

# Airborne Telemetry

## NBM-HSDB-1 NetDAS High Speed Data Bus (HSDB) Monitor Module for Garmin G1000™ Avionics Buses *Airborne Data Acquisition Products*

### FEATURES

The NBM-HSDB-1 module monitors network traffic and extracts selected messages/words for addition to the NetDAS output data stream(s). The NBM-HSDB-1:

- Operates as a "Bus Monitor" and tracks all traffic from a Garmin G1000 network
- Supports G1000 Embedded & PC Protocols
- Triggers on up to 1024 unique messages based on various network parameters
- Holds its own trigger list in FLASH memory
- Allows selection of any word from any buffered message
- Supports programming by L-3's Vista TEC application
- Time tags messages to 1 microsecond resolution (time is provided on the TEBus by the NetDAS NDC formatter)



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### DESCRIPTION

The NBM-HSDB-1 module provides bus monitoring capabilities for the Garmin G1000 High Speed Data Bus (HSDB). This module is designed for flight test of aircraft utilizing the Garmin G1000™ avionics suite by allowing for non-interfering monitoring of HSDB traffic as a bus monitoring input module within a NetDAS data acquisition system.

The NBM module can acquire a full spectrum of traffic from the monitored network, and is based on a high-performance FPGA that includes an embedded PowerPC processor running L3-developed application specific code.



In addition to standard data parameters, the NBM-HSDB-1 provides time-tagging and information regarding the number of messages received. This information is available for insertion into the PCM output.

The NBM-HSDB-1 module is transformer-coupled to the G1000 network, incorporating a 37-pin connector with differential Ethernet receive and transmit signals to ensure maximum signal integrity.

### *Network Data Processing*

#### **Overview**

The NBM-HSDB-1 supports the processing of network data based upon the characteristics of G1000 message protocol. The module's internal FPGA and embedded processor functionality can be further enhanced to support a customer's unique processing requirements.

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## ***Parameter Selection***

To select a parameter for insertion into the output data stream, the user defines a message (message block) based upon the unique characteristics of the proprietary G1000 protocol.

The NBM-HSDB-1 uses dual port RAM to support simultaneous writing and reading of parameters. In addition, a double-buffering method allows a previously received message to be fully read out before new data is read in. This method ensures that the NBM-HSDB-1 updates RAM content only as fast as new channel data is read. This way, data integrity is always preserved as long as all data requiring correlation is sampled in sequence in the PCM frame.

## ***Modes of Operation***

The NBM-HSDB-1 Ethernet Network Monitor is a "listen-only" module and does not interfere with normal network operation. The user has a choice of G1000 connection mode:

- **Embedded Mode:** The NBM-HSDB-1 is tied directly into the internal network. A separate Hub type connection is required to allow traffic flow to the NBM module.
- **PC mode:** The NBM module acts as an external monitor, per G1000 requirements.

## ***Message Block Processing***

The module is fully programmable and allows the user to select parameters from any number of messages that may be present on the network. These parameters are selected from various messages, which are defined by a unique combination of the source and destination addresses. Parameters can be 8, 16, 24, 32 or 64 bits in length.

## ***Status Information***

Along with stored data, the NBM-HSDB-1 also makes available the following information for insertion into the PCM output:

- **Message Time:** The NetDAS TEBus backplane provides continuous 1 microsecond time, allowing any module to perform application-specific time-tagging functions. For network monitoring, the NBM-HSDB-1 time tags each message as it is received, making it available as a separate parameter on the PCM output stream. Each message has its own unique time word parameters, so the user can differentiate when each message has been received.
- **Status Counter:** Each message includes a unique word count that provides the information below.

## ***Time Tagging***

The NetDAS formatter continuously places time on the internal TE BUS at a rate of 100 times per second and simultaneously broadcasts a 1 MHZ Clock. From these two signals, each NetDAS module has the ability to generate time tags that are accurate to within one microsecond. On the NBM-HSDB-1, each incoming message causes the internal circuitry to latch time from the internal TE Bus. This time tag is an additional parameter that can be placed into the PCM output.

## ***Programming***

The G1000 messages are defined in a vendor specific XML ICD, used by Vista TEC to populate the database tables that drive the NBM-HSDB-1 setup GUI. This method allows Vista TEC to easily support any message definition changes made by Garmin, without requiring any NBM software updates.

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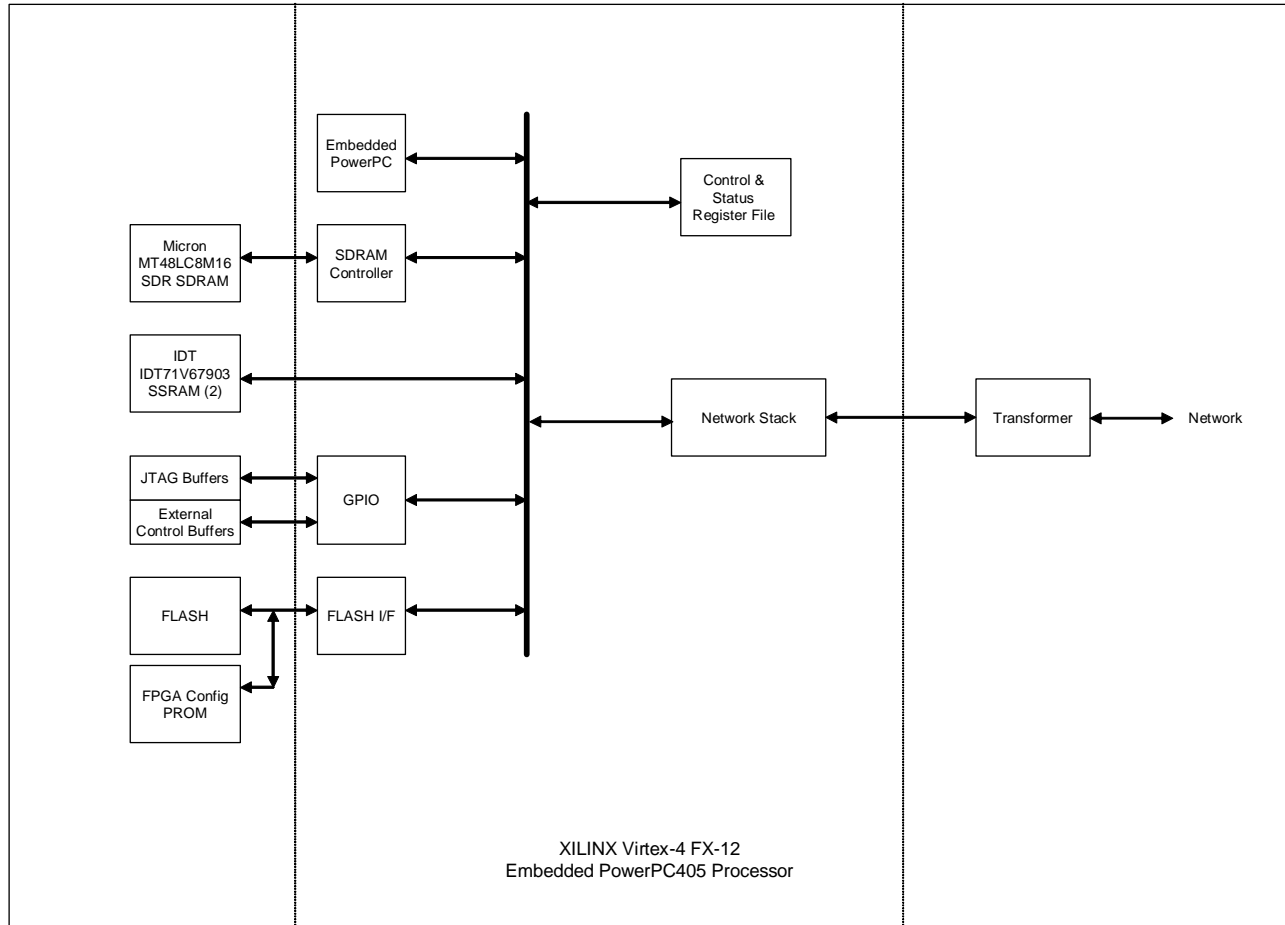
## SPECIFICATIONS

<b>Control / Status</b>	
Inputs	
Number	1
Input Level	Refer to IEEE802.3 Fast Ethernet 10 Base-T / 100 Base-Tx (10/100 Mbits/s) RJ-45 Fast Ethernet Interface Compatible
Mode	User Selectable: Embedded or PC

### **Control Specifications**

<b>Electrical and Physical</b>	
Power	
+3.3V	900 ma
+15V	5 ma
-15V	5 ma
Physical	
Dimensions	3.5" x 2.5" x 0.39"
Weight	70 grams

### **Electrical and Physical Specifications**



**NBM-HSDB-1 Functional Block Diagram**

[www.L-3Com.com/te](http://www.L-3Com.com/te)



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