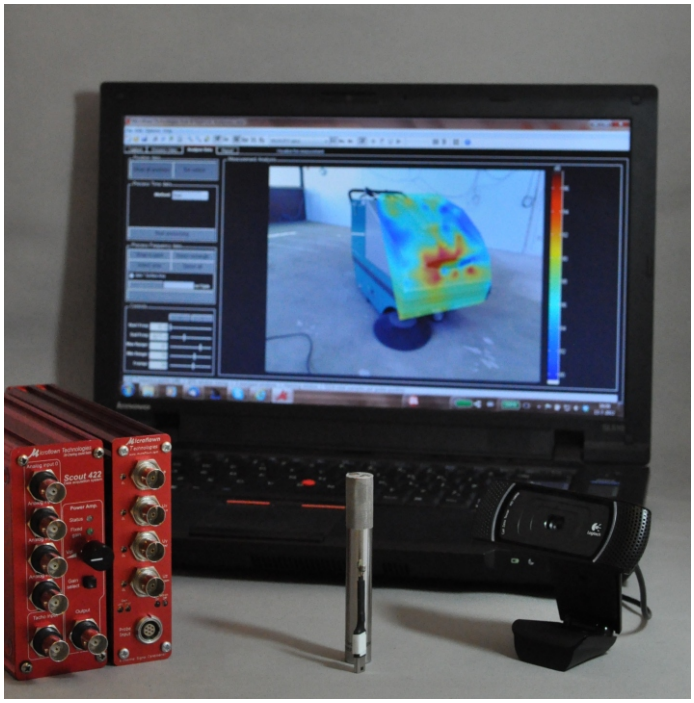
Microflown Technologies

Charting sound fields

Manual

Scan & Paint

V2.0 2013 - 10



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I. Scan & Paint system

Scan & Paint is an easy and straightforward tool to visualize stationary sound fields in broadband frequency range. Its fast and simple setup as well as the easy data acquisition makes S&P a really powerful engineering tool. It makes possible troubleshooting and product benchmarking on the spot, without the need of being in anechoic conditions as Microflown probes are practically not affected by background noise.

A. Typical applications

- Noise source localization
- Competitor analysis and noise benchmarking
- Component noise targeting
- Assembly quality control
- Troubleshooting

II. Compatible Probes

Number of sensors / channels:

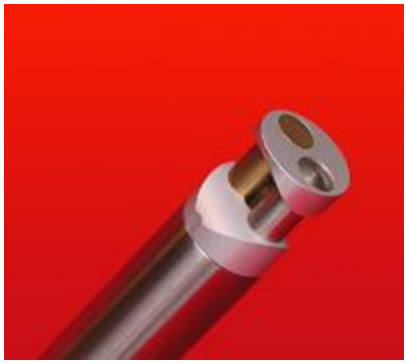
- PU: 1 pressure sensor and 1 particle velocity sensor

Packaging:

- Regular: ½ inch, 90 mm handle. Package gain. Lemo connector
- Mini: ½ inch, 42 mm handle. Package gain. Mini Lemo connector
- Match: 1D - 45 mm length. No package gain. USB connector.

Maximal threshold level:

- Regular



PU regular

PU mini

PU match

III. Components list

- Video camera
- Scan & Paint software
- Scout 422 frontend
- PU probe

IV. Scan & Paint characteristics

Tracking/Localization	• Location detected by color • Automatic in post-process stage • 2D tracking
Object size	• Usable for any element size
Noise Environment	• Stationary noise • No need anechoic conditions • Analyze method allows certain un-stationary.

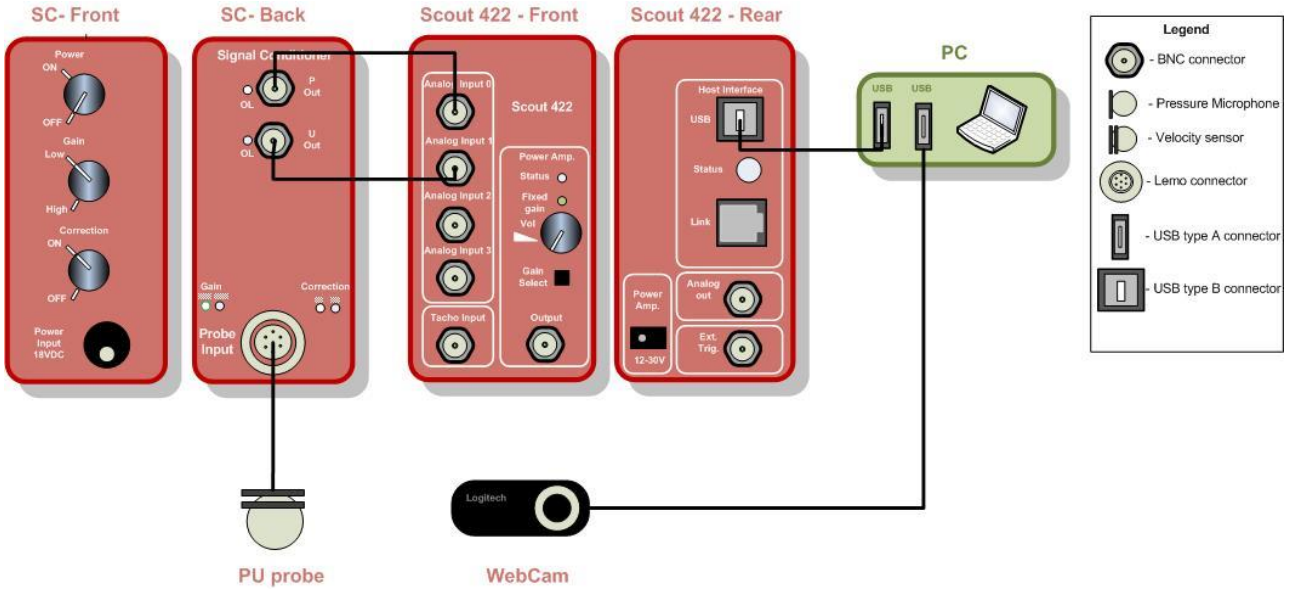
Analysis Capabilities	• Post processing
	• Up to 2 reference sensors (a/p/Q)
	  ○ Phase mapping
	  ○ ODS mapping
	• Extra analyze capabilities (coherence, u, reactivity,+/-)

Representation	• 2 D Picture to overlay • Multi section comparison • Narrow band/ 1/12 oct/ 1/3 oct / oct • P/U(+/-) /I (+/-)/J (+/-) / Lw vs Time & frequency
Reporting Capabilities	• Exportable to MS office • Extended export options (wav, txt) • Report module

V. PC requirements

Operating system	Windows XP,7, 8
Minimum processor	2,4 GHZ duel core Preferable I5 or higher
Memory	4 Gb internal memory or higher
Video card	Preferable NOT: AMD/ATI or GPU
Audio card/Frontend	Scout 422 MFDAQ
USB required	2 ports USB type: 2.0

VI. Cabling and Schematics



VII. System recommendations and limitations

A. System operation

1. Distance probe-measured object

The distance to perform the measurement depends on its objective:

- Sound source localization: 1-5 cm to optimize the SNR.
- Sound source characterization: 5-10 cm for sound intensity to minimize the reactivity error.

2. Recommended scanning speed

The recommended scanning speed is around 5-10 cm /s

B. Frequency limits of the method

- For sound source localization:

The system is recommended to be used for: 40- 10.000 Hz
Particle velocity is the best indicator because velocity is less environment dependent maximizing Signal to Noise Ratio in the vicinity of the noise source

- For source characterization:
  - Particle velocity:40-10.000 Hz
  - Intensity: 400-10.000 Hz
  - Pressure: 40- 10.000 Hz

C. Frequency resolution of the method

The results can be expressed in steps of a **few Hertzs,** it only depends on:

- Analyse parameters: number of FFT points.
- Length of time series and analyse method:
  - Point method: a compromise between frequency and spatial resolution needs to be achieved. If long time series are selected (high frequency resolution) the spatial resolution is reduced.
  - Grid method: the longer time series assigned to each grid cell, the higher frequency resolution. With a bigger grid size the frequency resolution is optimized.

Slower scanning allow obtaining longer time series which lead to higher frequency resolution.

D. Spatial resolution of the method

The spatial resolution of Scan & Paint is really flexible and only depends on the distance camera-measured object. The resolution and the object size can vary from a few mm up to several m. the actual results depend on:

- The Scanning speed: the slower the scan, the more measured points per time unit.
- Video frame rate: the more frames per second selected, the more measured points will be obtained. Above 15 FPS the results will not improve in terms of resolution.
- Distance camera-item: the closer to the object, a bigger number of pixels are used to represent the same are, so higher spatial resolution.

E. Available analyze methods

There are two analyze methods implemented in Scan & Paint, each of them have special characteristics which make them desirable for certain environments or results requirements:

- Point method:
  - Higher spatial resolution
  - Camera projection error minimized
- Grid method:
  - More accurate results
  - More robust against non-stationary noise sources
  - Smoother color maps
  - Faster processing

F. Limitations

- **Camera angle**: the angle between the camera orientation and the measured object can generate an error between the measured real point and its location the colour map.
  To minimize this error: orientate camera with 90 degrees to the measured object
- **Probe offset:** an incorrect setting of the tracked colour mark and the actual measured position (sensor tip) can lead to incorrect measurement points allocation.
  To solve this issue use the “set offset” tool in the post processing stage.
- **Probe handling:** two effects can appear because of incorrect measurement performance:
  - **Probe hitting**: while scanning the object surface if the probe is knocked on the surface a transient deviation will appear in the time signals, possibly leading to a phantom/ghost noise source.

To remove this effect: automatic detection and filtering tools are available on the post-processing stage.

- **Non-constant object-probe distance:** the measurement should be taken at a constant probe-surface distance.

Slight variations of the measurement distance will not influence the result

- **Non-stationary disturbances:** the measured item or noise ambience could be not completely stationary while measuring. This could lead to erroneous results.
  A Power spectrum (Frequency Vs time) plot is available in order to detect and eliminate the time parts where the signal is not completely stationary. Also, the grid method is much less affected by these signal variations as it takes longer time series for the analyses.

G. Airflow effect

The velocity sensor response is affected by airflow being able to stand **up to 2 m/s**. If the probe is overloaded, the results will not be usable.
For wind speeds **above** this value, special **wind caps** manufactured by Microflown technologies can be used to protect the sensor.
These wind protections and the automatic overload detection tool, allow removing the time parts where the signal is not properly acquired and discarded from the results.

VIII. Usage and precautions

A. Usage and operation

- Make sure the probe is correctly oriented and properly fastened so that its orientation is kept constant from free field measurement to material measurement.
- Make sure that hardware and software settings are also kept constant from free field measurement to material measurement.

B. Precautions and not to does

Use parts, connector and power supplies provided with the equipment. WARNING: Do not use the device with any cable or extension cable not supplied by Microflown Technologies.
In case of losing some part please consult with Microflown Technologies before using a similar item.

IX. Technical contact

For any problem or doubt with your equipment, please contact Microflown Technologies Customer service:

- Mail: cs@microflown.com

- Skype: cs.microflown

- Telephone: 0031(0) 88 001 08 11 Monday to Friday, from 9:00 to 17:00 (UTC+1).

X. Warranty policy, repairs and replacements

A. Warranty and replacement or substitution

1. Full warranty (year 1 and 2)

The warranty period starts on the date of the invoice.

During the first two years (24 month) the Seller offers a warranty on all its Products, except for trading items and third party manufactured items. The Seller warrants that all Products will be free from defects in materials and workmanship for this period of two years. During this two years period, the Seller will repair or replace products free of charge. Products damaged by accident, abuse, misuse, natural disaster or by any unauthorized disassembly, repair or modification are not covered by this warranty. The incurred transportation costs of returning the Products to Seller will be borne by the Buyer. The logistical cost for returning the Products back to the Buyer will be borne by the Seller. Several Product come with a "VOID if seal is broken" sticker, the warranty is void at all time when this sticker is broken.

2. Grace period (year 3 and 4)

During the third and fourth year the Seller offers a Grace Period. In the Grace Period the Products purchased at an earlier date can be replaced by completely new state of the art Products of the same scope of the original purchase. This applies only for the Products known as standard probes and signal conditioners. In the first year of the Grace Period, (year 3) customers have an option to replace their products for 25 % of the actual ex works end user price. The full freight and packaging charges apply.

In the second year of the grace period, (year4) customers have an option to replace their products for 50 % of the actual ex works end user price. The full freight and packaging charges apply.

The new products are accompanied by a new warranty. Both the two years warranty and grace period becomes applicable again from the date of invoice.

3. Repairs outside warranty policy

Alternatively two years after the purchase, small repairs might be offered all time against estimated costs to be quoted. Repairs come with six months' warranty with the same condition as the two year warranty