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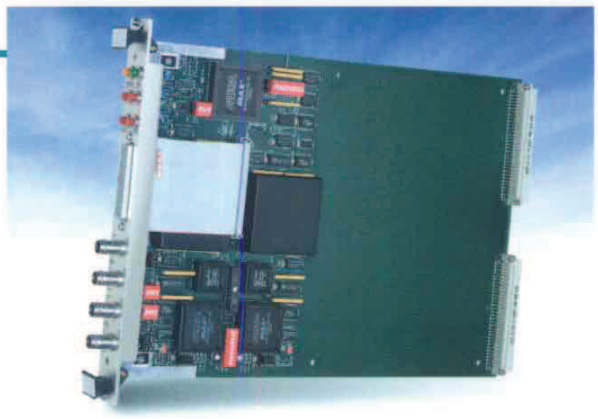
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1553-IDEA VXI

MIL-STD-1553 Tester Card



Functional Description

The 1553-IDEA VXI is a VME/VXI bus compatible card which functions as a tester/simulator for MIL-STD-1553 systems. The card architecture is divided into two identical halves which operate concurrently. Each half emulates a Bus Controller with up to 31 independent Remote Terminals, or a Bus Monitor.

The Bus Controller supports up to 250 independent messages and data tables. The messages are organized in a frame which holds up to 1000 entries; both major and minor frame periodicities are supported and timing is accurate to within 4 microseconds.

The Remote Terminals support up to 250 data tables which are accessed as a function of the command's terminal address, T/R bit and subaddress. Each of the 31 Remote Terminals has its own unique status which is dynamically updated as required by MIL-STD-1553. Protocol options such as broadcast, legality detection and dynamic bus control are supported. In addition, each Remote Terminal has its own error injection definition and can be used to thoroughly test external Bus Controllers.

The intelligent Bus Monitor is triggered by error type, command type, bits set in status words or an external TTL input. Messages are selected according to the command fields: terminal address, T/R bit and subaddress as well as the bus ID. The Monitor detects and reports all errors defined by MIL-STD-1553B and supports sustained real-time storage to disk of messages from a fully loaded bus.

The card has outstanding error injection capability and provides all the errors defined by the SAE Validation Test Plan for Remote Terminals. These capabilities include: encoding errors such as sync/parity/half-bit inversion, length errors (words per message and bits per word), gap errors, zero-crossing errors, and response errors. A unique feature of the card is the ability to inject glitches to simulate the most common source of errors encountered during a noise test.

Each half of the card contains a dual redundant transceiver which can be shared by both halves or operated independently. The transmitters have programmable rise times ranging from less than 100 nanoseconds to more than 250 nanoseconds and their amplitude can be varied from 0 to over 28 Vpp across 75 ohms.

The board provides a register based slave host interface and contains eight 8K x 16 pages of shared memory which occupy 32 KB of A24/A32 memory space. In addition, the card contains nine 16 bit registers in the A16 configuration space which are used to define device ID and type, interrupt levels and vectors, memory offset, shared memory paging, BC/RT and Monitor resets, 1553 functions and discrete I/O.

An extensive run-time library, with source code, is supplied with the card. The library, which runs under HP UNIX, contains over 100 functions written in ANSI C and complies with VISA software conventions to facilitate porting to other environments. A version which supports the National Instrument MXI-2 standard is also available.

The run-time library supports double-buffered data tables and message frames, queued interrupts, block data transfers via 1553, and over 30 special routines executed by the board's BC/RT during intermessage gaps. The run-time library is therefore a very effective software package for high performance real-time applications.

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1553-IDEA VXI

Specifications

Bus Controller

Number of Messages	up to 250
Message Timing	determined by a 32 bit timer with 2 microsecond resolution, major/minor frame periodicity supported, asynchronous insertion of messages supported
Message Frame Size	up to 1000 entries
Data Tables	up to 250 tables shared with emulated Remote Terminals
Input Trigger	wait until next message when TTL input is low
Output Trigger	active high TTL pulse after start of major frame

Remote Terminals

Number of Remote Terminals	up to 31
Data Tables	up to 250 tables shared with Bus Controller
Status Words	individual status words for each Remote Terminal, dynamic update of message error and broadcast bits
Protocol Options	legality detection, broadcast and dynamic bus control as per 1553

Bus Monitor

Storage Triggering	immediate or specified commands/bits set in status/error type
Message Selection	any subset of commands based on terminal address, T/R bit and subaddress
Time Tag	32 bits with 2 microsecond resolution
Input Trigger	initiate message storage when TTL input is high
Output Triggers	active high TTL output after detection of storage trigger, active high TTL output after detection of invalid message
Real Time Display	matrix of 8 counters per terminal address displaying message exceptions and total message count
Error Detection/Reporting	invalid command/data/status, late/early response, wrong terminal address, gap/missing word, inverse sync, flagged status bit

Error Injection

Inverse Errors	signal inversion starting on any 50 nanosecond boundary for up to 3 microseconds (used to inject inverted sync, inverted parity and inverted half-bits)
Glitch Errors	same timing as Inverse Errors
Gap Errors	1, 2 or 3 microseconds between neighboring words
Zero-crossing Errors	-250 to +250 nanoseconds with better than 1 nanosecond resolution (available with Validation Test software)
Message Length Errors	1 to N words (N=nominal number of words)
Word Length Errors	±3, ±2, or ±1, bits in any word
Response Errors	no response, late response of 12 to 30 microseconds in 1 microsecond steps, response on alternate bus, response with wrong terminal address

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1553-IDEA VXI

Miscellaneous

Transmit Amplitude	0 to 28 Vpp (min) in 256 steps
Transmit Rise/Fall Time	<100, 140-180, 180-220, or >250 nanoseconds
Response Timeout	14, 16, 18 or 20 microseconds

Front Panel Connectors and LEDs

Triax x 4	transformer or direct coupled stubs for Channel 1 A/B, transformer or direct coupled stubs for Channel 2 A/B Trompeter BJ77 connectors (or equivalent)
50 pin D-type	Bus Controller: 4 inputs and 4 outputs, TTL compatible, Bus Monitor: 4 inputs and 4 outputs, TTL compatible, Bus activity status: 4 outputs, TTL compatible, Host discrete I/O: 8 inputs and 16 outputs, TTL compatible, Power: 2 VCC and 2 grounds
LEDs	MODID: lit when MODID input is active READY: lit after card self-test passes BUS ACTIVITY x 4: Channel 1 and 2 A/B

Host Interface Requirements

Bus	VME/VXI
Memory	any 32 KB block in A24 or A32, any 64 byte block in A16
Interrupt	IRQ1-7 (both card halves can share the same interrupt)

Power Requirements

5 volts	1.8 A (max)
12 volts	30 mA @ 0% transmit duty cycle 400 mA (max) per transmitter, @ 100% transmit duty cycle and maximum output
-12 volts	100 mA (max)

Environmental Conditions

Operating Temperature Range	0° to 50° C
Storage Temperature Range	-20° to 70° C
Humidity	0 to 30 % non-condensing
Size	B or C

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