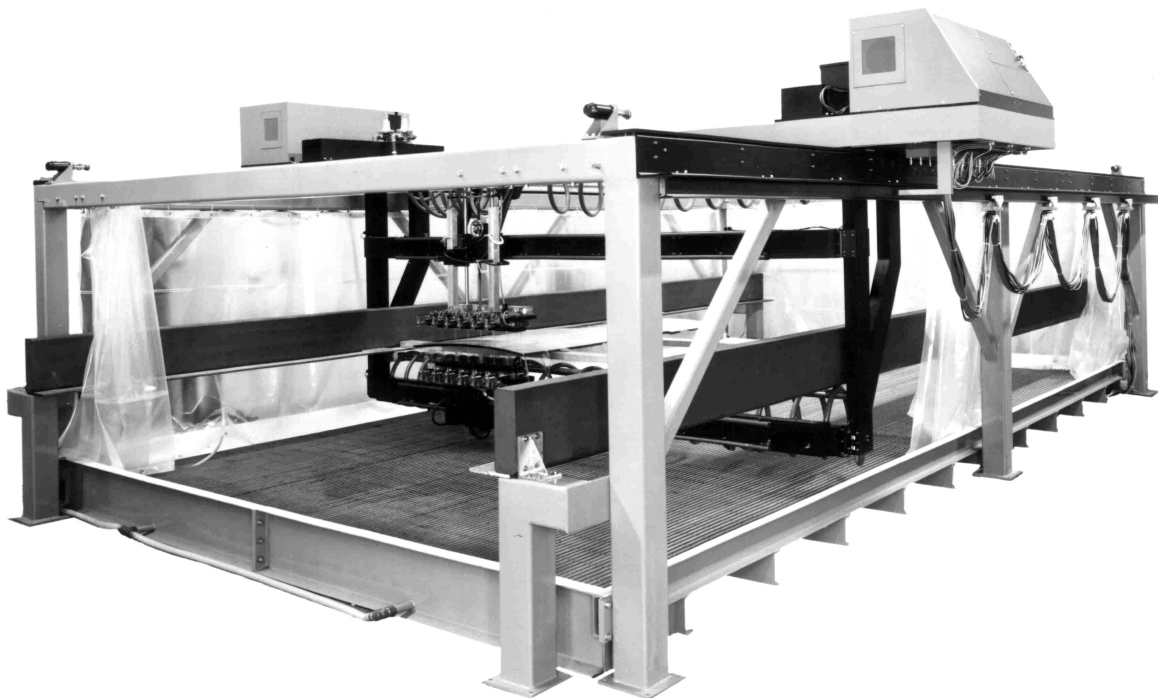
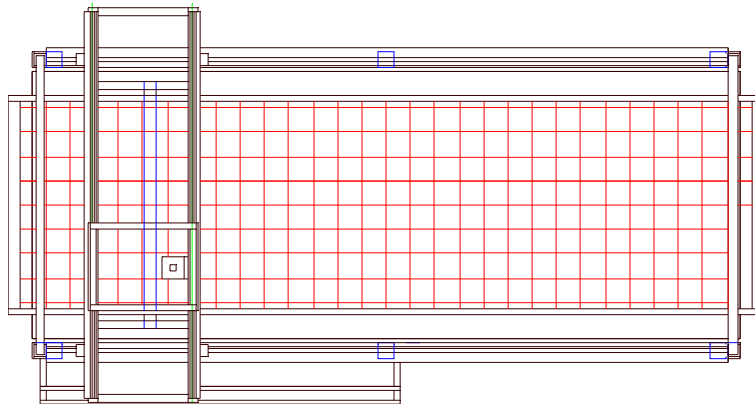
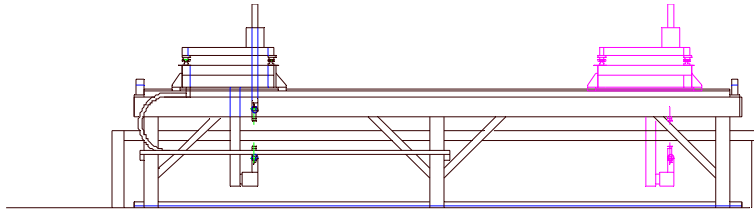




SDI-5630 Horizontal Through Transmission Inspection System Technical Specification



1 INTRODUCTION

This specification details the SDI-5630 through transmission system suitable for a variety of high performance C-scan applications. The system is designed for the production inspection of advanced composite and metal bonded components. The system employs modules used throughout SDI's product range. It incorporates the MasterScan motion control and WinScan data acquisition packages, which are among the most powerful in the industry, together with SDI's ultra low noise servo drive components. All modules used in the system are designed and manufactured in-house by SDI in their facility in Camarillo, CA.

2 SYSTEM GENERAL DESCRIPTION

The design features a rigid aluminum heavy box section bridge, supported by a stand alone gantry. The bridge carries the upper Y axis carriage with a motorized Z axis and transducer squirter assembly. Supported beneath this is a slave Y axis carriage with a corresponding squirter and gimbal assembly. Drive components are housed in a stand alone control console, together with the motion control and acquisition computers. Apart from the extremely low current ultrasonic signals, only low voltage drive voltages are present on the bridge and gantry making the system design extremely safe. The axes of motion provided on the system are shown in the table below:

Axis	Description	Range	Speed	Resolution	Accuracy
X	Primary axis along the gantry. High power d.c. servo drives with resolver.	20ft.	24 in/sec	.001	.004in/ft +/- 0.010in overall
Z	Vertical column rack and pinion drives. Manual with d.c. servo drives optional..	1-1.5ft.	2in/sec	.001	.004/ft +/- 0.010in overall
Y1, Y2	Rack and pinion drive d.c. motors and resolvers	6ft.	8in/sec	.001	.004/ft +/- 0.010in overall

The system is available with a multi-channel option providing up to four squirters on both carriages. The SDI acquisition software uses data swathing to combine the data from multiple transducers into a single file. The system can be made to automatically perform a defect evaluation mini-scan, with full waveform capture, for every indication meeting the defect criteria used in the automatic cluster analysis.

3 MECHANICAL CONFIGURATION

The major mechanical components of the SDI-5630 are the gantry, upper bridge, lower bridge, squirter housing and vertical drive assembly. The squirter housing is fitted with a manually adjustable gimbal for transducer alignment. The system is also equipped with a stand alone sump.

3.1 Gantry-X Axis.

The gantry is fabricated from heavy steel box section with a high redundancy outrigger design calculated to provide the required rigidity and stability for the large accelerating mass of the bridge and squirter assemblies. The gantry is fitted with ground tracks with leveling jack screws and guide bars. Mounted to the tracks are the linear ways and heavy duty rack and pinion drive components to provide precise positioning and encoder feedback. The gantry also carries the cable distribution components. All drives are closed loop d.c. servos with encoders/resolvers.

3.2 Bridge Y Axis

The bridge is fabricated from heavy aluminum box section with a rigid box girder construction. Mounted to it are the precision V ways for the Y-axis carriages which support the Z-axis vertical drive housings. The design incorporates methods of adjusting the orthogonality and alignment of the X, Y and Z axes.

3.3 Gimbals

The manual gimbals provide 10 degrees of adjustment in both the A and B axes. There is also lateral adjustment provided for precise alignment. The transducers are attached to the gimbals by a UHF mount.

3.4 Parts Positioners

Parts are supported in the system by a horizontal wire grid. The small diameter wires used are tensioned and will support components with loads up to 200 lbs. For heavier components, custom supports can be manufactured

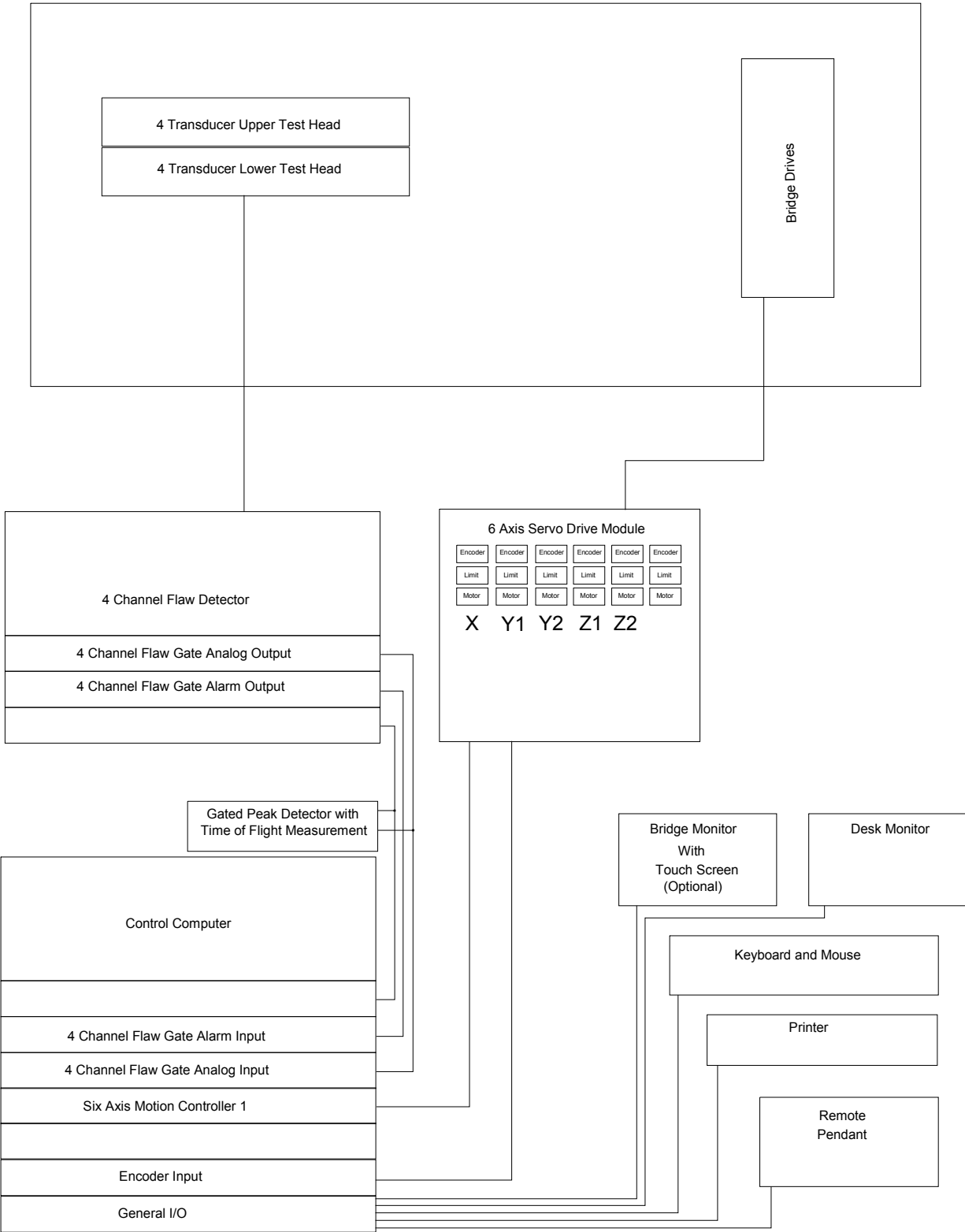
4 ELECTRICAL CONFIGURATION

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.

4.1 Control Console.

The mobile control console can be positioned anywhere within reasonable distance from the system. Current SDI systems have similar remote consoles up to 80 ft. from the scanner. It is fitted with two 19 inch monitors linked in the Windows operating environment to allow windows to be dragged from one screen to the next, or expanded over two screens. The console requires a single 110V 60 Amp single phase supply. SDI will install the necessary transformers to achieve this from the customer's supply. The console houses all the computing, drive and instrumentation components required to operate the system. The enclosure includes a filtration and refrigeration unit.

The electrical layout is shown below. The multi-channel option is shown to identify the additional components required for multi-channel operation.



5 MOTION CONTROL

The motion control is provided by the SDI-1830 MasterScan advanced controller. Designed specifically for ultrasonic applications, it features ultrasonic functional axes and scripted scan plans. This means that complex motion control and acquisition activities unique to ultrasonic inspection techniques are available to the operator through simple commands using ultrasonic terminology. The operator can construct complex scans by chaining together individual motion commands, scan plans and instrument set-ups. Full details of MasterScan are given in the data sheet. Some of the key features applicable to this system are:-

- Functional axes using standard UT terminology
- Import/Export of scan plans to CAD programs
- Integrated instrument control coordinated with the motion along a scan trajectory.
- Scripted scan plans
- Chained scans
- Stop on defect
- Return to defect
- Display of scan progress and time to finish.
- Data swathing to create a single file from multiple transducers.

6 DATA ACQUISITION

The system is supplied with the latest SDI-WinScan multi-tasking acquisition and analysis package designed for high throughput production applications. A technical description of the features and benefits of this high performance industrial package is attached. Some of the key features are :-

- High-speed pan and zoom through entire data file
- High speed, high quality 1:1 plotting of all or selected areas of the data file.
- Scan comments stored with the data file.
- Multi-channel operation.
- True multi-tasking to allow scanning, plotting and viewing of stored files to be performed simultaneously without a reduction in speed.
- Numerous analysis features such as histograms, in dB and linear scales, cluster analysis providing automatic defect identification, image smoothing and filtering with operator defined kernels.

Another time saving feature of the fully integrated motion control and data acquisition package is the ability to perform mini-scans. Areas of interest can be tagged on the data file and the system will automatically drive back to them and re-scan the area using selected defect evaluation scan parameters such as full waveform capture.

7 INSTRUMENTATION

All SDI systems are able to operate with a variety of flaw detectors. Systems have been installed using instruments supplied by all major instrument manufacturers. In addition, SDI manufactures their own range of high performance flaw detectors designed specifically for systems applications. When the SDI instruments are used there are a number of system features available which require instrument parameter changes at rep rate speeds. The standard SDI systems instrument is the 2480-multi channel flaw detector. A wide range of auxiliary instrumentation is also available. This includes pre-amplifiers, log amplifiers, tone burst pulsers, high frequency pulser/receivers and others. Details of the SDI 2480 are as follows:-

General:

High resolution, two channel, fully programmable "Tank Top" flaw detector for use with industrial immersion facilities.
Features switchable pulser voltage, frequency, gain and calibrated attenuation.
Flaw and thickness gates with initial pulse or interface triggering.
8 segment DAC module. Range 37dB
Rectified video and r.f. outputs are provided together with external/int sync and sync out.

Pulser:-

Selectable voltage and damping
High Power 100-1000V
High Resolution 50-300V
Rep Rate 0.5-5kHz. Per channel
Ext/Int sync.

Receiver:-

Selectable Pulse-echo/Through transmission.
Switched Frequency 1, 2.25, 5, 10 and broad band. 1-25Mhz
Gain:- 97 dB. dynamic range
Attenuation 1-127dB in 1dB steps

Gates:-

Flaw Amplitude and Thickness
Main Pulse/Interface sync

Outputs:-

Rectified video.
Stepless gated r.f.
Flaw alarm logic.
Thickness High-Low
Proportional analog 0-10V.

A-scan display module:-

Provides real time A-scan display
A scan printout