

**ARBITER
SYSTEMS**

Enabling Tomorrow's Technology Today

Who are we?

- Arbiter Systems Inc. established in 1973
- Founded as a metrology consulting company for the US Navy
- Resulted in three main product categories:
 - **Measurement and calibration equipment** (Power System Analyzer etc.)
 - **Time Synchronization devices** (GPS clock, Satellite Controlled Frequency Standard etc.)
 - **Combination of both** (PMU, Revenue Meter etc.)
- Purchased by Present Management 1986
 - Primary business changed to commercial power industry starting in 1988 using the background gained from the past
- Since 2007 European Marketing & Sales office located in the Netherlands to support European customers



What do we do?

- Arbiter **designs and manufactures GPS synchronized clocks and power measurement equipment** for the power industry
- Manufacture products that will be **installed for 10+ years without failing**
- **Help the customer** to find the right product to the right application requirements
- **Work together with partners** to supply total solutions and give local support

What are our products?

GPS Timing & Frequency:

- GPS Satellite controlled clocks
- Industrial
- Substation

Features:

- $\pm 500\text{ns}$ to $\pm 20\text{ns}$ accuracy
- Frequency accuracy of 1PPM
- System Phase
- Frequency and Time deviation



Combined GPS/DSA Products:

- 1133A Power Sentinel
- 933 A Portable Power Sentinel

Features:

- *All the above plus
- Synchrophasors, Sags, Swells
- Sequence of Events
- Fault recording, Load Shedding
- System Oscillations and Stability
- Revenue measurement

DSA Measurement & Calibration:

- Panel Meter Calibrator
- Power System Multimeter
- Power Analyzers

Features:

- Vrms, Arms, Phase Angle
- Power Factor, Watts, VARs,
- Harmonics
- Flicker



1133A – Power Sentinel™

- Combining GPS/DSA functionality in a 1U unit
- GPS Synchronization – built-in 12 channel GPS satellite receiver
- Revenue metering
- Power quality monitoring
 - Harmonics and K-factor, flicker, interruptions. Logging of data by time interval, record out-of-limit events
- System protection
- Disturbance Analysis
- System control and monitoring
 - (absolute) phase angle, system frequency deviation, system time deviations
- Data and event logging – flash memory up to 32MB
 - Record revenue data, power quality, internally detected faults, alarm, event and external events



933A – Portable Power Sentinel

- Portable Quality Meter
- Measure system time, phase, frequency and phasors
- When synchronized using the IRIG-B unmodulated input or the GPS input, the unit is capable of accurate revenue metering and synchrophasor analysis
- Remote GPS receiver optional
- Light weight 5.8 kg



GPS Clocks

- Satellite-Controlled clock provides **unprecedented flexibility, performance and value** for timing applications
- 4 GPS satellites are needed to lock the location, once location set only **1 visible satellite** is required
- **Accuracy** (worst case): 500ns, 250ns, 100 ns depending on model
- **Inputs:**
 - GPS L1 Code (1575.42 MHz), Event Timer(s)
 - Soon: GLONASS
 - Less soon: GALILEO



GPS Clocks

- **Outputs:**
 - IRIG-B (un)modulated
 - IRIG B Modified Manchester
 - 1 PPS
 - Programmable Pulse
 - RS-232 IRIG-J, RS-422/485 (Transmit)
 - Fault Relay(s)
 - Event

- **Ethernet connectivity (with option 34)**
 - Dual port
 - Independent NTP and/or IEEE 1588 PTP servers
 - Web interface or SSH connection
 - SNMP support



GPS Clocks

- **Power:**
 - Universal Power Supply
 - Low DC Power Supply
 - Surge Withstand capability
- **Special:**
 - Power System Time
 - Frequency/Phase Monitor,
 - IRIG-B Distribution Bus
 - Low Drift OCXO
 - COMTRADE generator
- **Various form factors and options**
- **Warranty: Limited lifetime!**
(1083B excluded)



Power Calibrators and Meters

931A Power System Analyzer

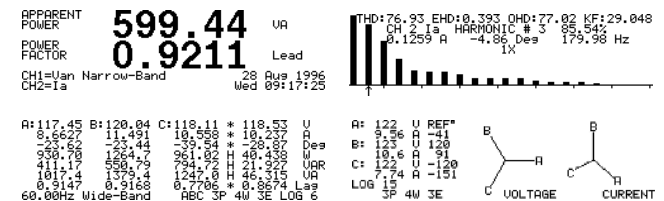
930A Three Phase Power Monitor

929A Three Phase Power Meter

- With PowerDSA – Digital System Analysis
- Accuracy of 0.05% of reading, 0.05° phase, harmonics analysis, full three-phase capability
- The 930A and 931A incorporate **full two-way serial communication** for use in quality trend monitoring
- 931A also includes **transducer calibration and timer features** for complete power system analysis



PowerDSA™



928A Power System Multimeter

- AC Power Measurement Instrument
- Two identical input measurement channels capable of measuring either voltage or current
- Features:
 - Low cost
 - 0.1% Accuracy
 - 0 to 40 mA range allows for accurate low level (<10 mA) measurements
 - Power and Energy
 - Flicker Per IEC 61000-4-15
 - Harmonics I, V to 50th, THD
 - Phase Angle I-I, V-V, I-V
 - Waveform display



Other:

935 A Current Source



936A Reference Current Transformer



1040C Panel Meter Calibrator



1073 Distribution Amplifier



0931 1A 400A Auxiliary Current Transformer



Why are we better?

Enabling Tomorrow's Technology Today

- PRODUCTS:
 - ✓ The **most versatile and cost effective** in the industry
 - ✓ Provide **long term reliability within the most demanding environments**
 - ✓ USP: **Limited lifetime warranty**
 - ✓ Highest **MTBF 2,000,000h = 228 years!**
 - ✓ Possibility to **fulfill specific options or requirements** of products and accessories
 - ✓ **Short** delivery time → 4 weeks from order to shipment
 - ✓ **Attractive** prices
- SERVICE:
 - ✓ **World class** service, sales and technical support
 - ✓ **Timely and accurate responses** to user-specific challenges
 - ✓ **Multilingual** US and European Offices with **knowledgeable and experienced teams**

References:



How can you contact us?

Arbiter Europe

Windmolen 22
7609NN Almelo
The Netherlands

Phone: +31 548 659045

Email: europe@arbitersystems.eu

Arbiter Systems Inc.

1324 Vendels Circle, Suite 121
93446 Paso Robles, CA
United States of America

Phone: +1 805 2373831

Email: sales@arbiter.com

www.arbiter.com

