

PLS-SYSTEM Positron Lifetime Picosecond Timing System

The existence of the positron, first predicted by Dirac, was experimentally identified in the 1930s. The positron is the anti-particle of the electron. A positron collision with an electron results in the annihilation of both particles and the emission of two characteristic 511-keV gamma rays. This phenomenon is useful to test predictions of quantum theory with regard to the differences between electron and positron interactions with matter. In addition, the positron has proven to be a useful tool in the study of various structures and processes. The lifetime of the positron is a measure of the local electron density at the point of annihilation. The annihilation can be easily detected by virtue of the gamma rays emitted.

Positron lifetime techniques are among the few methods sensitive to voids on the mono-atomic scale.

Historically, defect studies in metals have been a major application area for positron lifetime techniques. In more recent years, this work has extended to defect studies in alloys and non-metals. In addition, some biological systems can now be studied with the aid of positrons. Chemical properties of certain polymers and the specific surface areas of finely divided powders are being determined by the variation an range of positron lifetimes. The usefulness of positron characteristics extends to astrophysics where the characteristic 511-keV gamma from the positron-electron annihilation has been observed from certain solar flares and from a source near the center of the Galaxy. The Proceedings of the International Conferences on Positron Annihilation show the wide range of applications for this unique analytical tool.

Since the early 1970's ORTEC has been a major supplier of modular instrumentation for leading positron physicists and chemists world wide, as any positron conference proceeding can attest. The availability of positron sources makes the set-up of a positron lifetime system an attractive proposition for a teaching or research laboratory.

ORTEC makes the process even easier by providing a complete model PLS-SYSTEM.

Benefits include:

- A fully tested and integrated "turn key" system. . . all you require is a positron source.
- A complete set of labeled cables and connectors.
- Two model 905-21 detector assemblies.
- Documentation of the test process and results.
- Warranted system time resolution.

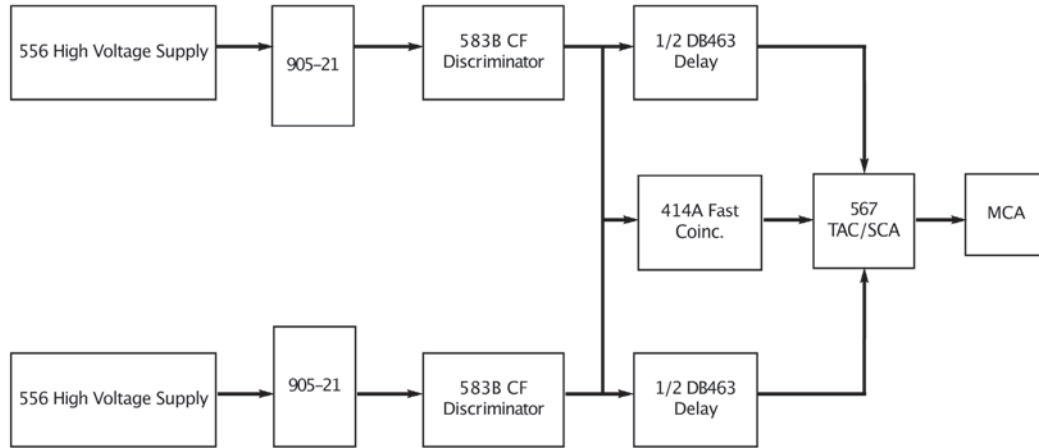
The model PLS-SYSTEM consists of the following instrumentation:

- 2 each model 905-21 Detector assemblies.
- 2 each model 583B Constant Fraction Discriminators.
- 2 each model 556 High Voltage Power Supplies.
- 1 each model 414A Fast Coincidence.
- 1 each model 567 Time-to-Amplitude Converter/Single Channel Analyzer.
- 1 each model 926-M32-USB Multi-Channel Analyzer with MAESTRO-32 Software.
- 1 each model DB463 Delay Box.
- 1 each model 4001A/4002D NIM Bin and Power Supply.
- 1 each model 113 Preamplifier.
- 1 each model 575A Spectroscopy Amplifier.
- 1 each Personal Computer.
- 1 each set of labeled cables and connectors.
- 1 each procedure with documentation of the factory test.



PLS-SYSTEM

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This system has a warranted time resolution of 200-Picoseconds (typically measures less than 180-Picoseconds) measured with a narrow energy window using a Co-60 source. (Sources are not included with this system.)

Ordering Information

Model	Description
PLS-SYSTEM	Complete Positron Annihilation Picosecond Timing System. (Sources are not included with this system.) Shipping Weight: 120 lbs. Net Weight: 100 lbs.
905-21	Fast Plastic Detector Assembly including a truncated cone detector element, 8850 or equivalent PMT, 265A tube base and mu metal shield. Shipping Weight: 30 lbs. Net Weight: 5 lbs.

Specifications subject to change
022808

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www.ortec-online.com

Tel. (865) 482-4411 • Fax (865) 483-0396 • ortec.info@ametek.com
801 South Illinois Ave., Oak Ridge, TN 37831-0895 U.S.A.
For International Office Locations, Visit Our Website

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