TESTRESOURCES
Best Value in Low Force Testing

500 Series Test Table
Static & Fatigue Tests
Axial & Torsional
Modular Approach

Modular Actuators
- Long actuator strokes (25 to 300 mm)
- LE Series – Forces to 5500 LB (25 kN) – to 20 Hz
- LM Series – Frequencies to 100 Hz
- LT Series – Torsional
- LX Series - Servohydraulic
- LQ Series - Static-only

Sensors
- Noise free digital encoder – 0.1 micron on up
- LVDT, RVDT, ADT – measure angle or position
- Load cells – 10 gram to 25 kN
- Extensometers

o Additional sensors

State of the Art GDS Software
- Global Data Sharing Technology
- Standard Control Products
- User Programmable MTL Language
- Developers Tool Kit (VB & C)
- Static & Dynamic Application Packages

o Engineered solutions

Model LE2 shown
- rated 550 LB
- 3 inch stroke

Accessories
- Tensile Grips – all types
- Bend Fixtures
- Compression Platens
- Biomedical Bathes

o Engineered solutions

Test Table with Reaction Brackets
- T Slot or threaded interfaces

Alternative System Concepts
- Affordable Single Column (100L)
- Portable (200L)
- Dual Column Axial (800L)
- Axial Torsion (800LT)
- Servohydraulic (900L)

o Engineered solutions

Cutting Edge 2350 Controller
- Fast Loop Closure (20 kHz)
- High Resolution (24 bit)
- Expands to 8 Axis or Stations
- Handles all actuator types
- Handles all sensor types

500LE4 Test System

Static or Fatigue – *Standard or Custom*

2350 controllers provide researchers unmatched control and measurement resolution when configured with an actuator and sensors matched to your unique needs. TestResources application engineers provide experienced guidance to configure test systems. Our integrated hardware and software modules are matched to control your actuator with high resolution sensors to monitor load, strain, position, or virtually any variable of interest.

Perform any static test -- Tensile, Compressive, Flexural, Torsion, Biaxial, Stress Relaxation, Indentation and Creep **-** Slow or quick ramps – single shot or multistep - in load, strain or position control. Easily set up and collect force, strain, and displacement data for materials characterization, stress – strain, strength or yield properties. Optional static software package handles wide number of analyses automatically.
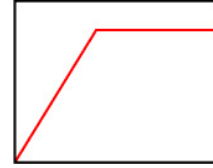
Fatigue & cyclic tests – Tension - Tension, Compression - Compression, Tensile – Compression **-** Run load controlled cyclic tests to determine how many cycles to failure or to prove your device meets endurance requirements. Adaptive control adjusts amplitude to handle different sample responses. Optional fracture mechanics software packages.
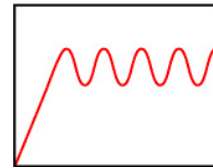
Multi-Axial tests – Tension, Compression, Torsion, Pressure **-** Your controller expands to handle multichannel control, so you can characterize your new material by testing it in a planar biaxial mode, or you can test your latest device by long term fatigue life tests using two modes of control such as axial torsion, or perform in-phase or out of-phase modeling, - even test vascular devices with pulsatile tests and pressure control.
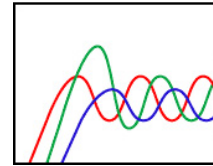
Point by Point loading - Create your own test, Mix n' match **-** Import your loading profile from a spreadsheet and produce customized point by point waveforms. You can mix ramps and sinusoids, switch control modes during a test condition, or customize your data collection process.
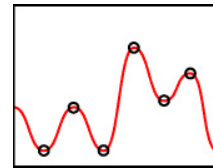
Dynamic impact & high strain rate – Tension, Compression, Torsion **-** Generate impact loads and capture high speed force, strain, and displacement data for materials characterization or product performance.
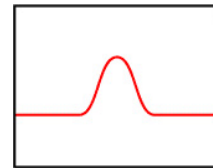
TestResources – *about innovation, relationship, support*

Innovation – the 2350 controller is the heart of our advanced test systems and designed for expand and adapt. Our servo-all-electric systems are also unique and offer so many advantages that they are displacing expensive older machines which can't deliver the precision needed today . **Relationship** - being the smallest firm in an industry of behemoths means that we know our customers by first name. Our customers choose us - *we know that* - so are committed to their success. **Support -** We handle questions immediately. Responsiveness is an advantage when you have experience and not available by big firms - so we strive to be the best at it. Also - our strategy of 'buy – not make' on parts available elsewhere keeps us focused on the important tasks.

Application Engineered Systems

We configure systems to meet immediate test needs coupled with long term considerations. Our application engineers discuss your research goals and plans and identify the test machine implications of your area of interests. Our proposal integrates the two and provides you a total solution with a roadmap to expand on.

Modify-it-yourself load frames and test tables
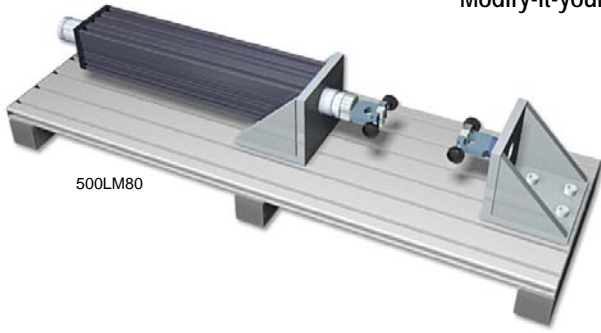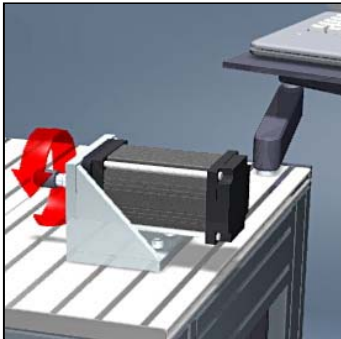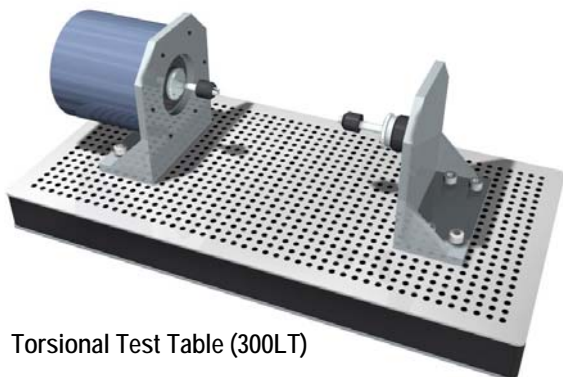
500LM80

100LM80

500LT Torsional – many sizes available

500L Test Table
Shown with optional Lab Cart. All items configured to customer size needs.

Torsional Test Table (300LT)

Axial Torsional Test Table (500LAT)
For biaxial tests

Servo-All-Electric Options

A test system is configured to meet both long term and immediate needs. Given our modular design approach, each system is configured to match customer needs and preferences, using assembled and integrated standard subsystems.

Cutting Edge Controller

The control system is PC-based and includes Windows-based software products, firmware, and control hardware matched to measurement and control needs. Each controller includes a high speed processor, or DSP to execute real time test control and measurement tasks. Expansion cards plug into the motherboard for each configuration. A tower style or rack mount enclosure is powered by 110V or 220V. Expansion cards are available for digital encoders to measure actuator position, LVDT's, load cells and extensometers.

2350 Controller Attributes	
Control Loop Update	Up to 20 KHz
Control	Up to 8 Test Stations
	Up to 8 Channels or axis
Digital IO	Up to 32 CH Inputs and Outputs
Signal Conditioners	Up to 24 Ch – LVDTs & Load cells
	Up to 24 bit – with digital filtering
	Expanded Ranges
Encoders	Up to 4
Data Acquisition	Up to 32 Channels
Analog Outputs	Up to 8

High Resolution Micromechanical Option

Standard card resolution is 16 bits. An optional high resolution card is available for micromechanical tests where very low forces and small positions are desired. This card provides up to 4 channels of 24 bit sigma – delta measurement and control and is recommended for research applications where precision load or strain measurement and control is desired.

Note – Because of the flexibility of the 2350 controller, an application engineer will assist in configuring a control system for your needs.

State of the Art Global Data Sharing Software

Global Data Sharing (GDS) software offers freedom to customers and TestResources to develop software extensions and applications that can be added easily to existing software products. GDS is a core technology that frees resources – resulting in lower software development efforts and reduced time to develop.

GDS enables all software applications to run at the same time. With GDS, data transmitted to and from the 2350 and PC is globally available to all software clients to gather data, provide control and perform analysis in real time, using languages like Visual Basic or C.

No data skewing occurs between clients. GDS occurs without the resource management problems inherent with DDE Windows data exchange programs. A new analysis application can be created as a software 'piggyback' that runs with an existing client - as a separate entity – not requiring extensive re-writes of existing source code.

GDS offers freedom to any number of software applications processing real time data from or to the controller without loss of test performance, and without modifying other software. GDS enables use of MS Excel macros with simple machine-user interfaces, real time software meters, and real time analysis. A GDS developers kit is optional.

2350 Software Products

MTL Control Software - Single Axis Single Station -- manage machine & test setups, generate commands (sine, square, ramp, dwell and point by point wave-shapes, mode switching, adaptive control), present real time data via scopes and displays, acquire and store test data, adjust servo-tuning, and generate reports.

MC Control Software - Multiple Channel Multiple Station – configure and manage up to 8 channels, axis and stations to match requirements.

GDS Developers Kit – All Applications - enables development of special applications by users familiar with VB (MS Office Products) and C (National Instruments LabWindows).

Standard Test Software for specific static and dynamic tests – these optional modules automate the testing process – made to industry standards test analyses.

Engineered Solutions – available – contact us.

Note -- All software products listed are Global Data Sharing (GDS) compatible.

Modular Actuators

Servo-All-Electric actuators are available in a wide variety of force, travel and speed ratings, and are compatible wiuth the 2350 Controller. Actuators are available in all types (direct drive, linear motor, electromechanical, hydraulic, torsional, linear, voice coil). The type is selected to match load, stroke and frequency demands. Each actuator is matched to a power pack and includes an internal digital encoder. The encoder may be optionally used as a position sensor. Virtually all actuators shown are maintenance free with fatigue life of billions of cycles.

LE Series
Load Cell Range: 0.1N to 25 kN (5500 lb)
Frequency 0.00001 to 20 Hz
LE actuators are available in force ratings to 25 kN (5500 pounds). Even though the actuator produces high loads, it can be used in low load tests when configured properly. The LE outperforms servohydraulic actuators in micromechanical test applications for a variety of reasons.

LM Series
Load Cell Range: 0.1N to 4.4 kN (1000 lb)
Frequency 0.00001 to 100 Hz
LM actuators come in several models for high frequency, speed and acceleration test applications – to 4.4 kN (1000 pounds). They are great for accelerated life testing of medical devices.

LT Series
Torque Cell Range 0.2 to 35 N-M
Frequency 0.00001 to 20 Hz
LT actuators perform static and dynamic torsional tests where angular position or strain and torsional stress are the test variables of interest. The same actuators are used with a linear actuator to produce combined axial and torsional loads, or biaxial tests.

All *Servo-All-Electric* actuators offer outstanding load sub-gram control and sub-micron strain control when configured with proper sensors.

Load Frames and Test Tables

Vertical and horizontal load frames and test tables are available in a variety of configurations. Most actuators are provided with a front flange mount that fits the load frame crosshead or a reaction bracket in the case of a test table. The actuators are modular and so changing the load frame – actuator selection is possible in most cases.

## Sensors, Transducers and Resolution

Given the high quality of the control electronics, digital filtering, and low friction actuators - the lower control and measurement limitation of a *Servo-All-Electric* system is the sensor – load cell, LVDT, encoder, or extensometer.

When we configure a system, our first step is to set the maximum actuator force rating. Establishing the long term higher limits for actuator force, speed and travel limits is especially important when the machine is used for research, which tends to be more demanding than most applications.

The second step to the process is to select transducers to fit the specific users test needs for load, position and strain measurement and control.

Take that Next Step - Call 800 430 6536

Our applications engineers are experts at configuring test systems for researchers and other needs.
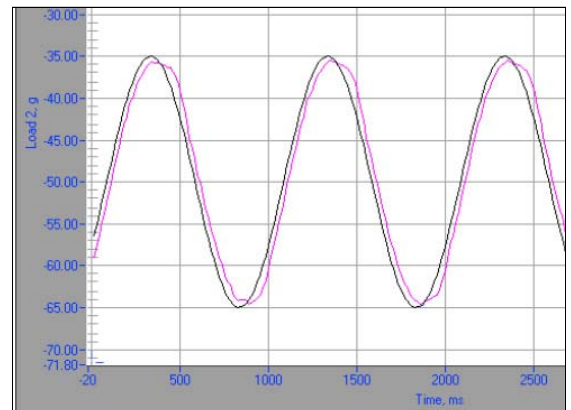
Representative load resolution (+/- 15 g) using STD 16 bit signal conditioner and 1000 gram load cell on 1000 lb actuator. 3 point bend test at 1 Hz. Improved control resolution available (24 bit).