Technical Bulletin

NetDAS

Programmable Signal Conditioning & Encoder System

Network Capable Airborne Data Acquisition Products

FEATURES

- Automatic Configuration Upload
- High Speed Internal 133 MBPS Bus
- Automated Calibration via Vista TEC
- 8 Selectable Formats of up to 256K words
- CAIS, 10WIF and Ethernet Compatible
- Modular Design with Integral Signal Conditioning
- Small Size, Light Weight, Low Cost
- Fully Programmable
- Missile and Fighter Aircraft Applications
- PCM operation to 20 Mbps
- Ethernet operation to 100 Mbps
- Resolution to 16 Bpw
- Accuracy ±0.5% Standard - Over Complete Environments (Optional Accuracies Available)
- System Programming via Vista TEC
- Military Screening and Parts Levels Available
- Standalone or Master/Slave Operation including integration with PCU-800, MMSC-800 or RMU1000 Data Acquisition Systems
- Embedded Encryption Available (Option) - Consult Factory

GENERAL FEATURES

The NetDAS is a complete data acquisition system providing all the signal conditioning and encoding functions, where size, performance, and cost are critical and the environmental conditions are severe. Based on over 35 years of Signal Conditioning, PCM Encoding and Data Acquisition experience, L-3 Communications Telemetry-East has designed the NetDAS to combine all of the most commonly required functions in a very small modular package. The unit is constructed from stackable conditioning and overhead modules that contain state-of-the-art high-density FPGA and DSP technologies, which increases performance, maintainability and survivability in harsh environments while minimizing size, weight and cost.

L3 communications

GENERAL FEATURES

PCM Encoder

The design philosophy of the NetDAS is based on the extremely successful MMSC-800 and MPC-800 product lines, merged with state-of-the-art technologies to provide greater functionality, making the unit more cost effective. Utilizing modular architecture, the NetDAS can be configured to meet the exact needs of any flight test program and still allows the user the ability to reconfigure the unit in the field to adapt to changing mission requirements. Full programmability of gains, offsets, filter cutoffs, and channel sampling rates is offered with a software package that offers a Graphical User Interface (GUI).

The NetDAS and its library of data input modules is the functional building block of a Distributed Data Acquisition System operating as a Standalone Encoder or in Master/Slave configurations.

In addition to configurations implemented using the NetDAS alone, the NetDAS may be integrated with any of the heritage L-3 Communications Telemetry-East data acquisition systems in large system configurations, allowing for installation of slave encoders in closer proximity to the sensors to be monitored which provides enhanced performance as well as reduced cabling requirements.

Finally, the NetDAS offers a Bus Bridge Module (NBB-801) that allows NetDAS and 10 WIF modules to be mixed in a single stack. This capability protects a customer's investment in fielded MPC-800 systems by allowing them to be upgraded with the latest in signal conditioning, bus monitoring and formatter modules.

Signal Conditioning

The NetDAS meets the challenge of today's market-place by offering a complete family of signal conditioning modules to accept inputs from sensors and subsystems. The types and features of these conditioners are continuously expanding as new modules are developed. Please consult the factory for a complete list of the currently available modules.

Custom modules can be created for unique measurement requirements.

Both analog and digital signal conditioning modules are available for virtually any sensor. Analog sensors include the following:

- Bridges and bridge type devices
- AC and DC voltage inputs
- Potentiometers
- Accelerometers
- Resistive Temperature Devices
- Thermocouples

A wide range of analog signal conditioning features are available depending on the type of sensor to be monitored and therefore the type of signal conditioning module selected. Modules are available with the following features:

- Excitation
  - Constant Voltage
  - Constant Current
  - Multiplexed Constant Current
- Programmable Gain and Offset Pre-sample filtering
  - Fixed frequency cutoff
  - Programmable frequency cutoff
- Calibration
- Simultaneous Sampling
- Input attenuation or filtering
- Bridge completion

A wide variety of digital input data can be accommodated through the selection of the appropriate signal conditioning modules. The following types of digital modules are available.

- Synchro/Resolver Inputs
- Discrete (single ended or differential)
- Isolated Discrete
- Serial Digital
- Frequency or Period
- Timed Event
- ARINC 429 Bus Monitor
- 1553 Bus Monitor

NetDAS Programming Software

NetDAS programming and system configuration management is available though the use of Vista TEC, the latest software development of L-3 Communications Telemetry-East.

Vista TEC provides the following programmable functions:

- Measurement Definition Management
- End-to-End Calibration
- Automatic Telemetry Frame Format Population
- Relational Database
- Airborne Hardware Setup
- Ground Hardware setup and Control - Ground Systems and Telemetry Receivers
- Project Manager
- Alarm Detection and Event Reporting and Logging
- Real-Time Data Archiving
- Real-Time Algorithm Processing
- Software Packet and Frame Decommutator
- Real-Time Data Displays
- Data Distribution
- Avionics Bus Management and Analysis
- Applications Programming Interface (API / SDK)
- Post-Processing Application (e.g., Matlab) Interface
- Compatible with ADASWARE export files Vista is implemented on Microsoft Windows NT or UNIX platforms. In addition the Vista TEC plug-in is downward scalable for operation on the current Windows operating systems: 95, 98, ME, 2000 and XP.

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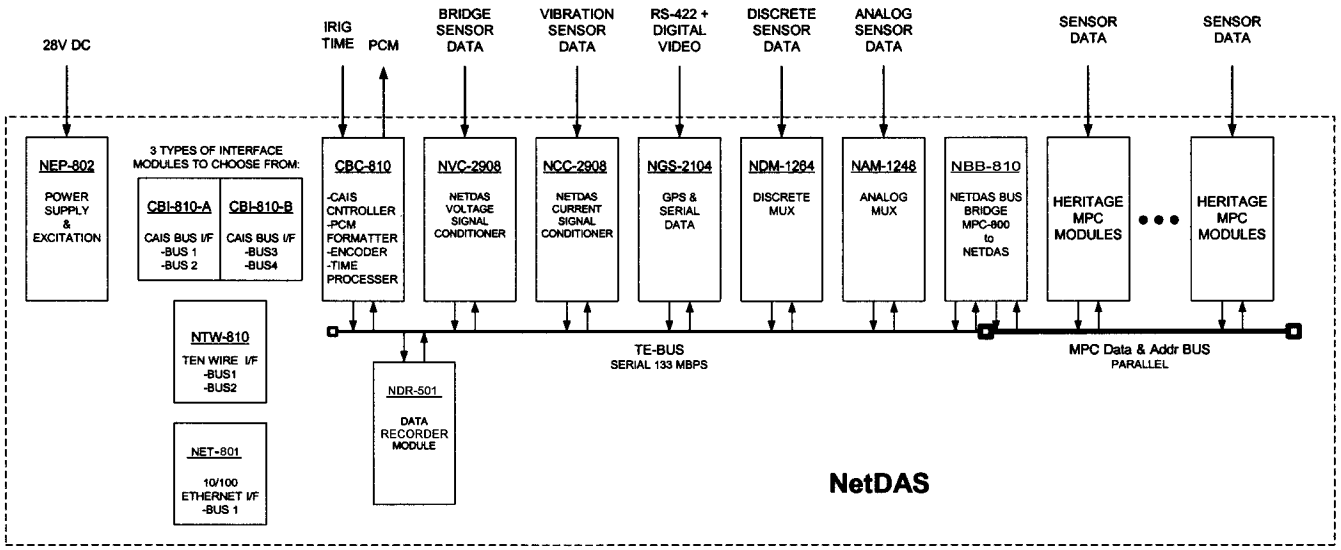
NetDAS Block Diagram



NetDAS Features

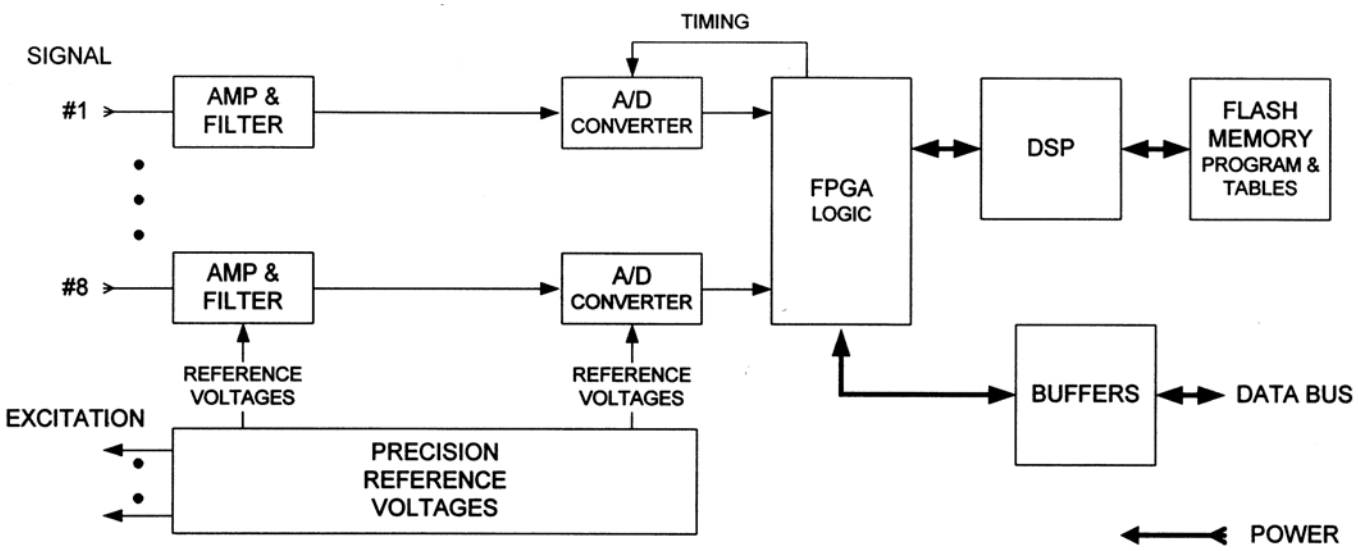
- Serial Interfaces Modules
  - *Four CAIS bus interfaces (requires 2 modules)*
  - *Two 10-wire interfaces*
  - *One 10/100 Ethernet interface*
  - *One USB 2.0 interface*
- 32-bit RISC micro controller
  - *Two UARTs (COM1 and COM2)*
  - *16 Mbytes SDR Synchronous DRAM (MT48LC8M16A2TG-75IT)*
  - *Optional memory (as available): 32 or 64 Mbytes*
  - *16 Mbytes Program/Parameter FLASH (Am29LV128MH123RPCI)*
    - Optional memory (as available): 32 or 64 Mbytes
- Formatter
  - *Selectable 1 of 8 active formats*
    - Class I IRIG 106
    - Optional Class II IRIG 106
  - *Dynamic switching*
    - Programmable switch time: Minor frame, Major frame, Immediate
    - Entire format
    - Commutator list only
  - *Instruction memory*
    - 1 Mbyte Instruction Synchronous SRAM (IDT71V67803S133BQI)
    - 4 bytes per instruction – Single format maximum of 256K words
    - Optional memory (as available): 2, 4, 8, 16, or 32 Mbytes
- High Speed Serial bus for local DAU data acquisition and programming
  - *LVDS signaling*
  - *133 Mbps operation*
- Continuous tuned Primary Bit Rate Generator (10 bps to 20 Mbps)
  - Numerically Controlled Oscillator
- Time Code Processor
  - *IRIG A, B, G*
  - *AC or DC inputs*
  - *3 External tick events*
- Smart track splitting
  - *Data routed to any output selectable on a word by word basis*
- PCM Code Generator
  - *Independent outputs: 1 filtered and 2 auxiliary*
  - *Selectable codes: NRZ-L,M,S; RNRZ-L;BiØ-L,M,S; MDM-M,S; DM-M,S*
  - *Programmable Randomizer*
  - *Bipolar output: Filtered (Data)*
  - Programmable gain and offset
  - *RS422 differential outputs: Auxiliary (Clock and Data)*
- Bit Rate Tracking PCM Pre-Modulation Filter

Model NVC-2908

NetDAS Voltage (Bridge) Conditioner

- Eight independent channels.
- Each channel's input voltage level is programmable from 20 mVpp to 20 Vpp in 4000 steps per octave. Higher sensitivities are available at reduced accuracy and reduced bandwidth.
- Each channel's offset is programmable from -50% to +50% of full scale in 4000 discrete steps.
- Each channel's pre-sample filter is programmable from 2 Hz to 2 KHz. Filter is flat until cutoff (1/4 sample rate), then attenuates to 1 LSB in one octave (1/2 sample rate). Allows sampling at four times cutoff. Sample frequency selectable in fine resolution steps. Bypass mode available that has 10 KHz, 5 pole analog filter.
- A/D per channel operating synchronously at 100 KSPS, from system 100 MHz clock.
- Accepts single, half and full bridges as well as potentiometers. Bridge completion is external to the module.
- Excitation voltages of +5 and -5V. 120 mA per group of four channels.
- Accepts source impedances of 0 to 10 Kohm.
- Each channel programmable simultaneous sample.
- Zero calibration internally shorts all channels to ground.
- Signal inversion on per channel basis (in software).
- Status word. Temperature and gain change flag(s).
- Each channel programmable balance output from –5 V to + 5 V in 4000 steps. [10 Kohm source].
- No cross talk (less then 1 lsb).
- ± 0.5% accuracy over full temperature range.
- 12 bit words. 16 bit for internal test.
- System sample rates to 10 MSPS.
- Over voltage protection to ±35V.
- Input impedance ≥ 1 Mohm for power on/off.

NVC-2908

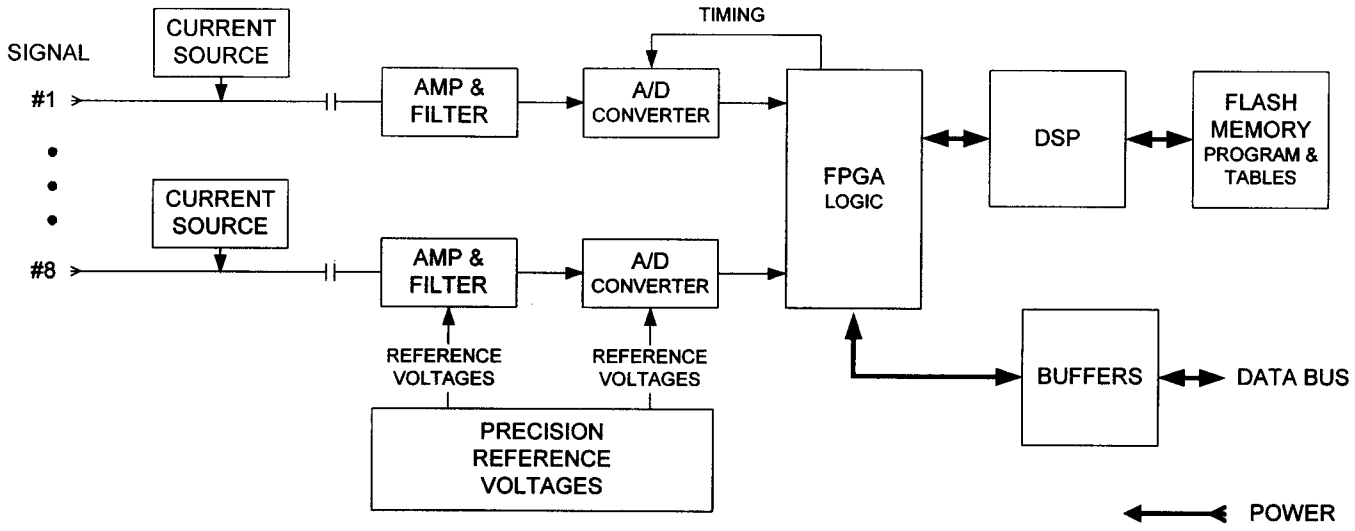


Model NCC-2908

NetDAS Constant Current Conditioner

- Eight independent channels.
- Each channel's input voltage level is programmable from 20 mVpp to 20 Vpp in 4000 steps per octave. Higher sensitivities are available at reduced accuracy and reduced bandwidth.
- Each channel's offset is programmable from -50% to +50% of full scale in 4000 discrete steps.
- Each channel's pre-sample filter is programmable from 2 Hz to 2 KHz. Filter is flat until cutoff (1/4 sample rate), then attenuates to 1 LSB in one octave (1/2 sample rate). Allows sampling at four times cutoff. Sample frequency selectable in fine resolution steps. Bypass mode available that has 10 KHz, 5 pole analog filter.
- A/D per channel operating synchronously at 100 KSPS, from system 100 MHz clock.
- Excitation is a constant current of 3 mA from +15 volts with return to ground or –15 volts (through 1 Kohm).
- Programmable simultaneous sampling for each channel.
- Signal inversion on per channel basis (in software).
- Status word. Temperature and gain change flag(s).
- No cross talk (less then 1 lsb).
- ± 0.5% accuracy over full temperature range.
- 12 bit words. 16 bit for internal test.
- System sample rates to 10 MSPS.
- Over voltage protection to ±35V.
- Input impedance ~ 1 Mohm for power on/off.
- AC input is 0.1 uF with 1 Mohm to ground for a 1.6 Hz pole, single ended.
- DC input is 1 Mohm to ground, differential (but matched only to 1%).

NCC-2908



NBB-810

NetDAS – Bus Bridge Module

FEATURES

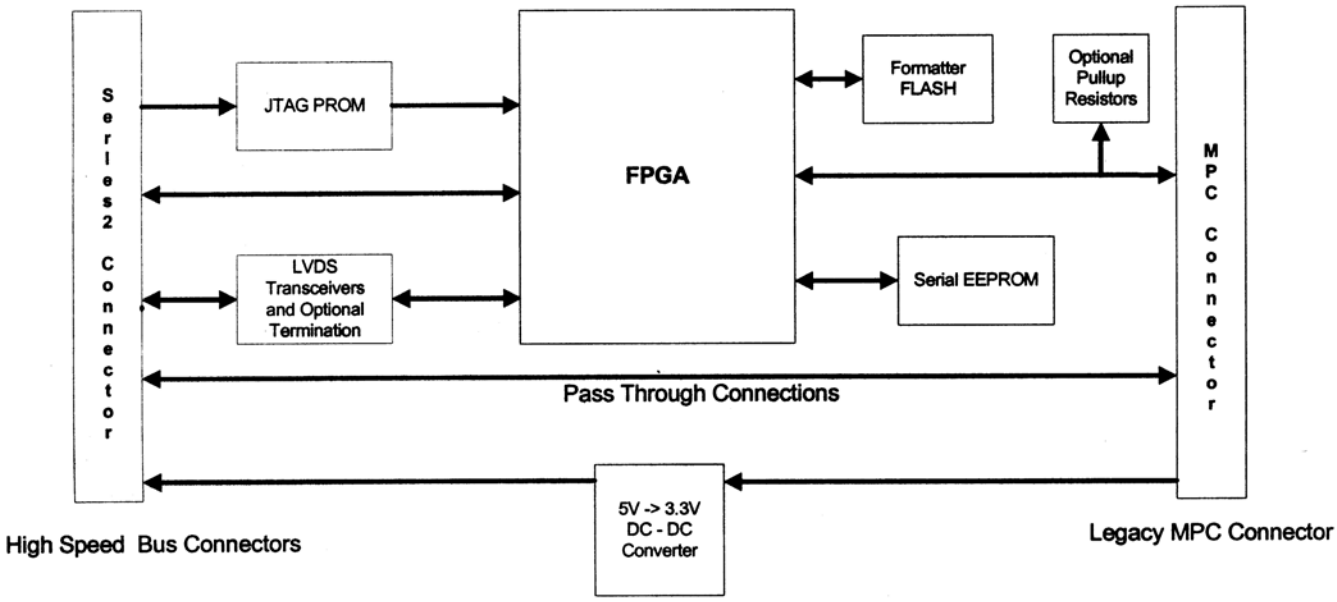
- Terminates and biases the LVDS bus at either end
- Converts the legacy MPC-800 5V operating power to 3.3V required for NetDAS modules
- Interfaces legacy MPC-800 modules to a NetDAS controller
- Interfaces NetDAS modules to a legacy MPC-800 controller

DESCRIPTION

The L-3 Communications Telemetry-East's NBB-810 Module will allow legacy MPC-800 modules to interface to the new NetDAS. The module will also allow the legacy MPC-800 5V power supply to power the NetDAS bus by converting 5V to 3.3V for the NetDAS bus.

The NBB-810 will also allow the NetDAS bus to be accessed by a formatter from the legacy MPC-800 side. This will allow the new NetDAS modules to be compatible with existing legacy MPC-800 systems.

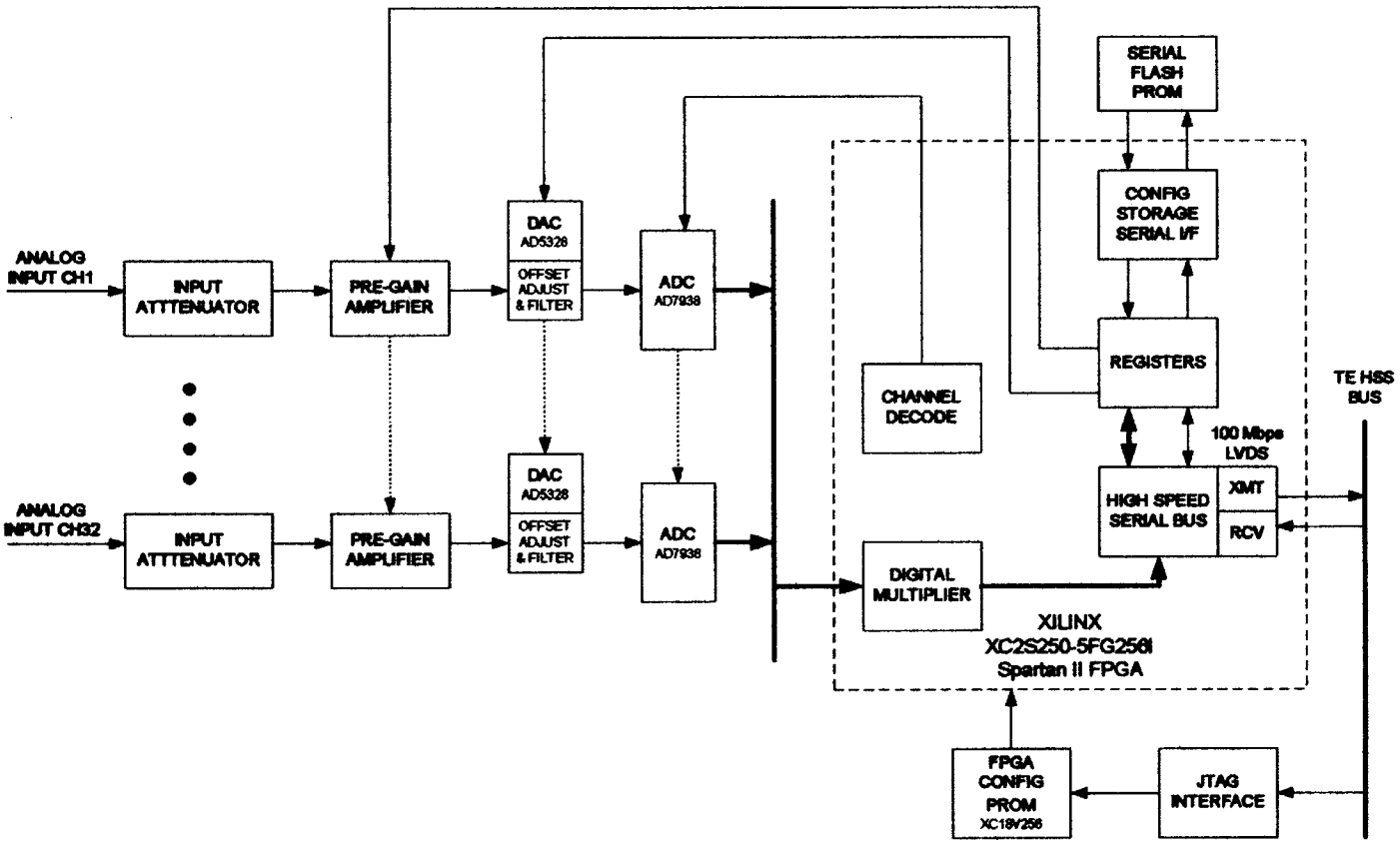
NBB-810



NAM-1232

NetDAS Analog Multiplexer

NAM-1232 Block Diagram

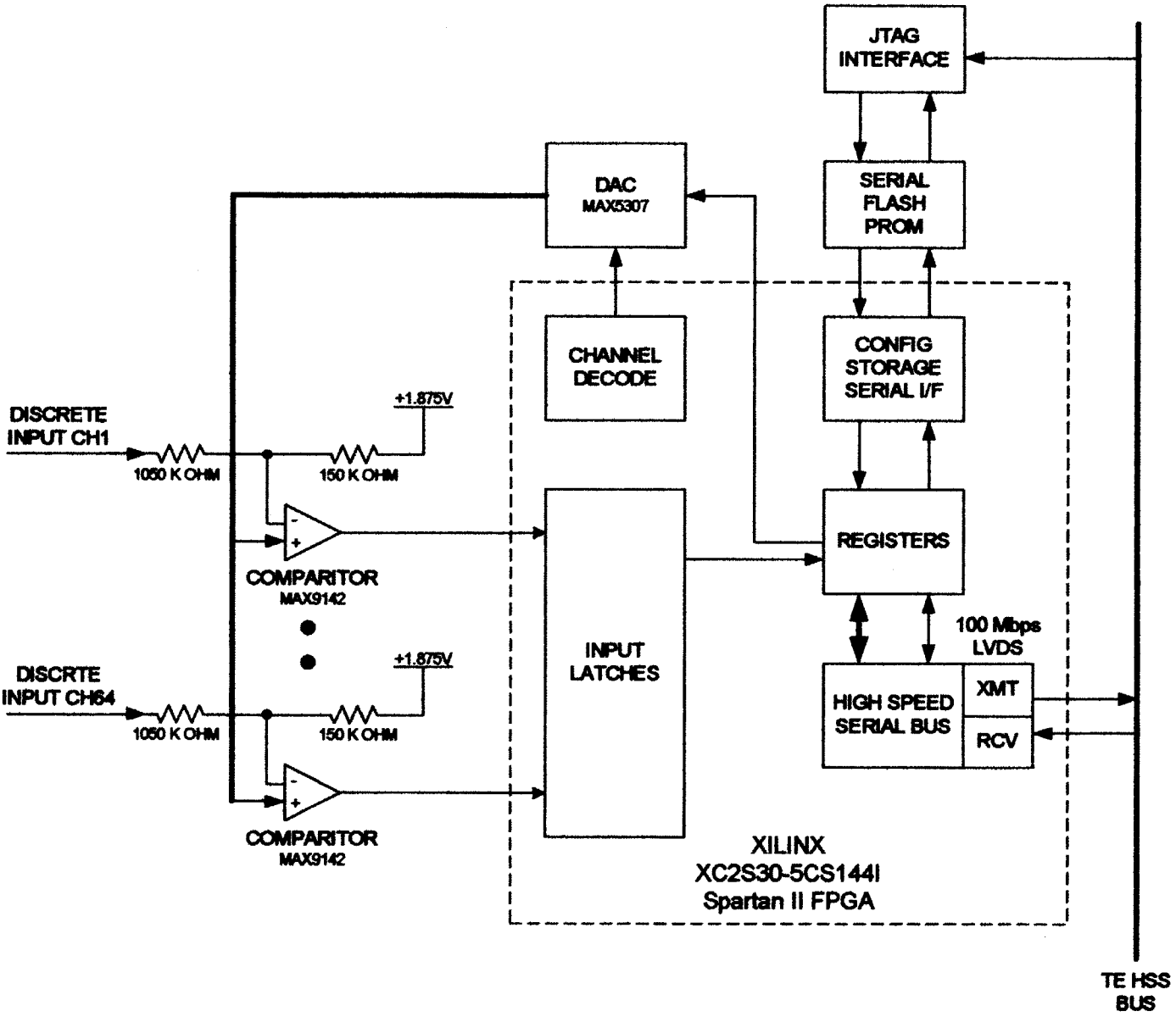


- 32 Independent single-ended channels.
- Each channel has fixed input gain/attenuation and filter.
- Each channel has 4 programmable secondary gains.
- Each channel has programmable offset from –Vmax to 0, and from 0 to +Vmax.
- Cross talk less than 1 lsb.
- ± 0.5% accuracy over full temperature range.
- 12 bit words.
- System sample rates to 10 MSPS.
- Over voltage protection to ± 35V.
- Input Impedance ≥ 1 Mohm for power on/off.

NDM-1264

NetDAS Discrete Input Module

NDM-1264 Block Diagram

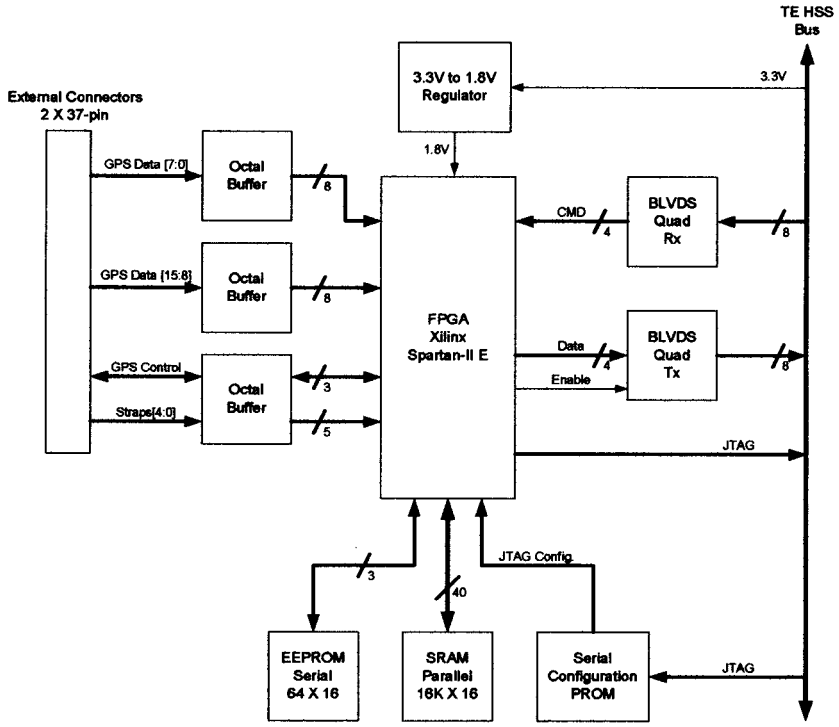


- 64 Discrete inputs.
- Input range ± 150V.
- Each channel has independently programmable threshold from –10V to +10V, in 4095 steps.
- No Cross talk.
- System sample rates to 10 MSPS.
- Input Impedance ≥ 1 Mohm for power on/off.

NGS-2104-1

NetDAS GPS (Parallel) and Serial Data Interface Module

NGS-2104-1 Block Diagram



Parallel I/F

- GPS I/F receives GPS data block transfers, sends data to SRAM for storage.
- SRAM I/F receives Read commands from the TE Bus registers. Read commands have priority over Write commands. Receives Write commands from GPS I/F.
- TE Bus registers send data to/from TE Bus, store data options (ie GPS data block size), Reads GPS data from SRAM, writes/ereads data from EEPROM. Provide configuration data to: GPS I/F.

Serial I/F

- Serial I/F Type I receives data, provides data and address to SRAM for storage. Stores page bigs (upper address bits) as needed. Three RS-422 Rx pairs for Serial Type I/II data with 100 ohm termination.
- Serial I/F Type II (7.16 Mbaud) receives 16-bit parallel data from 3 UARTs if enabled. Assigns address to data and sends both to SRAM for storage. Uses 114.56 MHz clock to decode serial data line into 16-bit words, and provides data to Serial I/F Type-II block Stores format select word, and truncates data if expected number of words is exceeded.
- EOF GEN uses EOF data from TE Bus and Type I/II selection to provide EOF signal for serial interface.
- SRAM/I/F receives Read commands from the TE Bus registers. Read commands have priority over Write commands. Replaces read Serial Type II data with fill patterns if accessed data is stale. Receives Write commands from Serial I/F Type I, or Serial I/F Type II. The Type I and Type II blocks will not be active at the same time. Uses internal block RAM to implement FIFO for Write commands to facilitate flow control (in case two write commands are received simultaneously) and allow priority for read commands.
- TE Bus registers and send data to/from TE Bus, Reads Serial data from SRAM, writes/reads data from EEPROM. Provide configuration data to: Serial I/F Type I & II, EOF Generator.

CONDITIONER/ENCODER SPECIFICATIONS

Input Power (MIL-STD-704)

Voltage:	28± 6 Vdc
Current:	Depends on input modules
Over Voltage:	+40 volts; indefinitely
Reverse Polarity:	-40 volts; indefinitely
Low Voltage:	+22 volts; without damage

Environmental Conditions (MIL-STD-810D)

Temperature Operating:	-35°C to +85°C (Std)
	-55°C to +85°C (Opt)
Non Operating:	-55°C to +100°C (Opt)
Vibration Sine:	30g; 10 Hz to 2,000 Hz
Random:	30g; 10 Hz to 2,000 Hz
Shock:	50g; 110 msec, half sine
Acceleration:	100g; steady state
Humidity:	to 95% non-condensing
EMI:	MIL-STD-461, 462

NDR-801
NetDAS Data Recorder Module

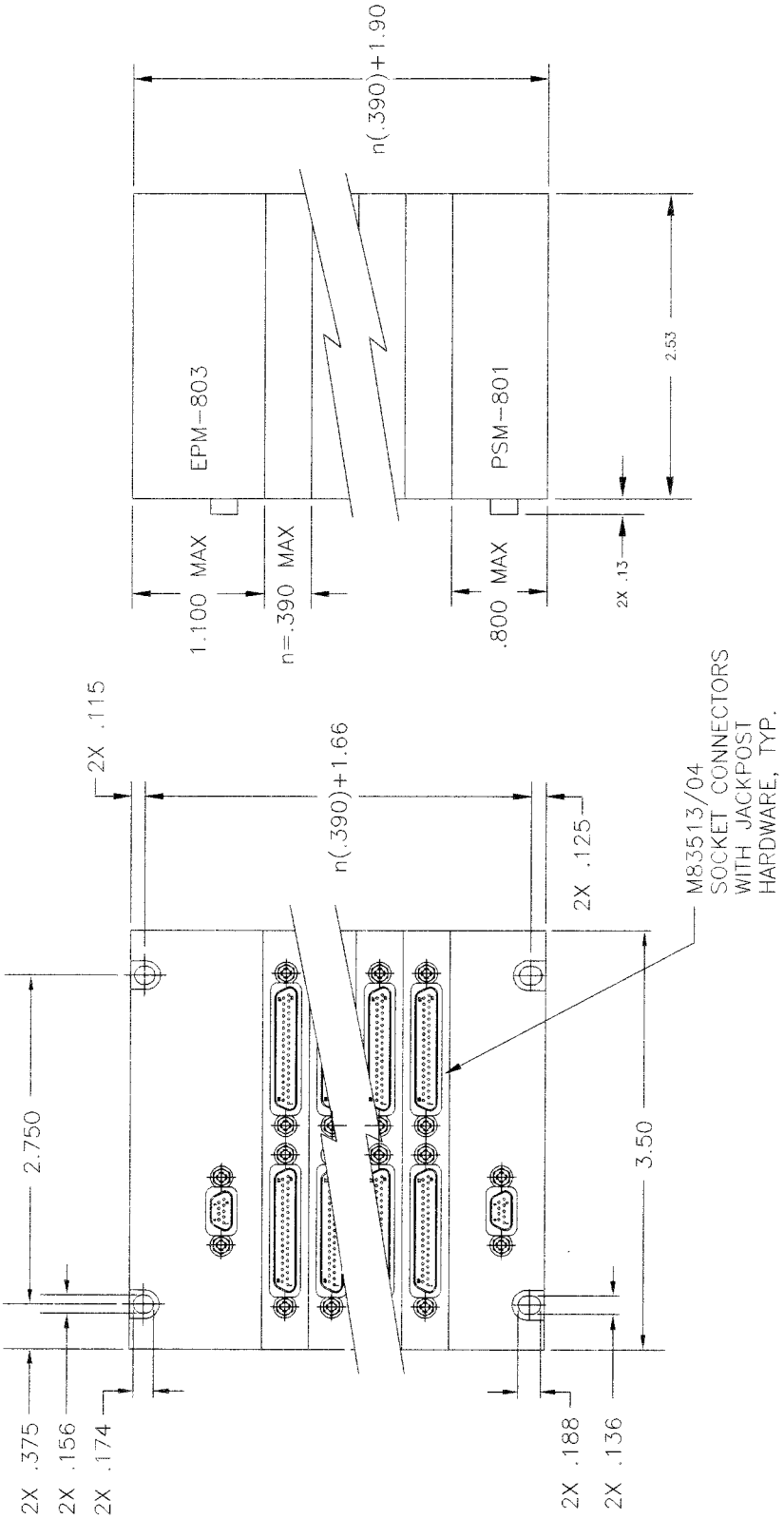
DESCRIPTION

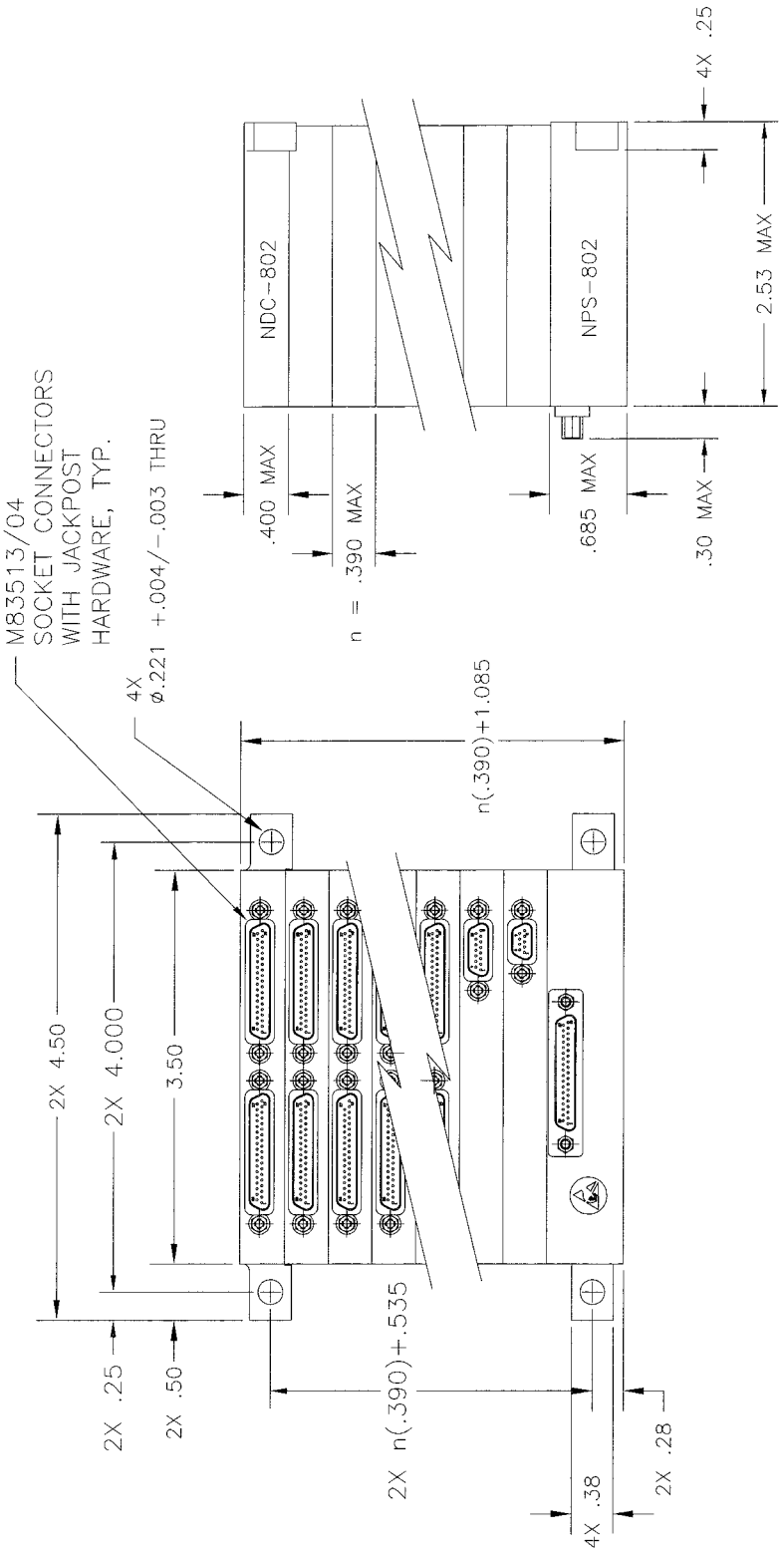
The NDR-801 module records a single PCM stream when given a RECORD command. The module continues to record PCM data until given the STOP or REWIND command or until all of the memory becomes filled. A PLAY command outputs the recorded PCM clock and data from the current memory location and continues until given the STOP or REWIND command or until all of recorded memory is read. A REWIND command halts the recorder and positions the recorder to the beginning of memory. Commands are falling edge triggered via RS422 inputs.

The Memory recorder interfaces to the NetDAS data acquisition bus and provides a 12-bit status word for insertion into the PCM output frame. The status word indicates the operational mode (halted, recording, playing) of the module and the current memory location. An RS422 status flag indicates when the memory is three-quarters full.

FEATURES

- 2 Gbit of storage (approximately 17 minutes of storage at 2 Mb/sec data rate)
- RS422 command inputs (falling edge active): RECORD, REWIND, STOP, PLAY
- Fail-safe RS422 inputs – and open or short circuit is received as a logic high level.
- RS422 clock and data inputs for recording
- RS422 clock and data outputs for playback
- 10 Mb/sec maximum data rate
- 12-bit Status word for insertion into the NetDAS overhead controller
- RS422 Status Flag: Memory three-quarters full
- RS232 Serial port for optional Host PC data transfer and control
- PCM input multiplexer to select between internal and external PCM clock and data


n(.390)+1.90
EPM-803
PSM-801
2.53
1.100 MAX
n=.390 MAX
.800 MAX
2X .13
2X .115
n(.390)+1.66
2X .125
M83513/04
SOCKET CONNECTORS
WITH JACKPOST
HARDWARE, TYP.
2.750
3.50
2X .375
2X .156
2X .174
2X .188
2X .136



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