

Ballast Test Systems BTS-Series

Production Ballast Testing

High speed, in-line electronic and magnetic ballast testing

- High throughput, low cost, fully automated test system for lighting ballasts
- Tests magnetic and electronic ballasts
- One to six lamp ballast type test capability
- Measures/records all lamp and filament voltages, ballast factor and distortion (THD)
- Tests for shorted and open windings to reject defective ballasts
- External test fixture and PLC interface
- User defined limits on all measured parameters
- Integrated PC based system produces test reports for ISO 9000 requirements
- Includes programmable AC source for turn key operation



Introduction

The California Instruments Ballast Test System (BTS) provides an affordable, PC based, production line test system for ballast manufacturers. Key benefits of the BTS system include high throughput with typical test times of less than 2 seconds per ballast and its easy to use Windows™ interface.

High Throughput

Leveraging modern PC technology, the California Instruments Ballast Test System provides unprecedented test throughput for production line ballast test. Test times are less than 2 seconds for a four lamp ballast and even less for simpler ballast types.

The modular architecture of the BTS system allows dual test bed stations to be operated from a single

PC. While testing is in progress on one ballast, the next ballast can be loaded. This allows continuous test throughput at the lowest possible cost.

General purpose ballast test software is included which provides a simple, function key driven interface to the operator. A history of all ballast test results is shown on screen. Large green banners indicate a PASS condition while failed ballasts are indicated with a red FAIL banner and are shown in a reject list. A digital interface is provided to control production line handlers so the rejected ballast can be moved to a separate bin for rework.

A programmable AC power source is used to provide the required AC power to the ballast while optional loads are available to simulate the lamp.

Measurements

The BTS System uses a unique 16 channel high speed acquisition system which resides directly on the PC bus for maximum data transfer to the PC's memory and disk subsystems. This enables the BTS sys-

tem to acquire voltage and current on both the ballast input side and all ballast outputs at the same time.

A built in relay board is controlled by software to provide the required interconnection switching so all tests can be performed in a single pass through the test fixture. All relay switching is performed under no load to ensure extended relay contact life. Routine maintenance is supported through the use of relay sockets which facilitate periodic replacement with minimum down time.

Electronic Ballast Applications (-HF Option)

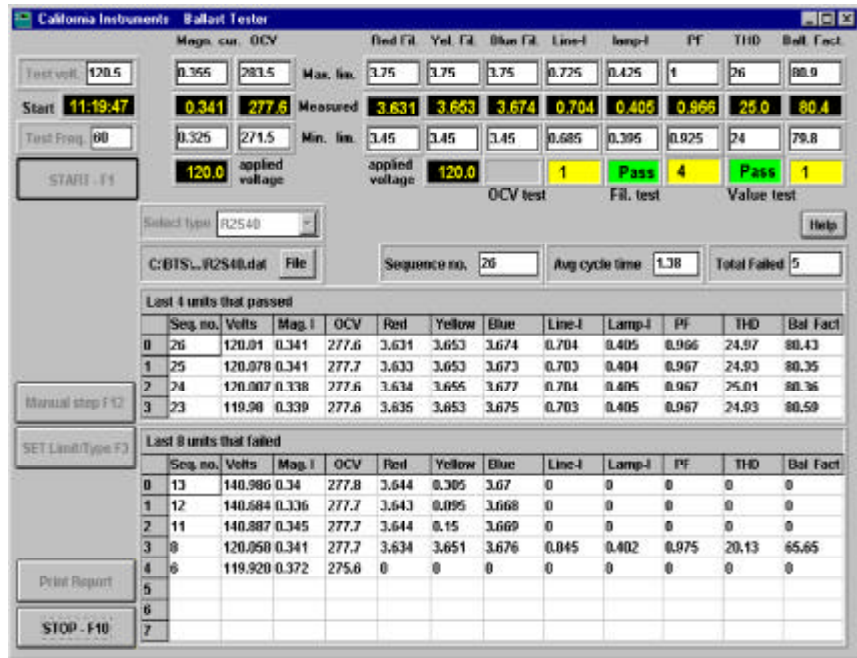
For electronic ballast applications, the High Frequency (-HF) option ensures correct measurement of high frequency ballast output parameters such as power and ballast factor. For magnetic ballast applications, this option is not required. The -HF option must be specified at the time of order as this is a factory installed option only. BTS-HF systems may be used for testing both magnetic and electronic ballasts.

Simple User Interface

All BTS operations are controlled from a single graphical user interface. The entire program can be operated using function keys, thus eliminating the need for a mouse. A touch screen may be used to eliminate the PC keyboard if desired.

The operator is presented with a single window which displays all test parameters for the last 4 tests as well as a list of 8 most recent rejects. After loading a ballast on the test fixture, a single function key is used to start the entire test sequence. No other operator intervention is required. Dual test bed systems are operated from the same single screen.

Test limits are always visible on screen so a visual verification is possible. A password is used to prevent unauthorized modification of applicable test levels. Different ballast types with preset test limits can be selected by the operator from disk when switching between production runs.



Ballast Test System main test window

Test Reports and Data Logging

Test results are continuously written to disk in ASCII format. Separate files are created for all tested and all failed ballasts. These files contain all measurement parameters obtained during the test so that a complete test record is available at all times. Data files can be exported easily to process control (SPC) or database applications used for quality control tracking. The same data files provide the basis for generating test reports with all the data needed for compliance with ISO 9000 requirements.

The separate failed ballast data file may be used to facilitate the rework process, as this information clearly shows the parameters of the ballast that were out of specification.

A summary test report can be printed at the end of a test run. This report contains a summary of test limits applied and percentage failure rates for each test step.

California Instruments Ballast Test Data															
Test date:		Jun. 26 1998		Test start:		10:22:07									
Test voltage:				120.2		Freq:		60.0Hz							
Time	Status	Seq.#	Test V	I Exc.	OCV	Red-fil	Yel-fil	Blu-fil	B/W-fil	Brrn-fil	I-Line	I-lamp	PF	THD	BFact
10:22:11	Pass	1	120.06	1.77	808.6	4.364	4.45	4.157	4.439	4.484	3.03	0.559	0.947	12.11	0.751
10:22:13	Pass	2	120.05	1.77	808.6	4.358	4.45	4.152	4.434	4.483	3.002	0.554	0.958	11.03	0.744
10:22:16	Pass	3	119.99	1.78	808.3	4.355	4.449	4.15	4.432	4.48	3.013	0.557	0.952	11.55	0.748
10:22:18	Pass	4	120	1.76	808.3	4.367	4.449	4.159	4.441	4.486	3	0.558	0.957	11.1	0.749
10:22:20	Pass	5	120.06	1.78	808.5	4.36	4.445	4.155	4.435	4.482	3.013	0.556	0.955	11.27	0.745
10:22:22	Pass	6	120.09	1.75	808.7	4.36	4.454	4.156	4.436	4.486	3.011	0.556	0.956	11.26	0.746
10:22:24	Pass	7	120.05	1.75	808.8	4.364	4.444	4.159	4.439	4.482	3.022	0.555	0.95	11.91	0.746
10:22:26	Pass	8	119.97	1.76	808.4	4.366	4.451	4.161	4.439	4.488	3.02	0.557	0.95	11.75	0.747

10:22:35	Pass	932	119.98	1.75	808.4	4.365	4.459	4.163	4.442	4.49	3.006	0.556	0.959	11.02	0.745
10:22:37	Pass	933	120.04	1.78	808.5	4.375	4.438	4.168	4.445	4.484	3.011	0.556	0.959	10.97	0.743
10:22:40	Pass	934	119.98	1.75	808.4	4.359	4.45	4.158	4.434	4.484	3.011	0.558	0.96	10.99	0.745
10:22:42	Pass	935	120.07	1.77	808.8	4.357	4.444	4.156	4.43	4.479	3.027	0.558	0.958	11.14	0.744
10:22:44	Pass	936	119.99	1.76	808.5	4.375	4.435	4.168	4.446	4.484	3.043	0.558	0.953	11.51	0.742
10:22:46	Pass	937	120.02	1.75	808.5	4.375	4.44	4.17	4.447	4.487	3.029	0.556	0.956	11.23	0.742

Production run test file shows data for all units tested

California Instruments Ballast Test Data															
Failed units data.															
Test date:		Jun. 26 1998		Test start:		10:22:07									
Test voltage:				120.2		Freq:		60.0Hz							
Time	Status	Seq.#	Test V	I Exc.	OCV	Red-fil	Yel-fil	Blu-fil	B/W-fil	Brrn-fil	I-Line	I-lamp	PF	THD	BFact
10:22:11	Fil F	47	119.96	1.77	808.5	0.816	4.45	4.157	4.439	4.484	0	0	0	0	0
10:22:13	Load F	361	120.21	1.77	809.3	4.358	4.45	4.152	4.434	4.483	2.815	0.625	0.976	14.39	0.731
10:22:16	Load F	487	119.99	1.78	808.9	4.355	4.449	4.15	4.432	4.48	2.811	0.623	0.975	14.52	0.73
10:22:18	Load F	874	120.11	1.76	808.9	4.367	4.449	4.159	4.441	4.486	3.454	0.544	0.964	10.08	0.624
10:22:20	Fil F	985	120.06	1.82	801.7	0.764	4.445	4.155	4.435	4.482	0	0	0	0	0
10:22:22	Fil F	995	120.09	1.79	806.3	4.33	4.454	0.762	4.436	4.486	0	0	0	0	0
End of test data file.															
Test end:		10:37:53				Jun. 26 1998									

Failure test file shows time stamp, sequence number and failure mode

Connections

AC power and ballast connections are made using standard terminal blocks that can be wired to the customer's proprietary test fixtures. This ensures easy integration of the BTS System in an existing production environment.

AC Power Source

A precision AC power source, capable of driving most lighting ballasts, forms an integral part of the complete ballast test system. This AC source is controlled directly from the BTS system using a serial or IEEE-488 interface. During test runs, the AC source front panel is locked out, eliminating the possibility of operator tampering. The programmable current limit capability of the AC source and the shorts test, which is part of the test sequence, work together to prevent any damage to a ballast under test. Available AC sources range in power levels from 1250 VA to 3000 VA and are housed in a rack mount enclosure matching the appearance of the BTS system unit cabinet.

The 2001L-BTS and 2750L-BTS systems provide accurate phase angle control for ballast start-up analysis and offer voltage outputs up to 400 V_{rms} L-N.

A measurement only version of the BTS System is available for customers who already own a suitable California Instruments AC power source. Contact the factory for more information on custom BTS configurations.

CE Mark

Selected Ballast Test Systems have been fully tested for compliance with 1998 CE Mark requirements. This allows these systems to be used in the European Economic Community. Refer to model selection table on back page for CE marked BTS configurations.

Measurement Specifications

Measurement	Specification	Unit
<i>Frequency - Standard (Magnetic Ballasts)</i>		
Range	45.0 - 440.0	Hz
Accuracy and Resolution	0.1	Hz
<i>Frequency - with -HF Option (Electronic Ballasts)</i>		
Range	0.040 - 150.00	kHz
Accuracy and Resolution < 1 kHz	0.01	kHz
Accuracy and Resolution > 1 kHz	0.1	kHz
<i>Volts - Line and Lamp</i>		
Range	0.01 - 1000.00	V _{rms}
Max. input	1500	V _{peak}
Accuracy	± 0.1 % ± 0.05 % FS	
Resolution	10	mV
Voltage CMRR	80	dB
<i>Volts - Filament</i>		
Range (selectable)	0.001 - 4.000 / 8.000	V _{rms}
Accuracy	± 0.5 / 1.0 % FS	typ./max.
Resolution	1	mV
Voltage CMRR	80	dB
<i>RMS Current</i>		
Current range	0.00 - 40.00	A _{rms}
Peak current	0.00 - 60.00	A
Max. input [permanent, no damage if < 200 A _{peak}]	60.00	A
Max. Crest Factor	20:1	
Accuracy	± 0.1 % ± 0.05 % FS	
Resolution	1	mA
<i>Power</i>		
Range	0.1 - 3,000	W
Accuracy	± 0.25 % ± 0.25 % FS	
Resolution	0.1	W
<i>Apparent Power</i>		
Range	0.1 - 3,000	VA
Accuracy	± 0.15% ± 0.15% FS	
Resolution	0.1	VA
<i>Power Factor</i>		
Range	± 1.000	
Accuracy	± 0.01 ± 0.001/ kHz	
Resolution	0.001	
<i>Harmonic Analysis</i>		
Range	Fundamental - 50th	
Accuracy Fundamental	± 0.05% FS ± 0.05%/kHz	
Accuracy Harmonics	± 0.1 % ± 0.1%/kHz	

AC Source Specifications

	1251RP-BTS	2001L-BTS	2750L-BTS	
AC Output to Ballast				
Power	1250	2000	3000	VA
Voltage - High range	0 - 270	0 - 400	0 - 400	V _{rms} L-N
Phase angle control	no	0.1°	0.1°	Degrees
Frequency	16 - 500	45 - 550	45 - 550	Hz
Current				
At maximum voltage	4.6	5.0	7.5	A _{rms}
Repetitive peak	13.8	18.8	28.1	A
AC Source Input				
Line Voltage	85 - 265	115 or 230	187 - 252	V _{rms} L-N
Line Frequency	47 - 63	47 - 440	47 - 440	Hz
Physical				
Dimensions Height	3.5 / 89	5.25 / 133	10.5 / 267	inch / mm
Width	19 / 483	19 / 483	19 / 483	inch / mm
Depth	22 / 560	23 / 584	23 / 584	inch / mm
Weight (net)	34 / 15.4	85 / 38.3	175 / 97.2	lbs / kg
Operating Temp	0 - 40	0 - 40	0 - 40	° C

Note: Data shown for AC power source is for reference only. Consult data sheets for listed and other AC source model specifications.

Ordering Information

Model	VA Power	Description
1251RP-BTS	1250 VA	Complete System, IEEE, RS232, CE Mark
2001RP-BTS 2001L-BTS	2000 VA 2000 VA	Complete System, IEEE, RS232, CE Mark Complete System, IEEE, 200 / 400 Vrms
2750L-BTS 3001iX-BTS	3000 VA 3000 VA	Complete System, IEEE, 200 / 400 Vrms Complete System, IEEE, RS232, CE Mark

Notes: L Series based BTS systems include -1PT controller and -EHV 200/400 V option. Owners of existing California Instruments AC power sources should contact the factory for information on adding BTS system capability.

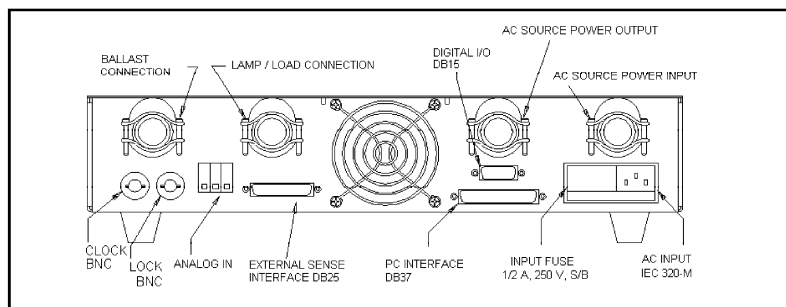
PC Requirements

The BTS system requires the use of a PC capable of running Windows™. Recommended PC hardware specifications are as follows:

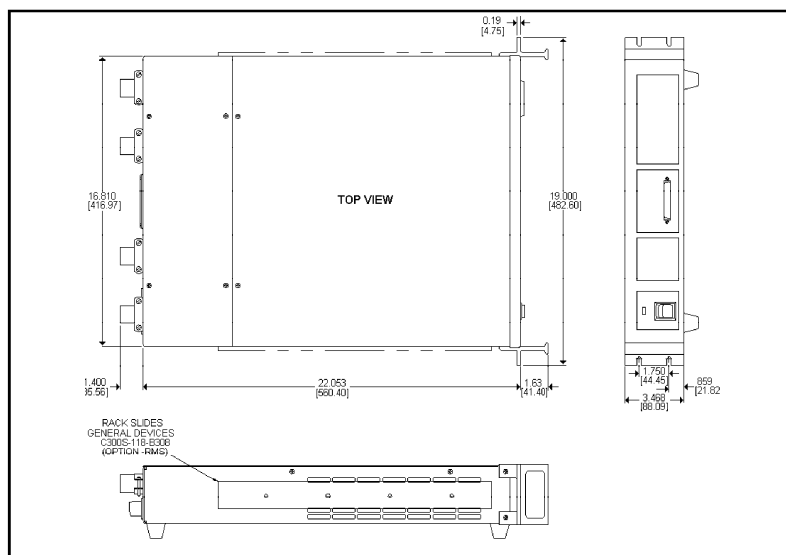
- CPU** Pentium 200 MHz or faster.
- RAM** 32 Mbytes or more.
- Hard Disk** 500 Mbytes or more. 6 Mbytes required for program storage.
- Display** Color SVGA Monitor

- Slots** Available ISA bus 3/4 size card slot.
- RS232C** Available serial port for RP Series BTS.
- IEEE-488** IEEE-488 controller card (CI488I or CI489P option) for L Series BTS.

California Instruments will quote a PC as part of the system on request. Contact factory for details.



Rear panel connections



Dimension drawing BTS system unit shown with -RMS option.

Options

- HF** High Frequency option. Required for testing of electronic ballasts
- RMS** Rack mount slides.

Accessories

- LD1** Single lamp load assembly - Rapid start, 40 Watt.
- LD2** Two lamp load assembly - Rapid start, 80 Watt.
- LD3** Three lamp load assembly - Rapid start, 120 Watt.
- LD4** Four lamp load assembly - Rapid start, 160 Watt.
- ECT1** Single channel External CT board.
- ECT2** Dual channel External CT board.
- CI400AD** Spare A/D ISA card.
- CI37C** Spare 37 pin signal interface cable.
- CI488I** IEEE-488 Bus Controller ISA Card.
- CI488P** IEEE-488 Bus Controller PCI Card.

Supplied with

- North American Line Power Cord for BTS system unit.
- RS232C cable DB9-F to DB9-F for AC source control. L Series based systems require IEEE-488 interface cable. (not included)
- Rack mount handles. (option -RMS recommended for rack mounting.)
- Instruction Manuals.
- Ballast Test Software.
- AC Source Control Software.

Contact California Instruments:
Toll-Free: 800-4AC-POWER
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