APOLLOTEK

FLIGHT TEST INSTRUMENTATION

TELEMETRY, DATA LINK
&
DATA RECORDING

PRODUCTS, SYSTEMS AND SOLUTIONS

www.apollotek.com

APOLLOTEK

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Introduction to Apollotek

- Apollotek is a British Company which specialises in the design, manufacture and integration of Aerospace related Telemetry, Flight Test Instrumentation Products, Systems and Solutions.

- Apollotek was formed in 1984 with the mission to provide its Clients with professionally engineered electronic hardware and software to meet Test and Evaluation, Flight Test Instrumentation, Data Acquisition, Signal Conditioning, Data Storage, Data Transmission, Real Time Telemetry, Signal Recovery, Data Link Systems, Data Recording and Telemetry Data Processing applications.

- Apollotek Airborne Products are designed to be extremely rugged and include PCM Encoders with associated Signal Conditioning Modules, Solid State Recording Modules and Data Recording Systems, Video Compression Modules and Systems, L-Band, S-Band and C-Band FM and SOQPSK RF Telemetry and Video Data Transmitters and real time duplex Data Links.

- Apollotek also specialises in the manufacture of ruggedised battery powered Instrumentation Systems which can include the provision of sensors and systems integration for airborne applications, very high-g applications and also for man-carried data acquisition, data storage and real time data transmission applications. We also manufacture Data Acquisition and Recording systems for Operational Loads Monitoring and systems to measure the physiology of Pilots while performing stressful manoeuvres and while flying long duration missions.

- Apollotek designs, manufactures and integrates a wide range of Signal Recovery and Telemetry Data Processing Systems which include single user, single stream Telemetry Groundstations through to large multiple user, multiple simultaneous datastream Telemetry Ground Station installations.

- Apollotek has developed a unique range of USB powered miniature signal recovery products which include combinations of FM and SOQPSK Receivers, Bit Synchronisers, Decommutators and Simulators.

- Apollotek Groundstation systems include many configurations of PC based Telemetry Data Processing Instrumentation which are supported by the industry standard Apollotek developed GDSmate Telemetry Environment Software package.

- Apollotek designs and manufactures a range of PC based Telemetry Data Recording systems providing very high speed multiple channel recording and replay capability. These recorders can include multiple modular internal Telemetry Receivers, Bit Synchronisers and Decommutators together with analogue and digital input and output modules. These recorders can be networked and remotely controlled and can be configured to start recording based on received data quality.

- If you have any current or future requirements which could utilise these Apollotek products for any Flight Test Instrumentation, Telemetry, Data Link or Video Surveillance system requirements for Aircraft, Ships, Missiles, Unmanned Vehicles or similar applications, please contact Apollotek (info@apollotek.co.uk) or your local Apollotek Sales Representative for additional information.

Apollotek Product Data Sheets in this Brochure:

Apollotek is a designer and manufacturer of Telemetry, Flight Test Instrumentation and Data Link Products, Systems and Solutions. If you have a Test and Evaluation instrumentation application which is not met by our standard product range, please contact Apollotek by Telephone: +44 1932 780410, Fax: +44 1932 780334 or e-mail: info@apollotek.co.uk. If you provide us with details of your requirements we will be pleased to respond with a proposed solution for your application.

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PCM Encoder Features:

- **Modular Rugged Construction**

- **Programmable System PCM Bit Rates and PCM Codes**

- **Stand Alone and Distributed Master / Multiple Slave Configurations**

- **IRIG 106 Compliant**

- **Available in several chassis sizes from 4 to 24 module slots**

- **Designed and tested for severe airborne environments**

- **Configured from a family of Input Modules matched to common transducer types**

- **Analogue, Digital, Frequency, Video and Time Modules are available**

- **Solid State Recorder Modules with a USB data download port can be installed in the encoder chassis**

- **Programmable Constant Current and Constant Voltage Transducer Excitation is provided on selected Modules**

- **Programmable Gain**

- **Programmable Offset**

- **Programmable Cut Off Filters**

- **Pre-modulation filter for RF Telemetry applications**

- **Compatible with Apollotek Telemetry Transmitters**

- **The Encoder is Set Up through a PC USB Port**

- **Compatible with the Apollotek GDSmate Telemetry Environment Software package**
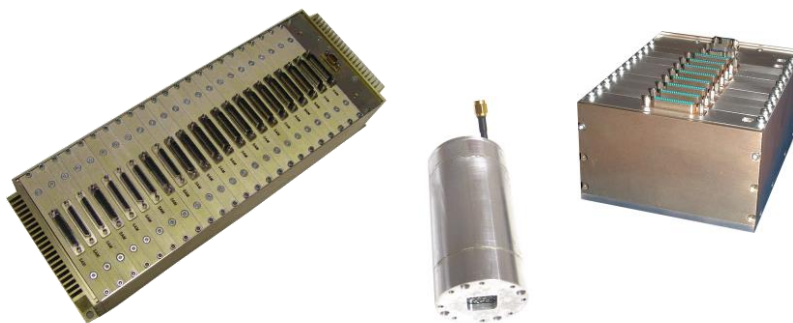
The ApolloDas 8600 Series is a modern generation of flight qualified Modular PCM Encoders comprising a range of Signal Conditioning Modules, Control Modules and Power Supply modules.

Maximum use is made of modern circuit design and construction techniques to provide a high performance, compact and cost effective solution for Aircraft, Helicopter, Missile, UAV and Ejection Seat Flight Test and Evaluation Instrumentation applications. Custom packaged solutions are also available.

The modular ApolloDas 8600 System is available in stand-alone and distributed configurations with up to 255 interconnected chassis.

The Mechanical design of the ApolloDas 8600 series provides a proven and extremely rugged and compact module design. Each module is individually retained into the module housing which is constructed from precision machined parts.

The ApolloDas 8600 signal conditioning modules are securely retained in the ApolloDas 8600 Chassis assembly. The modules are interconnected through an intelligent rugged backplane assembly.

The ApolloDas 8600 Encoder is programmed using a high level GUI interface which detects which modules are present in the ApolloDas 8600 Chassis.

All programmable functions of the ApolloDas 8600 are performed through a high speed USB link to a host PC. Programmed signal conditioning and format data is stored in non-volatile memory.

The Apollotek GDSmate Telemetry Environment Software package and the Apollotek 8000 Series of Groundstations are ideal companions for this ApolloDas 8600 family of Airborne Instrumentation.

ApolloDas 8600 STANDARD SIGNAL CONDITIONING MODULES:

All ApolloDas 8600 Sequential Sampling Signal Conditioning Modules have one Analogue to Digital Converter per module to provide a versatile, high speed and low noise programmable PCM Encoder configuration. Simultaneous Sampling Modules such as the SAM-X have one Analogue to Digital Converter per channel. The following examples of standard Signal Conditioning Modules are available in several configurations. This range of ApolloDas 8600 Signal Conditioners is continually being expanded and updated. Please consult the factory for Signal Conditioning requirements not listed below.

- **SGM-X 8 Channel Strain Gauge Module**

  Provides per channel Constant Voltage Excitation
  Supports ¼, ½ and full bridge configurations
  Per Channel Programmable Gain and offset.
  Per Module Programmable 12-pole Filters

- **SAM-X 6 Channel Simultaneous Sampling Module**

  A Multi-Function General Purpose Module which supports multiple Bridge configurations, provides transducer excitation, per channel gain and offset and per channel binary related Programmable 12-pole filters. Also provides programmable sequential sampling functions

- **RTD-X 8 Channel RTD Module**

   Supports ¼, ½ and full bridge configurations
  Per Channel Programmable Gain and offset.
  Per Module Programmable 12-pole Filters

- **VMM-X 8 Channel Vibration Transducer Module**

  Provides per channel Constant Current Excitation
  Per Channel Programmable Gain
  Per Module Programmable 12-pole Filters

- **LAC-X 8 Channel Linear Acceleration Module**

  Provides per module Constant Voltage Excitation
  Per Channel Programmable Gain
  Per Module Programmable 12-pole Filters

- **ACM-X 8 Channel Acoustic Noise Module**

  Provides per module Constant Voltage Excitation
  Per Channel Programmable Gain
  Per Module Programmable 12-pole Filters
  Sample rates up to 100 KHz per channel

- **TCM-X 18 Channel Thermocouple Module**

  Provides internal Electronic Cold Junction Compensation
  Gain matched to Thermocouple Type. Temperature Measurement Span can be user specified.
  Thermocouple wire termination on board the module.
  Internal chassis temperature is available as a parameter

- **SVM-X 16 Channel Single Ended Voltage Module**

  Accepts bi-polar Voltage Inputs
  Provides per module Transducer Excitation
  Fixed Gain per Analogue Channel
  Programmable 12-pole Filters per Analogue channel

- **DDM-X 8 Channel Differential Voltage Module with 12 Digital Inputs**

  Programmable Gain per Analogue Channel
  Programmable 8-pole Filters per Analogue channel
  Selectable threshold for Digital Inputs

- **DIM-X 24 Single Ended Digital Input Module**

  24 digital inputs with programmable switching threshold

- **ICP-X Transducer 8 Channel Module**
  Specifically configured to interface SPI compatible transducers
  Provides excitation and signal conditioning.
  Provides programmable gain and input offset.

- **PES-X 4 Channel Charge Amplifier Module**

  4 channel charge amplifier module provides excitation and interface specific to the B&K Type 4504-A shock and vibration transducer. Other Charge transducers can be supported

- **FPM-X Four Channel Frequency / Period Module**

  Provides four Frequency input channels which can also be gated for period measurements

- **VCM-X Single Channel Video Compression Module**

  Provides a single channel analogue PAL or NTSC input port and applies user programmable MPEG2, MPEG4, JPEG, Motion JPEG or H.263 digitisation and video compression prior to insertion in the PCM Datastream. Also available as stand-alone video compression systems

- **SRM-X Dual Channel Synchro / Resolver Module**

  Provides an electronic interface to standard 11 – 26 V Synchro and Resolver angular position transducers

- **ABM-X Four Channel ARINC 429 Bus Monitor Module**

  Provides an interface to High & Low speed ARINC 429 buses and decodes the data from programmed labels

- **MBM-X Dual Mil-Std 1553 Bus Monitor Module**

  Provides an interface to a Dual Redundant Mil-Std 1553 Bus and decodes messages and data from bus traffic

- **SUM-X Four Channel Serial Input Module**

  Provides interfaces for four synchronous serial RS422 or RS232 inputs at baud rates up to 115 KBPS

- **SBM-X Four Channel Serial Input Module**

  Provides interfaces for four asynchronous serial RS422 or RS232 inputs at baud rates up to 115 KBPS and provides FIFO buffering and status

- **ETH-X Ethernet Bus Monitor**

  Module provides intelligent interface to an Ethernet 10/100 Bus and captures user defined data packets.

- **TCR-X Time Code Reader Module**

  Provides an IRIG-B time code reader and time word insertion into the PCM Frame. Includes a 19,200 baud serial GPS interface for NMEA data. An Integrated GPS Reader Option is also available

- **SSM / SSC Solid State Memory Modules and Cartridges**

  Solid State Modules and Removable Memory Cartridges using generic non-volatile Flash Memory devices are available with storage capacity ranging from 512 MBytes to 512 GBytes. Standard Data download is provided through a USB port to a host PC

Features:

- **PAL, NTSC, SECAM Composite Video or Luminance and Chrominance Input Signals**

- **Programmable Picture Resolution**

- **Programmable Frame Rate**

- **Programmable Video Compression Characteristics**

- **MPEG-2 Video Compression**

- **MPEG-4 Video Compression**

- **H.263 and H.264 Video Compression**

- **Motion JPEG Video Compression**

- **Fully integrated with the ApolloDas 8600 Series of stand alone and distributed PCM Encoders and Flight Test Instrumentation Systems**

- **Multiple Video Compression Modules can be integrated with other ApolloDas 8600 Signal Conditioning Modules in the same Chassis**

- **Digitised Compressed Video data can be inserted into the ApolloDas 8600 IRIG 106 PCM Frame Format**

- **Available in stand alone Video Compression System configurations**

- **Serial Data Output options for connection to Apollotek RF Transmitters**

- **Ethernet Interface Option**

- **Rugged construction suitable for airborne applications**

The Apollotek single channel Video Compression Module is part of the ApolloDas 8600 series of modular rugged Flight Test Instrumentation and Telemetry Instrumentation.

The module is designed to be integrated into a standard ApolloDas 8600 Chassis assembly as part of a stand-alone or distributed data acquisition system or as a dedicated video compression system.

The compressed video data is transferred into the ApolloDas 8600 host chassis through interaction with the system Control Module. Windows based software is provided to enable the video compression module variables to be set up by the user.

Standard Picture resolution is selectable up to 704 pixels wide by 510 pixels high as standard. Higher resolutions can be supported as an option.

Standard video data display is provided by Windows CODECs and can be displayed as a video overlay in the Apollotek GDSmate software package supplied with Apollotek signal recovery and decommutation systems. Hardware Video Accelerator products are optionally available for low latency requirements.

The Video Compression module is also capable of stand-alone operation in single channel and multiple channel configurations.

Additional applications include fixed and mobile video surveillance including UAV video and data links when integrated with other Apollotek transmission and reception instrumentation.

ApolloDas 8600 VCM Series
Video Compression Module

SPECIFICATIONS

Video Input Processing:

PAL, NTSC, SECAM Composite Video input

Chrominance and Luminance Inputs

AGC or fixed gain

Wide chrominance and luminance bandwidth for PAL and NTSC

Video Scaler for variable size display windows

Dual 9-bit video ADC channels

Mechanical:

Dimensions

Standard module is a double width ApolloDas 8600 Module with nominal dimensions of:

Dual Module Width:	22 mm
Length:	110mm
Height :	65mm (including top panel connectors)

Environmental:

Normal Operating Temperature	-10 ^{O} Centigrade to +70 ^{O} Centigrade baseplate temperature
Vibration	>20g sine, 0.1 g ^{2} random, 20Hz to 2000Hz, in any axis
Shock	100g for 1 ms in three mutually perpendicular axes
Acceleration	100g in three mutually perpendicular axes

Software Setup:

Interactive software Module Set up and loading facilities including storage of video mission set up files are provided together with module status reporting and suggested video set-up advice including selection of:

- Video Input Control
- Source Type Selection
- Input Video Format
- Input Video Resolution
- Frame Rate
- Output Video Resolution
- Video Input Format
- Compression Mode
- HPI Buffer Size
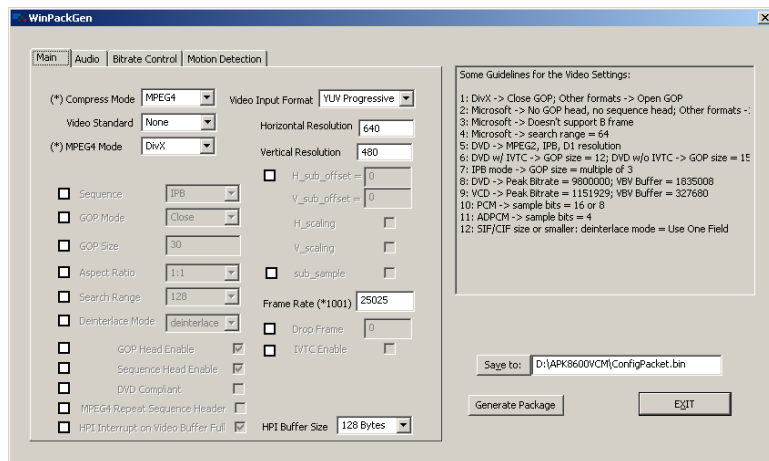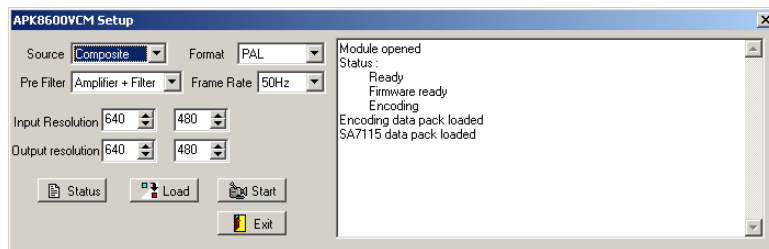
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Solid State Recorder Features:

- **Rugged Modular Construction**

- **Environmentally Qualified for Fast Jet and Missile applications**

- **28 Volts ± 4 Volts DC Power**

- **Data Rates in excess of 20 MBPS can be accommodated**

- **Up to 128 GBytes of non-volatile storage can be provided in one rugged chassis**

- **Terabyte storage is available with our rugged PC104 based Windows 10 packaging option (Model 8700-FD)**

- **Data Storage Format optimised for maximum recording duration**

- **Modular Construction enables the storage requirement to be matched to the application with minimum physical dimensions**

- **Customised packaging is available**

- **Standard IRIG 106 PCM and Clock data input interface - TTL or RS422**

- **Removable Memory Cartridge options**

- **Other input interfaces can be provided**

- **The Solid State Recorder can be configured as a stand alone unit or as a combined Encoder and Solid State Recorder configuration using the ApolloDas 8600 Series of Signal Conditioning and Excitation modules**

- **The Solid State Recorder operational modes, data extraction and memory erase functions can be externally controlled by the Apollotek GDSmate Telemetry Environment Software Package through a USB interface Port**

Typical Missile Configuration

Typical Modular Aircraft Configuration

Apollotek manufactures a range of ruggedised Airborne Solid State Data Recorders using a unique implementation of modular non-volatile Flash Memory storage elements controlled by High Density FPGA programmable logic technology.

Embedded intelligent processing is used to control data writing and reading functions and the external recording interface controls.

Systems are available with storage capacities up to and in excess of 1 TByte.

The standard Solid State Recorder range is designed to accept the output of IRIG 106 standard PCM encoders and can be configured to accept continuous data up to bit rates in excess of 20 MBPS.

Apollotek Solid State Recorders can also be configured with different types of serial and parallel data input and output ports for non-IRIG 106 applications.

The Solid State Recorder assembly is mechanically robust and of modular internal construction. The configured Recorder consists of a Power Supply Module, A Control Module and a series of bus interconnected memory modules. The standard power supply module provides operation from 24 V DC to 32 V DC. Other operating Voltage ranges, including 12 V DC can also be provided.

## The 8700 Solid State Recorders and the Apollotek GDSmate Software Package

The Apollotek 8700 Series of Solid State Recorders are delivered with Set-Up Software, Data Download Software and a user licence for the Apollotek USB GDSmate software package. GDSmate provides the means to replay and display decommutated PCM Parameters through a USB port connection between the Solid State Recorder and a host PC.

GDSmate is a Real Time data presentation and Stored Data Replay software package providing dynamic graphical display of data acquired from Telemetry, directly from sensors and from other Instrumentation sources including the **Apollotek** range of **Solid State Recorders**. GDSmate is in widespread use within the International Telemetry community. The package provides real time processing algorithms to enable arithmetic, algebraic and Boolean algorithms to be applied to individual parameters and to derive processed parameters.

GDSmate provides a wide range of graphical and tabular displays. Archived data can also be exported in several industry standard file formats.

Solid State Recorder Controls

The Solid State Recorder Software Controls are accessed through a pull down menu which is selected from the Options Menu of the GDSmate Toolbar. The data stored in the Apollotek Solid State Recorder is retrieved, processed and displayed using the standard features of GDSmate.
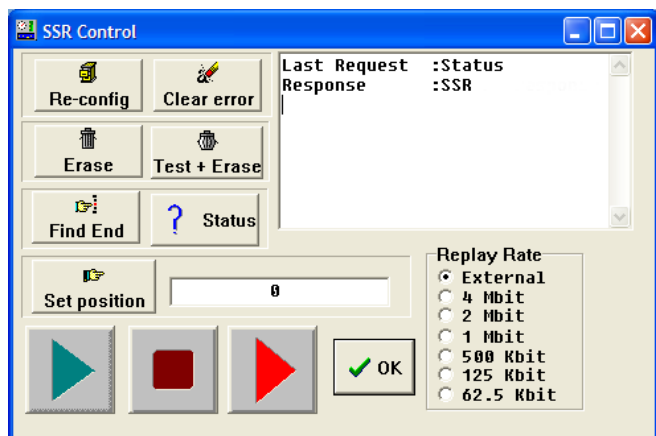
Solid State Recorder Control
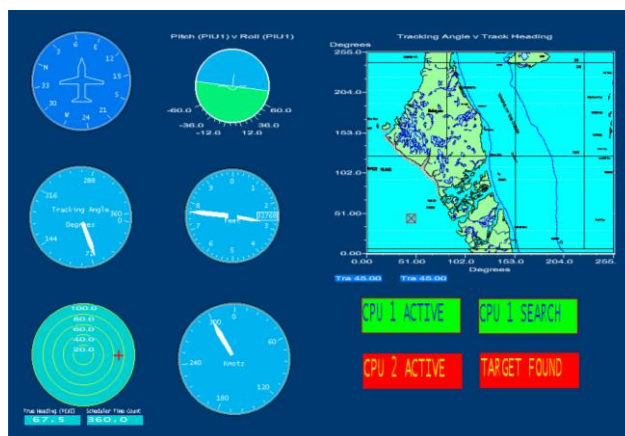
Typical GDSmate parameter screen display

The Solid State Recorder controls are simple to use and are designed to mimic typical DVD control buttons. A set of standard selectable Replay Rates is provided. An External Clock facility can also be selected and used to determine the data replay rate.

Please contact **Apollotek** or your local Representative for further details of the ApolloDas 8700 Solid State Recorder series, ApolloDas 8600 modular airborne Flight Test Instrumentation, PCM Encoders, Data and Video RF Transmitters, USB Telemetry Instrumentation and Telemetry Groundstations. Apollotek would be pleased to respond to any of your data collection, processing and presentation requirements.

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Solid State Recorder Features:

- **Rugged Modular Construction**

- **Designed for Airborne and Shipborne applications**

- **28 Volts ± 4 Volts DC Power as standard other options available**

- **Records and Replays an IRIG 106 serial PCM data stream**

- **Optional IRIG 106 PCM and Clock data input interface - TTL or RS422**

- **Compatible with the output of the ApolloDas 8600 PCM Encoder System**

- **Data Rates in excess of 20 MBPS can be recorded**

- **External Recording Start and Stop Control**

- **Additional User specified control features can be incorporated into the unit**

- **Greater than 1 Terabyte of non-volatile storage can be provided in one chassis.**

- **Solid State Recorder emulates a Windows Disk Drive**

- **Internal CPU runs an embedded Windows Operating System**

- **Compatible with the Apollotek GDSmate Telemetry Environment Software Package**

- **An Ethernet Port is provided for high speed data download and remote access control**

- **A PC Monitor, Windows Tablet, Laptop or remote desktop PC can be connected to set up and control the Recorder**

Typical Configuration

Apollotek manufactures a range of ruggedised Shipborne and Airborne Solid State Data Recorders using a unique implementation of solid state non-volatile Flash Memory storage elements and Very High Density programmable logic technology. Embedded signal processing is used to control the data formatting and recording of PCM data into Windows compatible data files.

The Standard 8700-FD Solid State Recorder is currently available with capacities up to 256 GBytes.

Data is stored in Microsoft Windows file format for ease of post processing.

The 8700-FD is designed to accept the output of ApolloDas 8600 IRIG 106 standard PCM encoders and similar devices and the Recorder can be configured to accept continuous data up to bit rates in excess of 20 MBPS.

The Recorder is available in several configurations including the capability to replay the recorded serial data stream as Data and Clock to feed to external equipment. An internal PCM Decommutation option is also available.

The Solid State Recorder assembly is mechanically robust and of modular internal construction. The approximate dimensions of the Recorder Unit are: 160mm x 160 mm x 160 mm.

The standard power supply module provides operation from 24 V DC to 32 V DC. Other operating Voltage ranges, including 12 V DC can also be provided.

Solid State Recorder Controls

The Solid State Recorder Software Controls are simple Start, Pause and Stop which can be controlled through physical contact closures or control voltages through the input connector or the Recorder can be controlled using a software utility if the unit is set-up through an attached display and keyboard.

The GDSmate Telemetry Environment Software Package

The Apollotek 8700-FD Solid State Recorder is typically supplied with the Apollotek GDSmate Telemetry Environment software package pre-installed and which can be used to download the stored data files and which can also provide tabular and graphical data display.

GDSmate can also be supplied to process data acquired from Telemetry Systems, directly from sensors and from other Instrumentation sources including the **Apollotek** range of **Solid State Recorders**. GDSmate is in widespread use within the International Telemetry community. The package provides real time processing algorithms to enable arithmetic, algebraic and Boolean algorithms to be applied to individual parameters and to derive processed parameters.

Data Recording and Data Presentation

The Apollotek Solid State Recorder can be controlled through an intuitive Graphical User Interface. The recorded data can be retrieved, processed and displayed using the standard features of GDSmate. GDSmate provides a wide range of graphical and tabular displays. Archived data can also be exported in many industry standard formats. A User Manual describing the general facilities and capabilities of GDSmate is available on request.
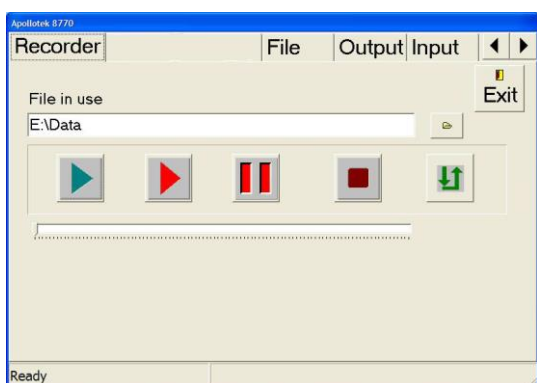
Solid State Recorder Control
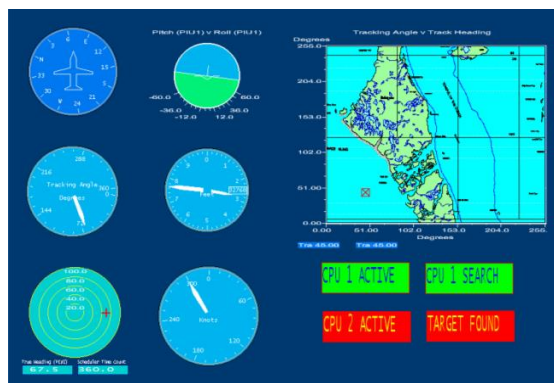
A GDSmate parameter screen display

Please contact **Apollotek** or your local Representative for further details of the ApolloDas 8700 Solid State Recorder series, ApolloDas 8600 modular airborne Flight Test Instrumentation, PCM Encoders, Data and Video RF Transmitters, USB powered Telemetry Instrumentation, Receivers, Bit Synchronisers, Decommutators, Simulators and Telemetry Groundstations. Apollotek would be pleased to respond to any of your Telemetry and Test and Evaluation data collection, processing and presentation requirements.

Features:

- **Designed to fit into Flying Suit Thigh Pocket**

- **Battery Powered Unit**

- **Typical four hour mission duration and data storage**

- **Synchronises to IRIG B Time**

- **Internal Solid State Storage of data with time stamps**

- **1 dedicated heart rate channel**

- **8 general purpose channels**

- **Individual Programmable Gain for each Channel**

- **Individual Programmable Offset for each Channel**

- **Per Channel Filter Cut-off selection**

- **Constant Current or Constant Voltage Excitation provided**

- **Completion Networks for Bridge Transducers**

- **12 to 16 bits per word resolution**

- **Real Time Infra Red Data Link to an Airframe mounted PCM Telemetry System**

- **System Set-Up and Post Mission Data Extraction using Apollotek GDSmate Software**

- **Fast Jet Qualified**

- **Alternative System configurations and mechanical configurations are available**

Acquisition Unit

Infra Red Receiver
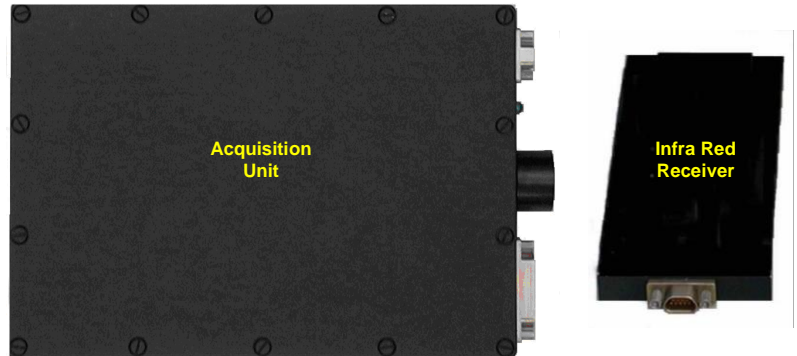
The Apollotek 8500 Series battery powered and Flight Qualified Instrumentation is designed to provide a totally portable and highly accurate human physiological and aircraft environmental parameter measurement capability.

The data acquisition unit is battery powered and the basic unit is designed to operate for periods in excess of three hours to accommodate the longest flight test missions. The Acquisition Unit is designed to fit into a Pilot's flying suit thigh pocket.

Eight General Purpose channels are provided. Each of these has programmable gains and offsets to accommodate a wide variety of sensors including bridges. Each input channel is also provided with programmable constant current or constant voltage excitation. A dedicated Heart Rate Monitor channel is provided in addition to the eight data channels. This channel accepts the electrical signals produced by standard three site adhesive ECG sensors and it converts the received electrical signals into a heart rate value in beats per minute.

The unit also contains a time code reader which can be externally synchronised to IRIG B or it can be selected to count from zero time from power-on.

All data acquired during the mission is stored internally in solid state memory. A Real Time optical data link is also provided which transmits the acquired data to a cockpit mounted receiving unit that in turn is interfaced to the Aircraft Flight Test Instrumentation System and an on-board Radio Transmitter provides real time transmission to a Telemetry Groundstation.

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Model 8500 Series Standard Configuration General Specifications

Electrical Specification

Number of Data channels: Minimum of 8 general purpose channels
Plus one heart rate monitoring channel

Resolution: 12 to 16 bits per data word

Typical Battery Duration: With 20 mA Excitation on 8 channels and with the Heart Rate Channel in use battery duration is estimated to be in excess of 180 minutes when using 1200 mA/h batteries. No data is lost from memory if the batteries expire.

Acquisition Unit Programming: The unit is programmed using the Apollotek Graphical User Interface supplied with the system.
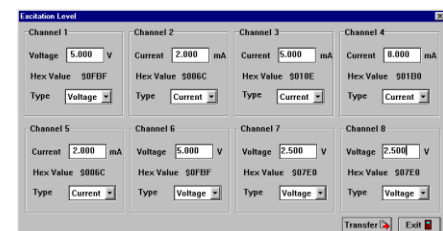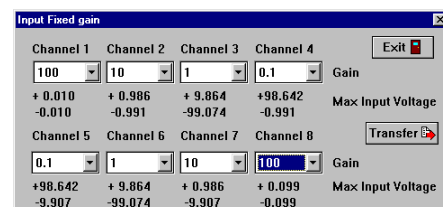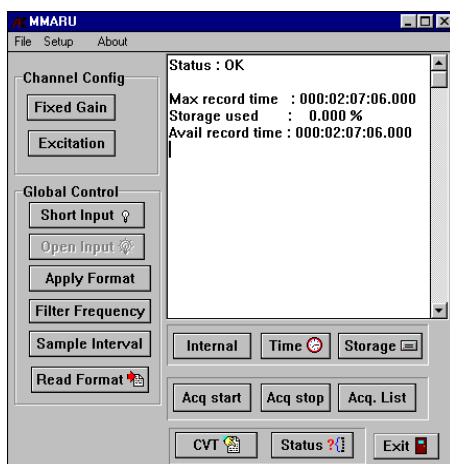
System Interfaces

Sensors are typically wired through the Pilot's flying suit to the Unit via a Microminiature D-Type Connector.

The real time Optical Data Link is via a 9-pin connector typically connected to an Infra Red transmitting device mounted on the Air Service Pack / PEC which connects to the Ejector Sector Seat in a Fast Jet.

A Cockpit Mounted Optical Line of Sight Receiver Unit is available which can provide a parallel handshaking data port to an on board Flight Test Instrumentation System. This Infra Red Receiver operates from the aircraft nominal 28 Volt DC Supply.

Ground Replay from Solid State Memory is via a serial RS422 or USB link through the 9-pin connector typically into an Apollotek PC running the GDSmate Telemetry Environment Software package. GDSmate provide a complete telemetry data processing software environment.

Mechanical Specification

Acquisition Box Size including switch and Connectors: 190 mm x 120 mm x 27mm

Typical Acquisition Box Weight: 695 grams with batteries installed

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T-905 Series Programmable Telemetry Transmitters

Transmitter Features:

- **S-Band PCM or Video Transmitters**

- **L-Band PCM or Video Transmitters**

- **C-Band PCM or Video Transmitters**

- **SOQPSK and Multi-h CPM compatible modulation options**

- **RF Power from 1 Watt up to 5 Watts**

- **Power Output On /Off control option**

- **Programmable Centre Frequency Range of 200 MHz across the band**

- **Optional four Frequency pre-sets selectable through input connector pins**

- **Programmable Frequency through a Serial Data Port to a host PC**

- **28 Volts ± 4 Volts DC Power**

- **High Efficiency design minimises current consumption**

- **FM frequency response options up to and above 10 MHz**

- **100 KHz/Volt to 6 MHz/Volt nominal carrier deviation sensitivity**

- **Nominal Input Impedance 75 Ohm Other values including 50 Ohms and 10K Ohms available**

- **Single Microminiature D-Type connector for Power Supply and Modulation Input as standard**

- **50 Ohm SMA RF Output Connector. TNC option is also available**

The Apollotek T-905 series of Telemetry Transmitters are designed using modern efficient components and are qualified for aerospace and similar applications.

The T-905 range of transmitters utilise a crystal stabilised programmable frequency synthesiser linked to a voltage controlled oscillator with a modulator driving the power output sections. The transmitter is programmed through a Flash memory based microcontroller. The T905 series of transmitters can be supplied as fixed frequency or tuneable in 0.5 MHz or 1 MHz steps over the tuning range.

As an option a set of four programmed frequencies can be assigned for selection via binary coding on two of the input connector pins. Frequency and power can also be controlled through a serial programming port.

The transmitter housing is machined from solid aluminium sections using precision numerically controlled machining processes to provide a very high strength transmitter assembly.

T-905 Transmitter series can be supplied in several mechanical assembly configurations to meet new application specific requirements and they can also be supplied in configurations designed to match the mounting hole locations of legacy transmitters for existing applications.

STANDARD SPECIFICATIONS

General:

Standard Frequency Bands	Up to 200 MHz tuning range within L-Band, S-Band and C-Band up to 6 GHz centre frequency
Nominal Frequency Stability	± 0.002 %
Output Power	Can be supplied in configurations providing up to 5 Watts.
VSWR	Protected against damage from any VSWR

Modulation:

Modulation Type	FM as standard. Other modulation and encryption support schemes are available including SOQPSK and Multi-h CPM
Input Signal Coupling	AC as standard. DC option available
Frequency Response	10 Hz to 7 MHz ± 1.5 dB as standard (other ranges available)
Carrier Deviation Range	Nominal 100 KHz to 6 MHz per Volt rms range – user or bit rate and modulation defined

Power Requirements:

Voltage	28V ±4 Volts DC (Other supply voltage and ranges available)
Current	Nominal 800 mA for 5 Watts output at 25° Centigrade
Isolation	Power and Modulation return are common to case ground. Isolated chassis options available

Mechanical:

Nominal Dimensions	Standard 55 mm wide 80 mm long and 25 mm high excluding connectors (35 mm height for SOQPSK and Multi-h CPM modulation configurations)
Power, Modulation and Programming Connector	15 way microminiature D-Type (SMA option for Modulation)
RF Output Connector	SMA as standard. SMB and SMC Options available, TNC option on 35 mm height package

Environmental:

Normal Operating Temperature	-30 ^{O} Centigrade to +70 ^{O} Centigrade baseplate temperature
Vibration	>20g sine, 0.1 g^2 random, 20Hz to 2000Hz, in any axis
Shock	100g for 1 ms in three mutually perpendicular axes
Acceleration	100g in three mutually perpendicular axes

T-910 Series Programmable Telemetry Transmitters

Transmitter Features:

- **S-Band PCM or Video Transmitters**

- **L-Band PCM or Video Transmitters**

- **C-Band PCM or Video Transmitters**

- **SOQPSK and Multi-h CPM compatible modulation options**

- **RF Power Output options from 10 Watts up to 15 Watts**

- **Power Output On /Off control option**

- **Programmable Centre Frequency Range of 200 MHz across the band**

- **Optional four Frequency pre-sets selectable through input connector pins**

- **Programmable Frequency through a Serial Data Port to a host PC**

- **28 Volts $\pm$ 4 Volts DC Power**

- **High Efficiency design minimises current consumption**

- **FM frequency response options up to and above 10 MHz**

- **100 KHz/Volt to 6 MHz/Volt nominal carrier deviation sensitivity**

- **Nominal Input Impedance 75 Ohm Other values including 50 Ohms and 10K Ohms available**

- **Single Microminiature D-Type connector for Power Supply and Modulation Input as standard**

- **50 Ohm SMA RF Output Connector. TNC option is also available**

The Apollotek T-910 series of Telemetry Transmitters are designed using modern efficient components and are qualified for aerospace and similar applications.

The T-910 range of transmitters utilise a crystal stabilised programmable frequency synthesiser linked to a voltage controlled oscillator and modulator driving power output sections. The transmitter characteristics are programmed by an on-board microcontroller. The T910 series of transmitters can be supplied as fixed frequency or tuneable in 0.5 MHz to 1 MHz steps over the tuning range.

An optional set of four programmed frequencies can be assigned for selection via binary coding on two of the input connector pins. Frequency and power can also be controlled through a serial programming port.

The transmitter housing is machined from solid aluminium sections using precision numerically controlled machining processes to provide a very high strength transmitter assembly.

The miniature transmitter components utilised in the Transmitter design enable the T-910 series to be supplied in housings of several types and configurations to meet new requirements and they can also be manufactured with mounting hole locations to match legacy transmitters for existing applications.

SPECIFICATIONS

General:

Standard Frequency Bands	Up to 200 MHz tuning range within L-Band, S-Band and C-Band up to 6 GHz centre frequency
Nominal Frequency Stability	± 0.002 %
Output Power	Can be supplied in standard configurations providing up to 10 Watts. Up to 20 Watt T-920 Version is also available on special order
VSWR	Protected against damage from any VSWR

Modulation:

Modulation Type	FM as standard. Other modulation and encryption support schemes are available including CPM and Orthogonal schemes
Input Signal Coupling	AC as standard. DC option available
Frequency Response	10 Hz to 7 MHz ± 1.5 dB as standard (other ranges available)
Carrier Deviation Range	Nominal 100 KHz to 6 MHz per Volt rms range – user or bit rate and modulation defined

Power Requirements:

Voltage	28V ±4 Volts DC (Other supply voltage options available)
Current	Nominal 1.5 A for 10 Watts output at 28 V DC and 25° C
Isolation	Power and Modulation return are common to case ground as standard. Isolated chassis options available

Mechanical:

Nominal Dimensions	Standard: 63.5 mm wide 89 mm long and up to 35 mm high Optional: 55 mm wide 80 mm long and 40 mm high
Power, Modulation and Programming Connector	15 way microminiature D-Type (SMA option for Modulation)
RF Output Connector	SMA as standard TNC option on 35 mm height package

Environmental:

|	
Normal Operating Temperature	-30° Centigrade to +70° Centigrade baseplate temperature
Vibration	>20g sine, 0.1 g^2 random, 20Hz to 2000Hz, in any axis
Shock	100g for 1 ms in three mutually perpendicular axes
Acceleration	100g in three mutually perpendicular axes

Transmitter Features:

- **S-Band, L-Band or C-Band Multipurpose PCM/FM, SOQPSK and Analogue Input Transmitter**

- **Unique Apollotek Design enables User Selection of PCM/FM modulation, SOQPSK modulation or Analogue FM Modulation**

- **RF Power Output Options from 10 milliwatts up to 20 Watts**

- **Internal Pre-Modulation Digital Filtering linked to PCM Bit Rate**

- **Internal Pre-Modulation Digital Filtering linked to Analogue Frequency Response**

- **Analogue pre-modulation filtered PCM Input capability**

- **Internal IRIG 106 Randomizer Option when configured for NRZ-L PCM Data and Clock inputs**

- **FM frequency response greater than 7 MHz as standard**

- **Programmable Centre Frequency Range of up to 200 MHz**

- **Programmable through a Serial Data Port to a host PC**

- **100 KHz/Volt to 6 MHz/Volt nominal carrier deviation sensitivity can be user programmable for an analogue modulation input signal**

- **28 Volts ± 4 Volts DC Power as standard. Alternative DC Supply options available. High Efficiency design minimises current consumption**

- **Single Microminiature D-Type connector for Power Supply and Modulation Input as standard**
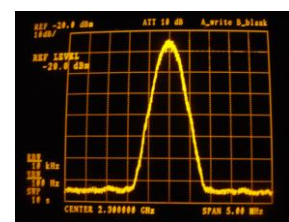
- **50 Ohm SMA RF Output Connector**

The Apollotek T-900 Tri-Mode series of Telemetry and Video Transmitters are designed using modern efficient components and are qualified for aerospace and similar severe operational environment applications.

This range of Apollotek Digital transmitters utilises design concepts based on FPGA and DSP technology to provide a uniquely programmable transmitter capable of operation as a traditional PCM/FM Transmitter and as a modern SOQPSK bandwidth saving Transmitter and as an Analogue Input FM Transmitter. Modulated RF Bandwidth Spectrum examples for a PCM input signal with the same bit rate is shown here for both PCM/FM and SOQPSK Modulation schemes:
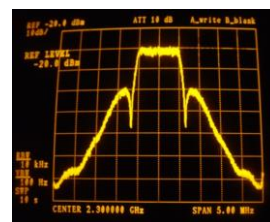
PCM/FM Configuration   **SOQPSK Configuration**

The transmitter housing is machined from solid aluminium sections using precision numerically controlled machining processes to provide a very high mechanical strength transmitter assembly. T-900 Transmitter series can also be supplied in custom mechanical assembly configurations to meet new application specific requirements and they can also be supplied in configurations matching the mounting of legacy telemetry transmitters for existing applications.

STANDARD SPECIFICATIONS

General:

Standard Frequency Bands	200 MHz programmable tuning range within the 1400 MHz to 1600 MHz frequency band.
	200 MHz tuning range within the 2200 MHz to 2400 MHz band
	200 MHz tuning range within the 4.9 GHz to 6 GHz band
Nominal Frequency Stability	± 0.002 %
Output Power	Can be supplied in mechanical configurations providing from 10 milliwatts up to 20 Watts
VSWR	Typically protected against damage from any VSWR

Modulation:

Modulation Type	User Selectable PCM/FM and SOQPSK Modulation or Analogue Voltage Input with FM Modulation. PAL / NTSC Video Input compatible
Analogue Frequency Response	1 KHz to 15 MHz ± 1.5 dB as standard (other ranges available) for Analogue Input Signal
Analogue Input Carrier Deviation Sensitivity Range	Nominal 100 KHz to 10 MHz per Volt rms range – user or bit rate and modulation type defined
TTL Clock and Data Bit Rate Range for PCM/FM and SOQPSK Modulation	10 MBPS for NRZ PCM/FM Codes as standard. >20 MBPS for SOQPSK modulation. Externally Pre-modulation filtered analogue unclocked PCM signal input option available for both PCM/FM and SOQPSK Modulation schemes

Power Requirements:

Voltage	28V ±4 Volts DC (Other DC Power supply voltage options including 12 V DC are optionally available)
Current	Nominal 950 mA for 5 Watts output at 28 VDC and 25° C
Isolation	Power and Modulation return are common to case ground as standard. Isolated chassis options available

Mechanical:

Nominal Dimensions	Up to 5 Watts: Standard 55 mm wide 80 mm long and 28 mm high excluding connectors
	5 Watts to 10 Watts: Standard 65 mm wide 90 mm long 35mm high excluding connectors
	10 Watt minimum footprint package Option: 55 mm wide 80 mm long and 38 mm high excluding connectors.
Power, Modulation and Programming Connector	15 way microminiature D-Type
RF Output Connector	SMA as standard. Other Connector Options available

Environmental:

Normal Operating Temperature	-30 ^{O} Centigrade to +70 ^{O} Centigrade baseplate temperature
Vibration	>20g sine, 0.1 g^2 random, 20Hz to 2000Hz, in any axis
Shock	100g for 1 ms in three mutually perpendicular axes
Acceleration	100g in three mutually perpendicular axes

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Transmitter Features:

- **275 MHz to 450 MHz Band Transmitter**

- **Up to 1 Watt Power Output**

- **RS-232 Serial Data Input**

- **Up to 28 KBPS Data Rate**

- **Deviation Bandwidth optimised for the data rate**

- **12 V DC Operation**

- **Low Current Consumption**

- **Digital Design Implementation**

The Apollotek T-567 Data Link Transmitter is a nominal 275 MHz to 450 MHz Band Transmitter designed to work with a companion Apollotek R-567 receiver to provide a robust minimal modulation bandwidth serial digital data link solution for UAV's and other covert and overt applications.

Standard serial data rates up to 28KBPS are supported using optimised modulation coding utilising I and Q digital signal processing to produce an FM Modulated RF Carrier

RF Output power up to 1 Watt can be specified.

The transmitter operates from a nominal 12 V DC Supply. It can be specified to operate at voltages up to 32 V DC and down to 8 Volts DC with reduced output power.

The standard T-567 is packaged in the same mechanical housing as the T-900 Series of Telemetry and Video Transmitters.
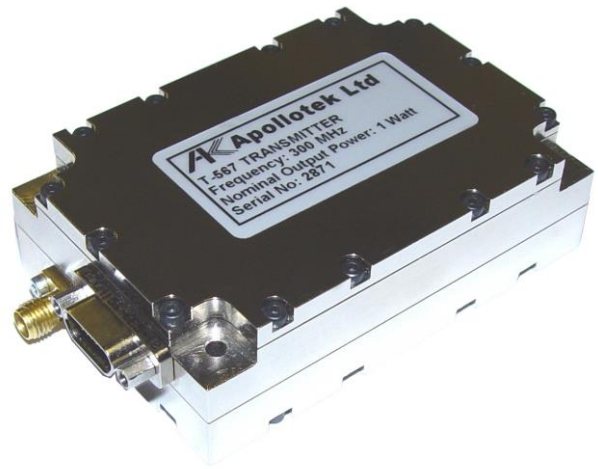
The Apollotek T-567 transmitter is designed for Data Link applications where asynchronous RS422 or RS232 data is required to be transmitted over an FM link.

The T-567 is designed to operate in a data link together with the Apollotek R-567 Receiver.

The digital design of the T-567 enables optimum frequency deviation.

The standard T-567 configuration provides a 1 Watt Transmitter operating at a fixed centre frequency between 275 MHz and 450 MHz with a typical deviation bandwidth of 19.6 KHz optimised for RS232C serial data modulation at 9600 baud.

The standard RF Output signal is provided through a coaxial flying lead terminated with an SMA Female connector. The Modulation input and the Power Supply input connections are provided on colour coded flying leads. Other interconnection options can be provided.

Alternative application specific options and Data Link configurations can be provided.

SPECIFICATIONS

General:

Frequency Band	275 MHz to 450 MHz frequency band capability as standard
Nominal Frequency Stability	± 4 PPM
Nominal RF Output Power	Standard unit set to approximately 1 Watt. Other lower and higher power configurations are available

Modulation:

Modulation Type	Proprietary Narrow band FM as standard. Other modulation options are available
Input Signal Coupling	Optimised for RS232C Amplitude and Impedance
Data Rate	Set to 9600 Baud as standard. Up to 28 KBPS data rate options are available
Modulation Bandwidth	Set to 19.6 KHz as standard. Other deviations matched for different data rates can be provided

Power Requirements:

Supply Voltage	12V +3V Volts DC for full power output. 12V -4V at reduced power output
Current	Nominal 350 mA for 1 Watt output with 12 V supply
Grounding	Power and Modulation return are common to case ground

Mechanical:

Dimensions	Standard package: 50 mm wide 75 mm long and 15 mm high excluding connectors. Other mechanical packaging and interconnection options can be provided
Power and Modulation Interconnections	Colour Coded flying leads as standard. Connector options available
RF Output Connection	SMA Female on 150 mm coaxial flying lead as standard. SMB, SMC and other interconnection options available
Weight:	Approximately 100 grams for standard unit. Lower weight application specific packaging options for quantity requirements are available

Environmental:

Normal Operating Temperature	-30° Centigrade to +70° Centigrade baseplate temperature
Vibration	10g sine, 0.1 g^2 random, 20Hz to 2000Hz, in any axis
Shock	10g for 1 ms in three mutually perpendicular axes
Acceleration	10g in three mutually perpendicular axes

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Receiver Features:

- **275 MHz to 450 MHz Band Data Link Receiver**

- **Designed to operate in conjunction with the Apollotek T-567 Data Link Transmitter**

- **RS-232 Serial Data Output**

- **Up to 28 KBPS Data Rate**

- **12 V DC Operation as standard**

- **Low Current Consumption**

- **Digital Design Implementation**

The Apollotek R-567 Data Link Receiver is a 275 MHz to 450 MHz miniature lightweight receiver designed to work with a companion Apollotek T-567 Transmitter to provide a robust minimal modulation bandwidth serial digital data link solution for UAV's and other covert and overt applications.

A proprietary LNA and amplifier front end is incorporated in the design to provide maximum sensitivity.

An Automatic Gain Control Amplifier is incorporated to provide maximum received signal dynamic range.

The receiver utilises digital signal processing techniques to demodulate the serial data stream and to produce I and Q components which are then further processed to recover and output the transmitted data in the required format.

Data Link Receivers operating in different frequency bands are also available.

The standard configuration of the R-567 Data Link Receiver provides a small and lightweight receiver unit operating at a fixed centre frequency between 275 MHz and 450 MHz with a deviation bandwidth of 19.6 KHz optimised for RS232C serial data demodulation at 9600 baud.

The receiver utilises direct conversion and digital signal processing techniques to demodulate and recover the transmitted data.

The standard RF input signal is provided through a coaxial flying lead terminated with an SMA Female connector.

The Modulation output and the Power Supply input connections are provided on colour coded flying leads.

Other types of interconnection options can be provided and different types of mechanical configurations can be provided.

The R-567 Receiver operates from a nominal 12 V DC Supply. The standard unit will operates over a 10 Volt to 15 Volt supply voltage range.

SPECIFICATIONS

General:

Frequency Band	275 MHz to 450 MHz frequency band capability.
Nominal Receiver Sensitivity	Better than -75 dBm with FM modulation
Nominal Image Rejection	Better than 45 dB

Modulation:

Modulation Type	FM as standard. Other demodulation options are available
Output Signal Coupling	Optimised for RS232C Amplitude and Impedance
Data Rate	Set to 9600 Baud as standard. Up to 28 KBPS data rate options are available
Demodulation Bandwidth	Set to 19.6 KHz as standard. Other deviations matched for different data rates can be provided

Power Requirements:

Supply Voltage	12V ±3V Volts DC
Current	Nominal 50 mA with 12 V supply
Grounding	Power and Modulation return are common to case ground

Mechanical:

|	
Dimensions	Standard package: 56 mm wide 110 mm long (including mounting flanges) and 27 mm high excluding connectors and antenna. Other mechanical packaging and interconnection options are available
Power and Demodulated Output Interconnections	15 Way Microminiature D-Type connector as standard
RF Input Connection	Bulkhead SMA as standard. SMB, SMC and other interconnection options available
Weight:	Approximately 100 grams for standard unit.

Environmental:

Normal Operating Temperature	-20° Centigrade to +70° Centigrade baseplate temperature
Vibration	5 g sine, 0.1 g^2 random, 20Hz to 2000Hz, in any axis
Shock	5 g for 1 ms in three mutually perpendicular axes
Acceleration	5 g in three mutually perpendicular axes

Features:

- **Provides clock and data recovery from perturbed serial PCM data over a Bit Rate range from 1000 BPS to greater than 20 MBPS**
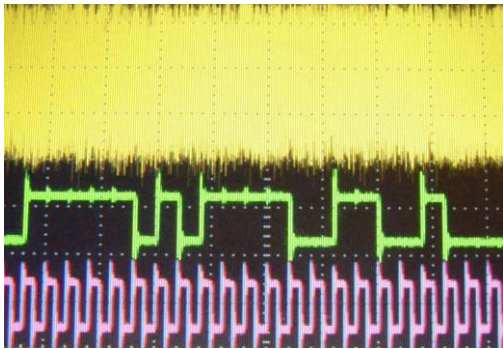
- **Processes PCM Codes including RNRZ, NRZ and Bi-Ø codes**

- **Unique Apollotek Analogue and Digital signal processing data recovery design implementation**

- **Programmable Bit Rate**

- **Programmable Loop Bandwidth**

- **The Bit Synchroniser is set up and its status is monitored through a USB port connection to a host Windows PC using the Apollotek GDSmate Telemetry Environment Software Package or with the stand-alone set up program supplied with the unit**

- **Bit Synchroniser Lock Status LED display**

- **LVTTL and RS422 Data and zero degree clock outputs**

- **Compatible with the Apollotek range of USB Receivers, Decommutators and other third party products**

- **Available in alternative mechanical packaging**

The APK8762 Bit Synchroniser is part of the unique Apollotek range of USB powered and set-up products which are designed for PCM Flight Test Instrumentation system checkout and Telemetry Test and Evaluation applications. The APK8762 is packaged in an aerospace grade aluminium housing machined from solid which is rugged enough to survive airborne applications.

The APK8762 USB Bit Synchroniser uses proprietary Apollotek developed FPGA based analogue and digital signal processing techniques to extract Clock and synchronised Data from a perturbed baseband serial PCM data stream.

The APK8762 takes power from the host PC USB Port and provides NRZ-L data and clock outputs at TTL through individual BNC connectors and at RS422 levels through a 4 pin circular connector.

The Data and Clock Outputs can be connected directly to an Apollotek USB PCM Decommutator or other similar functional devices.

Bit Synchroniser set-up and status monitoring is provided through the USB port under control of the Apollotek GDSmate Telemetry Environment Software package.

When used in conjunction with a portable PC and GDSmate, the Apollotek USB instrumentation product range can be configured as a mobile Groundstation. Apollotek PC based Telemetry Groundstations can also be scaled in performance to include multiple networked Servers and Clients.

STANDARD BIT SYNCHRONISER SPECIFICATIONS

Electrical and Performance Specification

Data Rates	10000 BPS to >20 MBPS for NRZ-L Codes
Input PCM Codes	NRZ-L/M/S
	RNRZ-L ($2^{11,15,17,20,23}$)
	BIØ-L/M/S
	Other codes optionally available
Standard Input Signal Amplitude Range	0.4 V to 6 V (± 3 V peak-to-peak)
Input and Output Signal Connectors	BNC input and outputs with a 4 pin RS422 data and clock output connector (mating half provided)
Loop Bandwidth Equivalence	0.03% to 5% of bit rate (software programmable)
Tracking Range	Up to 10% of programmed bit rate. Loop bandwidth dependent
Bit Error Rate	Nominally within 1 dB of ideal performance curve
Output Data	TTL data and clock and RS422 on separate connectors

System Interface Specification

Interface Type	USB 2 Port. Backwards compatible with USB 1 ports
Power Requirements	Within USB Bus Hub limits
Software	Set-Up and controlled using the Apollotek GDSmate Telemetry Environment Software package or with a set-up utility program supplied with the unit

Mechanical Specification

Overall Size	105 mm long by 55 mm wide and 21 mm high
Manufacturing Processes	Surface mount internal PCB technology
	Enclosure machined from solid aerospace grade aluminium to provide very rugged packaging

Operational Environmental Specification

Temperature	-25 ^{O} Centigrade to +70 ^{O} Centigrade
Humidity	0 to 90% non-condensing

Non-operating in appropriate packaging

Temperature	-30 ^{O} Centigrade to +90 ^{O} Centigrade

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Features:

- **Provides clock and data recovery from perturbed serial PCM data over a Bit Rate range from 10000 BPS to greater than 20 MBPS**
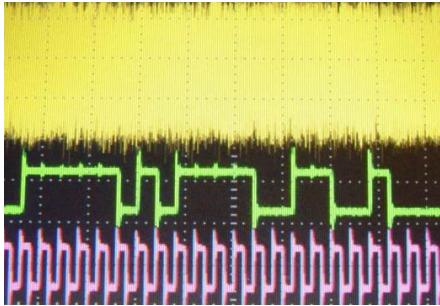
- **Processes PCM Codes including NRZ, RNRZ and Bi-Ø codes**

- **Unique Apollotek Analogue and Digital signal processing data recovery design implementation**

- **Programmable Bit Rate**

- **Programmable loop bandwidth**

- **The Bit Synchroniser is set up and monitored through the USB port using Apollotek supplied software**

- **The programmed set up is stored in non-volatile Flash memory. The stored set-up is automatically loaded when power is applied**

- **This version of the APK8762 Bit Synchroniser is powered from an external 5 Volt Power Supply**

- **Bit Synchroniser Lock Status and Input Signal Present LED display**

- **Isolated RS422 Data and Clock Outputs**

- **Compatible with the Apollotek range of USB Telemetry Receivers and Decommutators**

The APK8762-I PCM Bit Synchroniser is part of the unique Apollotek range of USB products which are designed to be used for Flight Test Instrumentation system checkout and Telemetry Test and Evaluation applications. The Bit Synchroniser is packaged into a rugged black anodised aluminium housing with a flanged baseplate.

The APK8762-I USB Bit Synchroniser uses proprietary Apollotek developed FPGA based analogue and digital signal processing techniques to extract a synchronised NRZ-L Data and Zero degree clock from a perturbed baseband serial PCM data stream input.

The APK8762-I operates from an external 5 Volt DC supply and provides NRZ-L data and clock outputs through individual BNC connectors and isolated RS422 outputs through a4 pin circular connector.

The Data and Clock Outputs can be connected directly to an Apollotek USB PCM Decommutator or other similar functional devices.

Bit Synchroniser set-up and status monitoring is provided through the USB port under control of the Apollotek Set-Up Software provided with the unit.

This version of the Apollotek miniature Bit Synchroniser is designed to be hard mounted using bolts passing through the flanged baseplate.

Other versions of the Apollotek Bit Synchroniser are powered directly through a USB port connection to a host PC.

BIT SYNCHRONISER SPECIFICATIONS

Electrical and Performance Specification

Data Rates	10000 BPS to >20 MBPS for NRZ-L Codes
Standard PCM Input Codes	NRZ-L/M/S, BIØ-L/M/S, RZ, RNRZ-L ($2^{11,15,17,20,23}$)
Input Signal Amplitude	0.4 V to 6 V (± 3 V peak-to-peak)
Input Impedance	User switchable to either 75 Ohms or 10 K Ohms
Input and Output Signal Connectors	BNC PCM input and NRZ-L Data and Clock outputs. 4 pin RS422 data and clock output connector
Loop Bandwidth Equivalence	0. 03% to 25% of bit rate (software programmable)
Tracking Range	Up to 10% of programmed bit rate. Loop bandwidth dependent
Bit Error Rate	Approximately within 1dB of nominal ideal performance curve for a specified data quality signal
Output Data	TTL data and clock and Isolated RS422 data and clock outputs on separate connectors.
LED Indicators	Power (Green when powered)
	Lock (Red when out of lock, Green when in-lock)
	Signal Level (Green when above threshold)
	These LED Indicators can optionally be duplicated on both sides of the unit to aid visual observation of the Status of the Unit

System Interface Specification

Interface Type	USB 2 Port. Backwards compatible with USB 1
Power Requirements	External +5V Power Supply required
Software	Set-Up and controlled using Apollotek Windows based Set-Up Software supplied with the unit

Mechanical Specification

Overall Size	147 mm long (including flanges) by 66 mm wide and 40 mm high
Manufacturing Processes	Surface mount internal PCB technology
	Flanged Base black coloured rugged packaging

Operational Environmental Specification

Temperature	-25 $^\circ$ Centigrade to +70 $^\circ$ Centigrade
Humidity	0 to 90% non-condensing

Non-operating in appropriate packaging

Temperature	-30 $^\circ$ Centigrade to +90 $^\circ$ Centigrade

APK8761 USB 2 Series
PCM Telemetry Decommutators

Features:

- **USB Powered PCM Decommutator**

- **Single PCM Stream Decommutation and multiple merged stream Decommutation capability**

- **Embedded Asynchronous PCM Stream Decommutation capability**

- **BERT Mode Bit Error Counter option**

- **USB 2 connection to Host PC**

- **Powered from Host PC**

- **TTL Data and Clock Inputs**

- **RS422 Data and Clock Inputs**

- **Integrated IRIG B Time Code Reader**

- **Greater than 20 MBPS Bit Rate Operation**

- **Lock and Status LED Indicators**

- **Frame Format stored in non-volatile memory when powered down**

- **Displays Lock Status of Stored Frame Format when externally powered and not connected to a USB Host Computer**

- **-25 ℃ to +70 ℃ operating temperature range**

- **Rugged Construction**

- **Supports IRIG 106 Frame Formats**

- **Supplied with single stream GDSmate software providing Frame Format set up and :**

  - **Control of Raw Data Archiving to Disk**

  - **Graphical Data Displays**

  - **Tabular Data Displays**

  - **Engineering Unit Conversions**

  - **Data Export in common file formats**

APK8761 Standard USB Unit
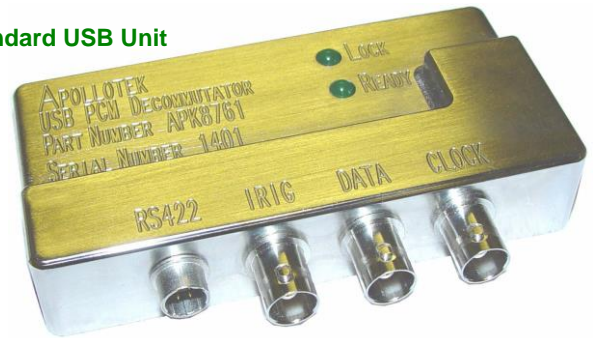
APK8761-IA Airborne Unit

The Apollotek 8761 USB 2 powered miniature rugged PCM Decommutator provides Decommutation of clocked serial NRZ-L PCM data streams and provides data transfer to a host PC. The Apollotek GDSmate Telemetry Environment Software package is provided with these units to graphically display data parameters and also to archive, replay and export data.

The dimensions of the standard USB Decommutator are 105 mm long by 55 mm wide and 21 mm high. The Low Profile APK8761-E has a nominal height of 15.6 mm
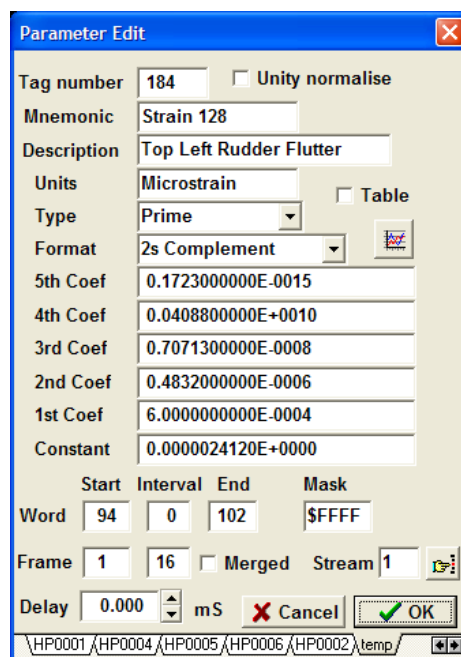
The USB Decommutator plugs into a standard PC USB 2 port and is powered through the USB port of the host PC. The unit will transfer data at the highest speed at which the Host PC USB port can accept the data. This includes full speed USB data transfer.

The 8761 USB Decommutator accepts data and clock signals from the output of a Bit Synchroniser such as the Apollotek APK8762 series.

An IRIG B Time Code Reader function is also incorporated into the Decommutator to provide accurate time stamping of decommutated frames of PCM Data.

USB Decommutator Software

- the Apollotek GDSmate Software supplied with the unit is a single stream PCM Decommutation version of the product which includes graphical and tabular data displays, data archiving and file export facilities

- The User Parameter Database is developed interactively through a Parameter Edit form. Each Parameter can be allocated a unique Mnemonic and Description.

- The User can apply up to 5th order linearising and calibration coefficients to each decommutated parameter. A Maths Processor editor provides additional processing functions.

- A PCM Frame Format form is used to set up the Decommutator Frame synchronisation strategy.

- The selected default time stamp source can be IRIG B or Computer PC Time derived.

- Secondary Forms are presented for definition of variable word length formats.

- An Interactive colour keyed graphical presentation of the Frame Map for PCM or Message Map for Serial Bus data streams is provided. The user can point and click on a parameter in the frame map and get immediate access to the Parameter Editor.

- The standard Single Stream USB Decommutator Software licence can be upgraded to the full version of GDSmate to provide multiple user data presentation and simultaneous processing of multiple data streams on a single computer or as part of a networked Server / Client installation.

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Features:

- **Combines the capabilities of the Apollotek APK8762 Bit Synchroniser and the APK8761 Decommutator into one USB2 Unit**

- **Provides clock and data recovery from perturbed serial PCM data over a Bit Rate range extending from 100 KBPS to greater than 20 MBPS**

- **Includes a Bit Synchronisers and a PCM Decommutator which transfers data to a host PC through a USB 2 Port**

- **Powered from the Host PC through the USB2 port**

- **Processes all common PCM Codes including RNRZ, NRZ and Bi-Ø codes**

- **BERT Count Mode Option available**

- **TTL and RS422 Data and Clock Inputs**

- **Buffered RS422 Data and Clock Outputs**

- **IRIG B Time Code Reader included**

- **Wide operating temperature range**

- **Rugged Construction**

- **Frame Lock and Status Indicators**

- **Supports IRIG 106 Frame Formats**

- **Frame Format stored in internal non-volatile memory.**

- **Supplied with single stream GDSmate software providing:**

  - **Raw Data Archiving to Disk**

  - **Graphical Data Displays**

  - **Tabular Data Displays**

  - **Engineering Unit Conversions**

  - **Post Processing Outputs in common File Formats**

The APK8763 PCM Bit Synchroniser and Decommutator is one of the Apollotek range of USB powered products which are designed for PCM Flight Test Instrumentation system checkout and Test and Evaluation Instrumentation applications. The Unit is packaged into an aerospace grade aluminium housing machined from solid which is rugged enough for airborne applications.

The APK8763 USB Bit Synchroniser and Decommutator combines the functions of the APK8762 USB Bit Synchroniser unit and the APK8761 USB Decommutator into a single cost effective unit.

The APK8763 uses proprietary FPGA Based analogue and digital signal processing techniques to extract clock and synchronised data from a perturbed baseband serial PCM data stream and to provide PCM Decommutation with data transfer to a host PC through a high speed serial USB port.

Bit Synchroniser status and stream lock status monitoring is provided on the unit through LED displays and also through the USB port under control of the Apollotek GDSmate Telemetry Environment Software package.

RS422 Data and Clock Outputs are provided for connection to external decryption or other similar functional devices. The decrypted data and clock can then be fed back into the APK8763 through the RS422 Input Port.

BIT SYNCHRONISER and DECOMMUTATOR SPECIFICATIONS

Electrical and Performance Specification

Data Rates	100 KBPS to >20 MBPS for NRZ-L Codes
Input PCM Codes	NRZ-L/M/S
	RNRZ-L ($2^{11,15,17,20,23}$)
	BIØ-L/M/S
	DM-M/S
	RZ
Standard Input Signal Amplitude Range	0.4 V to 6 V (± 3 V peak-to-peak)
Input and Output Signal Connectors	BNC inputs for PCM and IRIG B
	4 pin RS422 data and clock input connector for decoded data and clock inputs (mating half provided). Can also be used as a stand-alone USB Decommutator
Loop Bandwidth Equivalence	0.03% to 5% of bit rate (software programmable)
Bit Rate Tracking Range	Up to 10% of Bit Rate. Loop Bandwidth dependent
Bit Error Rate	Nominally within 1 dB of ideal performance curve
Output Data	RS422 data and clock (for external decoding). Decoded data can also be connected back into the unit through the RS422 input connector (mating half provided).
	Decommutated IRIG 106 PCM data transferred to host PC through a high speed USB port

System Interface Specification

Interface Type	USB 2 Bus. Backwards compatible with USB 1 ports
Power Requirements	Within USB Bus Port limits
Software	Set-Up and controlled using the Apollotek GDSmate Telemetry Environment Software package (see separate data sheet)

Mechanical Specification

Overall Size	105 mm long by 55 mm wide and 21 mm high
Manufacturing Processes	Surface mount internal PCB technology
	Enclosure machined from solid aerospace grade aluminium to provide very rugged packaging

Operational Environmental Specification

Temperature	-25 º Centigrade to +70 º Centigrade
Humidity	0 to 90% non-condensing

Non-operating

Temperature	-30 º Centigrade to +90 º Centigrade

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APOLLOTEK

Features:

- **The APK8763-I combines the capabilities of the Apollotek APK8762 Bit Synchroniser and the APK8761 Decommutator into a single rugged Unit which is externally powered. 5 V DC and 28 V DC variants are available**

- **The Unit is Set-Up from a Host PC through a USB2 port**

- **Provides clock and data recovery from perturbed serial PCM data over a Bit Rate range extending from 100 KBPS to greater than 20 MBPS**

- **Includes a PCM Decommutator which transfers frames of data to a host PC through a USB 2 Port**

- **Processes all common PCM Codes including RNRZ, NRZ and Bi-Ø codes**

- **TTL and RS422 Data and Clock Inputs**

- **Buffered RS422 Data and Clock Outputs**

- **IRIG B Time Code Reader included**

- **Wide operating temperature range**

- **Rugged Construction**

- **Frame Lock and Status Indicators**

- **Supports IRIG 106 Frame Formats**

- **Frame Format stored in internal non-volatile memory.**

- **Supports SFID, FAC & FCC**

- **Supplied with single stream GDSmate software providing:**

  - **Raw Data Archiving to Disk**

  - **Graphical Data Displays**

  - **Tabular Data Displays**

  - **Engineering Unit Conversions**

  - **Post Processing Outputs in common File Formats**

The APK8763-I PCM Bit Synchroniser and Decommutator is one of the Apollotek range of USB powered products which are designed for PCM Flight Test Instrumentation system checkout and Test and Evaluation Instrumentation applications. The APK8763-I unit is packaged into a rugged black anodised aluminium housing with a flanged baseplate.

The APK8763-I USB Bit Synchroniser and Decommutator combines the functions of the APK8762 USB Bit Synchroniser unit and the APK8761USB Decommutator into a single unit.

The APK8763-I uses proprietary FPGA based analogue and digital signal processing techniques to extract clock and synchronised data from a perturbed baseband serial PCM data stream and to provide PCM Decommutation with data transfer to a host PC through a high speed serial USB port.

Bit Synchroniser initialisation status and stream lock status monitoring is provided on the unit through LED displays and also through the USB port under control of the Apollotek GDSmate Telemetry Environment Software package.

RS422 Data and Clock Outputs are provided for connection to external decryption or other similar functional devices. The decrypted data and clock can then be fed back into the APK8763-I through the RS422 Input Port.

BIT SYNCHRONISER and DECOMMUTATOR SPECIFICATIONS

Electrical and Performance Specification

Data Rates	100000 BPS to >20 MBPS for NRZ-L Codes
Input PCM Codes	NRZ-L/M/S
	RNRZ-L (2 [11,15,17,20,23])
	BIØ-L/M/S
	DM-M/S
	RZ
Standard Input Signal Amplitude Range	0.4 V to 6 V (± 3 V peak-to-peak)
Input and Output Signal Connectors	BNC inputs for PCM and IRIG B Time Code
	Circular RS422 data and clock input and output connectors for decoded data and clock inputs (mating half provided). Can also be used as a stand-alone USB Decommutator
Loop Bandwidth Equivalence	0.03% to 5% of bit rate (software programmable)
Bit Rate Tracking Range	Up to 10% of Bit Rate. Loop Bandwidth dependent
Bit Error Rate	Nominally within 1 dB of ideal performance curve
Output Data	RS422 data and clock (for external decoding). Decoded data can also be connected back into the unit through the RS422 input connector (mating half provided).
	Decommutated IRIG 106 PCM data transferred to host PC through a high speed USB port

System Interface Specification

Data Interface Type	USB 2 Bus. Backwards compatible with USB 1 ports
Power Requirements	Specify 5 V DC or +28 V DC Power Supply Version
Software	Set-Up and controlled using the Apollotek GDSmate Telemetry Environment Software package (see separate data sheet)

Mechanical Specification

Overall Size	147 mm long (including flanges) by 66 mm wide and 40 mm high
Manufacturing Processes	Surface mount internal PCB technology
	Flanged Base black coloured rugged packaging

Operational Environmental Specification

Temperature	-25 O Centigrade to +70 O Centigrade
Humidity	0 to 90% non-condensing

Non-operating

Temperature	-30 O Centigrade to +90 O Centigrade

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Features:

- **Provides PAM demodulation from 100 channels per second to greater than 500,000 channels per second**

- **Legacy IRIG 106 PAM Standards Compatible**

- **2, 3, 4 or 5 channel IRIG 106 programmable synchronisation channels**

- **Legacy UK 4650 PAM Compatible**

- **Non Standard Synchronisation Strategy Options**

- **Automatic Gain and Level Control**

- **IRIG B Time Code Reader**

- **Wide operating temperature range**

- **Rugged Construction**

- **Powered from Host PC**

- **Lock and Status Indicators**

- **Frame Format stored in non-volatile memory**

- **Demodulated PAM data is passed to host Windows PC**

- **PAM to PCM Converted Output**

- **Supplied with single stream GDSmate software providing:**

  - **Raw Data Archiving to Disk**

  - **Graphical Data Displays**

  - **Tabular Data Displays**

  - **Engineering Unit Conversions**

  - **Post Processing File Outputs in several common file formats**
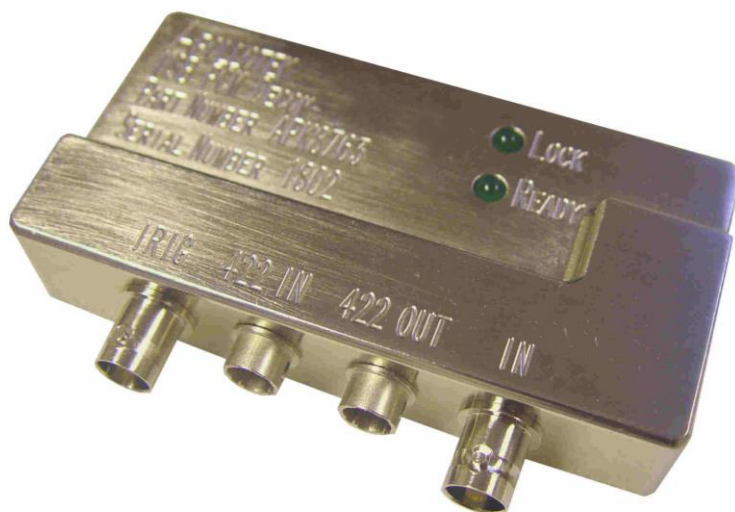
The Apollotek APK8763-P PAM Demodulator is part of the ApolloDas range of USB products which are designed for Flight Test Instrumentation system checkout and test applications.

The PAM Demodulator is packaged into an aerospace grade aluminium housing machined from solid which is rugged enough to be installed in an aircraft.

The APK8763-P Demodulator uses proprietary FPGA based Apollotek developed analogue and digital signal processing techniques to normalise and demodulate the PAM input and to provide data transfer to a host PC through a high speed USB 2 serial USB port controlled by the Apollotek GDSmate Telemetry Environment software package.

The APK8763-P unit also takes power from the host PC USB Port.

Initialisation and PAM datastream lock status monitoring is provided on the unit through LED displays and also through the USB port under control of the Apollotek GDSmate Telemetry Environment Software package which provides set up facilities, real time graphical and tabular displays and data archiving and replay facilities. A dynamic link library is available for users intending to control the PAM demodulator using independent software.

PAM DEMODULATOR SPECIFICATIONS

Electrical and Performance Specification

Data Rates	100 channels per second to in excess of 500,000 per second typically optimised for each application
Frame Length	3 Words to 128 Words per Frame as standard. Other options available
Frame Synchronisation Formats	2, 3, 4 or 5 Channel IRIG 106 Compatible. Other options include 4 channel uniquely programmable
Input Signal Amplitude Range	300 mV peak to peak up to 3 V peak to peak as standard. Other ranges optionally available
Tracking Range	Tracks greater than $\pm$ 5% of selected channel rate
Level and Gain Servos	Operates on selected zero and full scale Reference channels. Automatic channel amplitude correction range with Servos on. Software adjustment controlled by GDSmate software with Servos off.
Channel Measurement Resolution	12 bit Analogue to Digital conversion for each data channel
Accuracy	Better than $\pm$ 0.25% of Full Scale
Crosstalk	$\pm$ 0.1% of Full scale
PCM Output	IRIG 106 NRZ-L as standard at with standard bit rate approximately 16 times the PAM Sample Rate

System Interface Specification

Interface Type	USB 2 Bus. Backwards compatible with USB 1 ports
Power Requirements	Within USB Bus Port limits
Supplied Software	Set-Up using the Apollotek GDSmate Telemetry Environment Software package. .dll option available

Mechanical Specification

Overall Size	105 mm long by 55 mm wide and 21 mm high
Manufacturing Processes	Surface mount internal PCB technology
	Enclosure machined from solid aerospace grade aluminium to provide very rugged packaging

Operational Environmental Specification

Temperature	-25 ^{O} Centigrade to +70 ^{O} Centigrade
Humidity	0 to 90% non-condensing

Non-operating

Temperature	-30 ^{O} Centigrade to +90 ^{O} Centigrade

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PCM Simulator Features:

- **USB Interface to a host PC for set up and power**

- **PCM Simulation to greater than 25 MBPS**

- **Large on-board non-volatile Memory**

- **Very Long Frame Capability with low frequency Dynamics**

- **Complex Sub-Frame Capability**

- **Super-Commutation support**

- **Sub-Commutation support**

- **Embedded Stream Generation**

- **Generates User Programmable Dynamic Parameters including:**

- **Sine, Square, Ramp and Step**

- **Fixed Word Value**

- **Common Word Value**

- **BERT Generator Mode**

- **TTL PCM Data and Clock Outputs**

- **Programmable Amplitude and Offset PCM Output**

- **RS422 Data and Clock Outputs**

- **Compatible with the Apollotek GDSmate Software package**

- **Common set up screen for setting up the simulator and the Apollotek range of USB PCM Decommutators**
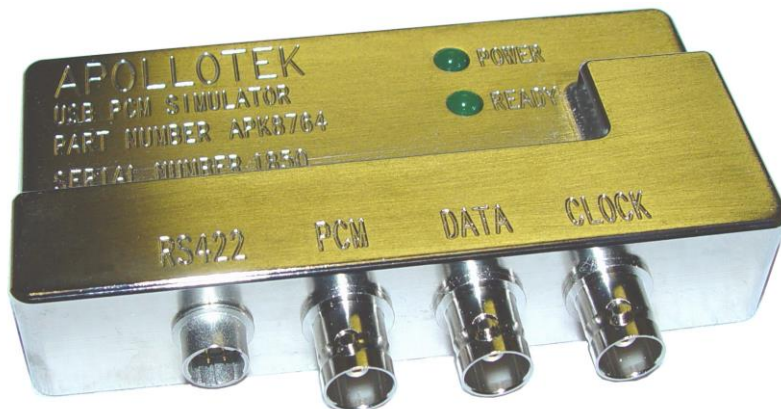
The Apollotek Model APK8764 is a general purpose high performance PCM Simulator which is set up through a USB connection to a host PC. The unit is also powered through the USB Port. The Model 8764 is provided with stand-alone set-up software and it is also designed to work directly with the Apollotek GDSmate Telemetry Environment Software package.

As well as being capable of operating at high data rates, the APK8764 is also designed to simulate low frequency parameter simulation within large and complex frame formats.

The APK8764 provides outputs of PCM Data and Clock at TTL levels through BNC connectors. A nominal 1 V rms serial PCM output is also provided on a separate BNC connector.

In addition, PCM Data and Clock signals at RS422 levels are provided through a circular 4-pin connector.

The TTL Clock Output BNC port can also be programmed to provide a Bit Clock, Frame Clock or Sub-Frame Clock.

As an option, the APK8764 can be supplied with the facility to read and interpret a user defined Frame Format set-up information text file.

The APK8764 is one of a family of Apollotek USB products which also includes high performance Telemetry Receivers, Bit Synchronisers and PCM Decommutators.

Model APK 8764
USB PCM Simulator

Simulator Software Control

- **Select the Bit Rate for PCM**

- **Select Channel Rate for PAM**

- **Build the Data Frame**

- **Variable Bits per Word supported**

- **Up to 32 bits per word**

- **Assign Dynamic and Fixed Data to Words in the PCM Frame**

- **Assign Embedded Data Stream Words**

- **Select the Variable Frequency**

- **Select the Variable Amplitude**

- **Select the Channel Interval**

- **Select the Channel DC Offset**

- **Set the PCM Output Signal Amplitude and Offset voltage**

- **Update the Simulator**

- **Output Simulated Data**

- **Colour Coded Frame Format Word Type identification**

- **Direct access to simulated parameters through a Frame Map display**

System Interface Specification

PCM Simulator and Frame Format Set Up

Interactive PCM Format Frame Map Display

Interface Type:	USB 2 with USB 1 compatibility
Programmable Functions:	Source of data word. Individual channel amplitude. Individual channel offsets. Individual channel frequency. Frame Format characteristics. Bit Rate. PCM Code

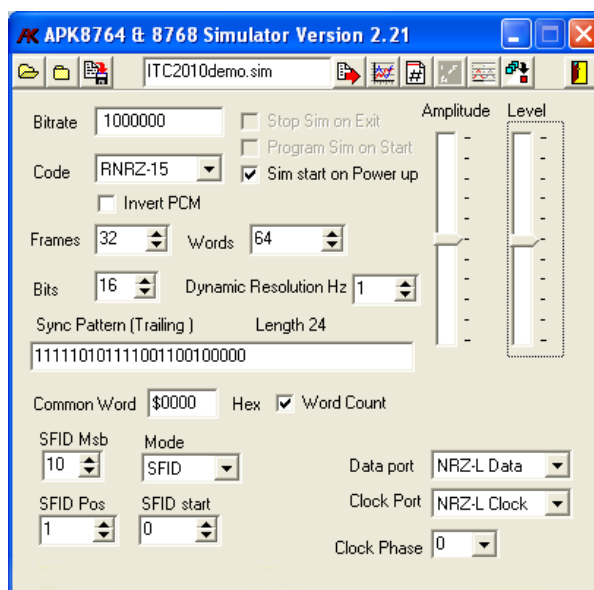## Mechanical Specification

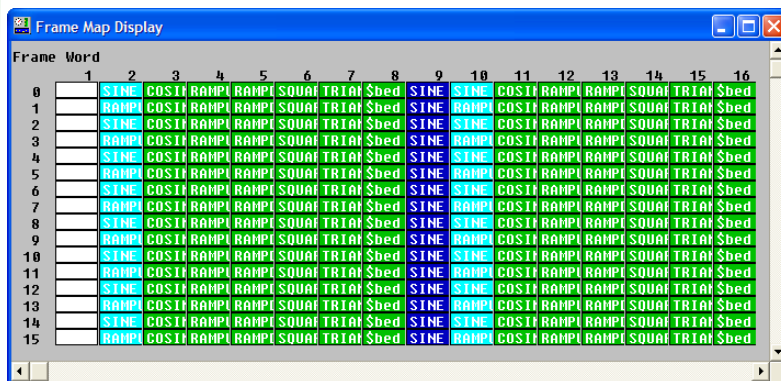| Standard Module dimensions:	Length: 115 mm Width: 70 mm (including connectors) Height: 21 mm.
Construction:	Multi-layer printed circuit board with maximum use of Surface Mount components mounted inside an Aerospace grade aluminium precision machined housing

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Features:

- **USB 2 connection to Host PC**

- **Powered from Host PC**

- **Dual Redundant Mil-Std 1553 Bus Monitoring**

- **Internal Direct Bus Coupling Resistors or external transformer coupling option**

- **IRIG B Time Code Reader and Time Stamp Option**

- **Status and Bus Activity LED Indicators**

- **Bus Message Configuration information stored in non-volatile memory**

- **Wide operating temperature range**

- **Rugged Construction**

- **Supplied with single stream GDSmate software providing:**

  - **Raw Data Archiving to Disk**

  - **Graphical Data Displays**

  - **Tabular Data Displays**

  - **Engineering Unit Conversions**

  - **Replay from Disk**

  - **Data Export in many common file format types**

  - **Multiple Stream Mil-Std 1553, ARINC 429 and Serial PCM Telemetry GDSmate Software upgrade option**
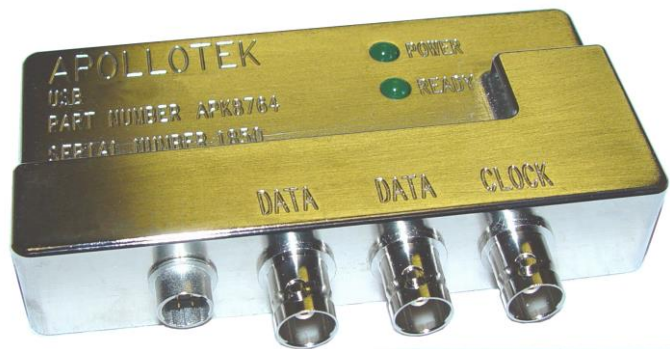
The Apollotek Model APK 8765 is one of a family of Avionics Bus and Telemetry Signal Recovery, Data Processing and data Simulation modules which are based on a common package size and all of which are set up through a USB connection to a host PC. These units are also powered through the same USB Port from the Host PC.

The APK 8765 is designed to provide a dual redundant Mil-Std 1553 Bus Monitoring capability when used with the Apollotek GDSmate software package.

This module is designed to enable the Mil-Std 1553 Bus Traffic to be monitored and the data contained in the bus messages can be extracted, processed and displayed under GDSmate control.

Direct Bus Coupling isolation is provided internal to the APK 8765. For connections greater than 0.4 metre and up to 3 metres, external Bus Transformer Coupling should be used.

Message Data can be processed in real time and 100% bus traffic can be stored to a Host PC hard disk in real time.

Parameters in any Mil-Std 1553 message can be displayed in several graphical, tabular and text based formats. Additional parameters can be derived by processing multiple parameters extracted from multiple messages.

The APK 8765 is one of a family of Apollotek USB products which also includes high performance Bit Synchronisers, PCM Decommutators, Simulators, Transmitters and Receivers.

Mil-Std 1553 USB Module Software

- The Apollotek GDSmate Software package supplied with the APK8765 will provide dual redundant Mil-Std 1553 Bus Monitoring and includes graphical and tabular parameter data displays, data archiving and file export facilities

- The User Parameter Database is developed interactively through a Parameter Edit form. Each Parameter can be allocated a unique Mnemonic and Description.

- The User can apply up to 5th order linearisation and calibration coefficients to each message parameter. A Maths Processor editor provides additional processing functions.

- The selected message default time stamp source can be IRIG B (extra cost option) or Computer derived.

- Secondary Forms are presented for definition of multiple word parameters and multiple message parameters

- An Interactive colour keyed graphical presentation of the Mil-Std 1553 Message Maps for Serial Bus data streams is provided. The user can point and click on a parameter in the frame map and get immediately to the Parameter Editor.

- The standard Single Stream USB Mil-Std 1553 Bus Monitoring Software licence can be upgraded to the full version of GDSmate to provide multiple user and simultaneous processing of multiple data streams on a single computer or as part of a networked Server / Client installation. This software upgrade also includes the capabilities to control and process data from the Apollotek range of USB PCM Telemetry Signal Recovery Modules

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Features:

- **L-Band, Upper L-Band, S-Band or C-Band Tuneable Receiver**

- **Provides a baseband analogue output signal**

- **Provides an Automatic Gain Control output voltage proportional to the received signal strength**

- **Optional 220 MHz IF analogue output signal**

- **Programmable Centre Frequency**

- **Programmable Deviation Sensitivity**

- **Programmable Baseband Filter cut off frequency**

- **Programmed through the USB connection to a host Windows PC**

- **Programming GUI software provided**

- **Powered from the Host PC through the USB2 port**

- **Ready LED indicates that the unit is programmed and ready for operation**

- **Signal Strength Indicator threshold set to -70 dBm as standard. Other settings are available**

- **Rugged Construction**

- **Wide operating temperature range**

- **Other modules in the Apollotek USB range include Receivers with integrated Bit Synchronisers and Decommutators, Bit Synchronisers with integrated Decommutators and also stand alone Bit Synchronisers, Demodulators and PCM Simulators**

The Apollotek APK8766 is one of the products in the Apollotek USB powered range of Telemetry Receivers, PCM Bit Synchronisers, Decommutators and PCM Simulators.

The APK8766 provides a tuneable S-Band or L-Band Receiver with an analogue baseband output signal. The Unit is packaged in an aerospace grade aluminium housing machined from solid which is rugged enough to be installed in an aircraft.

The APK8766 uses proprietary Apollotek developed analogue and digital signal processing techniques to extract the baseband analogue signal which is provided as an output from a connector mounted on the side of the unit. The Receiver centre frequency, deviation sensitivity and baseband filter bandwidth are programmed through the USB port from a host computer using Apollotek set up software.

Initialisation and receiver status indication is provided on the unit through multicolour LED displays. Status indication is also provided by the set up software supplied with the unit.

USB RECEIVER SPECIFICATIONS

Electrical and Performance Specification

Receiver Tuning Ranges:	Specify: a 200 MHz range in L-Band, Upper L-Band, S-Band, NATO E-Band or C-Band.
Receiver Sensitivity	Better than -80 dBm sensitivity. Red LED indication when the received signal strength drops below approximately -70 dBm
IF Frequency	Single down conversion to a 220 MHz IF prior to digitising
Baseband Analogue Output	Output Voltage adjustable up to ± 1 Volt peak to peak
	Selectable filter setting up to 10 MHz analogue bandwidth
AGC Output Signal	Logarithmic analogue voltage output range of 0 to +4 V DC nominally set for 4 Volts at 0 dBm received signal strength
Input and Output Signal Connectors	SMA RF female socket Input Connector. A simple Stub Antenna is provided with the unit.
	BNC Output Connector for Baseband Analogue Output BNC Output Connector for AGC Output Voltage Optional BNC Output Connector for 220 MHz IF signal
Software	Supplied with GUI based Set Up Software to enable selection of: Centre Frequency Deviation Sensitivity Baseband Output Signal amplitude Baseband Filter -3dB cut off frequency

System Interface Specification

Interface Type	USB 2 Bus. Backwards compatible with USB 1 ports
Power Requirements	Within USB Bus Hub power output limits

Mechanical Specification

Overall Size	105 mm long by 55 mm wide and 35 mm high
Manufacturing Processes	Surface mount internal PCB technology
	The housing is machined from solid aerospace grade aluminium to provide very rugged packaging

Operational Environmental Specification

Temperature	-25 ^{O} Centigrade to +70 ^{O} Centigrade
Humidity	0 to 90% non-condensing

Non-operating

Temperature	-30 ^{O} Centigrade to +90 ^{O} Centigrade

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Features:

- **L-Band, Upper L-Band, S-Band or C-Band Tuneable Receiver**

- **Provides a baseband analogue output signal**

- **Provides an Automatic Gain Control output voltage proportional to the received signal strength**

- **Optional 220 MHz IF analogue output signal**

- **Programmable Centre Frequency**

- **Programmable Deviation Sensitivity**

- **Programmable Baseband Filter cut off frequency**

- **Programmed through the USB connection to a host Windows PC**

- **Programming GUI software provided**

- **Powered from an external +5 Volt DC supply**

- **Ready LED indicates that the unit is programmed and ready for operation**

- **Signal Strength Indicator threshold set to -70 dBm as standard. Other settings are available**

- **Rugged Construction with Flanged Mounting Base**

- **Wide operating temperature range**

- **Other modules in the Apollotek USB range include Receivers with integrated Bit Synchronisers and Decommutators, Bit Synchronisers with integrated Decommutators and PCM Simulators**

The Apollotek APK8766-I is one of the products in the Apollotek USB powered range of Telemetry Receivers, PCM Bit Synchronisers, Decommutators and PCM Simulators. It has the same RF Performance as the APK8766.

The APK8766-I provides a tuneable L-Band, S-Band or C-band Receiver with an analogue baseband output signal. The Unit is packaged in an aerospace grade aluminium housing machined from solid which is rugged enough to be installed in an aircraft.

The APK8766-I uses proprietary Apollotek developed analogue and digital signal processing techniques to extract the baseband analogue signal which is provided as an output from a connector mounted on the side of the unit. The Receiver centre frequency, deviation sensitivity and baseband filter bandwidth are programmed through the USB port from a host computer using Apollotek set up software.

Initialisation and receiver status indication is provided on the unit through multicolour LED displays. Status indication is also provided by the set up software supplied with the unit.

TYPICAL USB RECEIVER WITH BASEBAND OUPUT SPECIFICATIONS

Electrical and Performance Specification

Receiver Tuning Ranges:	Specify: a 200 MHz range in L-Band, Upper L-Band, S-Band, NATO E-Band or C-band.
Receiver Sensitivity	Better than -80 dBm sensitivity. Red LED indication when the received signal strength drops below approximately -70 dBm
IF Frequency	Single down conversion to a 220 MHz IF prior to digitising
Baseband Analogue Output	Output Voltage adjustable up to ± 1 Volt peak to peak
	Selectable filter setting up to 10 MHz analogue bandwidth
AGC Output Signal	Logarithmic analogue voltage output range of 0 to +4 V DC nominally set for 4 Volts at 0 dBm received signal strength
Input and Output Signal Connectors	SMA RF female socket Input Connector. A simple Stub Antenna is provided with the unit.
	BNC Output Connector for Baseband Analogue Output BNC Output Connector for AGC Output Voltage Hirose connectors for Power and USB Setup
Software	Supplied with GUI based Set Up Software to enable selection of: Centre Frequency Deviation Sensitivity Baseband Output Signal amplitude Baseband Filter -3dB cut off frequency

System Interface Specification

Set-Up Interface Type	USB 2 Bus. Backwards compatible with USB 1 ports
Power Requirements	External 5 V DC Supply providing up to 1 Amp capability

Mechanical Specification

Overall Size	147 mm long (including flanges) by 66 mm wide and 40 mm high
Manufacturing Processes	Surface mount internal PCB technology
	Flanged Base black painted rugged packaging

Operational Environmental Specification

Temperature	-25 ^{O} Centigrade to +70 ^{O} Centigrade
Humidity	0 to 90% non-condensing

Non-operating

Temperature	-30 ^{O} Centigrade to +90 ^{O} Centigrade

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APOLLOTEK

Features:

- Provides a tuneable L-Band, S-Band or C-Band Telemetry Receiver combined with a PCM Bit Synchroniser and Decommutator in a USB powered and set-up product

- Demodulates FM or SOQPSK-TG Telemetry Transmissions

- Provides clock and data recovery from a received serial PCM data stream over a Bit Rate range extending from 100 KBPS to greater than 20 MBPS

- Receiver Frequency, Bit Rate and Frame Format set up through a USB Port by a host PC and the unit provides data transfer to the host PC through the same USB 2 Port

- Powered from the Host PC through the USB2 port

- Processes PCM Codes including RNRZ, NRZ and Bi-Ø codes

- RS422 Data and Clock Inputs

- Buffered RS422 Data and Clock Outputs

- IRIG B Time Code Reader

- Stand Alone Bit Synchroniser Operation

- Stand alone Bit Synchroniser and Decommutator operation

- Stand-alone Decommutator operation

- Frame Lock Indicator

- Supports IRIG 106 Frame Formats

- Frame Format stored in non-volatile memory

- Supports SFID, FAC & FCC

- Supplied with single stream GDSmate software providing:

  - Raw Data Archiving to Disk and Replay

  - Graphical and Tabular Data Displays

  - Common Format File Export Facility

The Apollotek APK8767 Telemetry Receiver, Bit Synchroniser and PCM Decommutator is one of the ApolloDas range of USB products designed for PCM Flight Test Instrumentation system checkout and test applications. The Unit is packaged into an aerospace grade aluminium housing machined from solid to enable the unit to be used in ground based and airborne applications.

The APK8767 USB Unit Receiver Frequency, FM or SOQPSK Demodulation, Bit Rate, Loop Bandwidth, Tracking Range and Frame Format characteristics are set up through a USB 2 port connection to a host PC running the USB version of the Apollotek GDSmate Telemetry Environment Software package.

Initialisation and Stream Lock status is provided on the unit by multicolour LED indicators. Status indication is also provided by the USB version of GDSmate software supplied with the unit.

The APK8767 uses proprietary Apollotek developed analogue and digital signal processing techniques to extract clock and synchronised data from a perturbed baseband serial PCM data stream and to provide PCM Decommutation with data transfer to a host PC through a high speed serial USB port. The APK8767 unit is also powered through the host PC USB Port.

The APK8767 unit provides a combined Receiver, Bit Synchroniser and Decommutator with an integrated IRIG B Time Code Reader.

The APK8767-3 provides an alternative package format which enables the unit to be operated as a Receiver, Bit Synchroniser and Decommutator, A Receiver and Bit Synchroniser, a combined Bit Synchroniser and Decommutator, just as a Bit Synchroniser and just as a Decommutator.

RECEIVER, BIT SYNCHRONISER and DECOMMUTATOR SPECIFICATIONS

Receiver Tuning Ranges:	Specify L-Band, S-Band or C-Band Frequencies
	Up to 200 MHz software controlled tuning range
Receiver Sensitivity	Nominal -85 dBm depending on Bit Rate
Bit Sync Data Rates	100 KBPS to >20 MBPS for NRZ-L Codes and SOQPSK-TG
Bit Sync Input PCM Codes	NRZ-L/M/S, RNRZ-L, BIØ-L/M/S
Decommutator Formats	Compatible with IRIG 106 Frame Format definitions
IRIG B Time Code Input	1 Volt rms modulated time code input into 600 Ohms impedance
Standard Input and Output Signal Connectors	SMA RF Input. A low gain Stub Antenna is provided
(BNC Data and Clock Output connector option is also available – specify at the time of ordering)	BNC input for IRIG B modulated Time Code Signal
	4 pin RS422 data and clock output connector for recovered data and clock inputs. RS422 input connector for external clock and data to enable use as a stand-alone USB Decommutator. (mating halves provided) BNC input for stand-alone Bit Sync Option
Loop Bandwidth	0. 01% to >5% of bit rate (user programmable)
Tracking Range	Up to >10% (user programmable)
Output Data	Decommutated IRIG 106 PCM data is transferred to the host PC through the high speed USB port
Software	Supplied with single stream USB version of GDSmate to enable the host PC to set up the unit and to provide graphical data displays. Archiving, Replay and Ethernet networking is also supported. A documented .dll is also available on request

System Interface Specification

Interface Type	USB 2 Bus. Backwards compatible with USB 1 ports
Power Requirements	Within USB Bus Hub limits
Software	Set-Up and controlled using the Apollotek GDSmate Telemetry Environment Software package (see separate data sheet)

Mechanical Specification

Overall Size	105 mm long by 55 mm wide and 35 mm high
Manufacturing Processes	Surface mount internal PCB technology
	Enclosure machined from solid aerospace grade aluminium to provide very rugged packaging

Operational Environmental Specification

Temperature	-25 ^{O} Centigrade to +70 ^{O} Centigrade
Humidity	0 to 90% non-condensing

Non-operating

Temperature	-30 ^{O} Centigrade to +90 ^{O} Centigrade

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USB Simulator and Transmitter Features:

- **USB Interface to a host PC for set up and DC power**

- **Nominal 10 mW RF Transmitter output frequency modulated with a Simulated dynamic serial PCM or SOQPSK Bitstream**

- **Rechargeable Battery Pack Option for autonomous operation when programmed. Recharges through USB port**

- **Transmitted Frequency covers L-Band, S-Band and C-Band from 4.3 GHz to 6 GHz**

- **Programmable transmitter centre frequency**

- **Optional User programmable attenuation in 1 dB steps down from nominal 10 mW**

- **PCM/FM Modulation and Optional SOQPSK Modulation**

- **PCM Simulation to 20 MBPS for PCM/FM and optional SOQPSK**

- **BERT Pattern Generator Mode**

- **Very Long Frame Capability with low frequency Dynamics**

- **Complex Sub-Frame Capability**

- **Super-Commutation**

- **Sub-Commutation**

- **Embedded Stream Generation**

- **Generates Programmable Dynamic Parameters including:**

- **Sine, Cosine, Square, Ramp and Triangular waveforms**

- **Programmable parameter frequency**

- **Fixed Word Value**

- **Common Word Value**

- **External User generated PCM data files can be stored and repetitively transmitted**

- **TTL and RS422 Data and Clock Outputs**

APK8768   APK8768-B with Battery Pack

The Apollotek Model APK8768 combines the features of the Apollotek APK 8764 USB PCM Simulator with a low power RF Transmitter module and an optional rechargeable battery pack.

The APK8768 unit is set up and powered through a USB Port connection to a host PC to provide a high performance programmable PCM Simulator coupled to an integral nominal 10 mW transmitter with programmable centre frequency to provide a portable Groundstation and data link test capability. The standard RF transmission is through an SMA connector and the supplied stub antenna. In addition to the RF Output, the APK8768 provides outputs of PCM Data and Clock at TTL levels through BNC connectors.

The rechargeable APK8768-B Battery Pack Unit enables the programmed PCM Simulator and Transmitter to be detached from the host PC and operated autonomously as a stand-alone unit. The Battery re-charges through the USB port when connected to a host Windows PC.

As well as being capable of operating at high data rates, the APK8768 is also designed to simulate low frequency parameter simulation within large and complex frame formats.

User generated bit level data files stored on a PC can be downloaded over a USB port into the APK8768 Flash memory using Apollotek supplied download software. Downloaded data can be used to simulate the User defined PCM data format containing real mission dynamic data derived from the downloaded file.

Model APK 8768 Series
USB PCM Simulator and Transmitter

Software Control

- **Select the Bit Rate for PCM**

- **Select the RF Transmitter Frequency**

- **Select PCM/FM or optional SOQPSK Modulation**

- **Select Attenuation Setting**

- **Build the Data Frame**

- **Variable Bits per Word supported**

- **Assign Variables to Words**

- **Assign Embedded Data Stream Words**

- **Select the Variable Frequency**

- **Select the Variable Amplitude**

- **Select the Channel Interval**

- **Select the Channel DC Offset**

- **Update the Simulator**

- **Output Simulated Data**

- **Colour Coded Format Status identification in Frame Map**

- **Direct access to simulated parameters through the GDSmate compatible Frame Map display**

- **The Simulator can also be loaded with Frame Format files generated by the ApolloDas 8600 Modular PCM Encoder Set-Up Software**

- **BERT mode generates standard IRIG pseudorandom sequence**

-

PCM Frame Format and Modulation Set Up
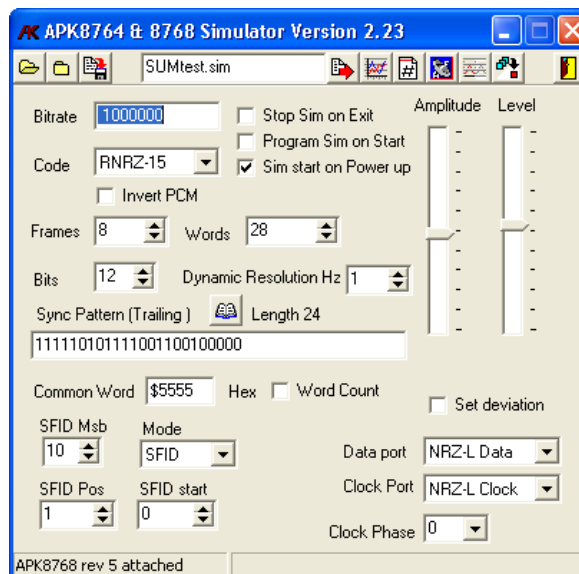
Interactive PCM Format Frame Map Display
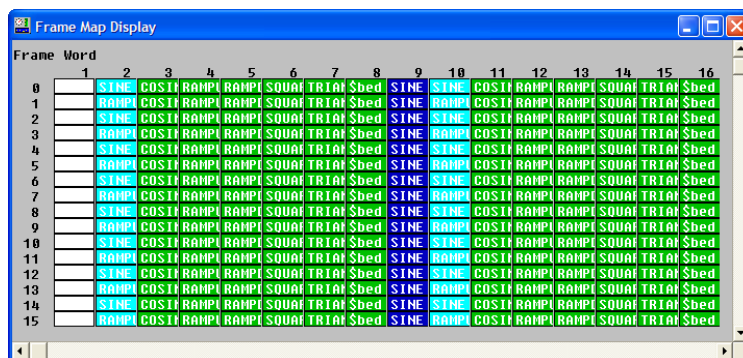
System Interface Specification

Interface Type:	USB 2 with USB 1 compatibility
Programmable Functions:	Source of data word. Individual channel amplitude. Individual channel offsets. Individual channel frequency. Frame Format characteristics. Bit Rate. PCM Code. Programmable RF Centre Frequency.

Mechanical Specification

Standard Module dimensions:	Length: 115 mm Width: 70 mm (including connectors) Height: 35 mm excluding antenna. 45mm with Battery Pack
Construction:	Multi-layer printed circuit board with maximum use of Surface Mount components mounted inside an Aerospace grade aluminium housing precision machined from solid.

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Features:

- **Combines the capabilities of the Apollotek USB powered L-band, S-Band or C-Band Telemetry Receiver and the APK8762 Bit Synchroniser in one small USB 2 powered module**

- **Receiver Tuneable over a 200 MHz Band in 0.5 MHz steps**

- **Unique Apollotek integrated signal recovery design implementation using Analogue and Digital Signal Processing techniques**

- **Bit Synchroniser Provides clock and data recovery from perturbed serial PCM data over a Bit Rate range from 100000 BPS to greater than 20 MBPS for NRZ Codes and 10 MBPS for Bi-Ø codes.**

- **Bit Synchroniser Lock Status LED display**

- **Programmable Bit Rate and Loop Bandwidth**

- **The APK8769 Receiver and Bit Synchroniser settings are programmed using the Apollotek Windows based Set-Up Software provided with the unit**

- **Once programmed the unit will store all set up parameters in non-volatile memory which will be loaded when power is applied**

- **The APK8769 is powered from a full power USB Port connection with a host PC**

- **The APK8769 is also available with an integrated PCM Decommutator as an option (Specify APK8767)**

The Apollotek APK8769 incorporates an L-Band, S-Band or C-Band Telemetry Receiver with an integral Bit Synchroniser and is one of the Apollotek range of USB products which are designed for PCM Flight Test Instrumentation system checkout and test applications.

The APK8769 Receiver Frequency, PCM Code, Bit Rate and Loop Bandwidth settings are programmed through a USB 2 port connection to a host PC running the Apollotek Set-Up utility software supplied with the unit. The programmed settings are stored in Flash Memory.

The APK8769 uses proprietary Apollotek developed analogue and digital signal processing techniques to digitally process a down-converted IF signal and then extract clock and synchronised data from the received serial PCM data stream.

The IF Bandwidth is automatically computed and set for the programmed PCM Code and Bit Rate.

NRZ-L Data and Clock outputs are provided through individual BNC connectors and 4 pin circular connectors. The Data and Clock Outputs can be connected directly to an Apollotek USB PCM Decommutator or other similar functional devices.

RECEIVER and BIT SYNCHRONISER SPECIFICATIONS

Electrical and Performance Specifications

Receiver Tuning Ranges:	L-Band, S-Band or C-Band up to 6 GHz
	1 MHz Tuning steps as standard
Input Signal Threshold	-85 dBm nominal
Bit Synchroniser Data Rates	100 KBPS to 20 MBPS for NRZ-L Codes
PCM Codes	NRZ-L/M/S, RNRZ-L ($2^{11,15,17,20,23}$), BIØ-L/M/S
	Other codes optionally available
Input and Output Signal Connectors	SMA RF Input Connector. BNC TTL and 4 pin RS422 PCM data and clock output connectors
Loop Bandwidth Equivalence	0.03% to 10% of bit rate (software programmable)
Bit Rate Tracking Range	Up to 10% depending on loop bandwidth setting
Bit Error Rate	Nominally within 1 dB of ideal performance curve for a given signal strength and signal to noise ratio
Output Data	TTL data and clock and RS422 on separate connectors
LED Indicators	Power (Green when powered)
	Bit Sync Lock (Red when out of lock, Green when in-lock)
	Received Signal Strength (Green when above threshold)

System Interface Specification

Programming Interface Type	USB 2 Port. Backwards compatible with USB 1 ports
Power Requirements	USB 2 Full Power Port or an External +5V Power Supply required
Software	Set-Up and controlled using Apollotek supplied Set-Up Software package designed to run on a Windows 10 PC.

Mechanical Specification

Overall Size	105 mm long by 55 mm wide and 35 mm high
Manufacturing Processes	Surface mount internal PCB assembly technology
	Enclosure machined from solid aerospace grade aluminium to provide very rugged packaging

Operational Environmental Specification

Temperature	-25 ° Centigrade to +70 ° Centigrade
Humidity	0 to 90% non-condensing

Non-operating in appropriate packaging

Temperature	-30 ° Centigrade to +90 ° Centigrade

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Features:

- **Combines the capabilities of the Apollotek USB powered L-Band, S-Band or C-Band Telemetry Receiver and the APK8762 Bit Synchroniser in a reduced height USB 2 powered module suitable for installation inside a portable PC**

- **Same performance as standard APK8769 units**

- **Receiver Tuneable over a 200 MHz Band in 1 MHz steps**

- **Unique Apollotek integrated signal recovery design implementation using Analogue and Digital Signal Processing techniques**

- **Bit Synchroniser Provides clock and data recovery from perturbed serial PCM data over a Bit Rate range from 100 KBPS to greater than 20 MBPS for NRZ Codes and 10 MBPS for Bi-Ø codes.**

- **Bit Synchroniser Lock Status LED display and software status reporting over USB**

- **Programmable Bit Rate and Loop Bandwidth**

- **The APK8769 Receiver and Bit Synchroniser settings are programmed using the Apollotek Windows based Set-Up Software provided with the unit**

- **Once programmed the unit will store all set up parameters in non-volatile memory which will be loaded when power is applied**

- **The APK8769 is powered from a full power USB Port connection to a host PC**

- **Outputs compatible with typical encryption support units**
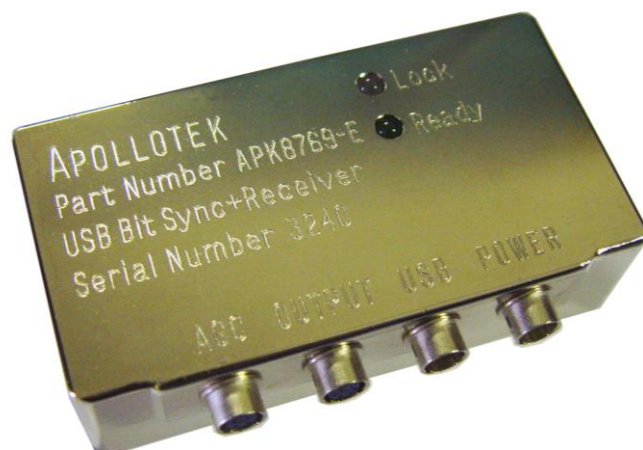
The Apollotek APK8769-E incorporates an S-Band or L-Band Telemetry Receiver with an integral Bit Synchroniser and is one of the Apollotek range of USB products which are designed for PCM Flight Test Instrumentation system checkout and test applications.

The APK8769-E Receiver Frequency, PCM Code, Bit Rate and Loop Bandwidth settings are programmed through a USB 2 port connection to a host PC running the Apollotek Set-Up utility software supplied with the unit. The programmed settings are stored in Flash Memory.

The APK8769-E uses proprietary Apollotek developed analogue and digital signal processing techniques to digitally process a down-converted IF signal and then extract clock and synchronised data from the received serial PCM data stream.

The IF Bandwidth is automatically computed and set for the programmed PCM Code and Bit Rate.

NRZ-L Data and Clock outputs are provided through circular connectors. The USB Programming Port and Power Input is also through circular connectors which enables the APK8769-E to be supplied in a lower height package compared to the standard APK8769

The Data and Clock Outputs can be connected directly to an Apollotek USB PCM Decommutator or other similar devices.

RECEIVER and BIT SYNCHRONISER SPECIFICATIONS

Electrical and Performance Specifications

Receiver Tuning Ranges:	L-Band, S-Band and C-Band options
	1 MHz Tuning steps as standard
Input Signal Threshold	-85 dBm nominal
Bit Synchroniser Data Rates	100 KBPS to >10 MBPS for NRZ-L Codes
PCM Codes	NRZ-L/M/S, RNRZ-L ($2^{11,15,17,20,23}$), BIØ-L/M/S
	Other codes optionally available
Input and Output Signal Connectors	SMA RF Input Connector. BNC TTL and 4 pin RS422 PCM data and clock output connectors
Loop Bandwidth Equivalence	0.03% to 10% of bit rate (software programmable)
Bit Rate Tracking Range	Up to 10% depending on loop bandwidth setting
Bit Error Rate	Nominally within 1 dB of ideal performance curve for a given signal strength and signal to noise ratio
Output Data	TTL data and clock and RS422 on separate connectors
LED Indicators	Power (Green when powered)
	Bit Sync Lock (Red when out of lock, Green when in-lock)
	Received Signal Strength (Green when above threshold)

System Interface Specification

Programming Interface Type	USB 2 Port. Backwards compatible with USB 1 ports
Power Requirements	USB 2 Full Power Port or an External +5V Power Supply required
Software	Set-Up and controlled using Apollotek supplied Set-Up Software package designed to run on a Windows XP Pro PC. GDSmate supplied with Decommutator Option

Mechanical Specification

Overall Size	105 mm long by 55 mm wide and 28.5 mm high
Manufacturing Processes	Surface mount internal PCB assembly technology
	Enclosure machined from solid aerospace grade aluminium to provide very rugged packaging

Operational Environmental Specification

Temperature	-25 ^{O} Centigrade to +70 ^{O} Centigrade
Humidity	0 to 90% non-condensing

Non-operating in appropriate packaging

Temperature	-30 ^{O} Centigrade to +90 ^{O} Centigrade

All Specifications in this Document are subject to change without notice E&O

Features:

- **Combines the capabilities of the Apollotek USB powered L-Band, S-Band or C-Band Telemetry Receiver and the APK8762-I Bit Synchroniser in one small Stand Alone DC powered module**

- **Receiver Tuneable over a 200 MHz Band in 0.5 MHz steps**

- **RF Signal Strength Indicator LED**

- **Unique Apollotek integrated signal recovery design implementation using Analogue and Digital Signal Processing techniques**

- **Bit Synchroniser Provides clock and data recovery from perturbed serial PCM data over a Bit Rate range from 100000 BPS to greater than 20 MBPS for NRZ Codes and 10 MBPS for Bi-Ø codes.**

- **Bit Synchroniser Lock Status LED display**

- **Programmable Bit Rate and Loop Bandwidth**

- **The APK8769-I Receiver and Bit Synchroniser settings are programmed using the Apollotek Windows based Set-Up Software provided with the unit**

- **Once programmed the unit will store all set up parameters in non-volatile memory which will be loaded when power is applied**

- **The APK8769-I can be powered from a full power USB Port and also in stand-alone mode from an external 5 Volt DC power supply. A 28 V DC Power Supply Option is also available**

- **The APK8769-I is also available with an optional integrated PCM Decommutator**

The Apollotek APK8769-I incorporates an L-Band S-Band or C-Band Telemetry Receiver with an integral Bit Synchroniser based on the standard APK8762 design and is one of the Apollotek range of USB products which are designed to support PCM Flight Test Instrumentation system checkout and test applications.

The APK8769-I Receiver Frequency, PCM Code, Bit Rate and Loop Bandwidth settings are programmed through a USB 2 port connection to a host PC running the Apollotek Set-Up utility software supplied with the unit. Programmed settings are stored in Flash Memory which enables the APK8769-I to be operated in a stand-alone mode from an external 5 Volt DC supply. The APK8769-I can also optionally be configured to operate from an external 28 V DC Supply.

The APK8769-I uses proprietary Apollotek developed analogue and digital signal processing techniques to digitally process a down-converted IF signal and then extract clock and synchronised data from the received serial PCM data stream.

The IF Bandwidth is automatically computed and set for the programmed PCM Code and Bit Rate.

NRZ-L Data and Clock outputs are provided through individual BNC connectors and 4 pin circular connectors. The Data and Clock Outputs can be connected directly to an Apollotek USB PCM Decommutator or other similar functional devices.

This version of the Apollotek APK8769 is packaged in a black anodised aluminium housing which is designed to be hard mounted using bolts passing through the flanged baseplate.

BIT SYNCHRONISER SPECIFICATIONS

Electrical and Performance Specifications

Receiver Tuning Ranges:	S-Band as standard. L-Band as an option
	0.5 MHz Tuning steps as standard
Input Signal Threshold	-75 dBm nominal
Bit Synchroniser Data Rates	100000 bps to 20 Mbps for NRZ-L Codes
PCM Codes	NRZ-L/M/S, RNRZ-L ($2^{11,15,17,20,23}$), BIØ-L/M/S
	Other codes optional
Input and Output Signal Connectors	SMA RF Input Connector. BNC TTL and 4 pin RS422 PCM data and clock output connectors
Loop Bandwidth Equivalence	0.03% to 10% of bit rate (software programmable)
Bit Rate Tracking Range	Up to 10% of Bit Rate. Loop bandwidth dependent
Bit Error Rate	Nominally within 1 dB of ideal performance curve for a given signal strength and signal to noise ratio
Output Data	TTL data and clock and RS422 on separate connectors
LED Indicators	Power (Green when powered)
	Bit Sync Lock (Red when out of lock, Green when in-lock)
	Received Signal Strength (Green when above threshold)
	These LED Indicators can optionally be duplicated on both sides of the unit to aid visual observation of the Unit Status

System Interface Specification

Programming Interface Type	USB 2 Port. Backwards compatible with USB 1 ports
Power Requirements	USB 2 Full Power Port or an External +5V Power Supply required. Optionally +28 V DC Power Supply
Software	Set-Up and controlled using Apollotek supplied Set-Up Software package designed to run on a Windows XP Pro PC. GDSmate supplied with Decommutator Option

Mechanical Specification

Overall Size	147 mm long (including flanges) by 66 mm wide and approximately 50 mm high
Manufacturing Processes	Surface mount internal PCB assembly technology
	Flanged Base black anodised aluminium box providing a rugged mechanical package

Operational Environmental Specification

Temperature	-25 ^{O} Centigrade to +70 ^{O} Centigrade
Humidity	0 to 90% non-condensing

Non-operating in appropriate packaging

Temperature	-30 ^{O} Centigrade to +90 ^{O} Centigrade

Specifications are subject to change without notice

Features:

- **USB Powered Digital to Analogue Converter module providing eight user programmable digital to analogue output channels**

- **Standard resolution of up to 16 bits per word**

- **Low output impedance**

- **Compatible with the Apollotek range of USB PCM signal recovery and decommutator Products**

- **Optional PCM Decommutator which accepts data and clock from a bit synchronised serial NRZ-L PCM stream (Specify APK87610-D)**

- **Compatible with the Apollotek GDSmate Telemetry Environment Software package**

- **Parameters to be converted can be selected through the GDS Frame Map display and can be allocated to a specific analogue output**

- **Standard ± 2.5 Volt output voltage range for full scale input**

- **Optional programmable low pass filter module can be integrated into the unit**

- **The Optional internal PCM Decommutator processes NRZ-L data and clock as standard. Additional Options for accepting other PCM Codes including RNRZ, and Bi-Ø codes**

- **The Optional internal PCM Decommutator accepts LVTTL RS422 Data and Clock Inputs as standard**

- **Supports SFID and FCC Frame Formats**

- **Wide operating temperature range**

- **Rugged Construction**

- **Supports IRIG 106 Frame Formats**

- **Frame Format stored in non-volatile**
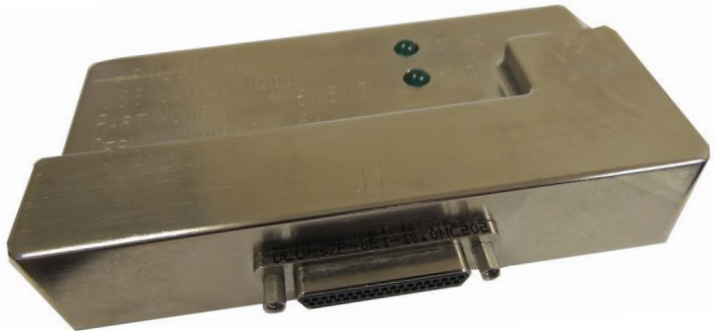
The Apollotek APK87610 is an 8 Channel Analogue to Digital Converter module which is one of the Apollotek range of USB powered and interfaced products which are designed for PCM Flight Test Instrumentation system checkout and test and evaluation applications.

The APK87610 Unit is assembled into an aerospace grade aluminium housing machined from solid which is rugged enough to be installed in an aircraft.

The APK87610 utilises proprietary Apollotek developed analogue and digital signal processing techniques to provide programmable Digital to Analogue conversion of user selected parameters extracted from the PCM Frame using GDSmate software or with the optional internal Decommutator

The APK87610 unit also takes power through the host PC USB Port.

The APK87610 is generally intended for use with the Apollotek range of USB Receivers, Bit Synchronisers and Decommutators. Options are available to enable the unit to interface to other external IRIG-106 compatible devices.

The eight analogue outputs are optimised for driving chart recorders and similar Data display devices.

The analogue outputs are available through a microminiature D-Type connector mounted on the opposite side of the unit to the input connectors.

An optional eight channel user programmable low pass filter option can be attached to the standard APK87610 module.

DIGITAL TO ANALOGUE CONVERTER MODULE SPECIFICATION

Electrical and Performance Specification

Number of Analogue Outputs	Eight single ended voltage outputs as standard
Output Signal Amplitude	± 2.5 V Output for a full scale word value. Other output voltage options are available
Input and Output Signal Connections	USB 2 buffered parameter data download from Apollotek GDSmate software as standard
	BNC inputs for LVTTL PCM Data and Clock inputs with Decommutator Option
	RS-422 inputs for PCM Data and Clock inputs on circular 4-pin HiRose connector (with internal Decommutator Option)
Standard Frequency Response	10 KHz per channel for direct PCM input. Lower maximum frequency range for USB Download from GDSmate
Programmable Filter Option	Programmable low pass filter cut-off frequency up to 10 KHz for each channel. Cut-off frequencies for each channel must be binary related
Analogue Channel Output Impedance	Nominal 1 Ohm

System Interface Specification

Interface Type	USB 2 Bus
Power Requirements	Within USB Bus Port limits
Software	Set-Up and controlled using the Apollotek GDSmate Telemetry Environment Software package (see separate data sheet)

Mechanical Specification

Overall Size	105 mm long by 55 mm wide and 21 mm high
	Increased height when Decommutator Option or Low Pass Filter Option is specified
Manufacturing Processes	Surface mount and BGA internal PCB assembly technology
	Enclosure machined from solid aerospace grade aluminium to provide very rugged packaging

Operational Environmental Specification

Temperature	-25 ^{O} Centigrade to +70 ^{O} Centigrade
Humidity	0 to 90% non-condensing

Non-operating

Temperature	-25 ^{O} Centigrade to +90 ^{O} Centigrade

Specifications are subject to change without notice

Features:

- **USB Powered IRIG B Time Code Reader**

- **Accepts amplitude and pulse width modulated 1 KHz signal up to ± 3 Volts**

- **IRIG B Time Code Generator Option**

- **GPS Receiver Synchronisation Option**

- **Time is passed over the USB interface to the host PC**

- **1 PPS output from the Unit**

- **Windows PC time display utility software is included**

- **Compatible with the Apollotek range of USB PCM signal recovery and data Decommutation modules**

The Apollotek APK87611 is an IRIG-B Time Code Reader which is one of the Apollotek range of USB powered and interfaced products which are designed for PCM Flight Test Instrumentation system checkout and test and evaluation applications. The unit can optionally include an IRIG-B Time Code Generator (Specify APK87612 for this option). An external GPS Receiver options is also available as an extras cost option which is designed to extract time information from the received and decoded serial NMEA datastream.

These Units are assembled into an aerospace grade aluminium housing machined from solid which is rugged enough to be installed in an aircraft.

These USB based Timing Products utilise proprietary Apollotek developed analogue and digital signal processing techniques to extract time from an externally applied amplitude modulated 1KHz IRIG-B Time Code and to internally generate an amplitude modulated 1KHz IRIG-B time code in the APK87612

These units take power through the host PC USB Port and pass decoded IRIG-B Time through the same USB port for display on the host Windows PC.

General Specifications:

IRIG-B Input:	± 1 V to ± 3 V Peak to Peak 1 KHz amplitude modulated
Typical Timing Stability:	1 part in 10^6
Power:	Through USB Port. Less than 500 mA current at +5V
Time Transfer to Host:	Through the same USB Port connection
Time Display:	Utility Software provided to display Time on a Windows PC
Time Tick:	1 PPS Output Pulse at LVTTL Level through a BNC on the unit
Operating Temperature Range:	-25 degrees Centigrade to +70 degrees Centigrade

Specifications are subject to change without notice

Features:

- **Provides two independently tuneable S-Band or L-Band Telemetry Receivers and an active Diversity Combiner coupled with the outstanding capabilities of the Apollotek APK8763 Bit Synchroniser and Decommutator into one multiple slice USB 2 powered unit**

- **Receiver Frequencies, Bit Rate and PCM Frame Format set up through the USB 2 Port by a host PC**

- **Provides data transfer to the host PC through the same USB 2 Port**

- **Powered from the Host PC through two host PC USB2 ports**

- **Processes all PCM Codes including RNRZ, NRZ and Bi-Ø codes**

- **Provides serial PCM input port directly to the Bit Synchroniser Section**

- **Provides RS422 Data and Clock Inputs to the Decommutator section**

- **Buffered RS422 Data and Clock Outputs for Encryption Support**

- **IRIG B Time Code Reader Option**

- **Wide operating temperature range**

- **Rugged Construction**

- **LED status Indicators on the unit with status reporting to the Host PC through a USB port**

- **Supports IRIG 106 Frame Formats**

- **Frame Format stored in non-volatile memory**

- **Supplied with single stream GDSmate software providing:**

  - **Raw Data Archiving to Disk**

  - **Graphical Data Displays**

  - **Tabular Data Displays**

  - **Engineering Unit Conversions**

  - **Post Processing File Outputs**

The Apollotek APK8772 is a USB powered signal recovery instrumentation module which provides two independently tuneable Telemetry Receivers and a digitally implemented Diversity Combiner together with a Bit Synchroniser and PCM Decommutator. This unit is part of the Apollotek family of USB Telemetry Receiver and Signal Recovery products designed for PCM Flight Test Instrumentation and similar applications.

The APK8772Unit is packaged in an aerospace grade aluminium housing precision machined from solid sections and which is rugged enough to be installed in an aircraft.

The APK8772 USB Module Receiver frequencies, Bit Rate, loop bandwidth and PCM Frame Format characteristics are set up through a USB 2 port connection to a host PC running the USB version of the Apollotek GDSmate Telemetry Environment Software package supplied with the unit.

The APK8772 uses proprietary Apollotek developed analogue and digital signal processing techniques to recover and combine the transmitted Telemetry signals and to extract clock and synchronised data from the diversity combined baseband serial PCM data stream. The unit also provides PCM Decommutation with data transfer to a host PC through a high speed serial USB port. The APK8772 is powered through two full power host PC USB Ports.

GENERAL SPECIFICATIONS

Receiver Tuning Ranges:	Specify S-Band, L-Band or NATO E-Band.
	Up to 200 MHz software controlled tuning range
	Independent centre frequency selection for each receiver
Receiver Sensitivity	Nominal -90 dBm with 40 dB Dynamic Range
Diversity Combiner Signal to Noise Improvement	Up to 2.5 dB depending on received signal strength and quality
Bit Synchroniser Data Rates	10000 BPS to greater than 10 MBPS for NRZ-L Codes
	Optionally 2 KBPS to >20 MBPS
Bit Synchroniser Input PCM Codes	NRZ-L/M/S, RNRZ-L ($2^{11,15,17,20,23}$), BIØ-L/M/S, RZ
PCM Decommutator Formats	Compatible with IRIG 106 Frame Format definitions
Standard Input and Output Signal Connectors	SMA RF Input connector for each receiver section
(BNC Data and Clock Output connector option is also available)	BNC input for IRIG B modulated Time Code Signal
	4 pin RS422 data and clock output connector for recovered data and clock. RS422 input connector for external clock and data inputs to enable use as a stand-alone Bit Synchroniser, with Encryption Support and as a stand-alone PCM Decommutator.
AGC Outputs	Two AGC Outputs are derived from each input signal and are provided as buffered logarithmic voltage outputs in the nominal voltage range of 0 V to 1 V peak with 1 Volt representing maximum AGC gain.
	The AGC outputs are provided through a 4 pin circular connector
Loop Bandwidth Equivalence	0.01% to 25% of bit rate (software selectable)
Bit Error Rate	Nominally within 1 dB of ideal performance curve. Dependent on signal strength, and signal to noise
Output Data	Decommutated IRIG 106 PCM data is transferred to the host PC through a high speed USB port
Software	Supplied with single stream USB version of GDSmate to enable the host PC to set up the unit and to provide graphical data displays. Archiving, Replay and Ethernet networking is also supported

System Interface Specification

Interface Type	Dual USB 2 Bus connection to Host PC
Power Requirements	Within dual USB Bus Hub limits
Software	Set-Up and controlled using the Apollotek GDSmate Telemetry Environment Software package (see separate data sheet)

Mechanical Specification

Overall Size	105 mm long by 55 mm wide and 60 mm high

Operational Environmental Specification

Temperature	-10 ^{O} Centigrade to +70 ^{O} Centigrade
Humidity	0 to 90% non-condensing

Non-operating

Temperature	-25 ^{O} Centigrade to +90 ^{O} Centigrade

All Specifications in this Document are subject to change without notice E&O

![Apollotek logo] APOLLOTEK

GENERAL SPECIFICATIONS

Signal Inputs	Two single ended inputs at 70 MHz with a nominal 2 Volt peak to peak level. Input Impedance 75 Ohms. Input Connectors: SMA
Diversity Combiner Signal to Noise Improvement	Up to 2.5 dB depending on relative IF signal quality
AGC Outputs	A Single Ended AGC Output Voltage is derived from each input signal and is provided as two buffered logarithmic voltage outputs in the nominal voltage range of 0 V to 1 V peak with 1 Volt representing maximum AGC gain.
	The AGC outputs are provided through 2 BNC Connectors
Combined Signal Output	Single ended demodulated analogue baseband output signal at a nominal 1 Volt peak to peak level. BNC Output Connector
Set Up Software	Provided with Set Up Utility Software system for Windows operating system

System Interface Specification

Interface Type	Single USB Bus connection to Host PC
Power Requirements	Within USB Bus Hub limits

Mechanical Specification

Overall Size	105 mm long by 55 mm wide and 35 mm high

Operational Environmental Specification

Temperature	-10 ^{O} Centigrade to +70 ^{O} Centigrade
Humidity	0 to 90% non-condensing

Non-operating

Temperature	-25 ^{O} Centigrade to +90 ^{O} Centigrade

GDSmate Features:

- **GDSmate is a real time Telemetry and Avionics data processing and visualisation software package which supports single stream portable applications through to Multiple Stream, Multiple CPU Server / Client networked Groundstation systems**

- **GDSmate provides complete control of Telemetry Hardware, parameter definition, PCM Decommutation, data processing, display archiving and file export functions**

- **GDSmate interfaces to the ApolloDas 8600 Modular PCM Encoder and Solid State Recorder units through a USB Port**

- **GDSmate can directly Control data replay from other Data Recorders via a SCSI Interface**

- **GDSmate can provide multiple PCM Stream Processing including Embedded Asynchronous data and non-IRIG formats**

- **GPS processing and Multiple Object Position presentation on digitised map displays**

- **GDSmate provides Mil-Std 1553 and ARINC 429 Bus Processing**

- **GDSmate provides Real Time Graphical and tabular displays with Pick, Place and Re-sizing of displays without requiring recompiling**

- **Archived data can be exported in several common file formats with time correlation across multiple datastreams**
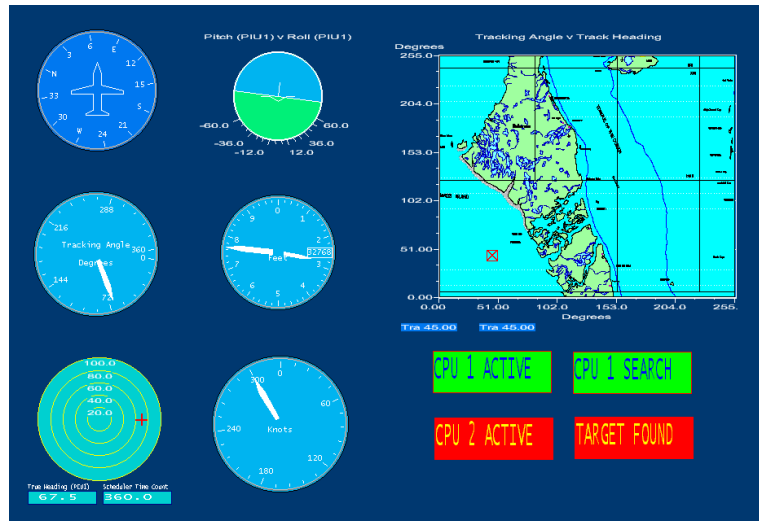
The screen display shown above presents some of the standard Apollotek GDSmate Icons.

The Map Display provides an interactive latitude and longitude overlay of the position and classification of multiple objects.

Aircraft Cockpit type displays can be selected.

Many types of Digital, Analogue and Graphical display Icons can be selected.

Tabular display of parameters with colour change limit settings can be selected.

The displays shown below present a selection of typical graphical, tabular and digital Icons which can be user selected and manipulated to provide application specific information data displays
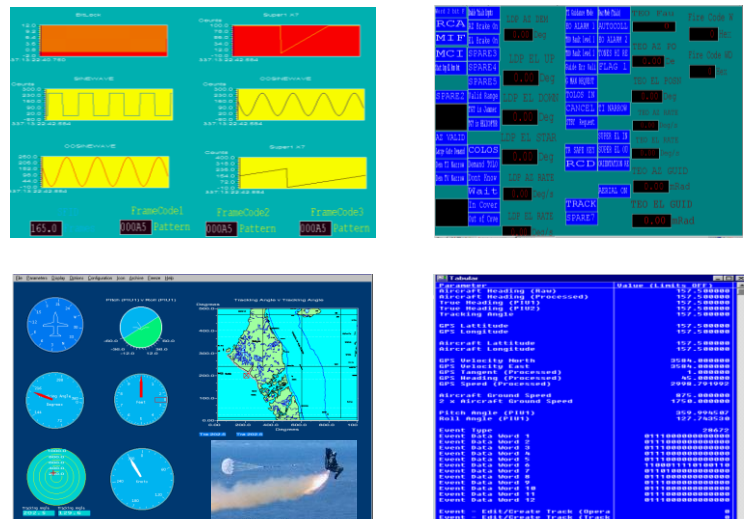
GDSmate Features

The GDSmate Parameter Database is developed interactively with the user through a Parameter Edit form. Each Parameter can be allocated a unique Mnemonic and Description.

GDSmate can process parameters from multiple data streams simultaneously

The Parameter editor can apply linearising and calibration coefficients to the Parameter. A secondary Maths Processor editor form is displayed if the Parameter type is declared as a Processed Type. The Maths processor provides the capability to incorporate other parameters into the processing algorithm.
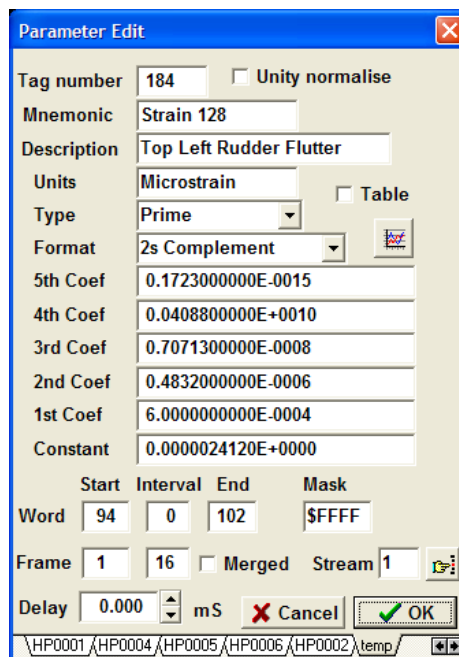
Mil-Std 1553 and ARINC 429 Avionics Bus data have similar parameter edit forms with the message identification replacing the PCM frame location definition.

A PCM Frame Format form is used to set up the characteristics of the frame and the synchronisation strategy. The PCM Bit Rate is set from this form as is the selection of the default time source which can be IRIG Time or Computer derived. Secondary Forms are presented for definition of variable word length formats.
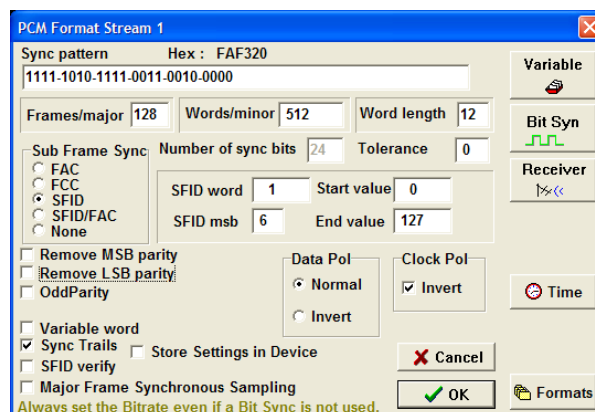
An Interactive colour keyed graphical presentation of the Frame Map for PCM or Message Map for Serial Bus data streams is provided. The user can point and click on a parameter in the frame map and get immediately to the Parameter Editor.

The Apollotek 8000 Series PC based Telemetry and Avionics signal recovery and data processing systems are supplied with the Multiple Stream version of the GDSmate package.
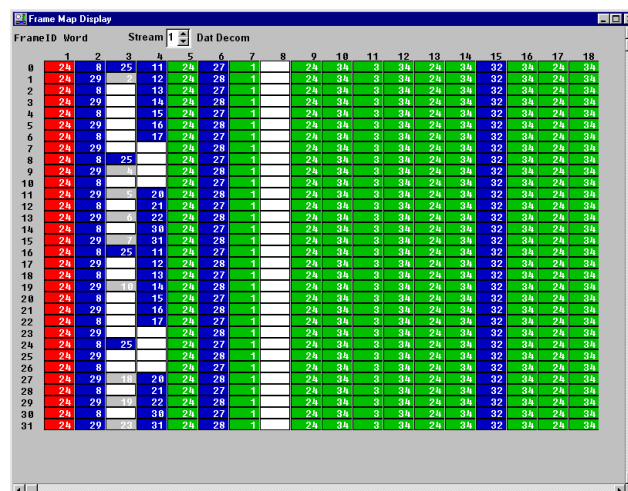
The Apollotek range of USB decommutation Products are supplied with the single stream single user version of GDSmate.

APOLLOTEK

8000 Series
Telemetry & Avionics Groundstations

Features:

- **A range of configurable PC based Turnkey Groundstation Systems including Telemetry and Avionics signal recovery and data processing modules controlled by the generic Apollotek GDSmate Telemetry Environment software package**

- **Portable Configurations**

- **Ruggedised Configurations**

- **Systems can be provided in many configurations including Portable, Desktop, Rack Mounting, Multiple Stream Processing Servers and Workstations**

- **Compatible with Windows operating systems**

- **PCM Stream Processing**

- **PAM Stream Processing**

- **Mil-Std 1553 Bus Processing**

- **ARINC 429 Bus Processing**

- **Time Correlation between multiple data streams**

- **Real Time Graphical and tabular data displays are easily linked to raw and processed parameters without compiling**

- **Real Time Archiving to Disk**

- **High Speed Networking including Gigabit Ethernet**

- **Networked operation and TCP/IP remote control options**

- **BGAN Satellite interface option**

Apollotek high performance Telemetry and Avionics Testing Groundstations are designed to be scalable across all Windows PC platforms.

Apollotek 8000 Series Systems can be configured to provide single or multiple PCM Stream processing with real time graphical and tabular parameter displays and with high speed recording and Replay capability. Standard system configurations are available to host a selection of Telemetry Receivers, Diversity Combiners, Bit Synchronisers, Decommutators and many types of I/O interfaces.

Networked Telemetry Groundstation with Data Recording to Solid State Disks and with Remote Control capability

Ruggedised Portable Laptop configurations

Ruggedised Portable Multiple Stream Groundstations
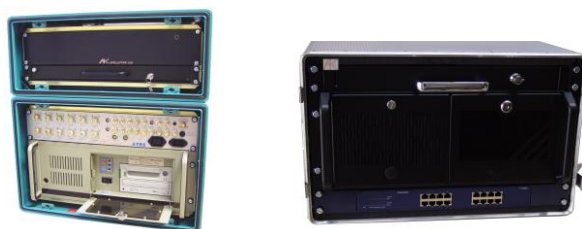
Apollotek USB range of Receivers, Bit Synchronisers and Decommutators

GDSmate Software

- The GDSmate Parameter Database is developed interactively with the user through a Parameter Edit form. Each Parameter can be allocated a unique Mnemonic and Description.

- The User can apply linearising and calibration coefficients to the Parameter. A Maths Processor editor form is displayed if the Parameter type is declared as a Processed Type. The Maths processor can also incorporate other parameters and operators to derive Processing algorithms.

- Mil-Std 1553 and ARINC 429 and 629 Avionics Bus data have similar parameter edit forms with the message identification replacing the PCM frame location definition.

- A PCM Frame Format form is used to set up the characteristics of the frame and the synchronisation strategy. The PCM Bit Rate is set from this form as is the selection of the default time source which can be IRIG or Computer derived. Secondary Forms are presented for definition of variable word length formats. The PCM Format Form can also set up an associated PCM Simulator.

- An Interactive colour keyed graphical presentation of the Frame Map for PCM or Message Map for Serial Bus data streams is provided. The user can point and click on a parameter in the frame map and get immediately to the Parameter Editor.

- Data can be exported in many common post processing file formats to facilitate further analysis including multiple stream time correlated and re-sampled formats.

APOLLOTEK

8770 Series Multiple Channel Telemetry Data Recording System

Features:

- **Multiple independent PCM Input Channels in one chassis**

- **Typically up to four channels of PCM recording and replay per chassis**

- **User selectable Baseband PCM or Digital Data and Clock signal input capability**

- **Internal Multiple Stream Telemetry Receiver Options**

- **Provides a total PCM recording throughput of greater than 100 MBits/second**

- **IRIG B external Time Code Input**

- **Easy to use Touch Screen User Interface to control recording and replay supplemented by pull out keyboard and trackball**

- **Windows Operating System**

- **19 inch Rack Mounting Chassis**

- **Dedicated internal Apollotek PCM Bit Synchronisers and Signal Recovery modules provide high performance time stamped recording and replay facilities**

- **An external signal such as receiver AGC combined with Bit Lock status can be user selected to automatically start recording**

- **Self Test Features**

- **All inputs and Outputs via rear panel BNC connectors**

- **Removable Solid State Terabyte storage media are used for data recording and replay**

- **Per Channel PCM Data and Clock outputs are provided during recording**

- **Network and Remote Control Options**

The Apollotek APK8770 series of high speed Data Recorders are designed to provide recording and replay of multiple serial PCM Streams as typically provided by the outputs of Telemetry Receivers or similar devices.

Each PCM Stream to be recorded is processed by an Apollotek digital signal processing engine and the data is stored in real time onto an internal hard disk subsystem.

A Recording Time tagging capability is also provided.

Recording criteria are user entered through a forms based channel oriented set-up procedure.

Removable very high speed Solid State Disks are used for data storage and Data Replay.

Recording can be manually or remotely initiated and can also be automatically initiated by monitoring the lock status of the input Bit Synchronisers together with an associated Receiver AGC voltage level.

Remote Control of the Replay process over Ethernet can be supported.

A per channel Data and Clock Output of the Input PCM streams are provided while data is being recorded.

The APK8770 Recorder runs under the Windows Operating System and supports all Windows file management, storage, retrieval and file transfer facilities and utilities.

Extended versions of the APK8770 can also incorporate modules from the ApolloDas 8600 range of multiple analogue and digital channel data acquisition modules to provide a flexible configuration recording system.

RECORDER SPECIFICATIONS

Electrical and Performance Specifications

Total PCM Bit Rate Recording	In excess of 100 Megabits per second as standard.
Input Signal Amplitude	0.5 V to 10 V (± 5 V peak-to-peak) as standard. Other user defined input amplitude options are available
	-85dBm typical receiver sensitivity when optionally installed
Input Signal Impedance	50 Ohms or 10 KOhms as standard – select when ordering
Input and Output Signal Connectors	BNC Rear Panel Connections for inputs and outputs
Channel Output Signal Level	TTL or RS422 Levels as standard
Output Signal Impedance	50 Ohms or 10 KOhms as standard
Networking	Gigabit Ethernet I/O port provided
	TCP/IP and UDP Remote Ethernet Control and Data File Transfer facilities can be supported

System Specifications

Power Requirements	115 V ac and 230 V ac 50 / 60 Hz autosensing supply
Software	Set-Up and controlled using Apollotek software running under the Windows Operating System
	The Apollotek GDSmate Telemetry Environment Software package is provided for display of decommutated PCM data
User Controls	Via front panel touchscreen and Pull Out Keyboard and Mouse
	Protected Remote Control functions via a user provided BGAN or similar interface is optionally available

Operational Environmental Specifications

Temperature	0 ^{O} Centigrade to +50 ^{O} Centigrade
Humidity	0 to 90% non-condensing

Non-operating in appropriate packaging

Temperature	-25 ^{O} Centigrade to +70 ^{O} Centigrade

All specifications are subject to change without notice

Features:

- **Multiple independent Analogue Input Channels in one chassis**

- **Provides a total analogue signal bandwidth of greater than 25 MHz per Channel**

- **Optional Multiple mixed Analogue, Digital and Telemetry Data Recording and Replay capability**

- **Unique Apollotek Analogue signal processing and Digital data transformation algorithms are utilised in the system to provide a faithful reproduction of the recorded analogue signal**

- **Easy to use Touch Screen User Interface to control recording and replay.**

- **Integral Keyboard and trackball**

- **External Display Screen and Mouse Interface**

- **19 inch Rack Mounting versions available**

- **Runs under the Windows Operating System**

- **Multiple Apollotek Bit Synchronisers and PCM Decommutators and Digital to Analogue Converters can be incorporated into the chassis to provide a multiple simultaneous IF Recording, Processing and Replay System**

- **Set up and controlled by Apollotek GDSmate based Software Package**

- **Network and Remote Control Options**

The Apollotek APK8780 is designed to provide high speed signal recording for up to four independent analogue signals as typically provided by the outputs of Telemetry Receivers.

The Analogue Signal from the associated Telemetry Receiver is processed and translated into the digital domain by an Apollotek FPGA based digital signal processing unit and then the data is stored in real time onto an internal hard disk subsystem.

Data is replayed from the hard disk and is processed to provide an Analogue Output which faithfully reconstructs the originally recorded analogue signal in amplitude, frequency and phase.

A simple user interface similar to a standard VCR or DVD recorder is provided through a touch screen display on the front panel of the unit or through the extendable keyboard and touchpad.

The APK8780 Recorder runs under the Windows Operating System and the unit can also therefore be used as a desktop computer and all Windows file management, storage, retrieval and file transfer facilities are available to the user.

The APK8780 can also incorporate modules from the ApolloDas 8600 range of multiple channel signal conditioning modules to provide a complete data acquisition and recording system.

Other models in this range of Apollotek products can incorporate up to four channels of PCM Bit Synchronisation and PCM Decommutation in addition to providing analogue baseband recording and replay.

APOLLOTEK

GENERIC RECORDER SPECIFICATIONS

Electrical and Performance Specification

Analogue Recording Bandwidth	In excess of 10 MHz per channel as standard. Higher bandwidth option available
Input Signal Amplitude	0.4 V to 6 V (± 3 V peak-to-peak)
Input Signal Impedance	50 Ohms
Input and Output Signal Connectors	BNC Rear Panel Connections for each channel
Output Signal Level	Unity gain as standard – Output will be the same as the Input Signal
Output Signal Impedance	50 Ohms

System Specification

Power Requirements	Nominal 230 V ac 50 or 110 V ac 60 Hz supply
Software	Set-Up and controlled using Apollotek software running under the Windows Operating System
	The Apollotek GDSmate Telemetry Environment Software package can be incorporated as an extra cost item

Operational Environmental Specification

Temperature	0 ^{O} Centigrade to +50 ^{O} Centigrade
Humidity	0 to 90% non-condensing

Non-operating in appropriate packaging

Temperature	-25 ^{O} Centigrade to +90 ^{O} Centigrade

Model Numbers:

|	
8780-1	Single Channel Analogue Recorder and Replay System
8780-2	Dual Channel Analogue Recorder and Replay System
8780-X	Analogue Recorder where X defines the number of channels

Also available:

8770-1	Single Stream Input Bit Synchroniser Unit
8770-2	Dual Stream Input Bit Synchroniser Unit
8770-3	Triple Stream Input Bit Synchroniser Unit
8770-4	Quad Stream Input Bit Synchroniser Unit
8770-1x1	Single Stream Bit Synchroniser and Decommutator Unit
8770-2x2	Dual Stream Bit Synchroniser and Decommutator Unit
8770-3x3	Triple Stream Bit Synchroniser and Decommutator Unit
8770 4x4	Quad Stream Bit Synchroniser and Decommutator Unit

All specifications in this document are subject to change without notice E&OE

ApolloDas 8600 Chassis Typical Dimensions

Standard Chassis Height excluding connectors: 65mm (2.56 inches)

Height
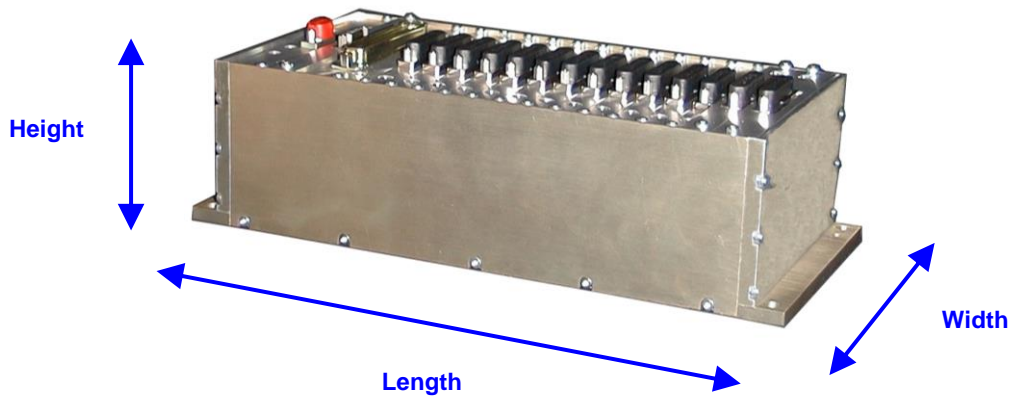
Width

Length

The standard Chassis Width is:	109 mm
24 Slot Chassis Length including Flanges:	306 mm
18 Slot Chassis Length including Flanges:	240 mm
11 Slot Chassis Length including Flanges:	163 mm
9 Slot Chassis Length including Flanges:	141 mm
6 Slot Chassis Length including Flanges:	109 mm

Note that other chassis slot lengths are available on special order

The standard single module spacing is 12 mm. Some modules such as the Thermocouple Module (TCM) and Video Compression Module are double width.

APK8761, APK8762, APK8763, APK8764, APK8765 Typical Dimensions

Standard Length:	105 mm
Standard width excluding connectors:	55 mm
Width to end of longest connector:	67.25 mm
Standard Height:	21.5 mm

APK8767, APK8768, APK8769 Typical Dimensions

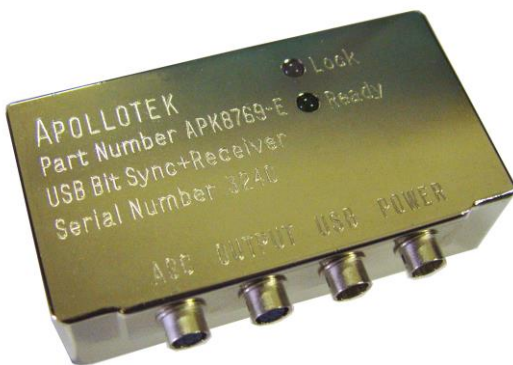|	
Standard Length:	105 mm
Standard width excluding connectors:	55 mm
Widest point excluding antenna:	77 mm
Standard Height:	33 mm

APK8761-E Series Decommutator Typical Dimensions

Standard Length:	105 mm
Standard width excluding connectors:	55 mm
Typical Standard Height:	16.5 mm

APK8769-E Receiver with Bit Synchroniser Typical Dimensions

Standard Length:	105 mm
Standard width excluding connectors:	55 mm
Typical Standard Height:	28.5 mm

APK8762-I Bit Synchroniser and APK8766-I Receiver Typical Dimensions

APK8762-I Bit Synchroniser

APK8766-I Receiver and Bit Synchroniser

Standard Length:	147 mm including flanges
Standard width excluding connectors:	66 mm
Typical Standard Height:	40 mm

Apollotek Telemetry Transmitters and Receivers Typical Dimensions

T-905 5-Watt FM Transmitter

Length excluding connectors:	81 mm
Length to end of longest connector:	90 mm
Standard Width:	55 mm
Standard Height:	24.5 mm

T-910 10-Watt FM Transmitter

Length excluding connectors:	90 mm
Length to end of longest connector:	99 mm
Standard Width:	64 mm
Standard Height:	35 mm

Note that the mounting holes for the standard T-905 and T-910 series of transmitters have the same footprint as legacy transmitters manufactured by other suppliers. These Apollotek transmitters can therefore be used as direct replacements offering higher efficiency and programmability.

All specifications in this document are subject to change without notice E&OE

Apollotek UAV Data Link, Video and Telemetry Transmitters and Receivers

Typical Dimensions - The packaging of these products can be customised

T-567 1 Watt 300 MHz Band Data Link Transmitter

Standard packaging is the same as the T-900 Series

Length excluding connectors:	81 mm
Length to end of longest connector:	90 mm
Standard Width:	55 mm
Standard Height:	24.5 mm

R-567 300 MHz Band Data Link Receiver

Standard Length Excluding Connections:	110 mm
Standard Width:	56 mm
Standard Height:	27 mm

TM-901 1 Watt L-Band, Upper L-Band and S-Band Video Transmitter
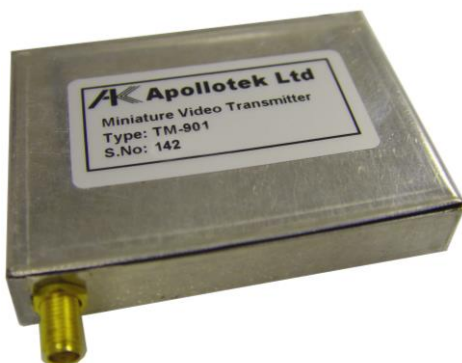
This product is typically designed into Custom Mechanical Packages. The version shown here has dimensions as follows:

Standard Length Excluding Connections:	72 mm
Standard Width:	52 mm
Nominal Height:	15 mm

Specifications and dimensions are subject to change without notice. Always check with Apollotek before ordering

APOLLOTEK

How to contact Apollotek:

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- **Website:**   **www.apollotek.com**

Apollotek also has Sales Representatives and Associates in most parts of the World.

Please telephone, fax or e-mail info@apollotek.co.uk for contact details of the Apollotek representative in your Country.

All specifications in this document are subject to change without notice. Always check specifications, dimensions and availability with Apollotek before ordering