Technical Bulletin

VistaTEC Product Description

Airborne Telemetry Equipment Configuration Application

Airborne Data Acquisition Products

VISTA APPLICATION OVERVIEW

This product description provides an overview of the L-3 Vista Telemetry Equipment Configuration (TEC) application that is used to setup and control any of the L-3 data acquisition systems. Vista TEC is a member of the L-3 Vista family of applications, which provides a single integrated solution that supports airborne data acquisition and encoding to ground support units and ground station systems.

L-3 Communications has taken its premier standard products and experience of delivering unique totally integrated aircraft flight test systems to build this new generation, hardware-independent platform. The Vista components supplied to a particular customer, though, are based upon the requirements of that customer, thus minimizing acquisition costs. Additional Vista components can be added at any time as the customer's data acquisition or processing requirements change.

Vista is developed in the Java objected-oriented language and utilizes an industry standard middleware database and real-time graphics applications to ensure platform independence. Thus one database contains all the information required to set up the airborne equipment and ground station without the requirement for translators. Operators need to be familiar with only a single look-and-feel GUI to control all hardware elements. A single application product means L-3 is required to support- and you only need to know how to operate- one application suite for all its franchise hardware products.

Vista may be looked upon as a container holding multiple data acquisition, telemetry, and avionics bus applications. Users will select only those plug-in software modules needed to meet application requirements. Plug-in functions include:

- 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 - DataScope/DataViews/SL-GMS/GLG
- Data Distribution
- Avionics Bus Management and Analysis
- Applications Programming Interface (API / SDK)
- Post-Processing Application (e.g., Matlab) Interface

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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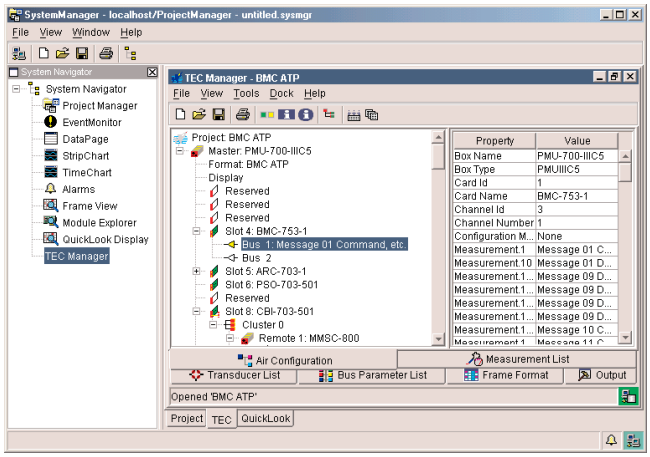
SYSTEM MANAGER

The Vista GUI is aptly called the System Manager. It provides a top-level display that enables the user to see high-level system status and data, and allows navigation to the various plug-ins. The System Manager derives much of its design from experience gained in delivering generations of graphical workstation-based systems and listening to our customers. It incorporates both new technologies and expands upon older features to provide a simple uncluttered tile format. As a pure Java application, it will run on any platform that supports the language. Users may choose the System Manager's look-and-feel between Microsoft Windows (available only on PCs running MS-Windows), OSF/Motif (available on all platforms), and the "metal" platform developed jointly by Sun and Netscape.

System Manager includes a full-featured integrated environment that has the flexibility to be customized by the end user. The tabbed workspace feature provides an efficient means of building multiple screen layouts that can be quickly switched using the tabs along the bottom of the workspace area. Tabs can be added, named and filled with the available plug-in applications by the user. Additionally, various docking options are available that allow individual plug-in applications to be contained within the System Manager workspace or to be docked to the host computers desktop.



PROJECT MANAGER

The Project Manager is a Vista plug-in that is used to configure and control the available air and ground hardware modules. A module concept is used to manage hardware items. The air hardware module is the entire airborne data acquisition and transmission system. Ground hardware modules consist of bit synchronizers, decommutators, time code readers, bus monitors and processing engines. Depending on the system configuration, the actual hardware could be a multi-function adaptor for a Flight-Line Checkout System or a VME crate that has many adaptors and is accessed via a local area network.

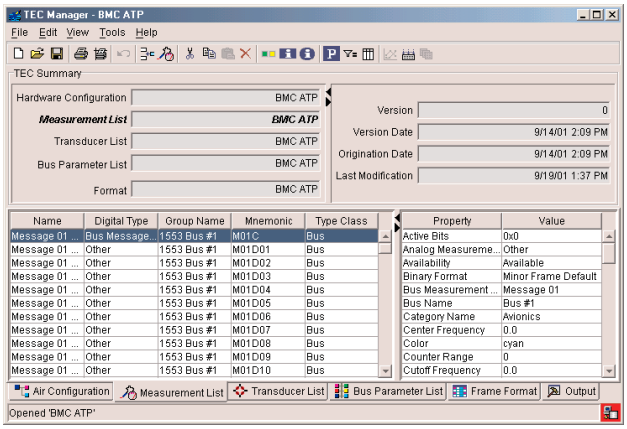
The Project Manager is used to select the desired modules for a flight test and then used to assign available configurations to the selected modules. Multiple configurations are supported and the selection process defines the setup of individual modules, definition of the data streams, definition of each sensor, measurement, processed and derived parameter, algorithm, etc. Project management functions include version control, previous version restore and archive capabilities.

A project is a collection of related lists or database tables. A project allows you to keep configurations for specific tests and programs together under a single named project and the manager can load, compile and run these configurations as a group. From the File menu you can open and save projects, modify, then save as new projects, and configure the system to have the most recent project loaded at start up.

TEC MANAGER

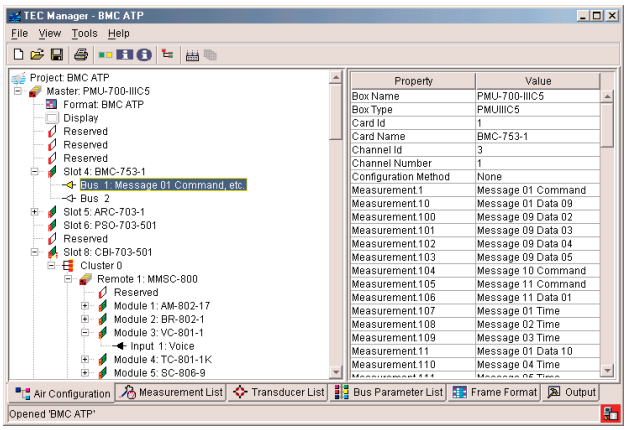
The Telemetry Equipment Configuration (TEC) Manager is the primary Vista application used to configure the airborne hardware. TEC Manager, similar to the Vista System Manager, has individual workspaces devoted to the various TEC subsystems: Airborne hardware configuration, measurement management (including transducer and bus parameter management) and frame format operations. These subsystems are used to describe the airborne hardware configuration, the details of the measurements being acquired and how to encode the acquired data for subsequent transmission for ground processing.

It is important to note that the measurement details include information that enables the Vista TEC components to completely configure both the airborne hardware and any ground hardware included in the project. For example, airborne signal conditioner gains and offsets can be computed automatically to meet a desired resolution and accuracy. Transducer calibration information can be utilized to provide accurate engineering unit conversion during ground processing. Display information is also included in a measurement description and is used to automatically configure ground displays.



AIR CONFIGURATION SUBSYSTEM

The Air Configuration Subsystem is used to develop or edit an airborne hardware configuration. A graphical editor is provided to identify the hardware components and how they are interconnected. Hardware components include the master unit, remote units, signal conditioners and product line specific modules. This subsystem also has the capability to enter or modify channel specific settings for the various analog and digital channels. Settings are stored directly within the hardware configuration database tables for the current project. The channel specific settings are normally automatically configured. However, user entered values place the channel into a manual configuration mode and prevent Vista TEC from changing values during compile time.



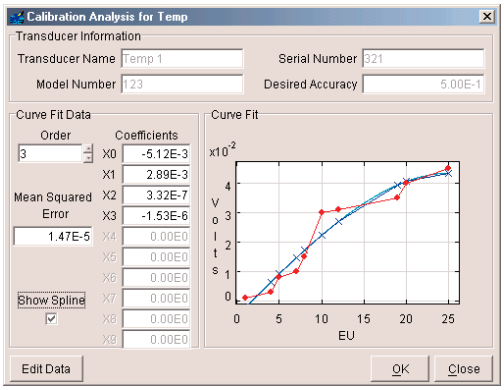
MEASUREMENT SUBSYSTEM

The Measurement Subsystem consolidates all aspects of a measurement channel from the sensor calibration information, through the signal conditioner and data acquisition system to the Flight-Line Checkout System, EU conversions and display process. A master measurement list contains the information used by all of the other Vista components, including the Flight-Line Checkout System.

The Measurement Subsystem provides an editor function that supports all TMATS measurement definition attributes, in addition to other application specific information, including display settings, measurement grouping and final calibration parameters. When a selected measurement is associated to a data acquisition channel and corresponding sensor, a sensor calibration data set can be attached to the measurement. The data conversion information is also used by the Vista TEC Flight-Line Checkout System to perform the proper engineering unit conversions on the acquired data.

CALIBRATION SUBSYSTEM

The Calibration Subsystem is used to maintain the sensor calibration database. Measurement configurations that include an attached sensor will draw from this database and the hardware configuration database to compute the necessary engineering unit conversions required by the Flight-Line Checkout System or ground station.



Sensor calibration information is provided to the TEC Manager plug-in in various forms. Manufacturer-supplied calibration information, laboratory measurements, and "in system" calibration measurements can all be used for individual sensors. Multiple calibration data sets for individual sensors are supported. These data sets can be selected individually by date or simply by the most recent calibration. An archive subsystem is included within the Calibration Subsystem to facilitate the maintenance of multiple calibration data sets for individual sensors.

When manufacturer or laboratory calibration measurements are supplied, the Calibration Subsystem will convert the data to a set of point pairs that relate engineering units to PCM values (counts). The selected projects hardware configuration is used to retrieve the associated gain, offset, and scaling data required for the conversion. A curve fit process is also performed to generate up to a 9th order polynomial for use by the Flight-Line Checkout System and ground station. This integrated capability eliminates the need to maintain a separate database to support sensor calibration data.

AVIONICS DATA BUS SUPPORT

A vehicle under test can be configured with any number of avionics buses that are typically outside the control of the PCM data acquisition system. This is due in part to the fact that the MIL-STD-1553 or ARINC components are manufactured by 3rd party vendors for avionics applications. A vendor's application solution includes setup, configuration, and monitoring software that is specific to the hardware components that are supplied.

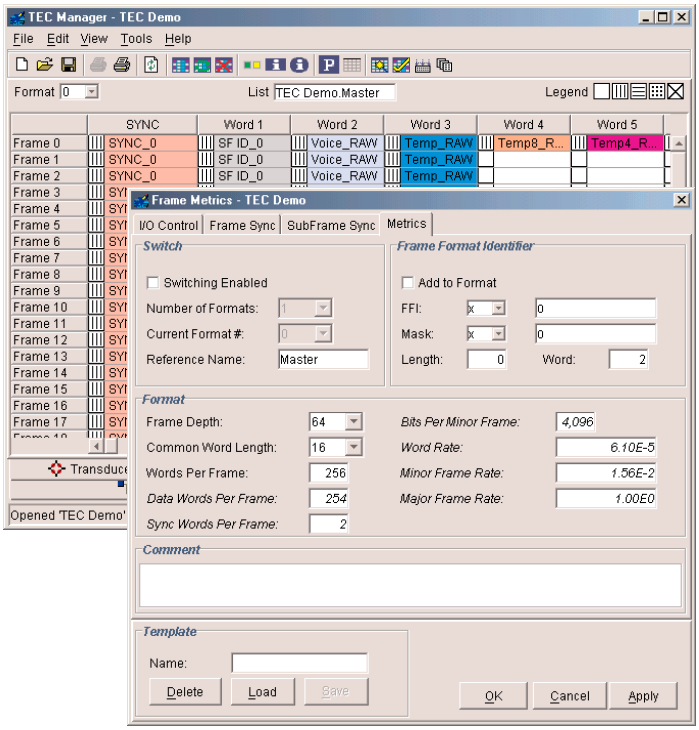
In most flight test scenarios, there is a requirement to see some if not all of the available bus data. To support this, a data acquisition system can be configured with the appropriate monitor module that allows it to unobtrusively extract data from the selected bus and insert the data into the output PCM stream. To support this functionality, Vista TEC is supplied with extensive import capability that allows it to obtain the necessary information regarding the measurements and messages that are present on a particular bus.

FRAME FORMAT SUBSYSTEM

The Frame Format Subsystem is used to either manually enter a frame format or to access the Frame Format Auto Populator. A frame format is required to instruct the telemetry hardware how to encode the desired measurements into the telemetry data stream. This same format is used by the Flight-Line Checkout System to set up the decommutator. Regardless of the mode used, this subsystem draws information from the hardware tables and selected measurement list to develop a populated format that does not violate any hardware restrictions (e.g., settling times, maximum sample rates, etc.)

The Frame Format Auto Populator provides an automatic frame population function that takes an end-user-developed format template and a selected measurement list as input. The output is a populated frame format that does not violate any specific data acquisition hardware restrictions. The resulting frame format can be viewed or edited using a tabular or graphical frame map editor.

The Frame Format Subsystem includes a frame format template management function used to maintain a table of available format templates. The Frame Format Auto Populator can then use these templates to build a desired frame format.



AIRBORNE HARDWARE LOADER

The Vista TEC Airborne Hardware Loader is responsible for uploading a compiled format to the target data acquisition system via an industry standard interface. Possible interfaces include Serial, 10/100BaseTX Ethernet, Wireless Ethernet or Infrared. The Airborne Hardware Loader selects the required interface based upon the properties of the data acquisition system that is specified within the hardware configuration. The Airborne Hardware Loader makes use of the I/O functions supplied by the computer interface's hardware drivers, while it handles all necessary application specific handshaking with the target unit.

The Airborne Hardware Loader is accessible from within the Vista Project Manager via the airborne hardware module. Modules are available for each airborne product line and module functions include select database, compile and load/run. The select database function presents a list of available TEC's which implies that previously developed TEC's are available to all Vista projects.

IMPORT AND EXPORT CAPABILITIES

Vista TEC provides industry standard and optional custom interfaces to external end user systems. Several types of interchange formats are available based on the desired source information.

Project level import/export consists of all the data necessary to define a single project. Interchange formats include Vista TEC, TMATS, CAIS, Excel, MicroDASM and ADASWARE. The TMATS format can be used with or without extensions for the airborne hardware information. L-3 Communications can develop unique import/export formatters to meet other third party or heritage applications software.

FLIGHT-LINE CHECKOUT SYSTEM

The Flight-Line Checkout System (FLCOS) integrates an L-3 airborne data acquisition system loader and a full featured telemetry decommutation system into a single, small, general purpose PC or workstation. Like other Vista plug-ins, the FLCOS is fully integrated into the workspace. The currently selected project is used to configure the decommutator making the process transparent to the end user. Since the FLCOS draws its setup information from the same database tables used to develop the TEC and project, changes are automatically propagated to ground operations.

CVSD VOICE ENCODING & DECODING

Vista can supply the necessary plug-in components that support CVSD encoding and decoding for those applications that require the transmission of voice from the vehicle. Vista TEC performs the setup of the CVSD encoder and provides information such as sampling rate and parameter selection to the decoding process that is resident on the FLCOS or the ground station. CVSD data that is received by the ground unit is buffered and then converted to WAVE format, which then can be passed directly to the Java Sound API via the multimedia interface within the computer, thus eliminating the need for any specialized external hardware.

HOST COMPUTER REQUIREMENTS

Vista will operate under Microsoft Windows 9X/ME, WindowsNT 4 or Windows 2000 on a robust Intel PC, or UNIX on most major workstations.

Depending on the desired product line support, additional hardware-related issues must be considered:

- To program airborne products, various communications interfaces may be required.
- If ground support unit and/or bus analysis capability is required, the host computer must have free expansion slots to support the desired hardware interfaces.

In many cases, a portable computer can be used to host Vista TEC and ground support hardware to provide an efficient means of system checkout and sensor calibration.

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