FEATURES

- **High precision 16-bit A/D resolution**
- **Sample rates up to 100 KHz**
- **32 single-ended or 16 differential A/D channels**
- **Software programmable gain amplifier (PGA) gain/ channel memory**
- **Signal conditioning pads for each analog input**
- **On-board FIFO stores up to 512 A/D samples**
- **Pulse rate, pulse period, and event counting**
- **Programmable timebase and square wave generation**
- **Supplies precision, adjustable transducer excitation**
- **Two 16-bit D/A voltage and 4-20 mA current outputs**
- **24 digital inputs and outputs**
- **CompactPCI bus interface supports DMA and plug and play (PnP)**
- **Pentium® and Windows® 95/98/NT/2K compatible**

GENERAL DESCRIPTION

Harness and exploit the power of the CompactPCI bus with this low cost solution to all your test, measurement, and control applications. The CPCI-511 combines analog input, analog output, digital input/output (I/O), and counter/timer I/O on a CompactPCI plug-in board that is designed for intelligent, high precision data acquisition and process control. It is particularly suited to a host of sensor and transducer inputs, such as strain gauges, RTD's, bridge circuits, and displacement sensing elements, as well as strip chart recording , and multi-channel data logging in factory automation, research labs, and industrial control.

Using the latest data conversion technology, the CPCI-511 combines many of the features usually provided in expensive stand alone data acquisition systems with significant savings. Numerous external signal conditioning modules are available to accommodate various sensor input requirements such as channel isolation, current inputs, and relay switching. The PCI bus plug and play (PnP) interface enables PC auto-detection and initialization, and eliminates all user hardware configuration. Simply plug the board into your computer, install DATEL's CPCI-511WIN software, and within minutes you will be analyzing and displaying data in real time, or archiving that data onto hard disk for later processing.
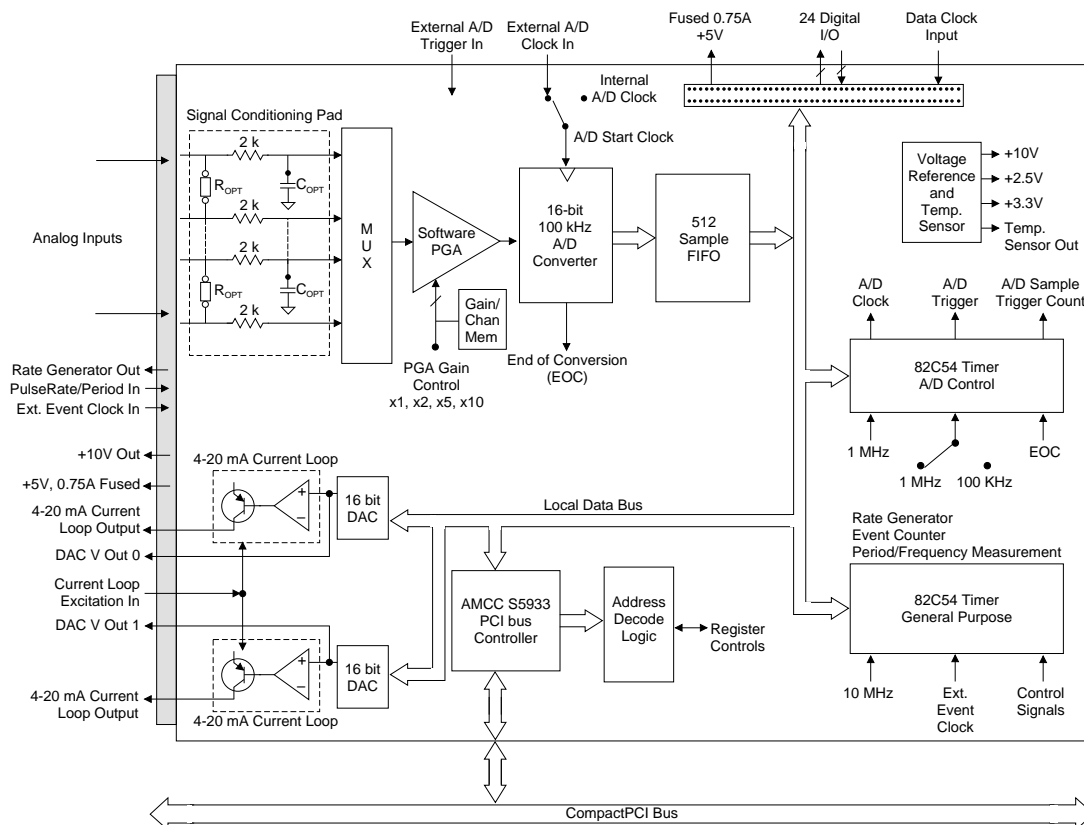

Figure 1. CPCI-511 Functional Block Diagram

The CPCI-511 offers 32 single-ended analog inputs that are software configurable as 16 true differential inputs. The full scale input voltage range is ±10V. Each input channel includes blank component pads that are user-configurable to accept different input voltage ranges, current inputs, simple filters, or other signal conditioning. A software programmable gain amplifier (PGA) offers high input signal gains that allow the board to detect low level sensor inputs. The A/D resolution is 16 bits, and it can sample at up to 100 thousand times per second. Channels can be individually sampled, or a software selectable group of adjacent channels can be scanned continuously.

Analog Input Gain Channel Memory

The on-board gain/channel memory stores PGA gain codes for each analog input channel. After loading the gains for all the channels, the CPCI-511 may be software selected to automatically load the Programmable Gain Amplifier with the desired code before each sample. In either case, the user must allow adequate PGA settling time before starting the next sample.

Automatic Input Channel Address Sequencing

The CPCI-511 includes registers for the start and final analog input channel addresses. After loading these registers, the board may be selected to automatically advance the channel address after each A/D conversion. When the final channel is reached, the system reloads the start channel for continuous automated sequencing. This produces a series of sequential A/D samples in the FIFO memory. The Command Register will also lock the address on a single channel for repeated sampling.

This autoincrement channel addressing may be combined with the gain/channel memory feature and the A/D FIFO memory to achieve mostly unattended automatic sampling of thousands of samples. The host program merely has to retrieve blocks of data periodically.

A/D data passes directly to an on-board first-in-first-out (FIFO) memory. This architecture allows non-stop, continuous data streaming to the computer without losing any samples. The streaming mode uses high speed PCI bus mastering (also known as Direct Memory Access - DMA) to place the data directly into host memory without CPU intervention. This frees up host CPU processing time, allowing it to perform other concurrent tasks such as data analysis, data display, and process control. Slower speed applications can use the FIFO to store up to 512 samples. Synchronization provided by software detectable FIFO flags (full, half full, and empty), and an end of trigger frame indicator, enable the host to periodically read one or all stored samples, and then return to other simultaneous tasks until more data is ready.

The A/D sampling rate is software selectable using an on-board 82C54 timer. The timer allows software programmable sampling rates from the maximum A/D speed of 100 KHz all the way down to 15.25 Hz. A/D sampling can also be directly controlled by a user-supplied external clock input. An internal programmable trigger timer allows acquisition of blocks of samples separated by programmable delays. In addition, external digital triggers can be used. For application synchronization and event detection, a programmable sample counter specifies the number of samples per trigger frame, which is independent of FIFO size and PCI bus transfer counts. This flexible timing architecture makes the CPCI-511 an ideal solution for most medium speed electronic test, measurement, instrumentation, and control applications.

A second programmable counter/timer accommodates pulse rate (frequency) and period measurements, event counting, clock and timebase generation, square wave generation, and other general timing applications. An on-board, precision 10 MHz oscillator is used as the timebase for timing and wave generation. Digital pulse trains can be generated at pre-programmed rates and software selectable pulse widths for logic testing and simulation. Externally supplied inputs allow period and frequency measurements, as well as event counting.

The CPCI-511 provides voltage and current excitation outputs for RTD's and strain gauges. The strain gauge voltage output is a regulated +10V (100 mA max.) source, while the RTD current source output is fixed at 500μA (±2% nominal). To verify strain gauge voltages and RTD currents these excitation outputs can be steered by software to the analog inputs. Other on-board software selectable A/D input sources include 5V fixed references and both D/A channels. An on-board temperature transducer uses a precision bandgap voltage reference to provide an output voltage that varies linearly with temperature. This temperature sensor can be selected as an A/D input for reference temperature compensation for RTD's.

The CPCI-511 includes two 16-bit digital to analog converters (DAC's) that add precision adjustable voltage and current outputs for transducer excitation, process control, and programmable voltage sources. The full scale output voltage range is ±10V, at 5 mA maximum per channel. Each DAC channel drives an on-board 4-20 mA current loop. The excitation power for the current loop is user-selectable from an internal 12V reference or from an external 12V to 30V supply. User supplied excitation allows higher impedance loads to be connected while still maintaining current loop voltage compliance. Gain and offset adjustment potentiometers are provided on each DAC channel for precision calibration. Under software control, the DAC outputs can drive the analog inputs for A/D and PGA calibration.

The CPCI-511 also provides 24 digital inputs and outputs for discrete monitoring and control systems, inter-machine communication, digital pattern recognition, digital signature generation, and relay switching applications. All the lines are TTL and CMOS compatible. The output port latches the data when commanded by host software. A user-supplied strobe latches data at the input port for reading by host software. The digital lines are accessed via the front panel connector which also supplies +5V and ground for external circuits. Various transition panels allow direct connection to industry standard interfaces such as Opto 22 modules.

The CPCI-511 is built on a 3U CompactPCI board that occupies one CompactPCI slot. The product is manufactured in DATEL's ISO9001 facility. The PCI bus interface is implemented using an AMCC S5933 PCI bus controller that supports full PCI bus mastering.

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CPCI-511WIN(S) Software

Windows® 95/98/NT/2K have become the platforms of choice for many data acquisition, test, measurement, and control applications. These feature-rich, 32-bit operating systems exploit huge gigabyte memory, secure multi-threading, and hardware plug-and-play (PnP) to provide high performing, user friendly working environments. CPCI-511WIN is an interactive data acquisition, analysis, display, signal generation, and digital I/O software system for the CPCI-511 that runs under Windows® 95/98/NT/2K. It consists of a point-and-click graphic user interface (GUI), a dynamic link library (DLL), and a device driver.

CPCI-511WIN main features include:

- Plug and Play (PnP) hardware detection and initialization.
- Easy-to-use, point and click graphic user interface (GUI).
- Transparent A/D data transfer to host memory using DMA.
- Control multiple CPCI-511's in the same computer simultaneously.
- A/D configuration – PGA gain, sample rate, etc.
- Set the DAC voltage and 4-20 mA current outputs.
- Read and write the digital I/O ports.
- Event counting, period, and frequency measurements.
- Generate digital signals, program pulse rates and widths.

CPCI-511WIN automatically detects the CPCI-511, configures the hardware, and continuously streams A/D sensor data to host memory using PCI bus DMA. A/D selections such as single-ended/differential, PGA gain, sample rate, trigger rate, and channel scan groups can be selected with the mouse.

Generate dynamic voltage waveforms or DC levels from both DAC voltage and 4-20 mA outputs. Read and write the digital I/O ports on command, or transfer blocks of data to and from the ports for pattern recognition, digital signature generation, and control. Timer control and manipulation selections perform event counting, pulse rate measurement, and pulse generation. The raw data can be displayed in decimal or hex, with real time scrolling.

CPCI-511WIN turns your computer into an intelligent data logger, archiving all A/D sensor data to disk for later analysis using third party applications such as Excel® and LabVIEW®. Analog and digital channel expansion can be achieved by running multiple CPCI-511's in the same computer simultaneously. Multiple, concurrent real time displays can be viewed, and the data from each board can be logged to separate disk files for later analysis.
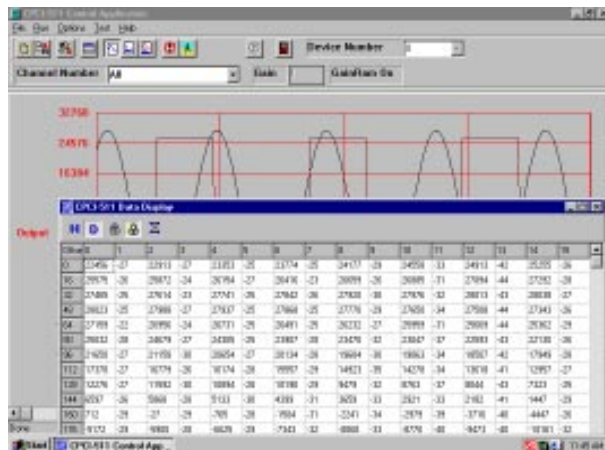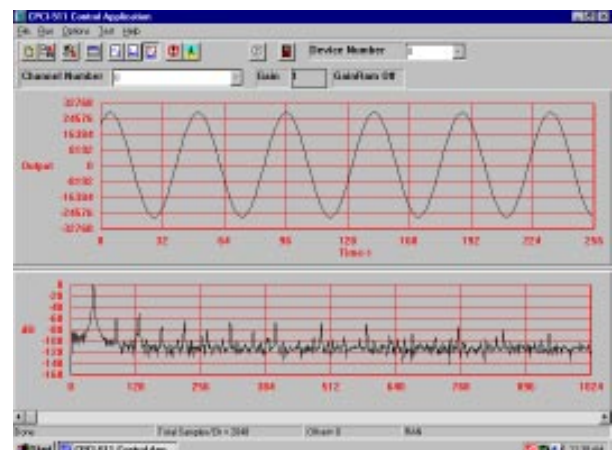

Figure 2. CPCI-511WIN with Data Table

Figure 4. CPCI-511WIN FFT Display
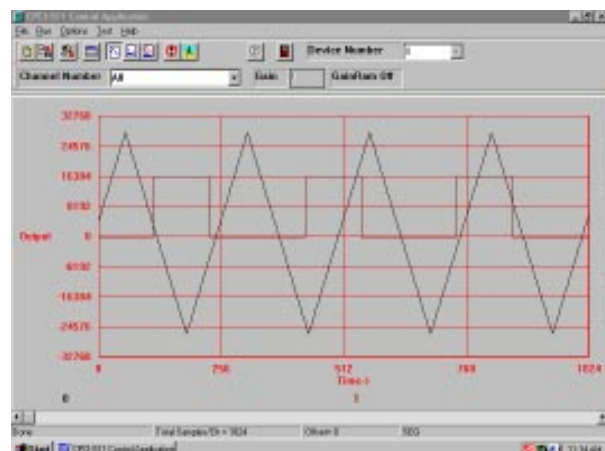

Figure 3. CPCI-511WIN Two Channel Display
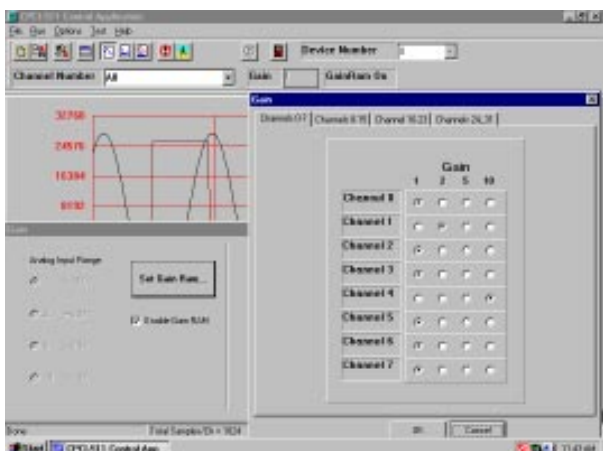
Figure 5. CPCI-511WIN Gain RAM Selection

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Software engineers and programmers will be interested in CPCI-511WINS — the source code for CPCI-511WIN. It includes complete source code for the GUI (Borland C++ Builder) and the DLL (Visual C++ 5.0), and allows you to communicate with the CPCI-511 from the familiar environment of your favorite high level language – C, Visual® BASIC, etc. It's standard Windows programming hierarchy facilitates custom software development and CPCI-511 integration into other applications. The source code contains a simple example console program, written in C, that exercises the CPCI-511 through DLL function calls.

CPCI-511WINS hardware register access includes:

Command Register
Controls for A/D trigger/clock selections, channel sequencing, single-ended or differential input configuration, PGA gain selections, and A/D calibration.

Status Register
FIFO flags (empty, half full, and full), counter/timer status, and channel block scan complete.

Start Channel Register
Select the first A/D channel in a contiguous, sequential group to scan. Channel addressing can be selected to automatically increment after each sample.

Final Channel Register
Select the last A/D channel in a contiguous, sequential group to scan.

Reset FIFO
Flush all FIFO data. All previous data not saved will be lost.

A/D Data Register
Read blocks of A/D data.

Interrupt Source / 82C54 Timer Control Register
Select counter/time mode (rate generator, event counter, period, or frequency measurement), and non-DMA host interrupt mode (FIFO full, half full, empty, end of trigger block).

Digital I/O Registers
Access the 82C55 I/O controller.

Write DAC 0 Register
Update the 16-bit analog output (channel 0).

Write DAC 1 Register
Update the 16-bit analog output (channel 1).

Write Gain/Channel Memory Register

Timer Control Registers
Configure both 82C54 timers.

Timer Data Registers
Load 82C54 timer data.

PCI Control Registers
Read/write access to all the registers on the AMCC S5933 PCI bus controller.

The hardware user manual contains detailed information on each bit in all the CPCI-511 registers.

*For example, the sample rate per channel sampling 16 channels is 25 KHz/16 = 1.56 KHz/channel.

SPECIFICATIONS
(Typical @ +25°C, dynamic conditions, gain = 1, unless noted)

ANALOG INPUTS	
Number of Input Channels	32 single-ended or 16 differential
Input Configuration	Non-isolated.
Standard Input Voltage Range	±10V, ±5V, ±2V, ±1V. Per-channel higher ranges are possible by installing attenuation resistors in the blank component pads.
A/D Resolution	16 bits.
Single Channel Sample Rate	100 KHz (single channel).
Multi-channel Sample Rate	25 KHz aggregate (per channel sample rate = 25 KHz/no. of chans.).*
A/D Output Data Coding	Two's complement, sign extended to indicate polarity.
Programmable Gain	Software programmable — x1, x2, x5 or x10.
Gain/Channel Memory	Stores gain codes for each A/D channel. May be selected to automatically load the stored gain into the PGA before each sample.
Input Impedance	10 MΩ, minimum.
Signal Conditioning	The board includes unpopulated component pads on each channel for user-installation of current shunts, attenuators, simple filters, etc.
Common Mode Voltage Range	±10 Volts
Common Mode Rejection	92 dB typical, DC to 60 Hz, 1 KΩ unbalance, gain=1.
Input Over-voltage	±12 Volts max., sustained no damage, power on or off. Diode clamp protection only.
A/D Adjustments	Gain and offset.
Addressing Modes	1. Single channel by random addressing in software. 2. Short cycle addressing – continuously sample a block of adjacent channels
Integral Linearity (gain=1)	±4 LSB of full scale range.
Differential Linearity (gain=1)	±3 LSB of full scale range.
Full Scale Temp. Coefficient	±1 LSB per degree C.
Offset/Zero Temp. Coefficient	±1 LSB per degree C.
Total Harmonic Distortion	-80 dB (optimized 16K FFT, 2nd to 5th harmonics)
Analog Input Connector	100 pin high density

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ANALOG OUTPUTS

Number of D/A Channels	Two, non-isolated
D/A Resolution	16 bits
Settling Time	
Full Scale Step	10 µs (100 KHz) max.
Single Step	6 µs
Slew Rate	10V/µs.
Output Voltage Range	±10V per channel.
Output Current	
(Voltage outputs)	±5 mA minimum per channel.
Output Impedance	0.1 Ohms.
Short Circuit Protection	Short circuit to ground.
Integral Linearity Error	±4 LSB's maximum.
Differential Linearity Error	±4 LSB's maximum.
D/A Calibration	Gain and offset adjust potentiometers per channel.
Data Coding	2's complement binary
A/D Excitation	The D/A channels may be software selected for voltage excitation of the A/D channels
Current Loop Outputs	Each D/A channel drives a 4-20 mA active current loop.
Current Loop Excitation	Internal fixed +12V supply or external user-supplied excitation (12V to 30V).
Current Loop Compliance	12V to 30V, non-isolated.

SENSOR EXCITATION OUTPUTS

RTD Current Excitation	RTD excitation is fixed at 500 µA, ±2% typical. Under software control the CPCI-511 can verify that the RTD current is present by directing this excitation output to the A/D.
Strain Gauge Excitation	10V regulated, ±2%, 100 mA max. current output. Under software control the CPCI-511 can verify that strain gauge voltage is present by directing this reference output to the A/D.
Temperature Transducer	On-board bandgap voltage source that varies linearly with temperature. It has an output voltage of 250 mV at 25°C, and a temperature coefficient of 10 mV per °C.

A/D TIMING AND FIFO MEMORY

A/D Sample Clock (82C54)	Internal software programmable or external TTL input.
A/D Frame Trigger	Internal software programmable or external TTL input.
A/D Sample Counter	Software programmable to 65535 samples. Can disable in software for continuous, non-stop sampling for long periods.
A/D FIFO Memory	512 A/D samples

GENERAL PURPOSE COUNTER/TIMER

Input Functions	Pulse rate and period measurement, and event counting.
Output Functions	Clock, timebase, or square wave generator.
Clock source	Internal 10 MHz crystal or external input (10 MHz max.).
Gate source	Internal (software) or external.
Input/output levels	1 TTL load min. (output), 1 TTL-LS load max. (input).
Controller	Standard 82C54 timer.

DIGITAL INPUT/OUTPUT PORT

Number of channels	24 I/O, arranged as three 8 bit bidirectional ports or two buffered 8 bit ports with strobes and latches.
Controller	82C55
Logic Levels	TTL-CMOS compatible.
Input Voltage	Input LOW Voltage 0.8V max. Input HIGH Voltage 2.0V min.
Input Leakage Current	1 µA
Output Voltage	Output HIGH 3.8 V min. Output LOW 0.5 V max.
Output Drive Current	Output Low 2.5 mA (1 TTL load)
Connector	100 pin high density on front panel.
Settling Time	350 ns

ENVIRONMENTAL

Operating Temp. Range	0 to +60°C
Storage Temperature Range	-25 to +85°C no thermal shock.
Relative Humidity	10% to 90%, non-condensing.
Altitude	0 to 10,000 feet. Forced cooling required.
Warm-Up Period	10 minutes to rated accuracy.

MISCELLANEOUS

Bus Interface	32-bit CompactPCI bus using the AMCC S5933 controller.
PCI Bus Mastering (DMA)	Automatically included with the AMCC S5933.
PCI Interrupt Sources	Non-DMA mode: A/D FIFO full, FIFO half full, FIFO empty, and end of trigger frame/block. DMA Mode: DMA T/C
Local RAM	Board includes non-volatile Random Access Memory to initialize the PCI controller, store calibration tables, and other model specific information.
Mechanical Outline Dimensions	3U CompactPCI board - 100 x 160 x 20.32 mm, 4 PH. Occupies one slot.
Regulated DC Power Required	Supplied by the host PCI bus: +5Vdc @ 750mA max., 500 mA typical +12Vdc @ 250mA max., 150 mA typical -12Vdc @ 150mA max., 100 mA typical
Manufacturing Environment	ISO 9001 certified facility.

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CPCI-511WINS for LabVIEW® (Windows® 95/98/NT/2K only)

Virtual instrumentation has revolutionized data acquisition and process control. LabVIEW® from National Instruments pioneers virtual instrumentation. Save yourself weeks and months of software development by graphically assembling your programs as a block diagrams rather than writing code. Together with Datel's CPCI-511WINS driver library, LabVIEW® transforms the CPCI-511 into easy-to-use virtual instruments that acquire, analyze, display, and archive digitized waveforms in real time, use the timer I/O for event counting and rate generation and measurement, and use the digital I/O and D/A channels for process control. Low level software development is replaced by visual, drag-and-drop programming that harnesses all the power of Windows® 95/98/NT/2K – graphic user interface (GUI), huge gigabyte memory, multi-tasking, plug-and-play, and inter-process communication via OLE/DDE.

How does CPCI-511 programming under LabVIEW® work? It's very simple! Using the mouse, you select a set of VI's from a function palette and "wire" them together…like creating a flowchart. There is absolutely no coding involved. All the low-level hardware interaction and control is transparently included in the drag-and-drop VI's supplied in CPCI-511WINS. You can concentrate on the real specifics of your application (such as data processing, display, and storage), rather than wasting time getting the hardware up and running. In addition to the hardware control provided by CPCI-511WINS, LabVIEW® provides hundreds of data analysis and display functions that can be used in real time or for post-processing.

CPCI-511WINS is a comprehensive library of simple, fast, modular VI's that allow complete hardware control. VI's can be visually strung together to acquire non-stop, seamless data into huge host buffers using PCI DMA or CPU status polling. Multiple CPCI-511's can be configured to operate simultaneously in the same computer. You can install and run as many boards as there are vacant PCI bus slots in your computer. All boards will perform concurrent PCI bus DMA data transfer to host memory without conflicts.

Datel's VI library includes complete functional VI programs that exercise all CPCI-511 features – A/D, D/A, digital I/O, event counting, rate generation, and period/frequency measurements. They include:

- Plug-and-play hardware detection and initialization.
- Run multiple CPCI-511's in the same computer.
- Allocate DMA buffers – single and dual (circular buffering).

- Configure data acquisition – sample and trigger rate, clock/trigger source, sample count, channel scan blocks, etc.
- Update analog outputs – voltage and 4-20mA current.
- Read and write the digital I/O ports.
- Configure the event counter and rate generator.
- Measure pulse frequency and period.
- Monitor the FIFO flags during data acquisition.
- Transfer data from the FIFO using status or PCI bus DMA.
- Pause DMA – allow access to local registers during DMA.
- Reload the DMA registers without interrupting the A/D.
- Low level register I/O – read/write all CPCI-511 registers.
- Fully functional VI example programs to illustrate usage.

The LabVIEW® libraries, supplied by National Instruments, include hundreds of user-interaction, data analysis, and data display functions, including:

Controls/indicators	Meters/gauges	Knobs/dials
Toggle/slide switches	Slider controls	Numeric math
Boolean evaluation	Looping	Histograms
Standard deviation	Matrix math	Vector Math
Linear evaluation	Polynomials	Statistics
Curve fitting	File I/O	2-D plotting
3-D plotting	Charts/graphs	Frames/borders
Internet communication	OLE automation	DDE

In addition, National Instrument's offers various add-on and helper packages for LabVIEW®. An Advanced Analysis package provides still more data analysis and display functions. The DSP Analysis library includes signal generation functions (impulse, pattern, white noise, etc.), various digital filters, data windowing, and time and frequency domain processing. Application Builder® can be used to generate a standalone application from your VI program. This can then be executed under Windows® 95/98/NT/2K, independent of LabVIEW®. Make your applications Internet-aware with the Internet Developers Toolkit®. Transfer data via E-mail or FTP and use a Web browser to monitor and control experiments remotely on the World Wide Web. Please contact National Instruments directly for more information on these and other "plug-ins".

CPCI-511WINS allows DLL function calls directly from a VI graphic.

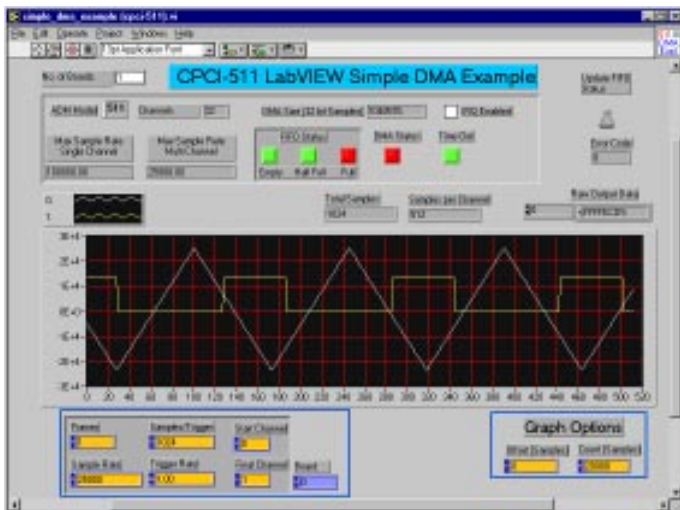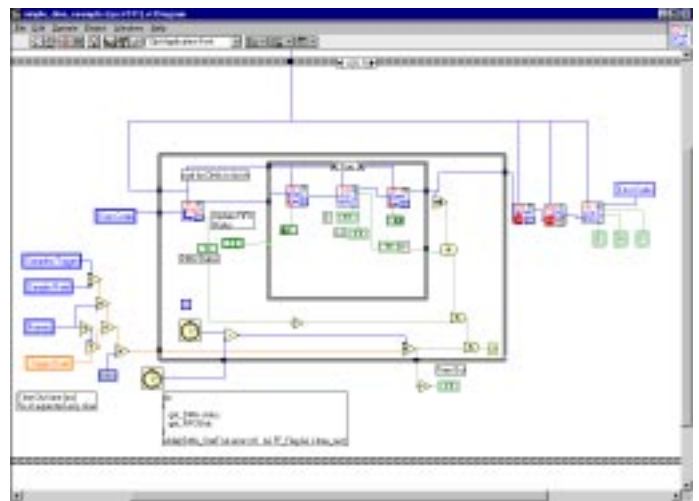**Figure 6. CPCI-511WINS LabVIEW Virtual Instrument**

Figure 7. CPCI-511WINS LabVIEW Visual Program

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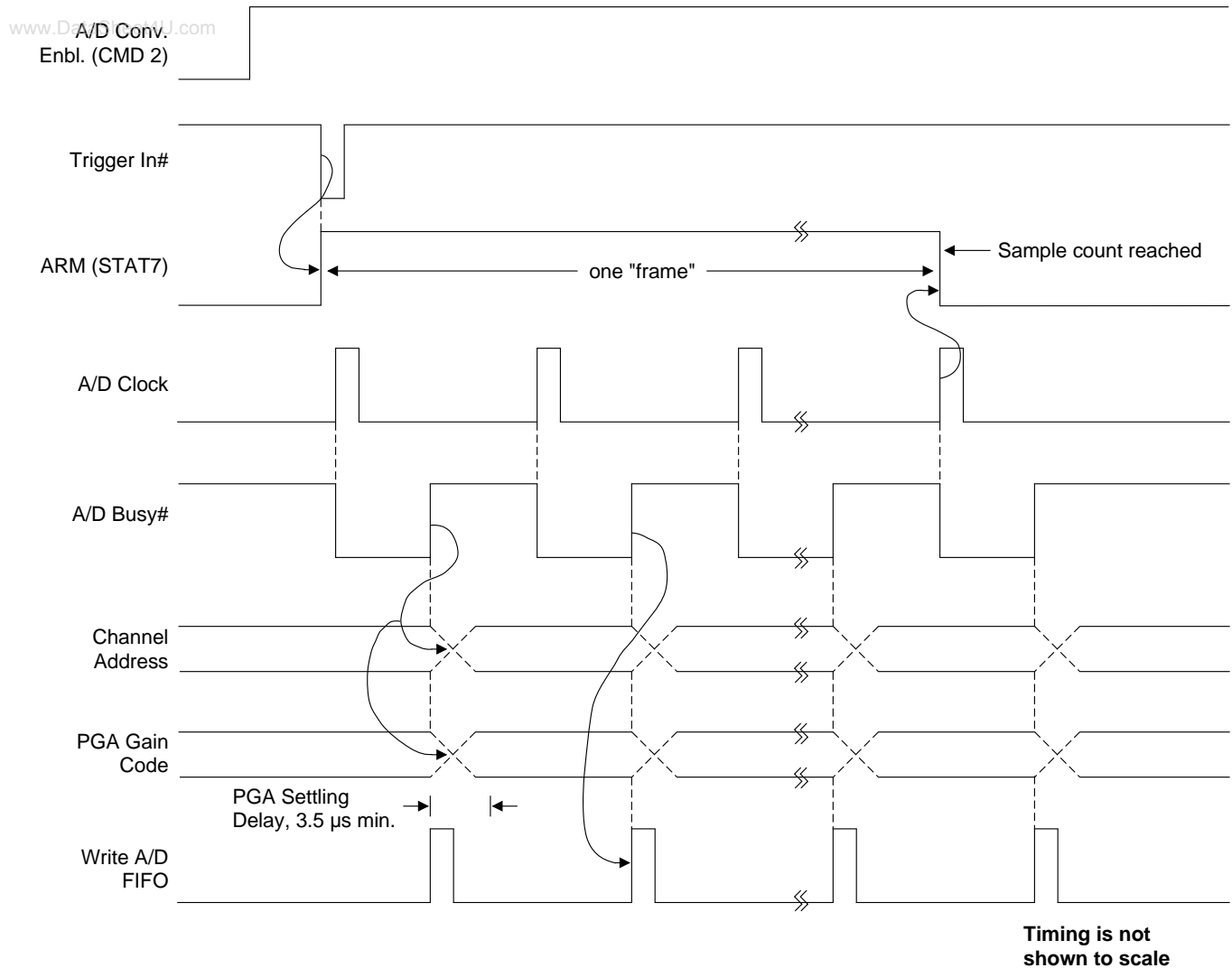
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Figure 6. CPCI-511 Timing Diagram

Notes

1. To retain highest data quality, channel addressing and PGA gain are not sequenced during A/D conversion.

2. Channel addressing automatically sequences only in autoincrement mode (Command Bit 3 = 1). The gain code will also automatically change at this time if enabled. In autoincrement mode, allow 20 microseconds minimum between A/D clocks for adequate settling.

3. A/D sampling stops at the end of a frame when the sample count is reached. The sample counter may also be disabled by software for non-stop continuous sampling.

4. The pound sign ("#") means LOW true.

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Input/Output Front Panel Connector

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Left pin	Signal		Right pin	Signal
100	Digital and Analog Ground		50	External A/D sample clock IN
99	+5V dc Power OUT		49	External trigger* IN
98	Digital I/O C0		48	No connection
97	Digital I/O C1		47	−12V dc Power out (100 mA max)
96	Digital I/O C2		46	+12V dc Power out (100 mA max)
95	Digital I/O C3		45	Digital and Power Ground
94	Digital I/O C4		44	+5V dc Power OUT
93	Digital I/O C5		43	Analog Return
92	Digital I/O C6		42	AIN 31 (AIN Lo 15)
91	Digital I/O C7		41	AIN 30 (AIN Lo 14)
90	Digital I/O B0		40	Analog Return
89	Digital I/O B1		39	AIN 29 (AIN Lo 13)
88	Digital I/O B2		38	AIN 28 (AIN Lo 12)
87	Digital I/O B3		37	AIN 27 (AIN Lo 11)
86	Digital I/O B4		36	Analog Return
85	Digital I/O B5		35	AIN 26 (AIN Lo 10)
84	Digital I/O B6		34	AIN 25 (AIN Lo 9)
83	Digital I/O B7		33	AIN 24 (AIN Lo 8)
82	Digital I/O A0		32	Analog Return
81	Digital I/O A1		31	AIN 23 (AIN Hi 15)
80	Digital I/O A2		30	AIN 22 (AIN Hi 14)
79	Digital I/O A3		29	AIN 21 (AIN Hi 13)
78	Digital I/O A4		28	Analog Return
77	Digital I/O A5		27	AIN 20 (AIN Hi 12)
76	Digital I/O A6		26	AIN 19 (AIN Hi 11)
75	Digital I/O A7		25	AIN 18 (AIN Hi 10)
74	Digital and Power Ground		24	Analog Return
73	Digital and Power Ground		23	AIN 17 (AIN Hi 9)
72	Digital and Power Ground		22	AIN 16 (AIN Hi 8)
71	Digital and Power Ground		21	AIN 15 (AIN Lo 7)
70	Digital and Power Ground		20	Analog Return
69	Digital and Power Ground		19	AIN 14 (AIN Lo 6)
68	Digital and Power Ground		18	AIN 13 (AIN Lo 5)
67	Digital and Power Ground		17	AIN 12 (AIN Lo 4)
66	Digital and Power Ground		16	Analog Return
65	+10V Excitation OUT		15	AIN 11 (AIN Lo 3)
64	+10V Excitation OUT		14	AIN 10 (AIN Lo 2)
63	0.5 mA CurRef OUT		13	AIN 9 (AIN Lo 1)
62	CurLoopExc. IN		12	Analog Return
61	CurLoopExc. IN		11	AIN 8 (AIN Lo 0)
60	Dac1 IOUT		10	AIN 7 (AIN Hi 7)
59	Dac0 IOUT		9	AIN 6 (AIN Hi 6)
58	Dac1 VOUT		8	Analog Return
57	Dac0 VOUT		7	AIN 5 (AIN Hi 5)
56	Ground		6	AIN 4 (AIN Hi 4)
55	Ground		5	AIN 3 (AIN Hi 3)
54	Gate0 IN		4	Analog Return
53	Timer Clk IN		3	AIN 2 (AIN Hi 2)
52	RateGen OUT		2	AIN 1 (AIN Hi 1)
51	Gate1 IN		1	AIN 0 (AIN Hi 0)

Figure 7. P4 Connector

Pins are shown as viewed from the front panel. Pin one is at the lower right. Analog inputs use the parentheses notation - single ended (differential). Channels are numbered starting from zero.

ORDERING INFORMATION

CPCI-511	Multifunction 3U board with 32S/16D A/D inputs and digital I/O. Includes timer I/O, 2 D/A loops, and CPCI-511WIN (binary executables only) for Windows® 95/98/NT/2K.
CPCI-511WINS	Source code for CPCI-511WIN. Includes the source code for the GUI, (written using Borland's C++ Builder®), and the DLL source code (written using Microsoft Visual C++ 5.0®). Includes a simple console program, (written in Microsoft C), that illustrates DLL function calling without the GUI. Includes library of drivers for National Instruments' LabVIEW® for Windows® 95/98/NT/2K. Purchase LabVIEW separately from National Instruments.
Accessories	Request the DATEL Data Acquisition Accessories data sheet for more information.

All boards are fully burned in, tested, and calibrated at the factory. All boards are shipped with a comprehensive hardware users manual, which includes register details, timing diagrams, and application information. The manual also contains software documentation, including API reference manuals for the source code (CPCI-511WINS)

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