

# Model P7882, PCI-based, 350 MHz Dual Input Multiscaler/TOF/Photon Counter



## FEATURES

- Dual Input Multi-Stop Multiscaler with 100 ns / 200 ns time resolution
- Dwell time:  
Using one input: 100 ns to 50s, manual and external  
Using two inputs: 200 ns to 25s, man. and external, programmable in steps of 25ns
- Large 512k S-RAM memory with 32 bit counting capacity for each time bin
- Memory segmentation for sequential spectrum acquisition
- Two Multiscaling Inputs with prog. discriminators, Countrate capability in excess of 350 MHz (400 MHz typical)
- No deadtime between channels, no lost counts or double counting, no end-of-sweep deadtime
- Multiscaling start modes: restart after sweep completed or instant trigger-restart (external start input or by mouse click)
- Presetable Sweep Counter
- Programmable sweep/memory range:  
1 Input: 256... 512k  
2 Inputs: 256 ... 256k
- NEW! Memory segmentation for sequential recording of sweeps (and sequential averaging)
- All Mossbauer control lines are accessible on a mounting bracket connector:  
Start, Count 1, Count 2, Ext. channel advance
- Versatile counting inputs ( $\pm 5V$  in steps of 2.44 mV) programmable input-threshold-levels for Count1 & Count2 and pos. / neg. slope for Start, 50 Ohms input impedance
- Two Analog Outputs:  
optional 0...10 V, 12bit programmable voltage or X-ramp output with sawtooth waveform and programmable start value;  
 $\pm 2.5V$  or 0...10V (jumper selectable), 12 bit
- Digital I/O for external control of data acquisition, the experiment, samplechanger, alerts etc.
- RAMP DAC X-Ramp, 0...10V, 12bit, i.e. for external control of HV-supplies, beam-position etc.
- Fully remote-controllable by host computer (RS232C, experiment control line or Ethernet), GO-line compatible for easy synchronization to other FAST ComTec products like scalers, counters, etc.
- Operating software MCAWIN for WIN2000 and WINXP included, Drivers available for LINUX

## APPLICATIONS

- Two input time-resolved Single-Photon-and Ion counting
- LIDAR
- Two channel Mössbauer Spectroscopy
- Dynamic Desorption Studies
- Cross-correlation measurements
- TOF Mass Spectrometry
- Scanning Mass Spectrometers
- Fluorescence lifetime studies
- Phosphorescence lifetime studies
- Laser induced chemical reactions
- OEM-applications

## DESCRIPTION

The P7882 is an advanced dual-input Multiscaler/TOF/Photon Counter designed for fast sweep repetition rates and counting rates of more than 350 MHz. The minimum dwell time (time-bin widths) is less than 100 ns, Two inputs accept counting rates of more than 350 MHz each. Both inputs and the START input are equipped with computer adjustable discriminators.

A special design prevents lost counts and double counting of input pulses.

The very large data memory has a 32 bit storage capacity and can be segmented to enable to accumulate successive measurements.

Spectra can be displayed in a two-dimensional array. This can be used to display successive sweeps to make - for example regression studies where even small changes are very visible.

Sweeps can be summed for realtime signal averaging - this means that as a new sweep is acquired it will be added to the sum of previous sweeps.

For the use in remote places an autostore function can be



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selected that will store spectra and setup parameters at selectable intervals.

The P7882 can be fully remote controlled by a host computer. "GO"-line compatibility enables the P7882 to start and stop accumulation synchronously with other FAST ComTec products like the MS-12 Timer/Scaler, the Multi Paramer System etc.

Extensive Operating Software is based on the MCDWIN software - a proven - easy to use graphical user interface for mouse and keyboard operation. Highresolution display with linear and log scales, autoscaling, ROI, zoom, Gaussian-Fit, FWHM calculation are just a few features MCDWIN offers. Batch processing with MACRO's is a flexible way to allow the user to execute task oriented batch programs.

The interactive display software can be set to display spectra with a high resolution, linear- or log scale. Screenshot allow text insertion and graphic editing with a variety of tools. This package also supports all graphic output devices installed under WINDOWS 2000 and XP.

**A unique feature of the P7882 is the selectable autostore facility. In case of a power failure the P7882 will lose just the last minute of data.** As all setup parameters are stored as well, a measurement can be continued as soon as power has returned.

## SPECIFICATIONS

**Dwell Time Modes:** programmable internal-, external- and manual channel advance

**Dwell Time per channel:** 100 ns (200 ns for two inputs) to 50 s, progr.in steps of 25 ns, and external  
**Count rate:** 350 MHz, typically >400 MHz

**Deadtime between time bins:** zero

Bin accuracy (leading/trailing edge) rel. to the Reference Clock +/-0.15ns, typical +/-0.07ns

**End-of-sweep deadtime:** zero

**Trigger Delay:** 25ns +/-12.5ns

**Abort:** ends the sweep at the end of the actual time bin

**Trigger / Start uncertainty:** < 25 ns

**Sweep Preset Range:** 1 to 2<sup>32</sup>

### INPUTS:

**START/TRIGGER:** +/-5V range, 50 Ω/1 kΩ slope and threshold programmable in steps of 2.44mV,

**COUNT1 and COUNT2:** +/-5V, 50 Ω/1 kΩ, falling edge sensitive, threshold programmable in steps of 2.44 mV,

count rate capability 350 MHz, typically >400 MHz  
**EXTERNAL CLOCK:** 50 Ω/1 kΩ, rising edge sensitive

### CONNECTORS:

Start/Trigger: LEMO 00 type connector

Count1, Count2: LEMO 00 type connector

Clock/Abort: LEMO 00 type connector

Sync-Out: LEMO 00 type connector

### D-SUB 15 pin female connector:

**Mossauer Control lines**

**Analog Ground**

**Digital Ground**

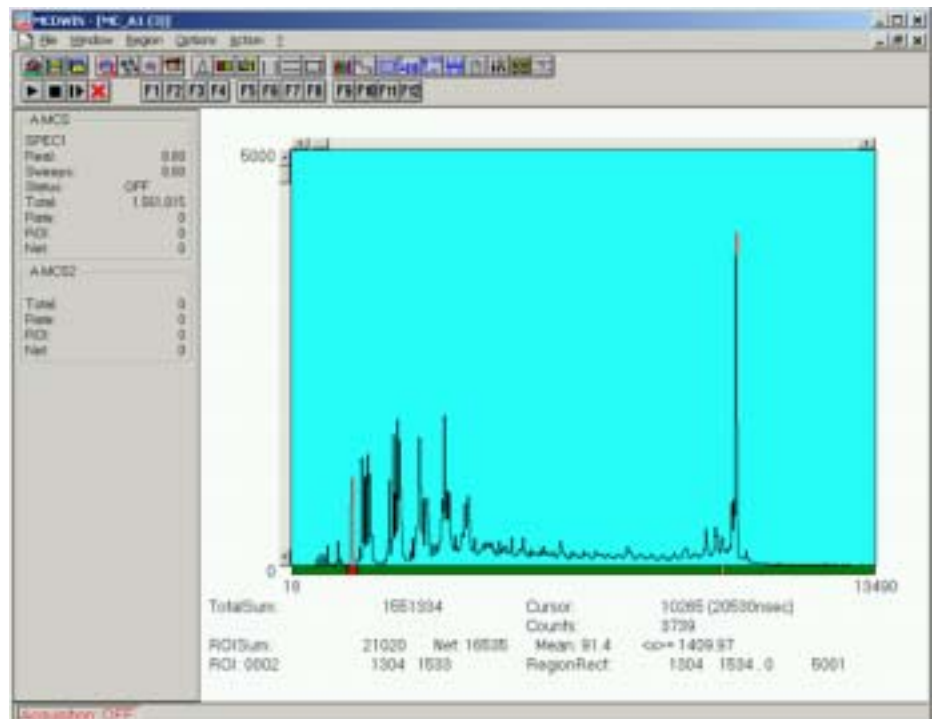
**+5V OUT**

**DAC OUT:** 0...10V

**DIG I/O:** 8-bit, very versatile

### Power Requirements:

+5V / 1400mA / 7W typ. (1600mA / 8W max.)



## SOFTWARE:

Operating Software: MCDWIN operating program - see separate datasheet.

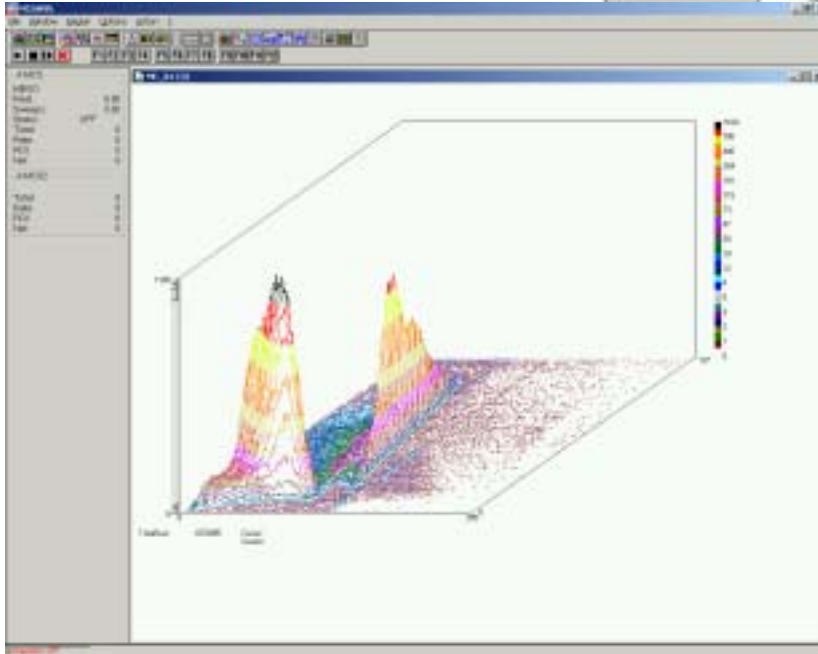
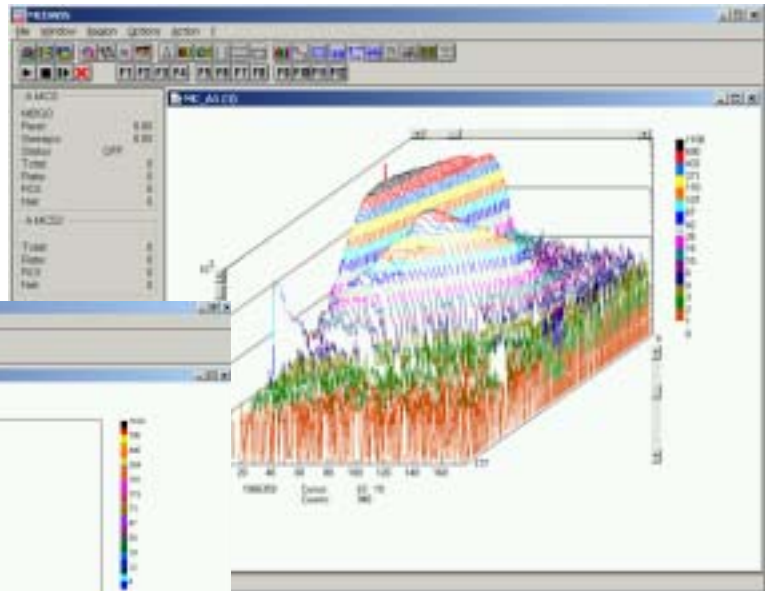
### Software Options

DLL for LabVIEW, Visual Basic and "C"

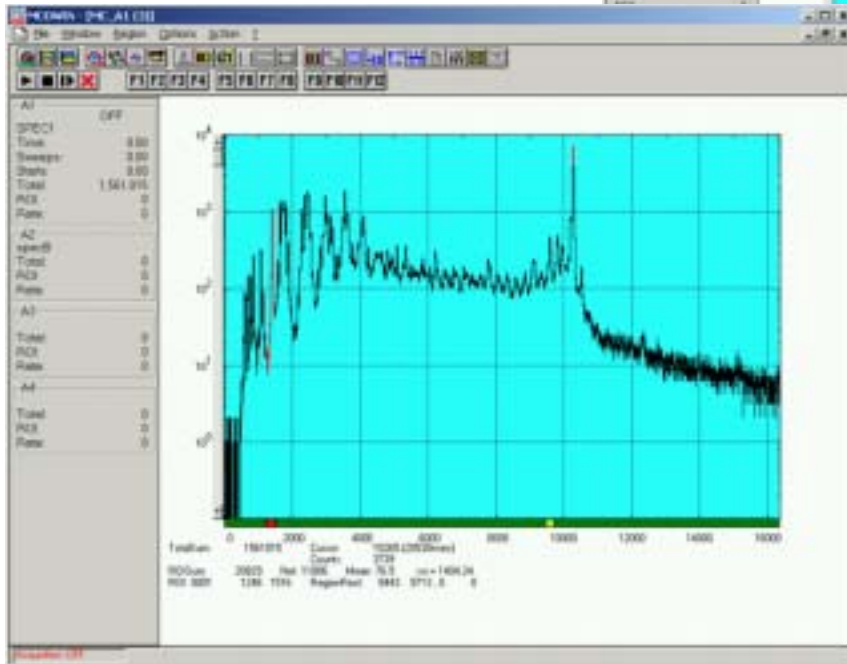
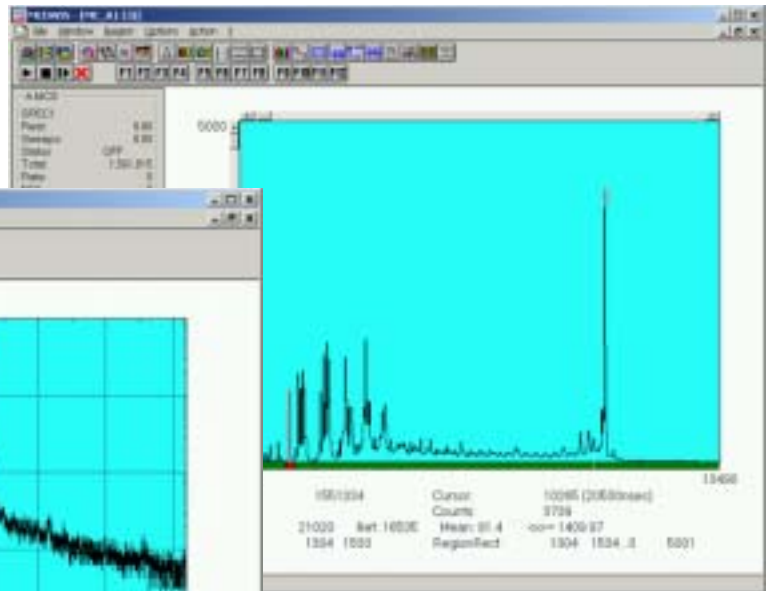
Driver for LINUX

## Two-dimensional spectrum display

Any number of single sweeps can be displayed as a two-dimensional array. Even small changes in counting intensity can be easily observed visually. The array can also be viewed in log scale.



## Linear and logarithmic presentation of a spectrum



P7882 Specifications are preliminary and subject to change without prior notice

## What makes the P7882 such a unique Multiscaler / TOF (Time-of-Flight) ?

The P7882 is designed to count incoming pulses over time. Different to other multiscalers it has two input channels that allow simultaneous pulse counting in both channels.

The P7882 is fast - with the shortest time bin of 100 ns (200 ns in two-channel mode) it is 25% faster than its predecessor the 7882.

We also significantly increased the capacity of the data memory to 512k which not only enables the user to set very long sweep times (up to 7,112 hours) but also to segment the memory in up-to 2048 segments of 256 time bins each. Other segments can also be selected like 1024 x 512...to... 2 x 256k.

Many experiments require more than one sweep to record significant information buried in noise. By summing sweeps one enhances signals in phase with the trigger event while randomly occurring noise that is not correlated with the trigger event add only with the square root of the number of sweeps added. This method very effectively improves the signal-to-noise ratio.

A new feature is Segmented Signal Averaging. Repetitive sweeps can be summed in each segment.

## Time-resolved fluorescence- and luminescence analysis

A pulsed laser excites fluorescence or luminescence in a sample and individual photons are detected by an appropriate detector. The P7882 records the profile of the decay with 100 ns time resolution.

In other experimental setups decay functions of ions, electrons, etc. can be recorded.

## Scanning Mass Spectrometers

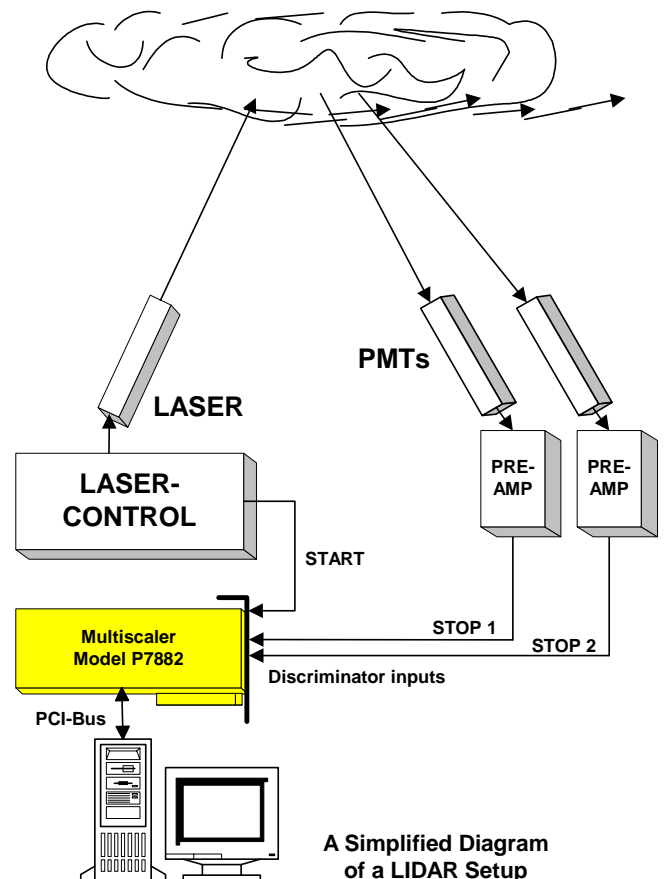
like - for example - Quadrupole Mass Spectrometers. The P7882 can be synchronized to the stepper control and counts all pulses generated by each selected mass in a time bin. After the sweep is completed the mass-lines can be viewed

## LIDAR

This is a typical application for the P7882.

The beam of a pulsed LASER is aimed at an object from as close as a plume of a smoke stack to as far as a cloud or the exhaust vapor of a Jet engine flying at high altitudes. The reflected beam is detected, for example with a PMT and the photons are counted as stop pulses by the P7882.

Responses from repeated shots from the LASER are summed to improve the statistical precision.



The time range of the P7882 from 100 ns to many seconds can be used to measure objects from close range up to distances far exceeding the useful range of a LIDAR System. The spatial resolution is 16 m - uniformly over the entire selected range.

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