Teletronics Technology Corporation
Total System Solutions

Ground Systems & Software

TTC delivers systems and software that optimize data collection, visualization, display, playback, analysis and reporting.
As a major supplier to the flight test and aerospace industries, TTC has a reputation for solid quality, attention to customer requirements and cutting-edge data playback and analysis technology.

TTC provides network-based and PCM-based data acquisition and encoding systems, recorders and RF receivers to all primary aircraft suppliers in the United States, the US Air Force, Navy, Army, NASA and many other customers around the world. Every TTC system includes configuration, management and monitoring application software. The Teletronics software applications manage, monitor and configure TTC systems and display acquired data. TTCGSS is a powerful data visualization tool. It can import supported image data from any source. TTC also provides compatible configuration, quick-look and monitoring software that seamlessly interfaces with GSS, allowing acquisition data to be visualized with less data manipulation. TTCWare facilitates device configuration, including XML configuration file import and export. TTCVision allows real-time visualization of acquired data and TTCNMS is a network monitoring and management system that uses MIBs and traps to monitor and report device health.

**TTC GROUND STATION SYSTEM DISPLAYS, ANALYZES AND REPORTS DATA**

The TTC Ground Station System (TTCGSS) is a multi-platform, scalable and distributed system that facilitates data visualization, analysis and reporting and allows multiple users to simultaneously view and analyze.

TTCGSS can render any 2D or 3D image supported by the OpenGL standard. It allows for real-time and post-flight data analysis and it is compatible with IRIG 106 Chapter 4 Class I and Class II PCM, IRIG 106 Chapter 8 and Chapter 10, and Ethernet networked data. TTCGSS is an extensive view management and display application that creates multiple displays including strip charts, dial and bar gauges, video, data lists, and PCM data grids. It defines Engineering Unit Conversions (EUC) using calibration tools, and gathers and records statistics about the data as it is being recorded.

**TTCVISION RECORDS LIVE DATA AND PROVIDES DATA VISUALIZATION FOR ANALYSIS**

TTCVision is a data visualization and quick-look application that records live data from TTC products for later analysis. TTCVision supports the Chapter 4 (PCM), Chapter 8 (1553), and Chapter 10 IRIG 106 standard data formats. TTCVision has advanced data visualization and analysis functions. PCM and 1553 parameters are displayed on a strip chart, data list, 1553 bus monitor or an enunciator. Audio and video data from MPEG-2, H.261 and CVSD streams is decoded, played and extracted. TTCVision can apply EUC to each measurement including concatenations, bit masks, and polynomials, and this processed data can be exported to CSV and MATLAB files for extended data analysis.

**TTCWARE CONFIGURES AND PROGRAMS SYSTEM HARDWARE**

TTCWare is used to configure and program all of TTC’s standard and network data acquisition units. TTCWare allows users to define their hardware configuration and customize the settings on each data acquisition card. Parameters can be created on each data acquisition card so that data can be sampled in a PCM Format. The layout of the PCM Formats can be manually defined by the user or the format can be automatically generated based on user specified desired sampling rates for each parameter. TTCWare projects can also be exported to XML and re-imported from XML. This facilitates the rapid creation and maintenance of large projects. For network devices, the network’s topology can be defined in TTCWare. All of the network devices can be configured in TTCWare and programmed via the network.

Several support utilities are included with TTCWare. The Media Manager utility allows users to download data files from Chapter 10 and Network Data Recorders. The system inventory utility performs an audit on the hardware to verify that the project’s configuration matches the hardware.

**VDBR-2000 PLAYS BACK IRIG 106 CHAPTER 10 VIDEO AND AUDIO FILES**

The VDBR-2000 Video Debrief Station is a high-performance computer with four high-resolution monitors, two video processing boards and a Fiber Channel cartridge playback system. The system accepts TTC Fiber Channel media cartridges, and processes and displays IRIG 106 Chapter 10-compliant files containing customer-specific Fibre Channel packets with embedded high-resolution MPEG-2 video data or standard MPEG-2 encoded video and audio. The VDBR-2000 allows full motion video playback, jump to specific time or event markers, speed control, play-and-wait and converts individual video frames to .jpeg images for frame-by-frame playback.

**TTCNMS MANAGES AND MONITORS THE NETWORK**

The TTC Network Management System (TTCNMS) is a platform-independent application that is the central resource for controlling and monitoring a TTC instrumentation network. Configured devices are graphically depicted, with IP addresses and logical connections displayed so that they can be easily tracked. An interactive display allows devices to be dragged and dropped to new network locations, and all device settings follow.

TTCNMS is a powerful monitoring tool. Using SNMP MIBs and traps, current device health and activity is available whenever it is needed. Individual devices can be monitored using a library of TTC-supplied templates, and custom templates are easily created. The embedded MIB browser makes TTC device MIBs easy to read. Network status and device viability data is immediately viewable and easily customized so that the information most important to the acquisition application is readily available.
SYSTEM DIAGRAM: SETUP SOFTWARE & GROUND SUPPORT SYSTEMS

PC RUNNING TTC SOFTWARE
A windows-compatible PC used for preflight configuration and verification of the airborne instrumentation and recording system. It hosts TTCWare, TTCVision, TTCCGSs and TTCCMS software, and optionally PCMCIA bit sync/dec and rec. rec. board.

PCM/FM AND SOQPSK
A telemetry receiver with PCM bit synchronizer.

BIT SYNC/DECOM
This PCMCIA type II card is installed in a portable PC. It combines the functions of Bit Synchronization and Data Decommutation for preflight checkout or lab test.

RECEIVER/BIT SYNC/DECOM/SIMULATOR
This board combines the functions of the RF Diversity Receiver, Bit Synchronizer, Data Decommutator, Simulator and IRIG time code reader into a single full size PCI-Bus card. It can be installed in a Desktop PC for preflight or lab test.

TRANSMITTERS
This unit allows airborne safety of flight data to be transmitted to the ground from the air. Generally, the transmitter is defined by its transmission power, modulation (PCM/FM and SOQPSK), and frequency.

RECORDERS
Recorders store all of the acquired data from the edges of the instrumentation system for later analysis. Some recorders use IRIG 106 Chapter 10 record format and others use linear binary format for PCM data.

GATEWAY
This unit functions as a bridge between the Ethernet network and legacy PCM systems. It allows legacy equipment to connect to the network for programming and for converting PCM data to data packets over the network. The gateway preserves and protects existing data acquisition assets and extends the useful life of the system.

DATA SOURCE
Data is measured at the edge of the data acquisition system. Data sources include video, ARINC, IEEE 1394, MIL-STD-1553 buses, accelerometers, strain gauges and pressure and temperature sensors. TTC data acquisitions systems can accept data input from almost any single source and also from large distributed source sets.
**SYSTEM SOLUTIONS**

TTC provides total system solutions for ground systems data collection in a configuration to match every data collection application. The TTC Ground Station System (TTCGSS) suite includes a client-server platform, advanced data display and simultaneous data playback and record.

Three hardware platforms are available for GSS, a full-size Ground Station Unit (GSU), a laptop-based Portable telemetry Support Unit (PSU) and a pocket PC-based Quick Look Unit. The GSU and PSU run TTC GSS Suite software, and the Quick Look Unit runs the PCM-based Quick-Look software application.

The GSU is a core system server, configurable for many clients and supporting multiple incoming data streams from many sources, including RF receivers, bit sync/decoms, Ethernet packets and IRIG 106 Chapters 4, 8 and 10 recorded data files. The GSU is powerful; capable of simultaneously processing recorded and archived data for post-flight analysis, distributing data to GSS clients over a network and recording all incoming data.

The PSU is a high-performance notebook computer-based host for TTCVision software. It is small, mobile and portable, yet powerful. The PCMCIA slot, Ethernet and a serial port allow customization for most applications.

The smallest ground system solution is the PHQC-2000, based on the PocketPC® with Windows CE and PCM Quick-Look software by TTC. The PHQC allows RS-232 connection to any data acquisition system and makes mobile data analysis convenient.

The VDBR-2000 is an IRIG 106 Chapter 10 data analysis and playback unit with a high-performance PC, recording cartridge processing equipment and four high-definition monitors. Video and audio can be streamed to four simultaneous displays and the playback can be stopped, skipped forward, jumped to a marker or IRIG 106 Chapter 10 time or played as a frame-by-frame slide show.

**TELEMETRY PC EXPANSION CARDS**

TTC manufactures and supports several PC expansion cards for ground systems. Each card has functions specifically combined to optimize data acquisition and analysis. The RBDS-120X is a PCM/FM receiver, performs bit synchronization and data decommutation, has a time code reader and simulation data regeneration functions and is designed for installation in a desktop PC for preflight or lab-based testing.

The RMDS-300X combines the functions of a PCM/FM and SOQPSK receiver, bit synchronizer, data decommutor and simulator into a single full-size PCI bus board. The card can be installed in a desktop PC for preflight or lab test.

The DBS-120X is a low-cost PCMCIA Type II card that provides bit synchronization and data decommutation, and the RCVR-210S is a PCMCIA Type II card that provides PCM/FM and SOQPSK telemetry reception and PCM bit synchronization.

The RCVR-105 combines the functions of an FM telemetry receiver and PCM bit synchronizer and is installed in a portable PC-compatible platform for preflight or lab testing. The RCVR-105 receives (from an external antenna or cable) and demodulates PCM/FM signals at L or S band.

The CPM-2000 interfaces with CAIS-compatible data acquisition devices and can operate as a CAIS master controller for system testing, integration and diagnosis and to program CAIS system controllers.

The PDAC-116 is a half-size PCI board that works with the RBDS-120X (receiver, bit sync, decom and simulator) board or the RMDS-300X. The board's functions include 16 programmable DAC-driven analog outputs, four sets of burst-mode digital data output and one CVSD-decoded audio output channel.

The CPM-2000 interfaces with CAIS-compatible data acquisition devices and can operate as a CAIS master controller for system testing, integration and diagnosis and to program CAIS system controllers.

The PDAC-116 is a half-size PCI board that works with the RBDS-120X (receiver, bit sync, decom and simulator) board or the RMDS-300X. The board's functions include 16 programmable DAC-driven analog outputs, four sets of burst-mode digital data output and one CVSD-decoded audio output channel.

The DBS-120X is a low-cost PCMCIA Type II card that provides bit synchronization and data decommutation, and the RCVR-210S is a PCMCIA Type II card that provides PCM/FM and SOQPSK telemetry reception and PCM bit synchronization.

The RCVR-105 combines the functions of an FM telemetry receiver and PCM bit synchronizer and is installed in a portable PC-compatible platform for preflight or lab testing. The RCVR-105 receives (from an external antenna or cable) and demodulates PCM/FM signals at L or S band.

**RACKMOUNT OUTPUT REPRODUCER UNIT**

The RMOR-2000 creates a true real-time air and ground data reproduction of airborne multiplexed channels. Airborne data is sampled and encoded by airborne systems, the data is formatted to guarantee full-link transmission integrity and the RMOR-2000 receives the data and decodes and reproduces the original signals for real-time viewing and analysis. The Series 2000 is configured using plug-in cards to reproduce high-speed serial data and video output.

**Suggested systems**

<table>
<thead>
<tr>
<th>System</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>GSU-2020</td>
<td>Ground station unit</td>
</tr>
<tr>
<td>PSU-2020</td>
<td>Series portable telemetry support unit</td>
</tr>
<tr>
<td>PHQC-2000</td>
<td>Pocket-PC based unit</td>
</tr>
<tr>
<td>TTCVision</td>
<td>Data analysis and graphical display</td>
</tr>
<tr>
<td>TTCWare</td>
<td>System setup and configuration</td>
</tr>
<tr>
<td>TTCGSS</td>
<td>Distributed ground station software</td>
</tr>
</tbody>
</table>