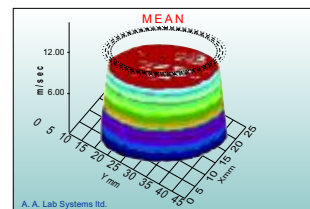
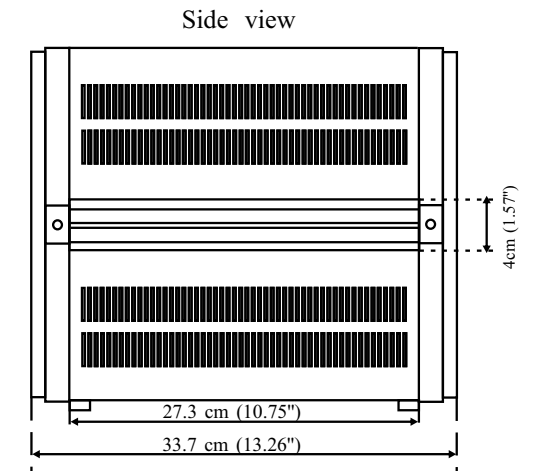
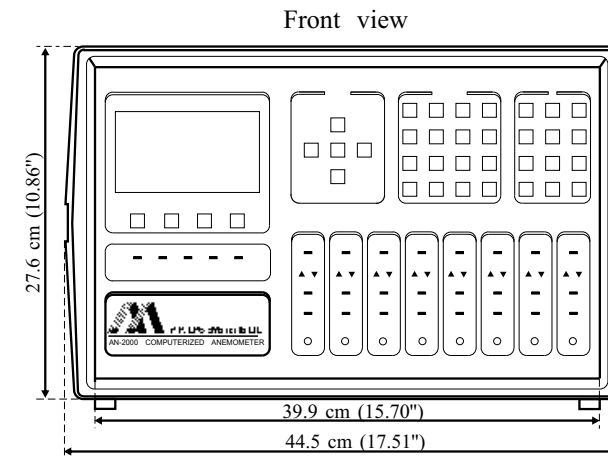


AN-2000

ANEMOMETRY SYSTEM



MAINFRAME DIMENSIONS



OPTIONS

Options allow the user to hand-pick the system he needs on a **channel-by-channel** basis, without having to choose between “all-or-nothing”. It is recommended to consult the factory about your application and the options required for that.

01 - ULTRA LOW NOISE INPUT AMPLIFIER

With 400pV Hz noise density (less than 0.1mV rms output noise on DC-10 kHz bandwidth).

02 - HIGH CURRENT POWER SUPPLY - (mainframe option) -
For operation of up to 8 probes in the high current mode (maximum of 600 mA per probe).

03 - CHANNEL EXPANSION UNIT

A slave unit which increases the AN-2000 capacity by 8 channels. Includes power supply and all necessary cables for connection to a master mainframe.

04 - FREQUENCY COMPENSATION

Extends the frequency response of each channel to 500 kHz. Also available for cable length up to 15m.

05 - CONSTANT CURRENT MODE

Provides C.C.A. mode probe operation in addition to the standard C.T.A. mode. Bridge current - 0.5-50mA.

08 - A/D CONVERTER

A 14 bit resolution A/D converter for each channel with maximum sampling rate of 93 kHz per channel (sampling rate can be changed by software).
Data output: 15 bits, parallel interface .

09 - DIGITAL LINEARIZER

Provides data linearizer (output linear to velocity), installed in each channel, 16 bit resolution. Linearization is digital, with no added noise/offset/drift etc. Option 08 must be selected with this option.

10 - USB2 interface box

A high speed data transfer card for use with option 08 and PC compatible computers. The interface works with any high speed USB2 port, and provides data transfer from the AN-2000 at rates to 480 Mbits/sec
On board FIFO memory buffer for fast data transfers, even with slow computers.

12 - BATTERY OPERATION

For uninterrupted operation. Includes rechargeable battery with built-in charger. Can support system operation for more than two hours without main current.

13 - AN-FLOW SOFTWARE

A complete data acquisition, control and operation software. For DOS, WINDOWS 95/98/XP/7/8 32/64 bit and LABVIEW

14 - SPD 500 DATA TRANSCIEVER UNIT

For transferring the DMA and display data to distances of 5-200m from the host computer.

15 - Additional 1 MB RAM

This option adds more memory to the FIFO buffer of the DMA interface and UP to 8MB total. For High Speed continuous sampling.

16 - CAL-2000 DIGITAL AIR SPEED CALIBRATOR

For calibrating sensors in Air, at 1-70m/Sec. Stand alone instrument with operation software.

17 - ANALOG INPUT CHANNEL

For acquiring external analog signals together with the velocity and temperature provided by other channels.

18 - 160 kHz A/D CONVERTER

For sampling rate of 160 kHz **per channel** (simultaneously).

19 - ULTRA HIGH CURRENT POWER SUPPLY

For driving 8 channels at up to 2 Amp. each. Including modification of bridge ratio to support high current.



Head office: 33 Hayetzira st. Ramat-Gan 52521, ISRAEL, Tel:972-3-5756327/8 Fax:972-3-5756326
U.S.A office: 9 Blossom Drive, Kennett Square, PA19348, Tel:(302)478-2881 Fax:(610)444-5544

www.lab-systems.com; e-mail: sales@lab-systems.com

The Intelligent Solution For Flow Measurement

GRAPHICS DISPLAY

The high resolution dot matrix display provides a detailed and clear interface for communication between the user and the anemometer. The built-in software is controlled by a hierarchical menu system which gives direct access to system functions. At every option the user is assisted by context sensitive help at the touch of a button. Frequency and impulse response plots can be plotted easily and a storage scope can be used to observe measured signals. On all plots and graphs, the cursor keys allow the immediate display of corresponding values measuring time, frequency, voltage etc.

MENU KEYS

The Menu Keys enable varied functions depending on the menu displayed on the screen. The corresponding functions appear above each key providing convenient, flexible and easy operation.

STATUS LIGHT

The status light indicates system status. During remote operation this provides an on line indication of the operation mode.

CURSORS

The general purpose cursor keys allow:

1. Selection of data points on graphs for measurements of amplitude frequency and time.
2. Amendment of the DC offset & gain, or time base & amplitude.
3. Selection of channels and menu options.

CHANNELS

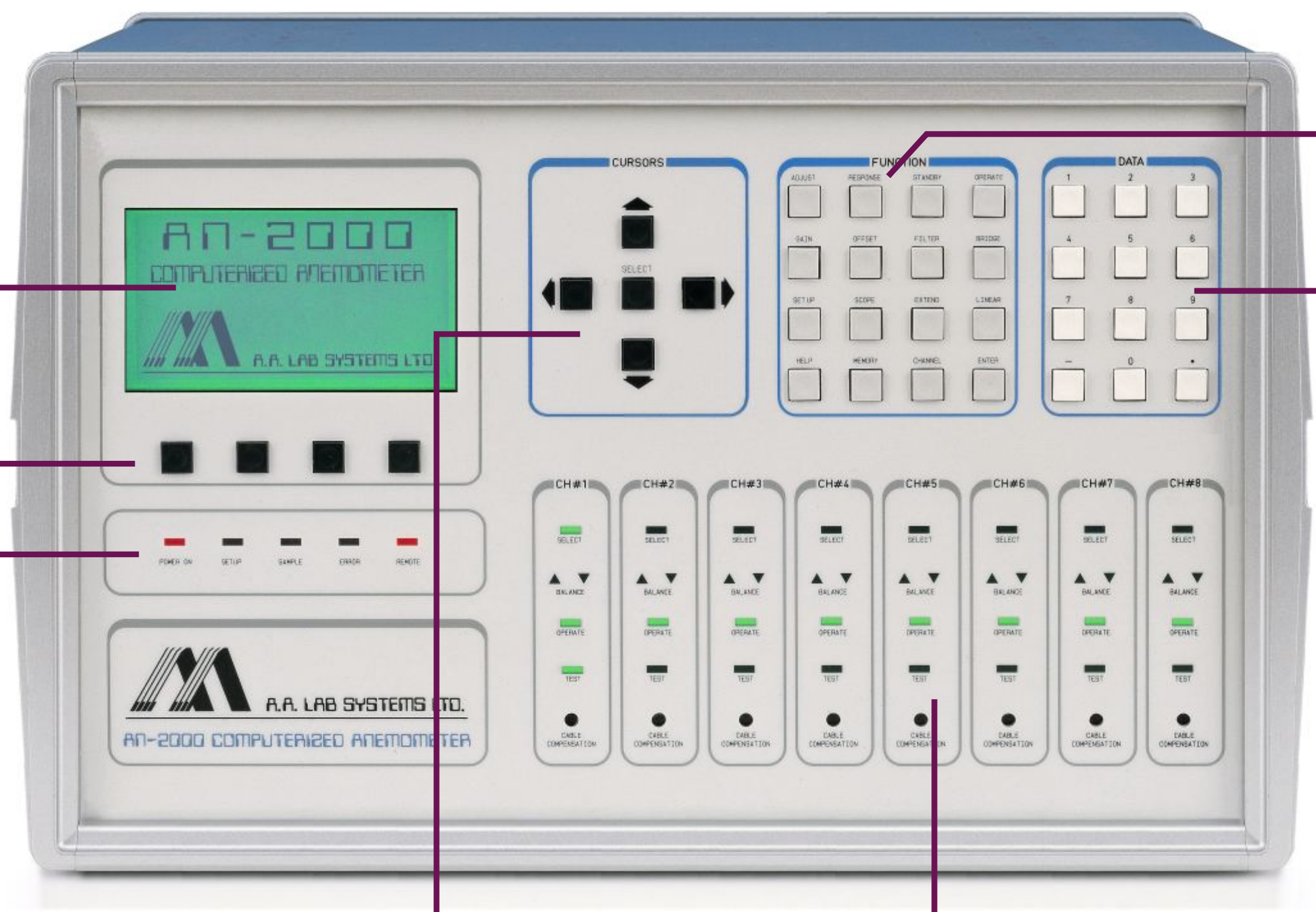
The AN-2000 supports up to 8 channel modules, 16 with the expansion unit. Each module has 4 LED indicators showing channel status: SELECT indicates channel selected; BALANCE indicates bridge balance. The OPERATE light, when on, demonstrates that the probe is operating, off when probe operation is discontinued by the user or the automatic burn-out protection circuit. The CABLE COMPENSATION accommodates cable lengths of 5 to 15meters.

FUNCTION KEYS

16 powerful functions give the user direct access to instrument control by accessing the various options throughout the menu hierarchy. The EXTEND key removes graph axes and provides maximum resolution by extending the view vantage to the whole screen display. The HELP key activates context-sensitive information and operating instructions at every menu screen . The SETUP functions used to select parameters for instrument configuration. All parameters are stored in non-volatile memory and therefore render re-entry of data redundant should power to the anemometer be discontinued. The OPERATE and STANDBY keys help protect the probes by connecting or disconnecting the sensor loop via the soft start protection circuit installed on each channel, preventing probe burn-out by any cause.

NUMERIC KEYPAD

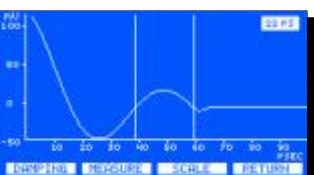
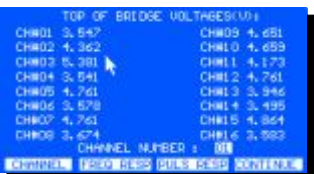
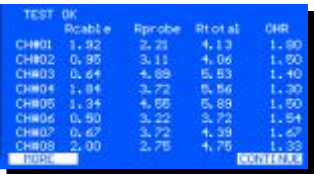
The Numeric Keypad is used for manual input of various data values including: cable & probe resistance, overheat ratios, gain, offset, calibration, graph points, etc. These parameters can also be input from a host computer through the RS-232 standard communication interface and stored in memory.



THE INTELLIGENCE BEHIND THE SOLUTION:

The combination of advanced silicon technology with A. A. Lab Systems experience provides research and industry with the best in fluid measurement instrumentation. This system allows accurate and automatic measurement of any type of fluid flow in gases and liquids using Hot-Wire- or Hot-Film probes.

Unlike other anemometers, the AN-2000 uses a custom integrated, built-in menu system to help automate otherwise tedious procedures, such as bridge-balance, resistance measurement and frequency compensation. The integration of advanced software with a high quality measurement system makes the AN-2000 a complete solution for all your fluid measurement requirements.



CABLE RESISTANCE

The cable resistance is measured automatically by the shorting probe. Values can also be entered manually for probes which cannot be disassembled. Cable resistance ranges from 0.1 to 4 ohms.

PROBE RESISTANCE DISPLAY

The probes resistance is automatically measured for both 1:1 and 1:10 bridges. Net resistance (without cable) is calculated within 0.01 Ohms accuracy and the probe resistance are displayed for inspection. By pressing REPEAT, the user may re-enter or re-measure values.

OVERHEAT RATIO

Overheat Ratios for each channel (or a single ratio for all channels) are entered. The values are stored in a non-volatile memory. The CHECK function runs a logical check of all values and will notify the user of any errors.

TEST OK

Upon successful completion of measurements and analysis, the following values are displayed for each channel: cable and probe resistances, total resistance, and Overheat Ratio.

T.O.B. VOLTAGES

Top of bridge voltages for all channels are measured after probes have been operated.

PULSE RESPONSE

A pulse is transmitted to the bridge and the pulse response of the selected channel is displayed on the screen. The time base, offset, and amplitude can be varied and the response can be measured precisely with the use of the cursor keys. The channel's damping factor can be adjusted while the pulse response is displayed.

GAIN & DC OFFSET

Any number of channels can be selected for calibration of gain and DC offset. Gain & Offset can be configured manually or calculated automatically according to your A/D range.

FILTERING

At any time during measurement, a Fourth Order Butterworth filter can be applied to the probe signal. Any combination of low and high-pass filtering can be selected from a range of filter frequencies.

SCOPE MODE

A built-in digital oscilloscope permits real-time observation of any channel and includes functions for freezing and measuring signal waveforms.

DIGITAL LINEARIZATION

The measured probe signal can be processed in real time using a transform polynomial, producing immediate readings of fluid velocity and temperature. The polynomial is unique for each channel and can be either defined manually, calculated from data points using Least Square Fit, or downloaded from the host computer.

BODE PLOT

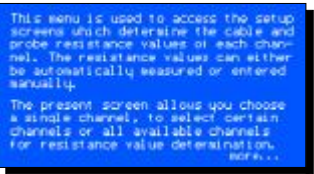
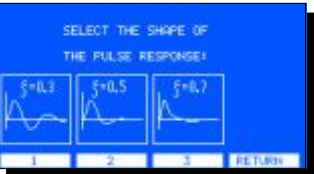
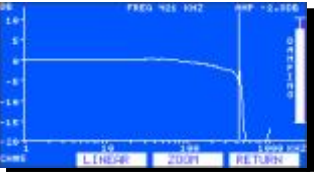
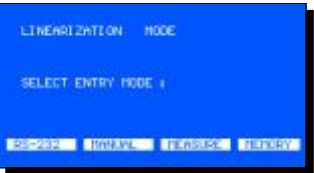
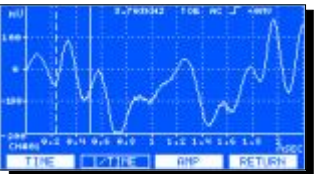
By sending a calibrated Sine Wave to any selected channel, the bridge response can be plotted on the graphic screen using a Lin / Log scale.

AUTOMATIC PULSE RESPONSE

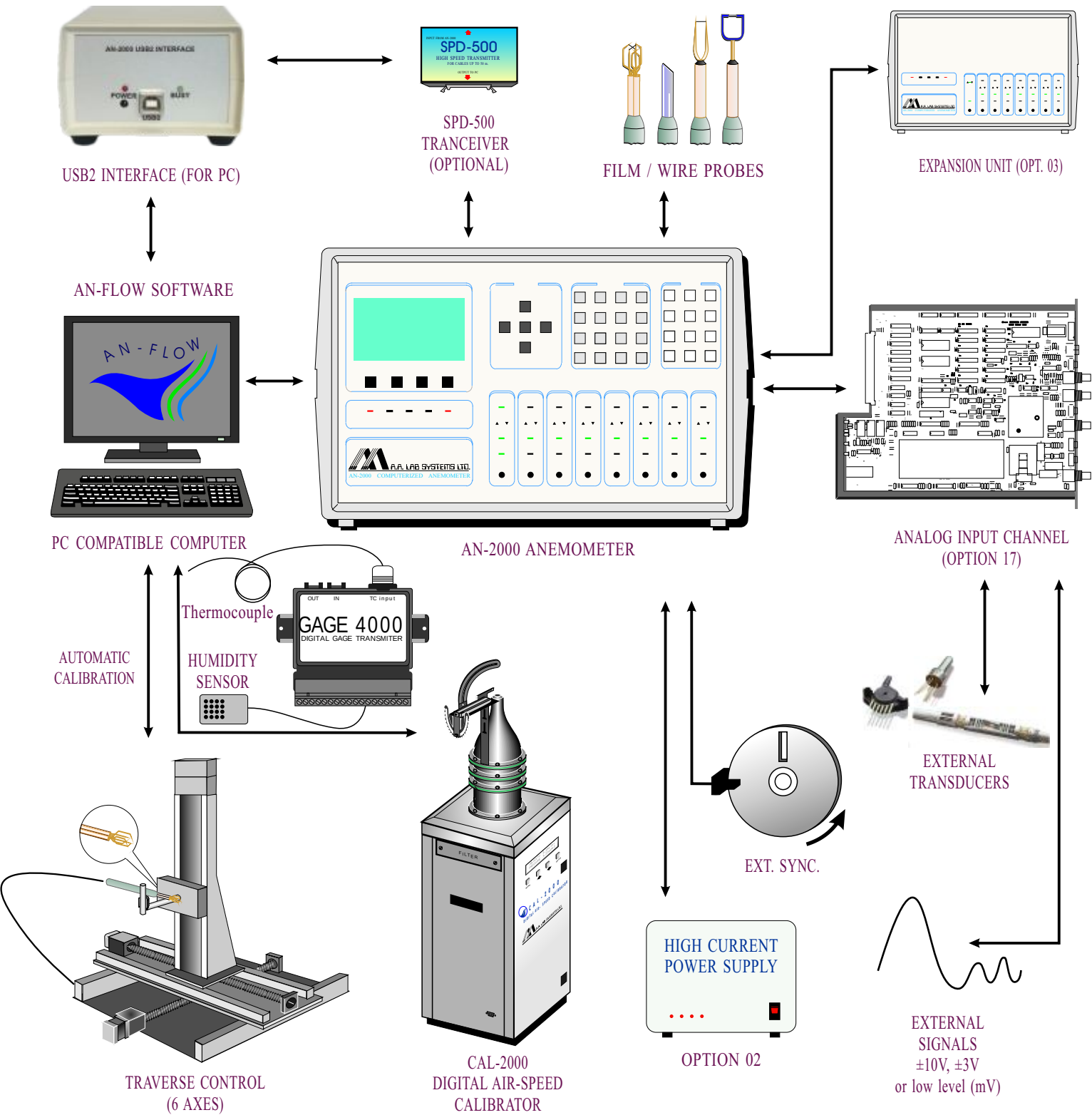
The pulse response of the operated channels can be adjusted automatically within 10 seconds per channel.

ON-LINE HELP

Immediate visual context-sensitive help is available at the touch of a button at any time from any menu screen.



SYSTEM CONFIGURATION:



The AN-2000 can be used with any type of film/wire probe, with up to 8 channels in the mainframe & 8 additional channels in an expansion chassis. Channel types may be CCA/CTA or analog input channels. The USB2 box interfaces between the AN-2000 and any of the PC compatible computers. A high current power supply unit may be added to boost probe current,

(recommended for measurement in water). All hot-wire sensors may be calibrated automatically using the CAL-2000 Digital Air Speed Calibrator. The AN-2000 supports a wide variety of external transducers. In addition, it's PC software is able to control Traverse systems of 6 axes and sample data to the hard disk while moving the Traverse unit.

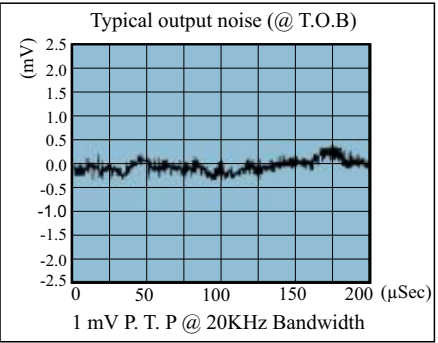
OPTIONS

Up to 20 different options may be added to the basic instrument configuration. Designed for specific research requirements, these options dramatically enhance the standard instrument configuration.

ULTRA LOW NOISE AMPLIFIER

Adapted from the bridge circuitry of the highly successful AN-1003 Anemometer, this high performance, low noise, bridge amplifier has two substantial features not found in any “off the shelf” amplifiers:
1) A very low noise voltage with a spectral density of 400 pico Volts per root of Hertz ($pV/\sqrt{Hz}$) compared to 1500-2000 $pV/\sqrt{Hz}$, found in

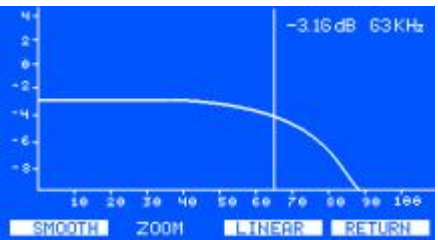
“Low Noise” commercial amplifiers.
2) A very stable input with a very low offset voltage drift, as low as 0.1 V/°C (micro Volt per degree Centigrade) resulting in an ultra low noise CTA anemometer, with almost zero drift. This option provides a precise and accurate Top of Bridge voltage and an excellent Signal-to-Noise ratio.



HIGH FREQUENCY COMPENSATION (Opt.04)

The frequency compensation option consists of both hardware and software that enable the user to adjust the sensor, to get the widest, flattest frequency response possible. This exhibits the response of the CTA bridge to a Sine Wave input into the bridge itself (after attenuation).

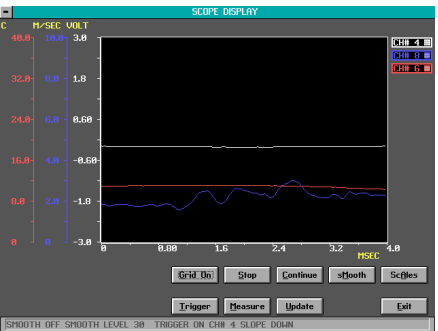
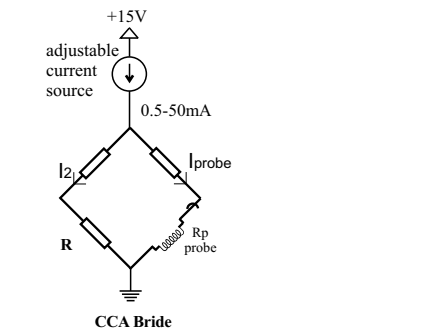
This Sine Wave input simulates a change in the heating/cooling of the sensor and it's response will be relative to the low frequency response (1 kHz in our case). The response test can be repeated as often as required while the user adjusts the Cable Compensation circuit and the Damping control simultaneously.



CONSTANT CURRENT ANEMOMETER (Opt.05)

The CCA bridge is usually used for rapidly varying temperature measurements. Unlike Thermistors or Thermocouples, which have a high heat capacity, large volume and slow response, the CCA circuit measures temperature fluctuations at frequencies of 2 kHz and higher, with accuracy better than 0.1°C. The sensor wire's diameter may be 2

microns or even less.
The Temperature to Voltage ratio of the CCA circuit is linear and temperatures of up to 800°C can be measured. The temperature of the CCA channel can be displayed or saved to a file in addition to the velocity information, allowing the user to make temperature compensation to the velocity measurements.

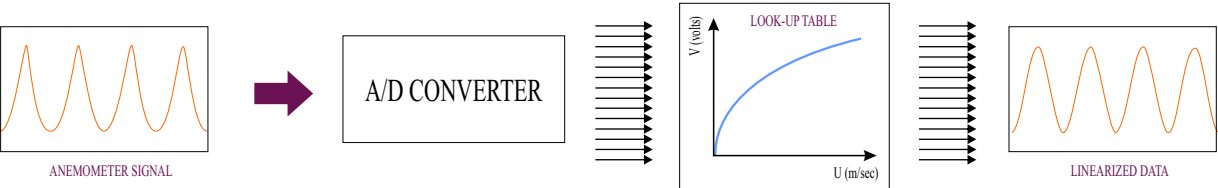


DIGITAL LINEARIZATION (Opt.09)

Specialized firmware, custom designed, is incorporated into the AN-2000. It supports the hardware in each channel as well as software for calibration and measurement in the PC, enabling sampled signals to be converted into digital linearized data and subsequently transferred, in real time, to the PC.

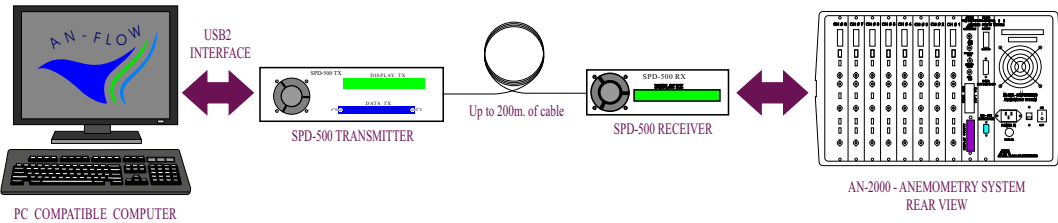
This feature allows user to “see” the velocity and temperature fluctuations on the PC’s screen, comprise correlations and spectrums, and store them on the hard disk in engineering units. This form of digital linearization, which is carried out at 70nSec, uses a high resolution lookup table which is formed digitally.

The noise, drift and time consumption characteristic of analog linearizes and standard A/D cards are eradicated. These unique properties endow the AN-2000 linearizer with a level of accuracy and reliability not attained by any other method of calibration.



SPD-500 DATA TRANSCIEVER UNIT (Opt.14)

The SPD-500 Data Transceiver consists of two separate units which can transmit and receive digital data at high speeds over a distance of 600ft. (200m.), using standard twisted-pair ribbon cable. These transceivers relay the data, and the graphic display generated by the AN-2000 to the remote PC.



CAL-2000 DIGITAL AIR SPEED CALIBRATOR

- ▶ RS-232 serial interface
- ▶ High accuracy to 0.5% of F.S.
- ▶ Stable air velocity
- ▶ Environmental monitoring of barometric pressure, humidity, differential pressure, temperature.
- ▶ Auto-Velocity sweep function for fast and immediate calibration.

motor velocity or read each one of the 4 built-in environmental sensors in engineering units.

The CAL-2000 unit features a uniform flow rate, according to user control via RS-232/USB port.

The CAL-2000 unit is a complete stand-alone system supplied with setup and control software for PC compatible computers. The AN-FLOW software interfaces directly with the CAL-2000 for automatic, on-line calibration.

The CAL-2000 is a high-precision digital air speed calibration system designed especially for the calibration of Hot-wire and Hot-film sensors. It’s powerful motor generates air velocities of 1 to 70 m. per second over varying temperature, humidity and barometric conditions.

The user may also send a requested

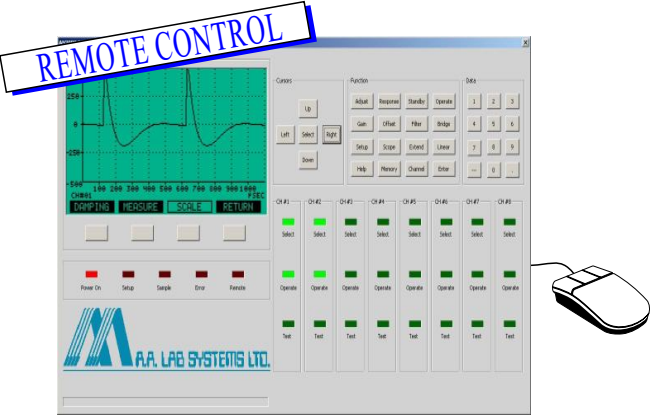
This complex block contains three elements. At the top, a digital display shows 'VELOCITY: 8.28m/Sec' and 'PRESSURE: 3.22mmH2O'. Below this is a screenshot of the 'CALIBRATION' software interface, which includes fields for 'VELOCITY', 'PRESSURE', 'HUMIDITY', and 'TEMPERATURE'. At the bottom is a photograph of the CAL-2000 unit, a black, cone-shaped device with a motor and a sensor. To the right of the photograph is a graph showing a calibration curve with data points and a fitted line.

ANFLOW SOFTWARE

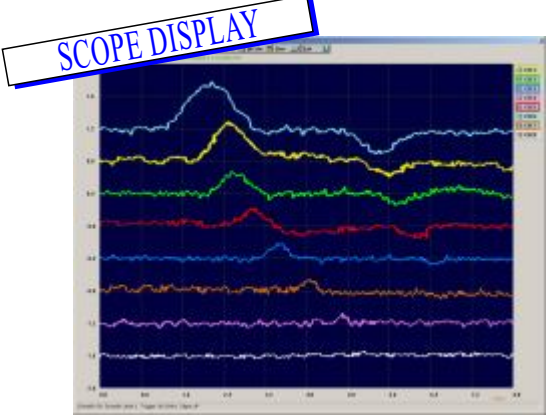
The AN-FLOW software program provides a multi-function PC based interface to the AN-2000 in addition to remote access and operation of the anemometer, AN-FLOW enables the real time display of data sampled by the

channels being operated, application of the built-in functions on that data (such as Fourier decomposition), data smoothing and statistical functions and data acquisition. The graphical user interface provides intuitive access

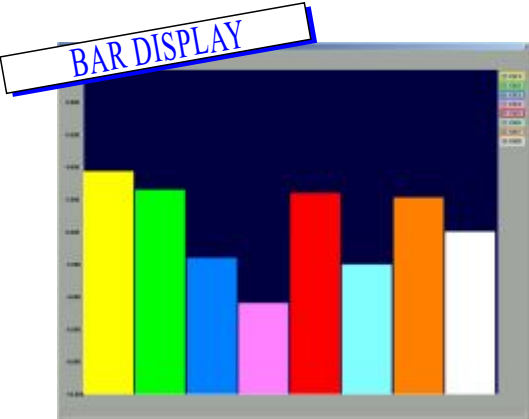
and user friendly operation of all functions with either keyboard or mouse.



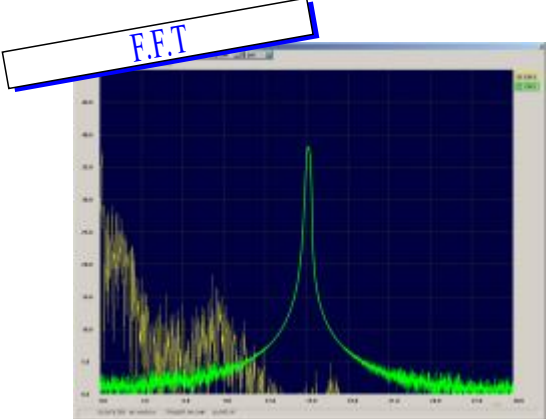
Remote control operation software provides full control over the instrument, including setup functions, bridge balancing, signal conditioning etc.



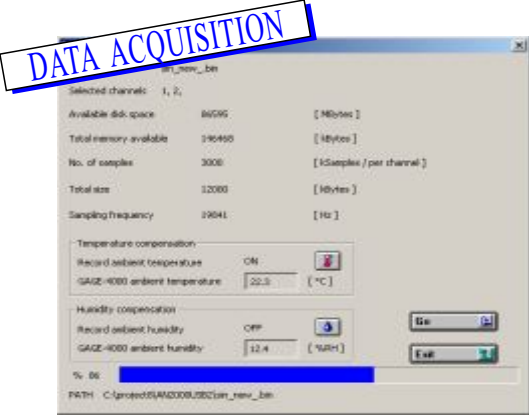
Simultaneous, real-time, ccope display of up to 16 channels with 3 different scales - Voltage, Velocity, Temperature.



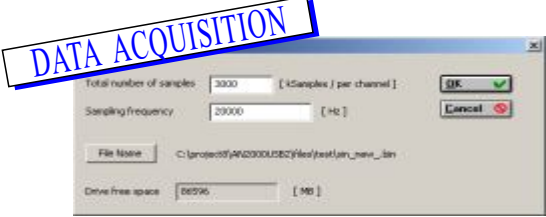
D y n a m i c , R e a l - t i m e Velocity/Voltage/Temperature bar-gaph display of selected channels.



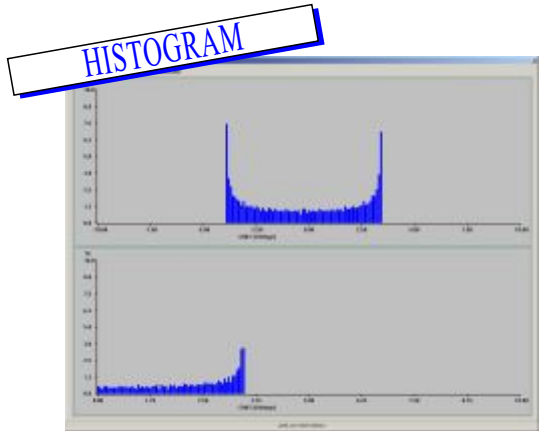
Fast Fourier Transform screen allows frequency analysis of up to 16 channels in real time.



High speed data acquisition system save the data into Binary/ASCII files.



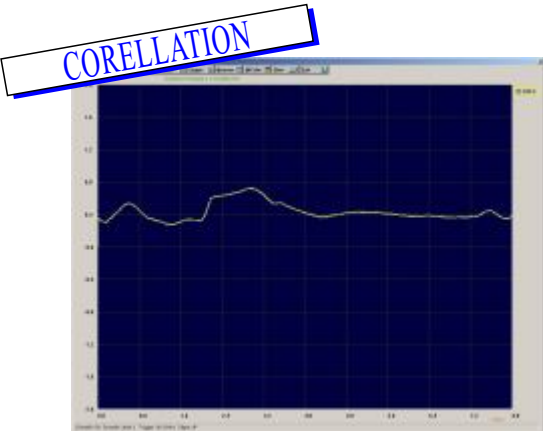
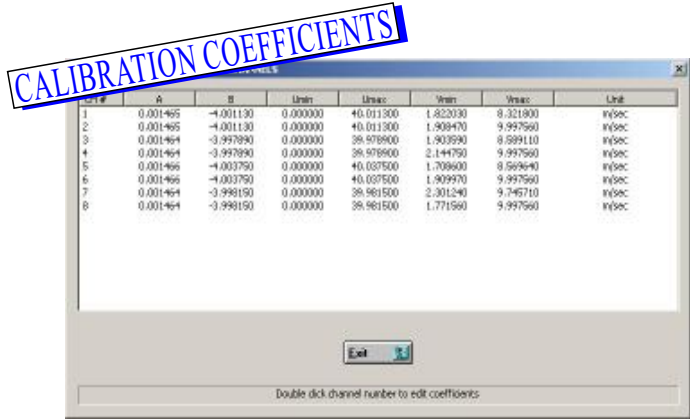
Data acquisition can be done directly to your hard drive. Files can be read by user by MatLab, Lab View, Excell or user programs.



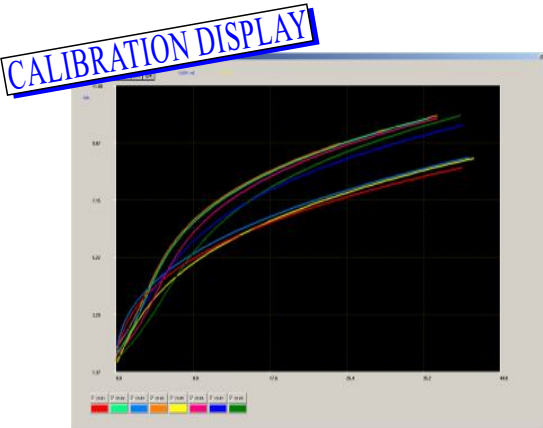
Real-Time histograms display of up to 4 selected channels in Velocity, Temperature or Voltage

Probe Calibration

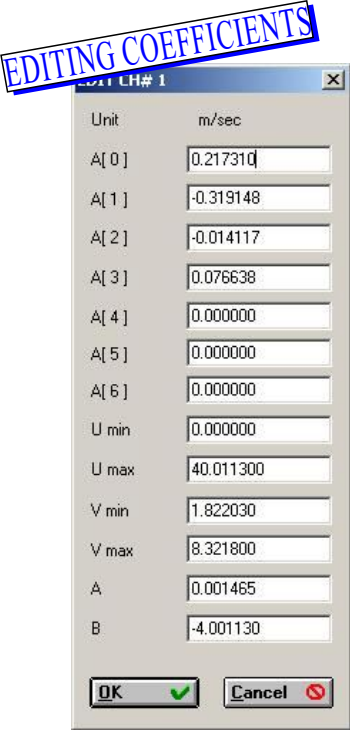
Calibration of a variety of sensors is made easy using LINFLOW software. Calibrate almost any type of probe: 1,2 or 3 wires, with any angle between sensors. Calibration can be manual using your flow, or automatic using the CAL-2000 Digital Air Speed Calibrator. Our smart calibration algorithm enables single sensor calibration within 20 seconds. The calibration model is based on Jorgensen’s equation which by taking into account flow condition, noise and other parameters, increases the accuracy of the calibration.



On-line cross-correlation display of any 2 channels.



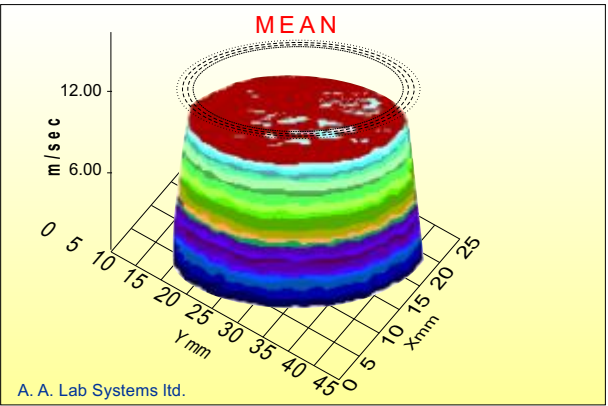
Calibration curve of the selected channels can be displayed and edited



Polynomial coefficients can be edited in order to fit King’s law or correct calibration errors.

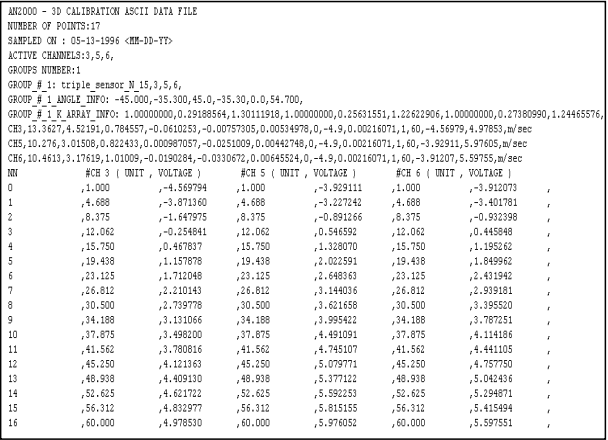
PROFLOW Profile Generator

Proflow software generates 2-D and 3-D velocity profiles within few minutes, from your ASCII data files, sampled in different physical locations. Graph types includes: Mean, RMS, FFT, Turbulence Intensity, Temperature, Humidity, etc.



DATA File Format

User friendly data acquisition file format. A header describes the parameters at the time of sampling - temperature, Relative Humidity as well as the polynomial coefficients of the channel sampled, as well as probe information and other important parameters. The binary and ASCII format can be read by most mathematics and lab software programs without a need for any "translation software". Format is available on the web.



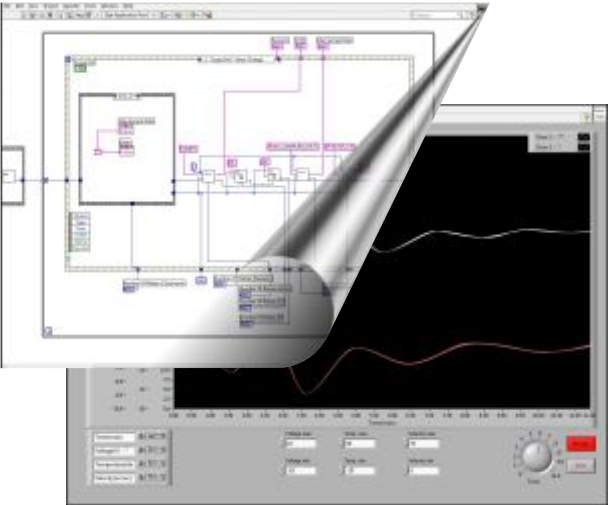
LABVIEW Software Interface

The AN-2000 also supports remote access control and operation by LABVIEW software. Three different VI’s are supplied with the AN-2000 software package. They enable the user to make on-line measurements, acquire data on disk and control the instrumentation. Modular software allows editing, adjustment & customization according to requirement. Fully documented source-code is provided with all modules.



Sampled data files can be converted to 2-D or 3-D velocity vectors using a conversion utility.

The VI files provided are open and can be edited and changed by the user. The VI files are based on a LIB (library) file which does all the access to the hardware. This LIB file is available with full documentation and programming examples for users who wish to write their own programs or integrate the anemometer into their existing software.



HIGH STANDARDS. HIGH SPEED. FRIENDLY.

High Speed microprocessor architecture, based on the industry standard X86 architecture gives the AN-2000 the ability to perform high speed display and control operations as well as complicated floating-point arithmetic calculations. Data acquisition is performed by proprietary

hardware designed by high reliability DMA transfers at high rates. The USB2 box is a high-performance, multi function interface which combines a high-speed DMA interface, RS-232 serial communications and a fast display port. It utilizes Direct-Memory-Access transfers

to achieve high speed data transfer rates up to 480 Mbits/Sec. The RS-232 port controls the operation of the AN-2000. The high speed display port provides continuous on-line view of the AN-2000 display on your PC's screen.



ANALOG SIGNALS AND ANEMOMETERS - WHAT YOU SHOULD KNOW

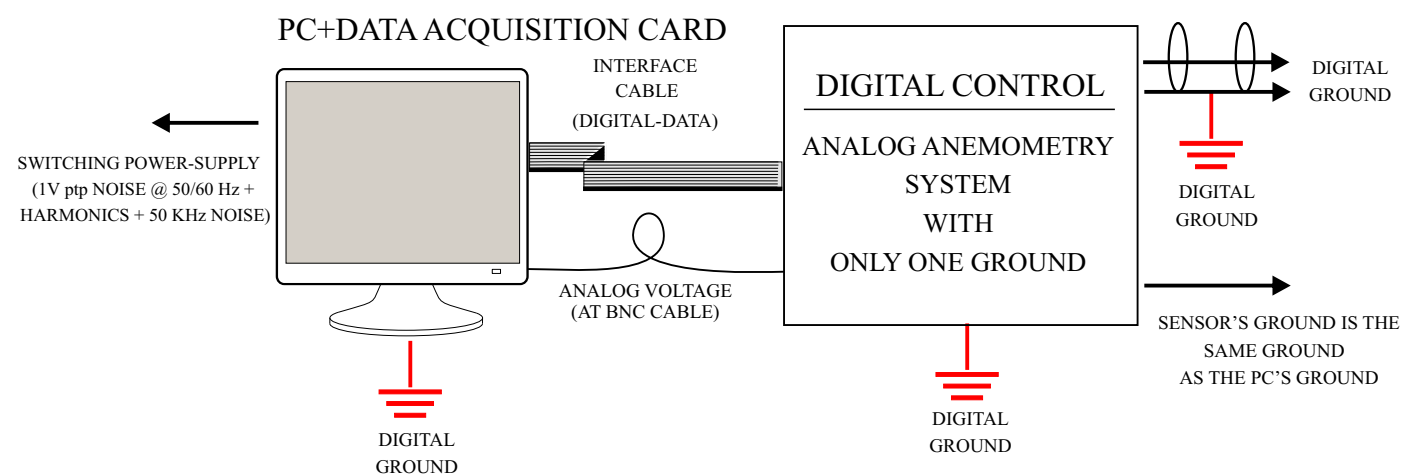
The most common configuration today is an analog instrument (usually controlled via RS-232), that produces voltage proportional to the flow. This instrument is generally connected via a signal conditioner module to the data acquisitions card via long cables. The data acquisition system is a PC (or MAC) interface card, and shares the same ground as the host computer. These typical analog instruments and PC configurations,

connected to the same ground, result in random appearances of strange noises and spikes on low level signals, even 50Hz or 60Hz spikes on some signals. Each spike input to the system via the same ground as the sensor results in an “overshoot”. The experienced user recognizes these “Pulse” or “Square Wave” response curves. In the event that there is a “train” of such impulses from multiple sources and the PC ground is shared by the sensor (via the data

acquisition system), all of the current spikes generated by the PC will appear in the signal.

Hardware interruptions caused by DMA refresh of the memory, writing to the disk, mouse & keyboard use, switching power supply spikes (50 - 80 kHz), and VGA refresh, contribute to a noisy environment not conjunctive to accurate data acquisition.

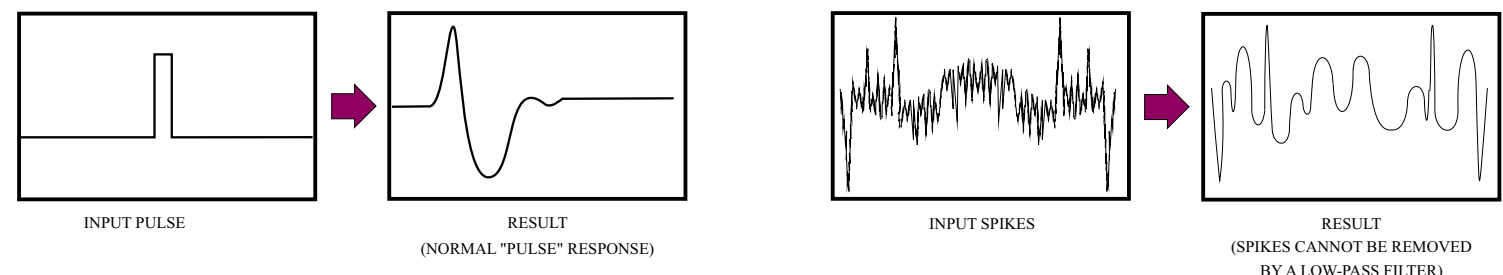
STANDARD ANEMOMETRY SYSTEMS



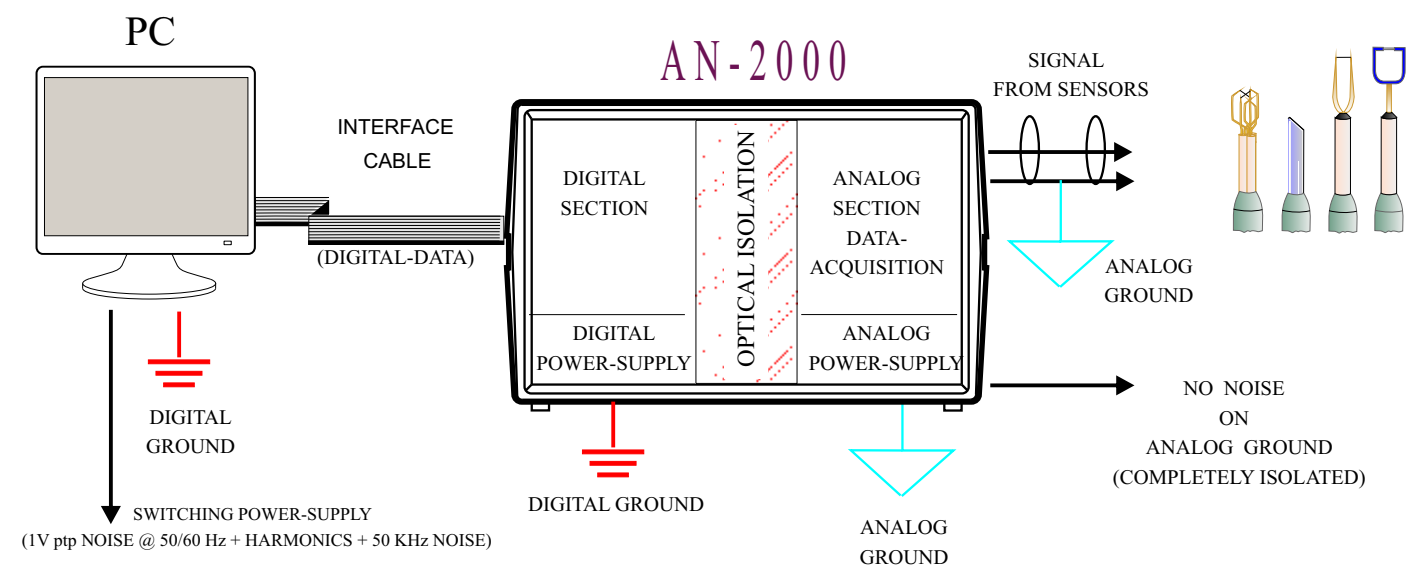
Despite the fact that an analog anemometer was specified to work up to 50 kHz, the user finds that it has a -3dB response of 20 kHz only. These systems do not process data channels simultaneously and most of the important phase information is lost. When requesting support from the supplier one is ultimately told that the problems

encountered result from “other system components”. The same response is generally given by the supplier of the other system components. Unfortunately it is more often than not, a familiar scenario with no simple solution. These systems work appropriately when separate, on data acquisition, the DC levels of the analog

system tend to fluctuate, and even movement of the mouse during sampling causes strange random spikes to appear on data. These expensive 16/12 bit acquisition PC cards sample data at 10 bit readable resolution only... however, when integrated they can become unstable, inaccurate and unreliable.



SMARTWARE - THE BREAKTROUGH



As a result of years of rigorous field experience in measurement and data acquisition in research institutions and industry world wide, A.A. Lab Systems' engineers offer multi-platform compatible, user friendly, high tech solutions:

Years of research brought about the evolution of a new approach by A.A. Lab Systems, to the data acquisition of

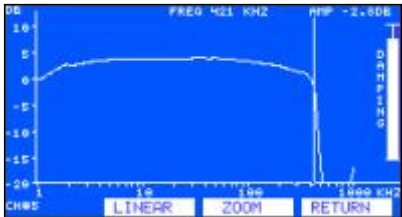
anemometry signals, i.e. placing the entire data acquisition system on **different electrical grounds**. The key word is **Optical Isolation**. There is no connection **at all** between the analog ground and the digital ground of the AN-2000 (isolation of more than 2 Mega Ohm resistance!) All of the signal conditioning and data acquisition are done **inside** the channel module, where

the signal path is only 3cm (compared with 2-5m of cable in other systems). Sampling is **true simultaneous** at rates of 93 kHz, 160 kHz and higher (per channel). The frequency response is automatic, **Body plot** display is real-time and dynamic according to user adjustments. The data measured with the built-in data acquisition system is linearized and correct up to the last bit.

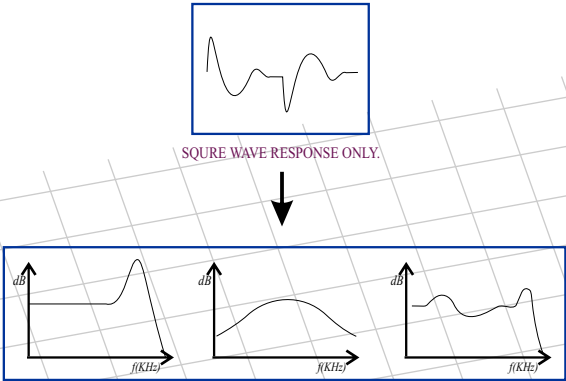
When measuring only mean values of your flow, a Hot-Wire/Film anemometer may not be required. However, when you want to measure the velocity fluctuations of your flow and require more detailed data, such an instrument is essential. Most users need to measure dynamic signals. The frequency range might be from few hundreds of Hz up to 500 KHz. When you measure those high speed velocity fluctuations you need to know two things:

- 1) That your measurement system is capable of measuring those fluctuations accurately and correctly.
- 2) That all signals measured are on the same time base.

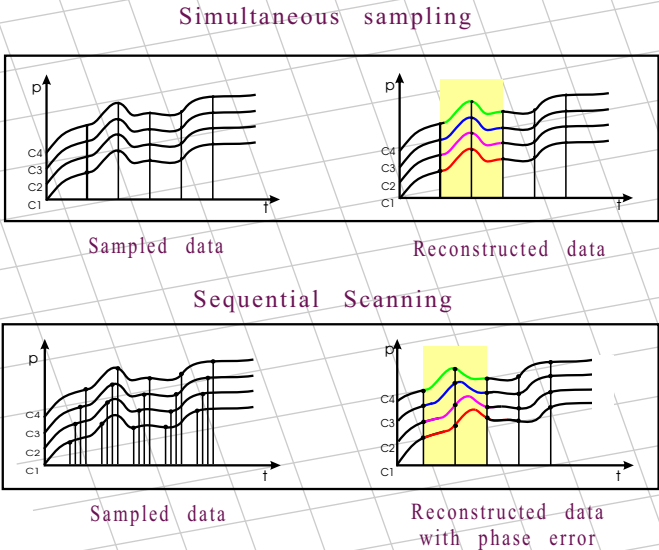
You must ensure that both occur in order to know that your measurements are precise and reliable. Our High Frequency compensation option (04) scans all frequencies in the range of 1 KHz to 1 MHz, exhibiting the correct response graph in the frequency domain. This plot gives you detailed information about the total frequency characteristics of your system: Is it flat in all the frequency range? Are there any oscillations (or a response which might lead to oscillations in a higher velocity?) What is the actual frequency range you might measure with your current sensor? All of those parameters may be adjusted on-line by user.



BODE PLOT
* option 04 only



This information and flexibility of adjustment can not be obtained by any other frequency compensation method. Simultaneous sampling is another important feature for dynamic signal processing. A non-simultaneous data acquisition system will lead to phase errors between the signals, after they are reconstructed. Those errors might be from few degrees in very low frequencies to 180 degrees if a high sampling rate is used in conjunction with a large number of channels. The simultaneous sampling feature of the AN-2000 allows you to sample at the highest sampling rates, With NO Phase errors. You Can correlate between the temperature, velocity and external signals WITHOUT worrying about the accuracy of your results.



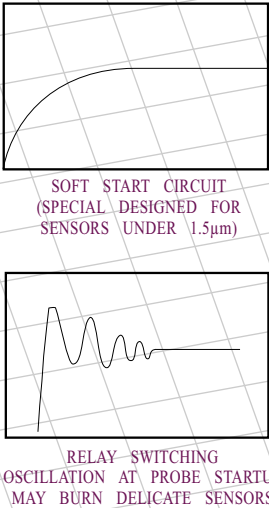
The built-in low pass filters are self-calibrated to have the same cut-off frequency on all channels. This means that all channels will have the same delay, no matter how old is the electronics or what is the temperature today. This calibration may be repeated by the user at any time.

SOFT START CIRCUIT

How many times did you try to connect a 1.2 micron wire to your anemometer, only to find that it was burned before you could measure with it?

The AN-2000 is one of the few instruments in the world capable of protecting the probe due to its unique Soft Start circuit. In regular anemometers, each channel is operated by a switch or relay for closing the control loop. This operation creates “ringing” and oscillations which burn out delicate wires.

The AN-2000 eliminates this problem with a unique proprietary bridge start circuit, which protects your very delicate sensors from being burned. It also incorporates additional circuits for the protection of sensors in case of power failure, manual power discontinuation or user malfunction.



SPECIFICATIONS

CTA CHANNEL MODULE

C.T.A BRIDGE

Non linear, constant temperature type:

Bridge Ratios.....	1:10 and 1:1
Sensor Resistance Range:	
1:1 Bridge.....	0.3-200 Ohm
1:10 Bridge.....	0.3-20 Ohm
Probe Lead Resistance Compensation.....	0-4.0 Ohm
Resistance measurement accuracy.....	±0.01Ohm ±0.05% +0.05%

Maximum Closed Loop Bandwidth:

1:1 Bridge.....	DC-120 kHz
(Up to 500kHz. with option 04).	
1:10 Bridge.....	DC-120 kHz
(up to 550 kHz. with option 04)	

Probe current:

x1 drive.....	300 mA max
x2 drive.....	*600 mA max
*(opt. 02 is required for more than 6 channels simult. Up to 1.8A per sensor is available on request).	

Equivalent input noise:

1:1 Bridge.....	1.6nV/√Hz
1:10 Bridge.....	2.2nV/√Hz
With option 01.....	400pV/√Hz
Typical Hum induced in input.....	0.03µVrms

Typical output noise:

5µm tungsten probe, R=3 Ohm, OHR=1.5, U=0	
B.W=10kHz.....	135µVrms
The same with option 01.....	60µVrms
Stability - Typical Input Drift:	
1:1 Bridge.....	0.4µV/°C
1:10 Bridge.....	0.3µV/°C
With option 01(all bridge ratios).....	0.1µV/°C

Probe cable.....	5m of RG174 or RG58A
Up to 8m of cable with option 04, 20m optional.	
output.....	Top of bridge buffered.

SIGNAL CONDITIONER

Output Voltage Range.....	±12V
Amplifier Gain (256 discrete settings).....	1-99.9
Other gain values may be ordered.	
Gain accuracy.....	±0.2%
DC Offset.....	+/-10V (in 5mV steps)
Output Impedence.....	100 Ohm
Input Impedence.....	10K Ohm
Typical Input White Noise.....	30nV/√Hz
Frequency Range.....	DC-200 kHz
Typical Equivalent Input Drift (Gain 1).....	160µV/°C

LOW-PASS FILTER

4'th order Butterworth Filter with 512 Cut-off frequencies 100Hz-120kHz. (Other frequency bands can be ordered). All filters have linear phase and are self calibrated to have the same delay on all channels.

HIGH-PASS FILTER

2 second order High-Pass filters switchable on back panel. Cut-off frequencies.....1 Hz, 10Hz

C.C.A. BRIDGE (OPTION 05)

Constant current type (in addition to C.T.A. mode)	
Bridge current (in 256 equal steps).....	0.5-50mA
Setup accuracy.....	±0.5%
Temperature drift.....	100ppm/°C

CHANNEL A/D CONVERTER (OPTION 08)

Sampling method.....	Simultaneous S&H
Sampling rate.....	0-93 kHz
Clock source.....	internal or external
External Trigger.....	Edge or Level Trigger
Resolution.....	14 bit

DIGITAL LINIARIZER (OPTION 09)

This option is available only if option 08 is installed

Output resolution.....	16 bit
Input-Output delay.....	100nSec

Output resolution is higher than Input resolution in order to prevent errors caused by polynomial calculations. All polynomial graphs and coefficients are calculated using floating point arithmetic. All channels have analog “Top Of Bridge” and “Signal conditioner” outputs on BNC connectors.

CONTROL UNIT

All analog parts are optically isolated from the digital parts and use separate power supplies.

DOT MATRIX DISPLAY

Resolution.....	256(W)x128(H) pixels
Viewing Area.....	108(W)x58(H)mm
Dot Size.....	0.4x0.4mm
Backlight Color.....	Gray-Blue

A/D CONVERTER

(for frequency response and scope only!)

Sampling Rate.....	15mHz
Resolution.....	8 bit

All signals displayed are sampled by the control unit A/D converter. Acquired data which is sent to the parallel DMA port is sampled by the channel's A/d converter (14 bits).

INTERFACES

RS-232C serial interface.....	Standard
Baud rates.....	1200,2400,4800,9600,19200
DMA parallel interface compatible with:	
DRV-11 connector.....	Standard
Display bus.....	Standard
Analog outputs	
Top of bridge, buffered, amplified & filtered output	
Throughput rate.....	up to 1.6 MegaWord/Sec
External clock input.....	DC-90kHz, TTL Level
External trigger input.....	TTL Level
External Sync input (for Ensemble averaging).....	TTL Level
Operation voltage.....	230V/115V 50/60Hz switchable