Integra 20

The first oscilloscope designed especially for the physical measurement marketplace.
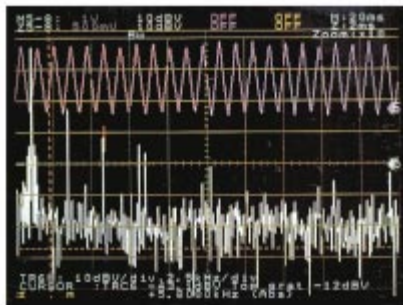

Flexible Displays

The Integra 20 offers many ways to view your data including roll mode, X-Y, display compression, min/max, and interpolation. A split screen mode can be utilized enabling simultaneous display of an entire record and a magnified region of interest. The standard color display can easily distinguish between incoming and calculated waveforms, and parameter measurements.

Signal Conditioning

The Integra 20 offers a wide range of signal conditioning options - suitable for almost any application.

Front panel differential inputs allow for improved common mode performance in a high noise environment or in high voltage floating applications.

Optional rear panel signal conditioning allows the most common sensors to be directly connected to the Integra 20. This means no fumbling with external devices. Signal conditioning modules include support for strain gages, ICP type accelerometers, high voltage fiber-optic and a special high common mode differential amplifier. Mix and match the removable signal conditioners for any configuration.

Real-Time Data Analysis

The Integra 20 supports a wide range of the most popular real-time parametric calculations including: Risetime, Falltime, Frequency, Period, Duty Cycle, Pulse Width, Overshoot, Undershoot, Peak-to-Peak, Area, Root Mean Square, Voltage, Time, Amplitude (top and base).

Trace Analysis

Standard analysis functions can be processed at high speed and displayed in real-time using the on-board DSP technology. Functions include: Invert, Add/Subtract, Multiply/Divide, and Scaling.

- **Real-time DSP analysis**
- **True 1 MS/s, 12 bit performance**
- **Differential, single ended, and/or signal conditioning amplifiers**
- **Four independent channels**
- **40 mV to 160 V full scale**
- **Advanced digital triggering**
- **Up to 2 MegaSamples memory per channel**
- **Dual timebase for maximum measurement flexibility**
- **Color display - standard**
- **Floppy drive standard, internal hard drive optional**
- **Optional integrated thermal plotter**
- **Compatible with many popular PC analysis packages**

Let's face it. Oscilloscopes are designed by electronics engineers for electronics engineers. The fact that oscilloscopes have been a mainstay of the mechanical, physiological, and electrical equipment market is until now just a fortunate coincidence. The Nicolet Integra 20 is the first oscilloscope designed specifically for the measurement of low speed, physical phenomena.

High Resolution Digitizers

The Integra 20's 12-bit digitizers offer 16 times the resolution of the ordinary 8-bit oscilloscopes so that you can see even the smallest signal variation. Combined with ultra-high accuracy amplifiers, the Integra 20 offers uncompromising measurement performance with accuracies of better than 0.25%.

Real-Time Analysis

Nicolet

TECHNOLOGIES

Advanced Analysis (Option A)

Additional real-time analysis functions can be added enabling even the most complicated measurements to be performed at incredible speeds.

- **FFT -** linear or logarithmic scaling, user selectable windowing, at lengths up to 16 k points in real-time.
- **Integration/Differentiation -** with selectable scaling.
- **Histogram -** displays results accumulated over time.
- **Trend waveforms -** trend display of instantaneous parameter measurements.
- **Filtering -** Six selectable stages of low pass filtering are offered per timebase range.

On-board Automation Through Custom Measurements And Sequences (Option S)

Automated sequences increase productivity by saving time and eliminate the need for interfacing to an external computer.
Eight programmable sequences can be entered through a Learn command allowing complete instrument control. Key features include:

- Conditional branch statements can establish an action based on a specific measurement result.
- Sequences can be fully modified.
- Measured results can be automatically saved or printed for ISO9000 archival.
- Sequences can be labeled on screen and attached to bezel buttons for easy operation.
- Sequences include separate event input and output I/O for external test control.
- Custom measurements can be embedded into any sequence.

Waveform Limit Testing

Use reference waveforms or a mathematically derived standard to automatically determine whether a waveform is inside or outside the desired boundaries.

Versatile Acquisition Modes

The Integra 20 offers a wide selection of powerful acquisition modes:

- **Multi-shot** allows for quick storage and recall of previous sweeps.
- **Autocycle** enables automatic capture and storage of waveforms to disk for hands free operation.
- **Averaging** captures and averages x-number of sweeps.
- **Persistence** provides a means of simulating a long persistence phosphor CRT.
- **Glitch detect** identifies narrow pulses between samples when sampling at a slower rate.

Multiple Sampling Modes For Maximum Efficiency

At Nicolet, we recognize that one fixed sample rate may not always be the ideal for all measurements. That's why we offer a variety of sampling options to handle almost any situation.

Dual sample rates - The Integra 20 is the only digital oscilloscope to offer two independent timebases. The dual timebase allows two channels to be sampled at one rate while simultaneously sampling the other two channels at a different rate. This allows slow and fast events to be sampled at different rates and remain time synchronous.

Sample rate switching - Slow - fast - slow sampling allows you to sample at a slow rate until the event of interest and then accelerate to a faster rate until the event passes. This feature allows you to get a better picture of the area of interest without wasting sample points on non-critical events.

External clock - The external clock feature allows you to use an external device such as a tachometer pulse to clock the acquisition of data.

Trigger Flexibility

Most DSO's are content with analog trigger circuits which are extremely susceptible to drift and noise. The Integra 20 offers a precision digital trigger for the highest accuracy available in a digital oscilloscope.

The conventional oscilloscope is designed for maximum trigger sensitivity, and triggers whenever the trigger level is crossed. A slightly noisy signal may cross the trigger level many times, causing unstable or spurious triggers. The Integra 20 provides the ability to vary trigger sensitivity, so you know the signal of interest (and only that signal) will trigger every time. Advanced triggering options include trigger delay/count capability, combinational triggering such as AND/OR combinations, pulse width, pattern/state and frequency/period.
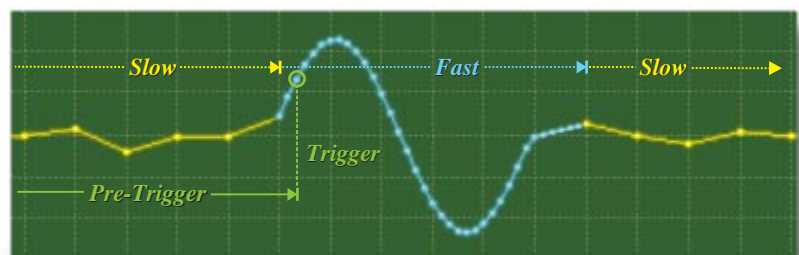
Sample Rate Switching

by Design

Engineering Units

With the Integra 20, you get fast and easy measurements in your own units such as g's or PSI. Based on the y=mx+b equation, custom scaling and offset values can be entered for each individual channel. No more messy conversions to calculate test results.

Ultra-long Record Lengths

With the Integra 20, Nicolet again leads the industry in record length. RAM-based record lengths of up to 2 MS per channel in four channel mode is among the longest in the industry. The ability to store directly to the hard disk enables an amazing 200 Million points of gap free storage.

Data Storage/Reference Memories

The Integra 20 includes a 3.5" DOS compatible floppy disk drive for permanent waveform storage. Store over 500 waveforms and front panel settings on one disk, complete with time and date stamp. On-board reference memories provide additional storage of a reference waveform for comparison to new live incoming data.

Direct To Disk Storage (Option H)

The optional internal 500 MB hard drive expands storage to 190,000 waveforms and front panel setups and adds direct to disk capability for gap free storage, up to 100 kS/s aggregate sample rate.

Simplicity By Design

Auto Setup - Touch the Auto Setup button and the Integra automatically selects channel, timebase and trigger settings, to optimize dynamic range.

Channel Controls - All primary scope controls are located on the front panel for convenient operation. Front panel timebase readout eliminates screen clutter. Each channel offers a Save Reference memory to compare reference waves or calculation results with incoming live signals.

Hardcopy The Way You Want It

The one-touch print/plot button allows traditional page style printing to laser and ink-jet printers or the optional internal thermal array printer. Up to 200,000 samples can be printed in strip chart mode to simulate up to 400 screens of data. In addition, the internal printer can be used as a real-time strip chart recorder at speeds of up to 4 cm/s.

Control, Analysis And Report Generation Software

To complement the on-board analysis of the Integra 20, Nicolet offers a broad range of Windows® based software products including ProView which provides instrument control, analysis and report generation in a single integrated package.

ProView's easy-to-use graphical interface ensures almost instantaneous productivity. Views and reports are automatically updated as new data appears. Add graphs, results tables, text and images to generate stunning color documents with ProView's point-and-click report generator.

One key parameter extraction gives you fast and easy access to over 80 mathematical and processing functions. Flexible import and export capability allows data interchange with a wide variety of third party software packages including Excel®, FAMOS®, LabView®, DiaDago® and many others.

Ordering Information

Integra 20................................ 986A0071
Includes 50 k Word memory per channel, 1.44 MB floppy drive, color display, RS-423, Centronics and GPIB interfaces and (2) 1x, 600V max. probes.
Option P 845-048900
Additional (2) 1x probes
Option M..845-047700
200 k Word memory per channel.
Option 1M.......................................845-047800
1 M Word memory per channel
Option 2M.......................................845-047900
2 M Word memory per channel
Option H..845-048000
500 MB internal hard disk
Option R 845-048100
1 MB battery backed RAM disk
Option T...845-049500
Internal thermal plotter
Option E 845-048200
Single-ended instead of differential inputs
Option A..826-006400
Advanced analysis
Option S..826-006500
Sequences and custom measurements
Bridge amplifier 845-048300
High CMRR amplifier 845-048400
Accelerometer amplifier....................845-048500
High voltage fiber optic amplifier.....845-048600

Software and accessories
ProView analysis software 826-004500
Windows® based control, analysis and report generation. Requires Windows® 3.1 or higher
Probe X10.......................................085-718400
10x, 250 MHz, 600 V max. (1.2 mtr cable)
Probe X100.....................................085-722100
100x, 400 MHz, 2000 V max. (1.2 mtr cable)
Differential Probes X10 085-939200
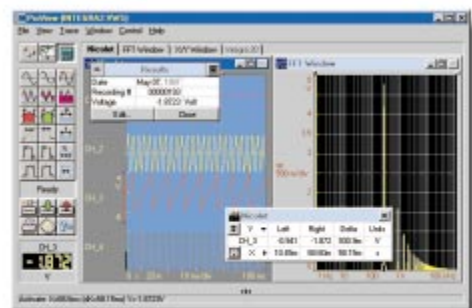*10x, 200 MHz, 600 V max. (1.2 mtr cable)*
Differential Probes X100 845-032300
100x, 150 MHz, 4000 V max. (3 mtr cable)
Oscilloscope cart.............................222-900303
Soft sided carrying case...................143-903800
Hard sided transit case 143-903700
Rackmount kit................................117-901200

VERTICAL
Number Of Channels
Four, Differential (Single Ended optional)

Analog Bandwidth
DC - 500 kHz (–3 dB)

Vertical Sensitivity
5 mV - 20 V/div in a 1-2-5 sequence

Vertical Resolution
12 bits (0.025%)

Accuracy (MSE)
< ± 0.25% Full Scale Maximum Static Error

Offset Error
❑ 40 - 160 mV range............. ± 2 % Full Scale
❑ 0.4 - 160 V range .... ± 0.2 % Full Scale

Input Impedance
1 MΩ ± 0.5 %, < 50 pF

Coupling
DC, GND, AC (–3 dB at 1.5 Hz)

Position Range
0 - 100 % of Full Scale

Safe Overload
± 240 Volts RMS to 500 Hz, 360 V DC peak

Differential Inputs CMRR
❑ DC .... 72 dB
❑ 1 kHz.. 60 dB
❑ 100 kHz.. 40 dB

HORIZONTAL
Timebase Range (per channel)
1 MS/s to 0.25 S/s in 1, 2, 5 time/div. steps

Timebase Accuracy
± 0.01 %

Sweep Length (number of points)
500 - 50k* per channel in 1, 2, 5 steps
*Optional 200k, 1M, 2M memory expansions

External Clock
500 kHz maximum

TRIGGER
Source
Any channel, external, AC line

Slope
Positive, Negative, Dual

Pre-trigger
0 - 100 % of sweep in 0.2 % steps

Trigger Delay
0 - 999 seconds

INTERNAL TRIGGER
Range
100 % of input voltage range

Sensitivity
Variable noise reject from > 0.01 division

EXTERNAL TRIGGER
Range
12 Volts Full Scale (± 6 Volts)

Sensitivity
Variable noise reject from > 20 mV

Coupling
AC, DC, 1 kHz LF reject, 15 kHz HF reject

Bandwidth
> 1 MHz

ADVANCED TRIGGER MODES
Pulse width, frequency/period, skew, missing event, divide by N, dual slope, combinational, A delayed by B, B gates A delayed by N, delay by N.

AUTO SETUP
Selects voltage range, timebase and trigger level for repetitive > 10 Hz signals.

DISPLAY
Type
5.6" Color LCD with over 9000 colors

Modes
Roll, Refresh, X-Y, Single-shot, Persistence

STORAGE
Hard Disk Drive (optional)
500 MB internal HD drive MS-DOS™ format

RAM Disk
45 kB standard, 1 MB optional, battery backed

Floppy Disk
3.5", 720 kB / 1.44 MB MS-DOS™ format

Files
Waveform data and front panel setups

INTERFACES
Centronics, RS-423, GPIB / IEEE-488.2 with 50 kB per second transfer rate

EXTERNAL PLOTTING I/O
Output in HPGL or PCL3 via RS-423, Centronics, or IEEE-488.2 ports with full annotation.

INTERNAL THERMAL PLOTTER (Optional)
Screen Plot
Plots screen data including trace identification, range settings, time, date, and graticule.

Plot Size (WxH)
3.3" x 3.3" (85 mm x 85 mm)

Plot Buffer
Allows for Integra 20 operation while plotting

Memory Plot
1 to 100 times screen width dependent on selected memory length. Up to 200,000 points of memory can be plotted out in 400 screen widths

WAVEFORM ANALYSIS
Measurements
Up to 50 measurements can be made simultaneously. (See page 1 for complete listing of parameters supported). Standard pulse measurements can be performed using 10 %, 50 % and 90 % points or by bounds defined by cursors or other measurements, and made with respect to ground or cursor.

Scaling
Individual customized units per channel for scaling, offset, and units annotation.

ADVANCED ANALYSIS (Optional)
Filter
Six selectable stages of low pass filtering.

Fast Fourier Transform (FFT)
Hanning or Rectangular window. Logarithmic or Linear scaling of frequency and amplitude. Maximum FFT size is 16 k data points.

Histogram
Produces a display of results accumulated from a measurement over a time period. Display update rates are 1 to 100 seconds in 1, 2, 5 steps.

Graphing
Produces a display of measurement results against time as a trace graph. Display range is ± 999 x 10^{36} with individual settings for maximum and minimum.

Display update rates are 1 to 100 seconds in 1, 2, 5 steps. Display time is 50 x display update rate/division.

Integration/Differentiation
Calculates integral or derivative of a trace with selectable scaling.

X-Y Measurements
Up to 30 automatic measurements can be displayed. Includes angle (deg/rad); ΔY, ΔX (Volts); ΔT (sec); area (Volts^2); integrate (Volts^2).

MEASUREMENTS AND SEQUENCES (Optional)
Custom Measurements
V$_{cross}$, Knee, Trigger, Sum, Delta, Multiply, Divide, Average, Constant, Cos(), Log(), AntiLog().

Sequences
Eight programmable sequences can be entered, incorporating 240 steps. Includes instrument control and menu selections. Program flow can be redirected dependent upon measurement results. Full sequence editing including printing results, wait function, timed pause and TTL event I/O.

POWER REQUIREMENTS
Voltage and Frequency
❑ 90 - 132 V ....45 - 400 Hz
❑ 180 - 264 V ....45 - 65 Hz

Power
150 W typical, 250 W maximum

PHYSICAL
Size(WxHxD)
15.4" x 7.1" x 18.9" (390 x 180 x 480 mm)

Weight
27 lb (12.2 kg) approximately

ENVIRONMENTAL
Temperature
❑ Operating.................................. 0°C - 50°C
   with disk .... 5°C - 45°C
❑ Non-operating........................ −40°C - 70°C
   with disk .... −40°C - 60°C
❑ All specifications guaranteed ... 15°C - 35°C

Humidity (operating)
Tested to IEC 68-2 Ca at 40°C and 95 % relative humidity (with disk 40°C at 80 %)

Safety
EN61010-1 (IEC 1010)

Vibration
Random frequency to Mil STD 810D, 5 Hz to 500 Hz, at 1g RMS, 15 minutes in each of 3 axes (0.3g RMS with drive)

Shock
Operating: 3 shocks of 30g peak, half-sine, 11 ms duration on each axis (10g with drive)

EMC
Emission: EN50081-1, FCCpt15 class A
Immunity EN50082-1

Specifications subject to change without notice.

ISO 9002 CERTIFIED

Nicolet
TECHNOLOGIES

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