Guildline Instruments Celebrates 40 Years of Achievements

Guildline Instruments celebrates its fortieth birthday in November. Over the last forty years Guildline has grown into one of the most recognized companies in the standards and calibration instrumentation business. Former employees of the British company, H. Tinsley & Company, Ltd., formed the new company under its first President, Jack Sutcliffe, in 1956.

The first products developed by the fledgling company were a Dauphinee isolating potential comparator, which enabled the first commercially available EMF comparison of better than 10 ppm and the first and only current comparator resistance bridge with a permanent accuracy of 0.1 ppm.

This was followed in rapid succession by more industry "firsts," such as the first direct reading thermometer bridge, the first temperature-controlled standard cell enclosure to use invertable saturated standard cells, and the first volt-ratio device with self-heating of less than 1 ppm from 0 to 1500 VDC.

The most significant firsts were the commercialization of voltage and resistance measuring instruments based on the unique principles of the direct current comparator developed by the National Research Council of Canada (NRCC). This family included products recognized as some of the most accurate products available at that time, many are still in use in national laboratories today.

In the 1960's Guildline was one of the first companies to make the transition from electrical to electronic metrology. Measurement Instruments in the early '60s were, for the most part, designed using passive components such as resistors, capacitors, and inductors. Guildline was one of the first companies to market products designed using active components such as transistors, diodes and digital

displays. This enabled a reduction of size and weight for measurement systems and decreased measurement operation times.

In the 1970's the "Digital Age" was born and measuring instrumentation began to take on a whole new look. Metrologists of that time did not trust "these new instruments with digital displays," and instrument manufacturers had difficulty convincing users that they could trust a digital readout to give accurate numbers. Guildline's engineers accepted the challenge and successfully marketed the world's first digital teraohmmeter for precision measurements of resistance in the range of 10^6 to 10^{16} ohms (10,000,000,000,000,000 ohms). This NRCC developed instrument had an accuracy of up to 0.02% and a resolution of 0.01%. An instrument combining the original design with the latest in CMOS circuitry is available today.

Internationally Guildline has worked closely with many national laboratories to develop and commercialize new measurement tecnhologies. Today's product line includes instrumentation that was jointly developed and commercialized with the cooperation of the National Institute of Standards and Technology (NIST) in the United States of America, the Physikalisch Technische Bundesanstalt (PTB) in Germany, the National Physical Laboratory (NPL) in England, and the Commonwealth Scientific and Industrial Research Organization (CSIRO) in Australia.

In the early 1970's, Guildline foresaw the need for precision AC voltage measurements. About the same time, researchers at NPL had achieved true ACV measurements using a multi-junction thermal converter. The NPL technique utilized a series of 200 junctions to provide an output 10 times greater than conventional thermocouples, thereby providing significantly increased measurement resolution. Guildline introduced the first thermal

Guildline Instruments Achievements 1960-1997

1960 - Model 9800	Dauphinee Isolating Potential Comparator, EMF comparison to better than 10ppm.
1961 - Model 9144	Dauphinee Potentiometer—first DC potentiometer with accuracy better than 10ppm.
1962 - Model 9500	First and only direct reading thermometer bridge.
1963 - Model 9152	First standard cell enclosure using insertable saturated standard cells.
1964 - Model 9700	First volt-ratio box with self-heating of < 1ppm from 0 to 1500 VDC.
1965 - Model 9900	First current comparator instrument: a current transformer test set with ratio accuracy of 1 ppm.
1966 - Model 9330	First and only resistance standards with temperature and power coefficients of < 2 ppm.
1966 - Model 9176	First nanovolt potentiometer.
1966 - Model 9250	Dunn Divider, a 7-digit, 2000 volt 0.1 ppm Kelvin-Varley divider.
1967 - Model 9930	First and only current comparator potentiometer with permanent accuracy of 0.5 ppm .
1967 - Model 9920	First and only current comparator resistance bridge with permanent accuracy of 0.1 ppm.
1968 - Model 7000	First AC/DC transfer standard with transfer accuracies better than 5 ppm.
1969 - Model 9154	Transvolt — first self-contained, battery powered, transportable standard cell enclosure.
1970 - Model 9520	Teraohmmeter — first digital ultra-high resistance measuring instrument with accuracy superior to bridge methods.
1971 - Model 9970	First current comparator thermometer bridge with permanent accuracy of 0.1ppm.
1972—Model 99301	"Phantom Burden" — first and only electronic burden that simulates standard ANSI loads for current transformer testing.
1973 - Model 9907	First digital current transformer test set.
1974 - Model 9917	First potential transformer test set with ppm accuracy and voltage capability to 200 KV.
1975 - Model 8400	Autosal — first automatic precision salinometer.
1976 - Model 9936	First integrated DC voltage calibration system with accuracy to 1 ppm and 1500 volt capability.
1977 - Model 9577	First 7-1/2 digit precision digital voltmeter launched in North America.
1978 - Model 9575	First microprocessor-controlled 5-1/2 and 6-1/2 digit DVMs with math capability under time control launched in North America..
1979 - Model 9734	First precision microprocessor controlled constant temperature fluid bath.
1979 - Model 9535	First precision self-contained digital platinum resistance thermometer.
1980 - Model 9536	First precision differential platinum resistance thermometer.
1980 - Model 9576A	Datastore — first microprocessor-controlled 6-1/2 digit DVM with math and datastore capability under time control launched in North America.
1981 - Model 9574	First 6-1/2 full systems digital multimeter to break $3000 price barrier.
1982 - Model 7100A	First sub-10 ppm accuracy AC/DC thermal transfer standard.
1983 - Model 7200	World's most accurate precision digital wattmeter.
1983 - Model 9578	First 8-1/2 digit precision DVM.
1986 - Model 9211	First multitap current shunt with O.01% accuracy.
1987 - Model 9350	First Hamon transfer standard with accuracies in parts in 10^{-8}.
1989 - Model 6500	First microprocessor controlled teraohmmeter.
1990 - Model 9230	First single current shunt with less than 5 ppm temperature coefficient, power coefficient, and 100 ppm annual stability.
1993 - Model 7620	First transconductance amplifier with a frequency range to 1 Mhz at 8Amps.
1993 - Model 6675	First automated wide range direct current comparator bridge.
1994 - Model 7410	First transportable multiple frequency/waveform AC voltage standard.
1995 - Model 9334	First wide range of air resistors 1 Ω to 100G Ω.
1997 - Model 9336	First standard resistors in the teraohm range with ppm accuracies.

AC/DC voltage difference measurement system and the first digital thermal wattmeter, both incorporating this new technology.

As the company grew, it became known for building unique and enduring products that form an essential core in many standards laboratories. The direct current comparator bridge, developed by NRCC and marketed by Guildline over 25 years ago, is still one of the main products used today for resistance measurements.

The field of AC current was advanced with a first from Guildline in the introduction of a commercial version of a NIST-developed transconductance amplifier with 20 A capability at 100kHz and 8 A at 1Mhz. Another first that resulted from a close relationship between NIST and Guildline is an AC voltage standard with an extremely low frequency capability.

In 1972 with the support of the National Research Council of Canada, Guildline embarked on an ambitious R&D program to develop thermal measurement instrumentation and related equipment for the rapidly expanding needs of oceanographic research institutions. These products are used on board research vessels as well as in oceanographic calibration laboratories. Temperature measurement of 0.002 °C at depths of 6000 meters have been achieved. Bedford Institute of Oceanography (BIO) helped Guildline develop further the oceanographic market with OEM products like the BATFISH®, a programmable towed-instrument platform for oceanographic research. More recently, the MiniBAT®, a miniature version of the BATFISH has been introduced. This miniature platform was designed for shallow coastal and freshwater research.

An important part of all oceanographic measurements is the salinity of water samples. In 1975 Guildline introduced the 8400 Automatic Salinometer, known as the Autosal, which is now the defacto world standard for the measurement of the salinity of seawater. Oceanographers around the world use Guildline salinometers for their traceable salinity measurements. Continued research and development has yielded the 8400B Autosal and 8410A Portasal.

Unique products continue to be added to Guildline's product line to this day. Those of note from more recent years include the first Hamon transfer standard with an accuracy of one part in 10^{-8}, the first transconductance amplifier with 20 A output at full compliance, and the first and only automated wide range direct current comparator bridge. This bridge uses the original industry-recognized NRCC design, enhanced by Guildline's engineers for better accuracy and resolution.

Guildline's first President, Jack Sutcliffe had vision and dedication that quickly established the company's reputation for service to the metrology community. Guildline, through Mr. Sutcliffe's leadership, was one of the early supporters of The National Conference of Standards Laboratories (NCSL). Successive leaders of Guildline, Victor Buxcey, Stewart Graham and the current President and CEO, Tony Anderson, who in 1996 was the President of NCSL, have continued this tradition of service to advance the metrology community. This philosophy became the cornerstone of Guildline's corporate culture and permeates the company to this day.

From its facilities near Ottawa, Ontario, Canada and its new corporate headquarters near Orlando, Florida, the company continues to design and manufacture innovative new products to move the industry forward.

Happy Birthday to Guildline Instruments!

Jack Sutcliff, Guildline's first president and one of its founders, died tragically in 1978 in an airplane accident. A permanent memorial to Mr. Sutcliff is in the entrance to the facilities in Smiths Falls, Ontario, Canada.