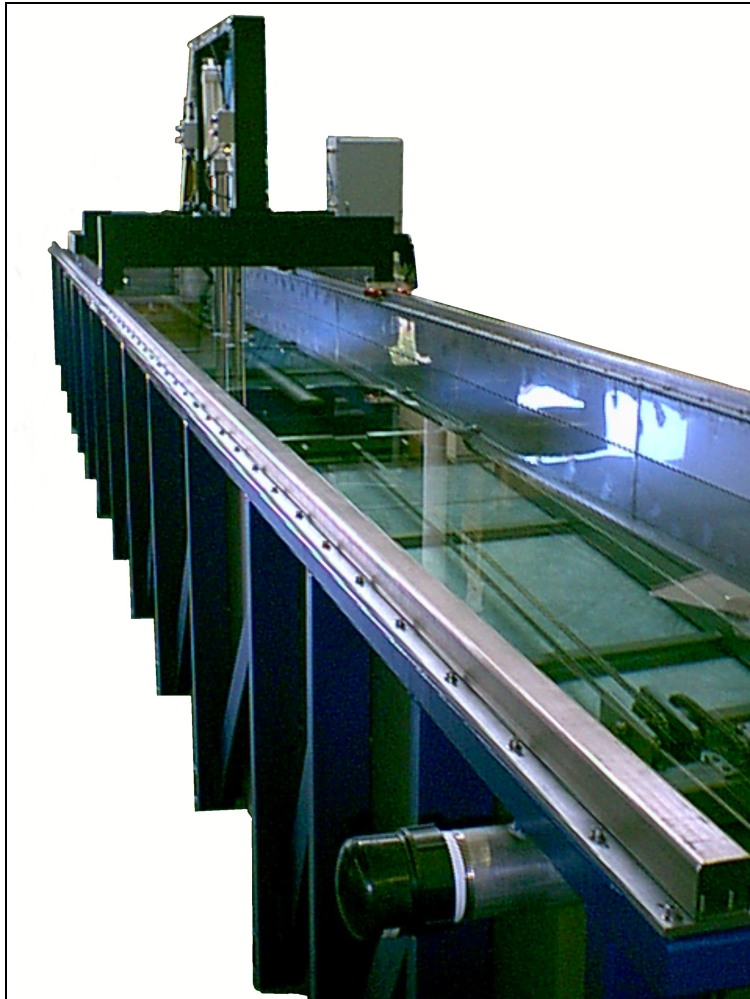




TECHNICAL SPECIFICATION

SDI-5270

Automated Ultrasonic Heavy Duty Bar Inspection System



Note: This specification is for the standard SDI-5270 Bar Inspection System and is for information only. The details may differ significantly from those proposed for specific customer requirements. The specification provided in the Statement of Compliance and formal quotation supercede this document.



Specification for an Automatic Defect Detection System for Heavy Bar

1 INTRODUCTION

This specification is for an automatic, single or multi channel, high-resolution ultrasonic test system for heavy bar inspection. The equipment components include a heavy duty precision bridge mounted on a stainless steel immersion tank fitted with the SDI-1335 or 1336 rotator and search tube equipped with the selected gimbal assembly. The equipment is designed to operate with any system level ultrasonic instrumentation. It is designed to achieve the accuracy and resolution required at high throughput speeds in a harsh operating environment. SDI have supplied systems of this type for testing product with diameters ranging from 2 in (75mm) to 16 in (355 mm). with lengths up to 35ft. (8m)

2 SYSTEM DESCRIPTION

The system consists of floor mounted heavy gauge stainless steel tank with a re-enforced base suitable for supporting rotators up to 35ft (10m) long. A variety of transducer holders and bar followers are available. These range from a single channel dual axis motorized gimbal to a multi-channel bar follower where the transducers are mounted in-line in a housing which rides in contact with the bar. The bar to be tested is loaded onto the rollers and the transducer/follower assembly positioned above it. As the bar is rotated, the transducer assembly traverses the entire length of the bar. All test parameters, including rotator speed, helix pitch etc are controlled by the SDI-1830-UTB system controller. The time to test a bar is dependent on the test standard defect size and determined by the bar diameter.

The 1335 and 1336 series rotators consist of separate drive and idler units providing, in most cases, two point support for the bar under test. This provides greater tolerance to slightly bent bars than the multiple roller designs. The drives are installed in oil filled underwater housings. Both the drive and idler stations can be relocated to any point along tracks mounted to the support frame in the bottom of the tank. The modular design allows rapid reconfiguration of the system to accommodate different lengths and diameters of bar. The 1335 is the heavy duty unit for bars weighing up to 16000#. The 1336 is for bars up to 8000# and has adjustable idler height for accommodating bars with varying diameter.

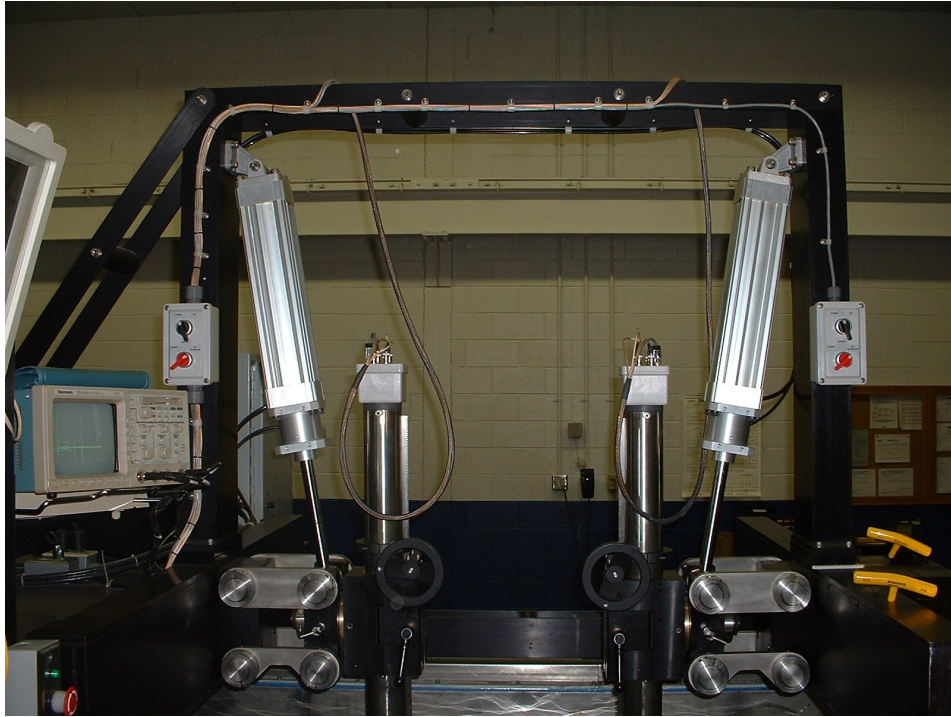
3 ELECTRICAL CONFIGURATION

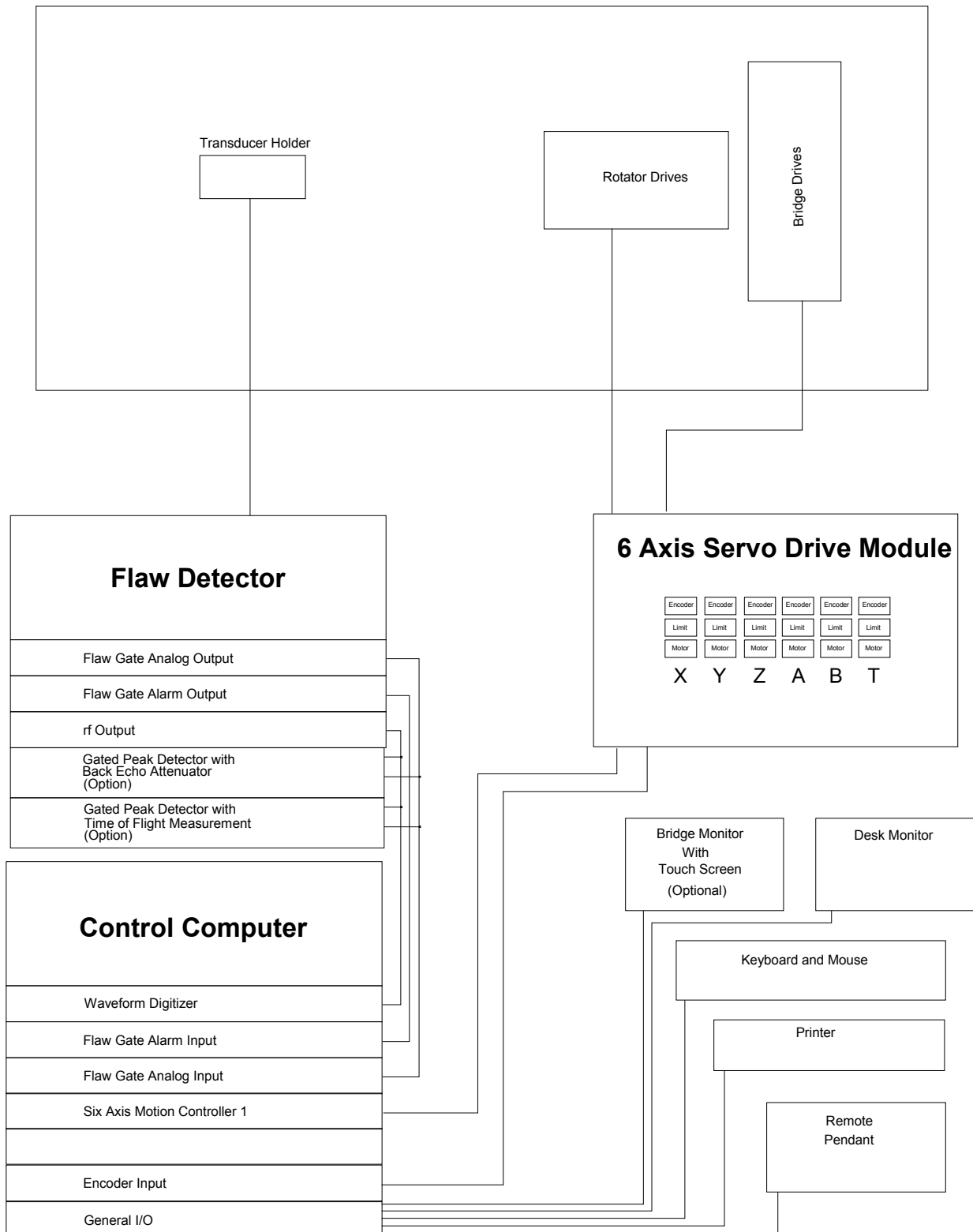
The electrical configuration describes the components and interconnections for the motion control, drive, instrumentation and data acquisition sub systems. The majority of the components are housed in the system console. All system components meet applicable US and International safety codes. Apart from the very low current ultrasonic signals, no voltages greater than 70 volts are present anywhere on the system outside the control console. The electrical layout is shown below



**Structural
Diagnostics, Inc.**

Technical Specification







4 INSTRUMENTATION

SDI has installed heavy duty bar systems with instrumentation from numerous sources. Multizone systems have been installed with proprietary GE multi-channel flaw detectors. Other systems have Krautkramer USPC 2100 instrumentation. The recommended instrumentation is the SDI-2460 flaw detector. This high speed, high-resolution instrument is designed for industrial on-line applications where features such as the interface gate synchronization eliminate variations due to surface conditions and bar flutter. The unit can have up to eight sequenced channels each consisting of a pulser/receiver module. Each channel will accommodate four gate modules with rear panel outputs and front panel LED displays indicating the gate condition. For each channel a flaw gate LED will be illuminated if an echo appears in the gate above the preset thresholds. Thickness modules are available if required.

5 SYSTEM CONTROL

All system functions will be controlled and monitored by the SDI-1830-UTB system control module. This is an integrated suite of software modules running on a rack mount industrial P.C. with an optional touch screen display. There are four main functions: - 1) Instrument setup and display, 2) System control, 3) Operator input, and 4) Data logging. The screens can be custom designed for particular applications. Typical screens for each of these functions are shown below. These could be reconfigured as required.

5.1 Instrument Setup

This screen allows each instrument channel to be set up and directs the video and gate outputs from the selected channel to the display scope. At any time the operator can view the A-scan display of any channel by touching that channel number on the screen. All setups can be stored and recalled with a file name. Other functions controlled include:

- Instrument setup; gain, gate position and gate threshold.
- Instrument response monitoring - either the alarm condition, the signal amplitude or the time of flight.
- Multi-channel sequencing to prevent cross talk by sequencing pulsing, gate position and gate width on each pulse.
- Transducer manipulation where motorized transducer positioners are used the positions of each transducer for each material, type and size can be stored as part of the test parameter setup. (option)



5.2 System Control

This is the main screen for controlling system configuration parameters and defect location markers when supplied. The inspection helix pitch is controlled as determined by the required defect detection level. The system controller controls the drive speed and helix angle of the system. For more automated systems this module receives input from various sensors on the system and instrumentation and determines a sequence of events based on these inputs. The precise sensor input is determined by the type of test being performed and the options installed. Custom inputs can be accommodated for special functions.

For the variable input levels, both digital and analog, internal comparator logic allows the operator to set high and low thresholds for the quantity being measured. When these thresholds are exceeded the required response can be programmed. An example of this device would be the marking of regions where different types of defect occur.

Other parameters monitored are rotational speed and linear velocity of the bridge. Part diameter can be entered manually or automatically measured.

There are a wide range of programmable controller responses, examples of these are 1) delayed response, for the action of down stream devices, such as paint markers or sorting stations, and 2) defect indication suppression. This is required at or near the end of a bar.

It also provides direct operator jog control allowing the system to be reversed to investigate defect indications.

5.3 Operator Input

This screen allows the operator to input the details of the product being tested.

4.4 Data Logging and Display

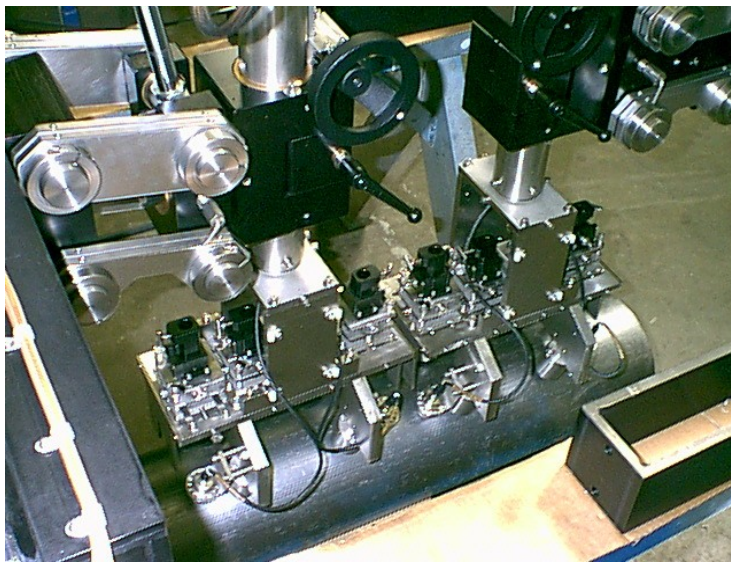
The system is available with C-scan or data logging options. The conventional c-scan acquisition and display is described in the SDI-WinScan technical specification. The screen shown in this document is the data logging screen used when full c-scan generation is not required. This screen shows the condition of the system alarms. All



alarm outputs will be continually monitored using this SDI-1910 Posilog PC data logging package. When an alarm condition occurs the Posilog will record the channel number, alarm type and encoder counter reading. These values will be displayed on the screen and stored to disk. In addition, an optional paint marker will indicate the occurrence of a defect on the side of the bar. The defect log files will be accessible in read only mode from any other PC networked with the host.

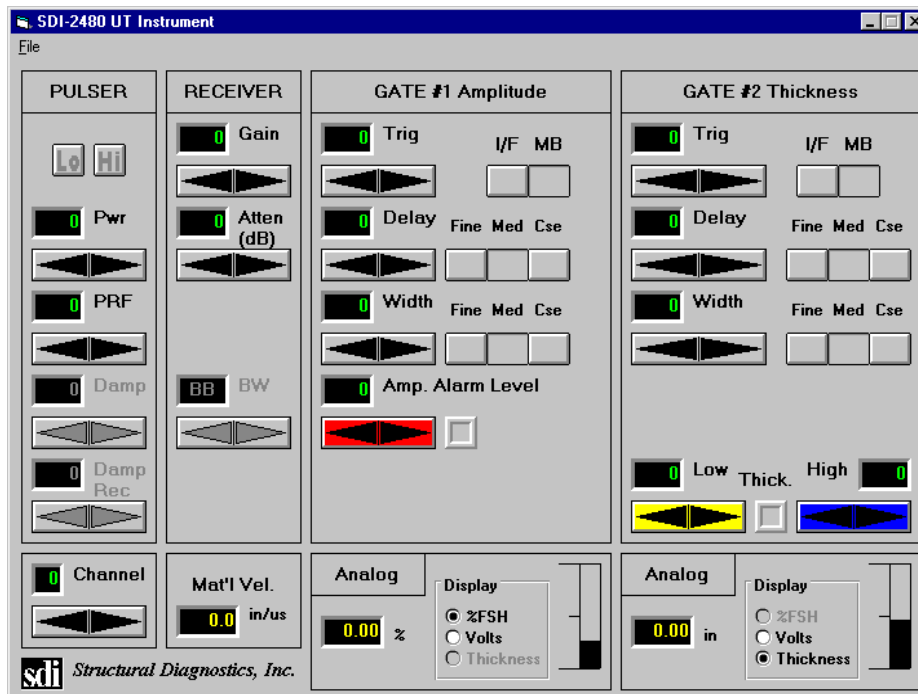
6 TEST RESULTS

Digital defect logging modules are available for computerized archiving of test results. The SDI-1961 Posilog data acquisition package option will provide tabulated defect location in a report format.

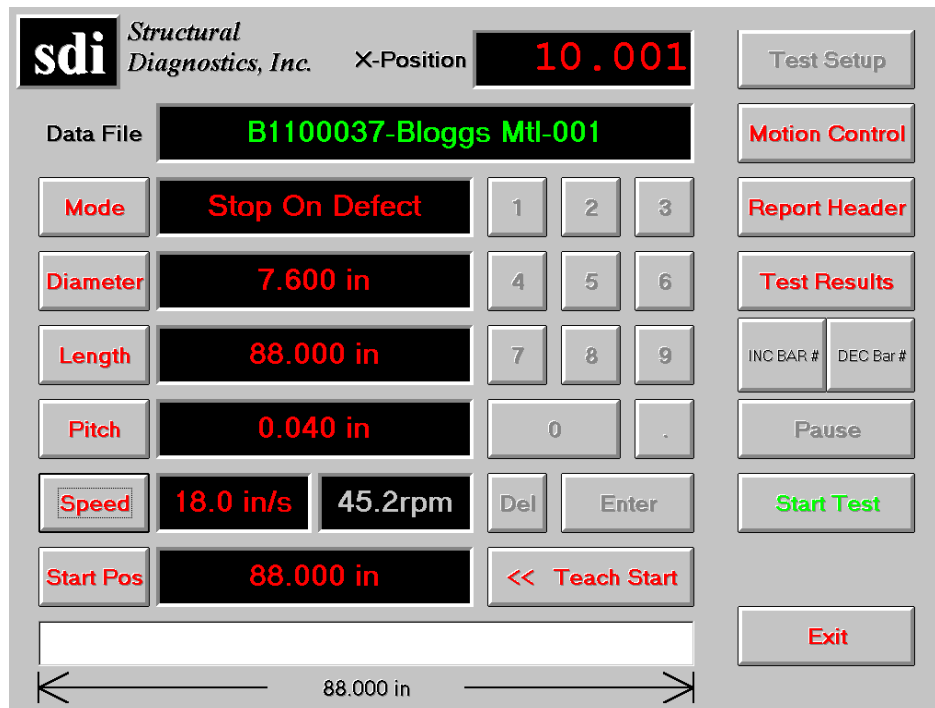




7 SAMPLE SYSTEM CONTROL SCREENS



Instrument Setup



System Control



Tacking Data

sdi Clear All Clear Screen

Record File --

01

Pre Fix	Mill Order	Tag No.	No. of Tags	Charge to Order/Prod. Code	Alloy	Heat

Operator Width Thickness

Comments

Pre-Calibration Post-Calibration

A	B	C	D	E	F	G	H	I	J
K	L	M	N	O	P	Q	R	S	T
U	V	W	X	Y	Z	<=Delete		Clear Field	
0	1	2	3	4	5	6	7	8	9

Calibrate & Test

Tracking Data

UT Setup

Main Alarm Monitor

Exit to Win95

Operator Input

sdi

Data File 2CI 12848 DOCUMENT NUMBER 450-581-001

Ultrasonic Inspection Test Report

Pre Fix	Mill Order	Tag No.	No. of Tags	Charge to Order/Prod. Code	Alloy	Heat	Width	Thick Avg.
ABC	0123	4Q						

0h 20h 40h 60h 80h 100h 120h 140h 160h 180h

200h 220h 240h 260h 280h 300h 320h 340h 360h 380h

Test Started	5/7/98 11:32:59 AM	Test Finished	5/7/98 11:41:49 AM	Pre Calibration		Post Calibration	
Defect Under Thickness Over Thickness		System Operator		Data Record	ABC-0123-4Q		Print Back

Data Logging