TECHNICAL SPECIFICATION
SDI-5130

Utilitank Immersion Inspection System

Note: This specification is for the standard SDI-5130 Immersion 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 supersedes this document.

Specification for an Advanced Ultrasonic Immersion System

1 INTRODUCTION

This specification is for an general purpose immersion system with the precision and repeatability required for the inspection of aeroengine and airframe components. The equipment components include a heavy duty precision bridge mounted on a stainless steel immersion tank optionally fitted with one of the SDI-1320 series turntables or 1330 series rotators. The system is available with single or dual precision search tubes configured to accept a range of manual or motorized gimbal options. The equipment will 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 from all major aircraft, aeroengine and rocket motor producers.

In addition to being approved by all major aerospace manufacturers, the following advanced features of SDI systems give major advantage over competitor's equipment in terms of ease of use and inspection setup and test time;

2 SYSTEM DESCRIPTION

The system consists of floor mounted heavy gauge gantry which spans the stainless steel immersion tank. The precision bridge, search tube and gimbal assembly are mounted on the gantry, isolating them from the tank structure. The stainless steel tank is provided with optional polycarbonate windows to meet the customer's requirements. The base of the tank is reinforced to support turntables, rotators and lift platforms. The turntables have interchangeable drives making it possible to employ an auxiliary small high speed turntable in a system fitted with a large heavy duty unit for normal operation. All SDI turntables and rotators are removable and interchangeable.

For deeper tanks with a large Z range, a number of lift platform options are available. For lower cost systems the 1645 series lift platforms provide an upper loading position and a lower test position on fixed locator stops. The drive is independent of the system controller and is positioned by limit switches. For precision elevation the 1640 series lift platforms are available. These are lead screw driven with closed loop servo control and can be positioned accurately at any height for component testing. Their motion is fully integrated with the system control and the position can be stored as part of a scan plan.

2.1 Gantry-X Axis.

The gantry is fabricated from heavy steel box section with a high redundancy frame design calculated to provide the required rigidity and stability for the large accelerating mass of the bridge and search tubes. The gantry is fitted with ground tracks with leveling jack screws and guide bars. Mounted to the tracks are the linear ways and lead 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.

2.2 Bridge Y Axis

The bridge is fabricated from heavy aluminum extruded section. Mounted to it are the precision 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.

2.3 Search Tubes Z-Axis

The search tubes incorporate several novel design features to provide the required adjustments and accuracy to maintain the alignment of two independent search tubes during high speed 3D contour following. The stainless steel cruciform construction, precision rack and pinion drive and V ways provide single search tube systems with these benefits even though the alignment requirement does not exist.

2.4 Gimbals

Manual and motorized gimbals are available. For the latter, the gimbals are closed loop servos with integral high precision resolvers. The units are housed in oil filled stainless steel enclosures. The transducer is attached to the gimbals by a UHF mount.

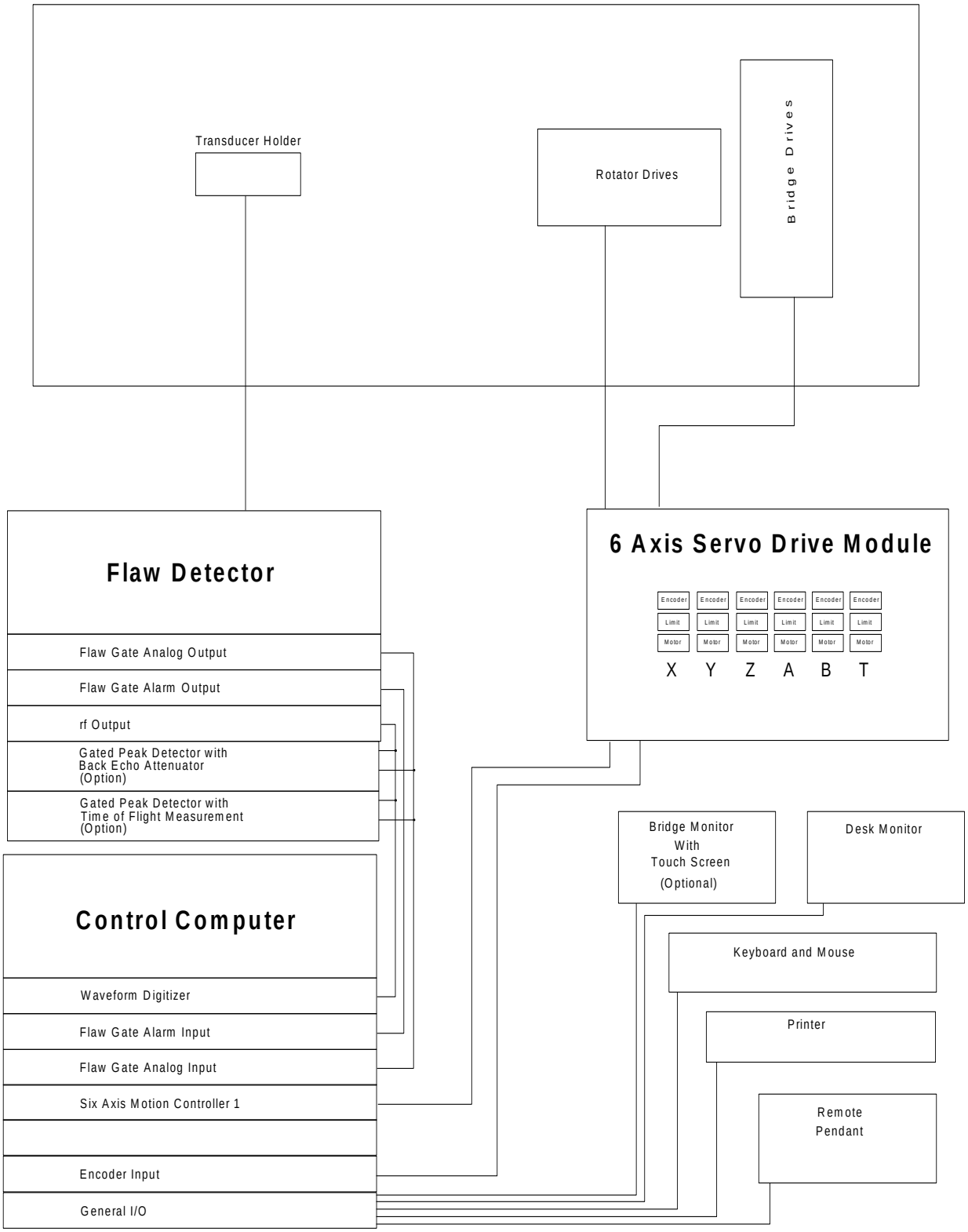
3 ELECTRICAL CONFIGURATION

The electrical configuration describes the components and interconnections for the motion control, drive, instrumentation and data acquisition sub systems. The components are design to be supported on a table supplied by the customer. 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.

3.1 Control Console.

The control console components can be positioned on a table 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 21 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.

The electrical layout is shown below


Transducer Holder
Rotator Drives
Bridge Drives
Flaw Detector
Flaw Gate Analog Output
Flaw Gate Alarm Output
rf Output
Gated Peak Detector with
Back Echo Attenuator
(Option)
Gated Peak Detector with
Time of Flight Measurement
(Option)
6 Axis Servo Drive Module
Encoder
Limit
Motor
X Y Z A B T
Control Computer
Waveform Digitizer
Flaw Gate Alarm Input
Flaw Gate Analog Input
Six Axis Motion Controller 1
Encoder Input
General I/O
Bridge Monitor
With
Touch Screen
(Optional)
Desk Monitor
Keyboard and Mouse
Printer
Remote
Pendant

4 SYSTEM CONTROL - GENERAL

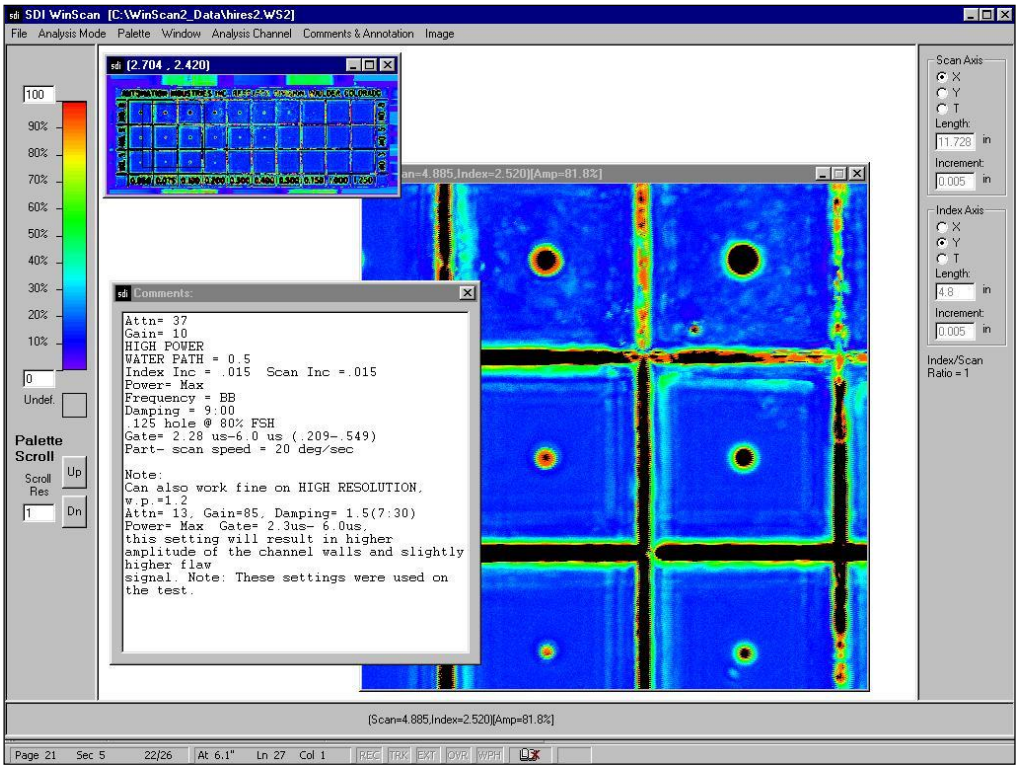
The SDI MasterScan/WinScan suite is one of the most powerful motion control and acquisition packages available. The well structured modular software has evolved by incorporating customer's motion control and acquisition requests into the standard product. With a user base of well over 200 systems, incorporating the suggestions of technicians who spend all their time operating our equipment has resulted in the most versatile, user friendly, package in the industry. Targeted primarily at high volume test lab users, the principal operational criteria are ease of use and fastest possible inspection times.

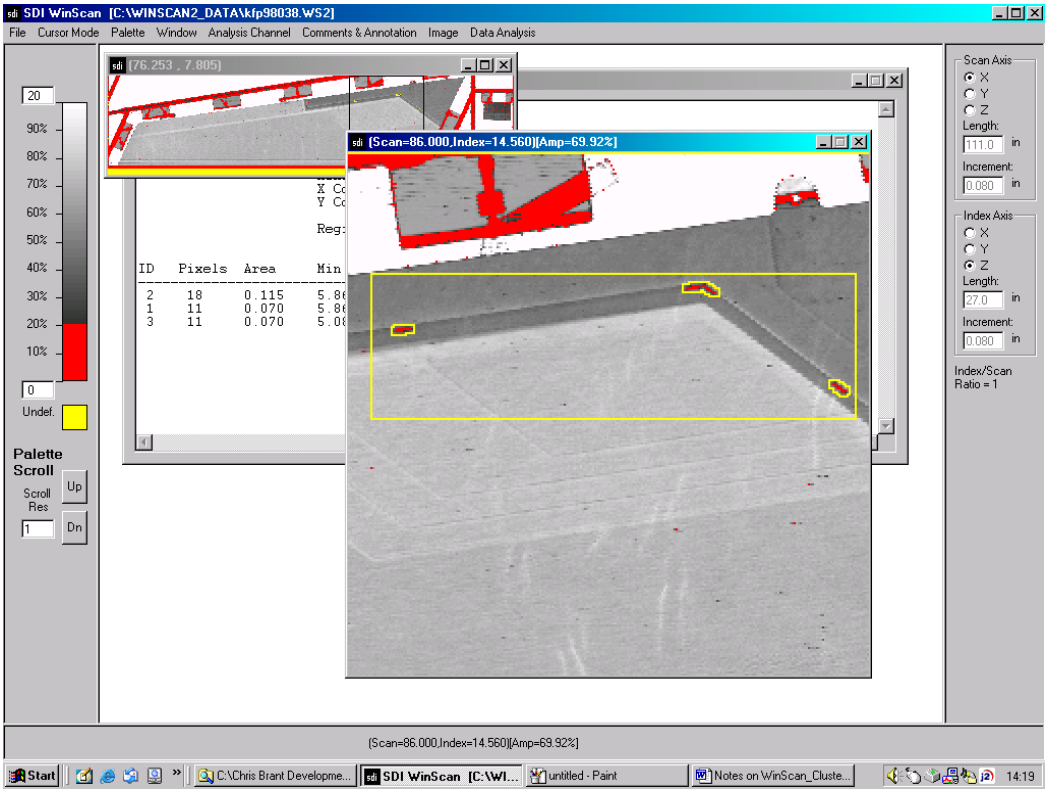
5 MOTION CONTROL

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. With the chain scan option, the operator can construct complex scans by chaining together individual motion commands, scan plans and instrument set-ups.

6 DATA ACQUISITION

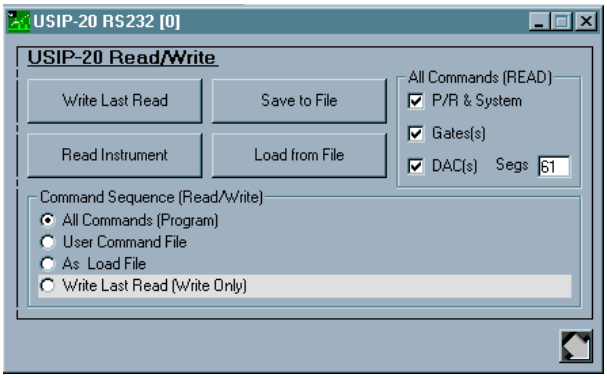
The system is supplied with the latest SDI-WinScan multi-tasking acquisition and analysis package designed for high throughput production applications. A technical description of the features and benefits of this high performance industrial package is attached





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. A wide range of SDI manufactured auxiliary instrumentation is also available and compatible with other manufacturers' flaw detectors. This includes pre-amplifiers, log amplifiers, tone burst pulsers, high frequency pulser/receivers and others. The following third party flaw detectors have been supplied fully integrated with the SDI software. Socomate 3100, USD 15, USD 30, USIP 20, USPC2100, Staveley 138, Panametrics 9000. Other programmable flaw detectors can be used as required.



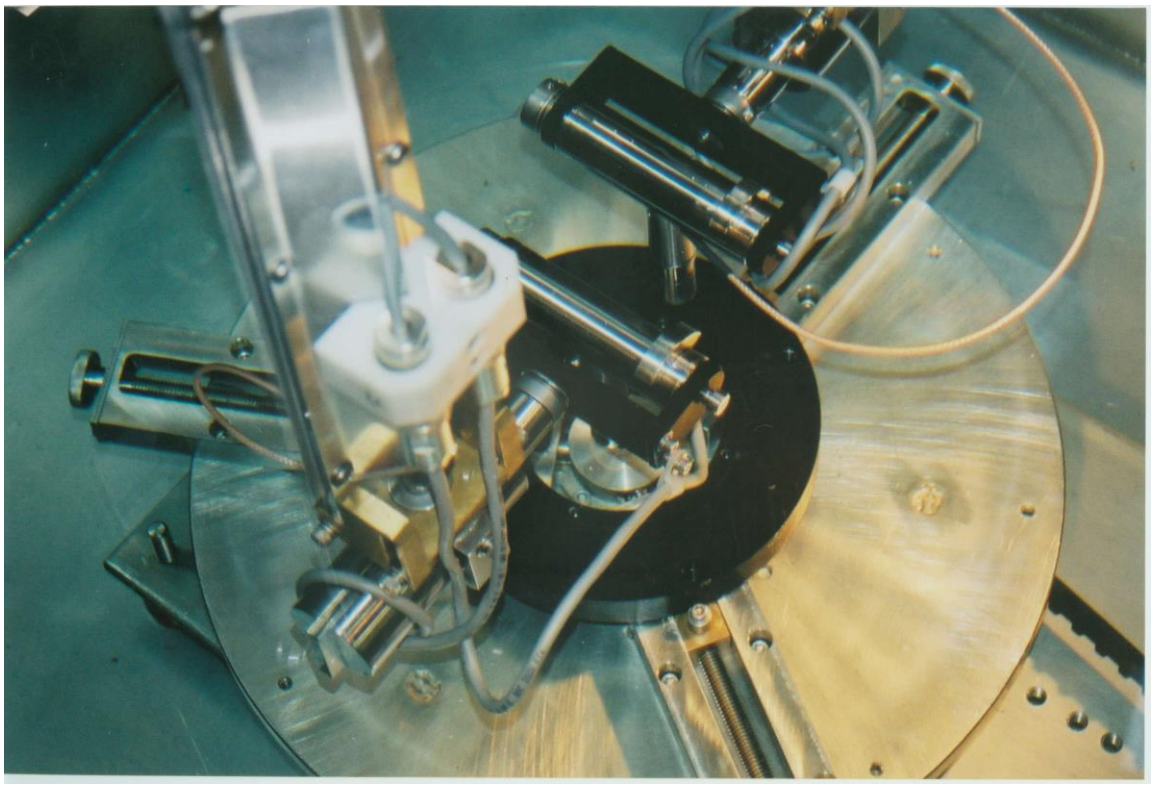
8 SYSTEM ACCEPTANCE/INSTALLATION

The system will be available for customer acceptance trials prior to shipment. The details of the Acceptance Test Procedure (ATP), are in accordance with the customer's requirements. The system will then be installed at the customer's site. It is understood that the customer will provide suitable single-phase power, water supply and drainage. Full installation drawings will be provided shortly after receipt of order.

9 CUSTOMER SUPPORT

The service, maintenance, and technical support facilities offered by SDI can be tailored to meet a wide range of customer requirements. Please let SDI know if you need additional training or support than what is offered in the quotation.

Field service personnel are complimented by the technical support and engineering staff at the SDI facility. The technical support staff is available to customer engineering and service personnel for free consultation via phone or email.



Dual search tube system inspecting internal bore and top face simultaneously