Dynetics Modular Instrumentation System

The industry’s most compact, comprehensive telemetry solution.
The Dynetics Modular Instrumentation System (MIS) is a comprehensive suite of solutions for the testing and evaluation of weapons systems. The MIS is highly configurable, compact in size, and cost-effective.

Save time, money, and labor resources with the Dynetics MIS.
Dynetics MIS offers a comprehensive array of interchangeable and expandable modules that can be configured to meet customers’ unique requirements.

**Modules include:**
- Analog signal inputs
- Digital / discrete signal inputs
- Inertial measurements
- Custom encoding
- High-dynamic global positioning system (GPS)
- High-sensitivity GPS
- RF data transmission
- Onboard data storage
- Serial interface
- Time, space, and position information (TSPI)
- Secure communications

Flight proven in numerous missile environments, our comprehensive, compact design can often be installed without removing the warhead. Integration time is reduced with our system, making it more economical and cost-effective. The system delivers unsurpassed reliability and unique flexibility.

**Benefits:**
- Many integration options
- Module interchangeability
- Easy configurability
- Ruggedized architecture
- No mechanical moving parts
- Minimal wiring harnesses
Dynetics has extensive experience in the design, fabrication, and support of miniature telemetry systems. After years of building custom telemetry and instrumentation systems from commercially available subcomponents, Dynetics developed the Modular Instrumentation System (MIS). The MIS is a bus-based design featuring a series of interchangeable, expandable modules optimized for speed, performance, and packaging.

The primary advantage of the MIS is its configurability for numerous applications, with custom features added to existing designs without the need to redesign the entire system, resulting in time and money savings. Examples of common configurations are the Dynetics Modular Telemetry System (MTS); the Dynetics MIS Data Recorder; and the Dynetics GPS Time, Space, and Position Information (TSPI) Data Recorder System.

**MIS Packaging Options**

The MIS can be packaged to meet customer requirements. The system is specifically designed for integration into a 2.75-inch diameter missile and rocket system; however, the compact size makes it easily adaptable to other applications. Dynetics manufactures the MIS in-house to accommodate custom applications.

**Dynetics MIS Data Recorder**

The MIS Data Recorder is an ideal solution for applications involving rugged environments and limited space for instrumentation. This product can be configured with any of the MIS modules to form a complete instrumentation system.

The data recorder module interfaces to the MIS bus and stores the collected data into non-volatile memory. The stored data can be downloaded to a PC using a standard USB 2.0 interface.

**Dynetics GPS TSPI Data Recorder System**

The Dynetics GPS TSPI Data Recorder system configuration provides the user with a compact solution for highly accurate position measurement and scoring. An airborne data recorder is used in unison with a ground-based reference receiver and post-processing software to provide TSPI solutions. The soda can-sized airborne unit is self-contained, requiring only access to a GPS antenna. Internal batteries provide operating power for up to nine hours. Raw GPS data is stored on 1 Gbyte flash memory and can be downloaded post mission via a USB port.

**Test Site Support Services Available**

To maximize the value of the Dynetics MIS suite, Dynetics experts can provide mission-critical support services at test sites to assist with data collection and objective real-time data analysis.

Dynetics developed the Telemetry and Instrumentation Ground Receiver Station (TIGRS) van to provide total system support at the test range. The TIGRS van includes state-of-the-art telemetry receivers, test equipment, and real-time analysis tools. TIGRS includes a customer viewing area that allows our customers to observe live tests and test results.
Dynetics MTS

Telemetry systems assembled from commercially available component modules had a significant problem – they would not fit into the space available in smaller missile airframes, such as Man-Portable Air Defense Systems (MANPADS). To solve this problem, Dynetics developed the MTS, which integrates all the necessary instrumentation and telemetry components into a single, small package. Dynetics has successfully used the Modular Telemetry System (MTS) to instrument 2.75-inch diameter shoulder-launched missiles for several test programs.

The MTS is a complete instrumentation system including power supply, signal conditioning, programmable encoder, transmitter, and antenna. An integrated GPS / IMU TSPI module is also available.

The MTS IRIG-106 formatted output is compatible with existing DoD test range infrastructure.

Physical Dimensions
- Length: 14.1 cm (5.6 in.)*
- Diameter: 6.35 cm (2.5 in.)
- Weight: 610 g (1.36 lbs)
- Other packaging and mounting options available

Transmitter
- Tunable 2200.5 to 2299.5 MHz
- Serial port programmable
- 500-mW minimum output
- Other options available

Encoder
- 16-bit bus
- Programmable frame structure
- Bit rate 10 Mbps+
- NRZL/RNRZL

Premodulation Filter
- 6-pole bessel

Signal Conditioning
- Analog
  - 32 differential inputs*
  - Factory set gain
  - 5-pole butterworth filtering
- Discrete
  - 8 TTL inputs*
  - Logic-block processing

Power Source
- Rechargeable NiMH
- 55-min operating time
- Other power options available

*Additional input channels available
**Dynetics MIS Modules and Options**

**MODULES**

**20-Channel Analog/Digital Input Module**
- 16 differential analog inputs
- 16 individual A/D (simultaneous sampling if desired)
- 4 discrete inputs
- Single card
- 28-Channel, 33-Channel, and 49-Channel Analog/Digital Input Modules available upon request

**Compensated Inertial Measurement Unit (IMU)**
- Temperature compensated
- 3000°/sec rates
- Bias drift 18°/hr
- Cross-axis coupling 0.13%

**Miniature IMU**
- 3-axis 10-g accelerometers
- 3-axis 50-g accelerometers
- 3-axis rate sensor 300°/sec
- Other ranges available
- 3-axis magnetometer
- Temperature compensation
- Compatible with GPS modules

**High-Dynamic GPS**
- Sensor mode (50 g, 15.67 Hz)
- Navigation mode (25 g, 7 Hz)

**High-Sensitivity GPS**
- C/A code L1
- 12 channel
- -180 dBW (acquisition)

**GPS/IMU TSPI**
- Synchronized GPS and Inertial Data
- Real-time or post-mission processing
- State estimates of acceleration, velocity, attitude, and position
- Performance to 50-g acceleration

**BASE UNIT**

**PCM Encoder**
- PCM data processing and control
- 6-pole bessel PMF (analog or digital)
- Programmable frame structure
- 10 Mbps
- Bidirectional RS232/422/485 and TTL/LVTTL
- FPGA-based processing encoder
- Complex data frames

**Power and Conditioning**
- Rechargeable batteries
- Internal/external on/off control
- Power filtering and regulation
- Solid state switching (optional)
- Custom microprocessor controlled switching sequences (optional)

**OPTIONS**

**Data Recorder**
- Onboard flash storage
- 2-Byte/memory module (additional memory available)
- 37-Mbit/sec data storage rate
- USB 2.0 data retrieval
- Other transfer options available, including memory configuration

**S-Band Telemetry**
- 0.5 to 5.0 W
- Tunable frequency 2.2 to 2.299 GHz
- IRIG-106

**Dynetics MIS Data Recorders in production**

The Dynetics MIS Base Unit includes encoder, power, and conditioning.
Dynetics Modular Instrumentation System Example Configuration

Dynetics can configure a custom solution to meet your requirements. This example configuration shows external signal instrumentation and internal MIS sensor data combined into a common serial telemetry stream that can be recorded or transmitted over various media.
For 35 years, Dynetics has been a trusted partner to Department of Defense (DoD) agencies and contractors in undertaking many of the most challenging engineering and scientific problems. An important part of our work has involved providing customers with high-performance instrumentation solutions for test and evaluation of weapons systems.

The result of this experience is a comprehensive suite of compact-sized telemetry products that offers an unparalleled combination of reliability, flexibility, and cost-effectiveness: the Dynetics Modular Instrumentation System (MIS).

**Reliable**
- Ruggedized architecture
- No mechanical moving parts
- Flight proven in a range of missile environments

**Flexible**
- Compact size affords diverse system integration options
- Modular design permits custom solutions

**Cost-effective**
- Minimal integration time and costs
- Minimal engineering time and costs

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