD-3000C unit, in order to measure air temperature, relative humidity, atmospheric pressure, etc.

REMOTE TERMINAL CABINET

Batteries, charge regulator, communications modem, keyboard and visual display (optional) are all enclosed into the same cabinet, as a totally compact mount.

The data acquisition and transmission unit 3000CP is enclosed into a IP-67 Polypropylene housing (40x33x17cm).

CENTRAL STATION - DATA ANALYSIS AND NETWORK MANAGEMENT

GEONICA SUITE is a set of software programs developed by Geonica for remote station configuration and data management. The software package runs under Windows operating system. Data management goes from data download (locally or remotely) of the remote terminal (Noise Mapper-RT) to historical data display and analysis.

See Brochure No. 9780.0046 for a description of GEONICA SUITE package components.

At Central Station, the following list of acoustic and related parameters are processed, stored in database and displayed:

Lpeak, Lpeak-day, Lpeak-night
Leq A Day, Leq A Night
Leq A Day Min, Leq A Night Min
Leq A Day Max, Leq A Night Max
Leq C Day, Leq C Night
Leq C Day Min, Leq C Night Min
Leq C Day Max, Leq C Night Max
L10, L50, L90
Zone Category (Silence, Residential, Commercial, Industrial)
Longitude, Latitude, Altitude
Battery Average
Remote system Noise Processor self-test and status bits

LAF (F. Weighting A, Fast) Avg. Complete, Instantaneous
LAS (F. Weighting A, Slow) Avg. Complete, Instantaneous
LAeq (F. Weighting A, Equivalent)
LAFmax
LASmax
LAFmin
LASmin
LASavg
LAn1 (Percentile 1, Freq. Weighting A)
LAn2 (Percentile 2, Freq. Weighting A)
LAn3 (Percentile 3, Freq. Weighting A)

LCF Avg. Complete, Instantaneous
LCS Avg. Complete, Instantaneous
LCeq
LCFmax
LCSmax
LCFmin
LCSmin
LCpeak
LCn1 (Percentile 1, Freq. Weighting C)
LCn2 (Percentile 2, Freq. Weighting C)
LCn3 (Percentile 3, Freq. Weighting C)

GEONICA WEBTRANS Internet Platform is a WEB application to manage, query and monitor data collected by Noise Mapper-RT Stations. See Brochure No. 9780.0030 for a description of WEBTRANS.