

# ***PALSupport (UK) Limited***

# ***Veristore***

## ***Recording Solutions***

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## ***Introduction***

Veristore Record and Replay Systems are purpose designed for use in Air Traffic Management where the security and integrity of the recorded data is imperative. In this environment the prime use of a recording system is to be able to quickly, easily and accurately reconstruct a situation exactly as it occurred. Veristore achieves this goal and has a well proven track record being installed in more than thirty airports throughout the United Kingdom.

The requirements for ATC Recording have been written to take into account the statement from Accident Investigators that their work would be greatly assisted if it were possible to see exactly *'what was presented to the controller'* and to hear exactly *'what was said'*.

ATC providers have to record any information that could influence decisions that are made by their Controllers. The recorded information may then be replayed and analysed when there is a need to investigate incidents or accidents that have occurred. This may be a few seconds after the recording was made, when a controller or supervisor wishes to listen to a message or conversation that was not clear, or it may be sometime in the future when an investigator needs to try and determine why a decision had been made. All of the information must be available for immediate replay and able to be selected and recovered with the minimum delay.

A very large amount of data, in a number of different formats, from many different sources, is continuously presented to each controller and there are occasions when split-second decisions have to be made. It is therefore essential that all of the available information is collected, captured and recorded without error. When replayed it is imperative that it is complete and accurately time-synchronised to ensure that it is truly representative of the information that was presented to the controller.

Many other environments have similar requirements for recording data from a number of sources with the ability to replay everything in perfect synchronism. Veristore is ideally suited to these applications and PALSupport (UK) will be pleased to discuss any recording requirements that you may have.

***Veristore can solve all of your recording requirements where  
the security and integrity of the data is imperative.***

## ***Veristore System Overview***

The underlying philosophy behind a Veristore Record and Replay System is that each data source is directly interfaced to the recorder which will be used to store the data. This not only guarantees the security of the recorded data by avoiding the need to transfer it from one storage location to another with multiple write and read operations but also allows the optimum technology to be used for acquiring and recording each type of data.

For example, in an ATC environment, controller voice communications are the most important information to be recorded and in order to achieve the best possible results they are recorded continuously without the use of coding or compression and are subjected to a 'read-after-write' check. Furthermore, two identical Voice Recorders, which do not communicate with each other, may be used in each system to provide true 100% redundancy for these signals. There will then be two totally independent, complete and accurate copies of the controller voice communications, both of which will be stored for a minimum of 30 days.

A user may therefore present a Safety Case, for the recorders to be used, without external archiving, to their appropriate regulatory authority. However, if either the regulatory authority or local operating procedures demand that the data is to be archived to external media it may be copied, either automatically or under manual control, to an external storage location.

The ICAO SARPS require that radar data, both raw (Through the Wall) and screen capture (At the Glass), and Ambient Microphones are recorded and replayed synchronously with the voice data. Veristore Record and Replay Systems record data from all of these specified sources and replay them in perfect synchronism.

Veristore Record and Replay Systems are truly modular in design and may be easily extended or upgraded whenever demanded by changes in operating requirements or legislation. Additional interfaces may be added to the recorders and additional recorders may be added to the system by simply connecting them to the Veristore Ethernet Network. The Central Management System and Replayer(s) will then be re-configured to take the increased capacity of the system into account.

***Veristore Record and Replay Systems are designed for  
use in modern ATC environments and are fully  
compliant with all of the current ICAO regulations.***

## ***Voice Recorder and Radar Recorder***

- ◆ The Veristore Voice Recorder and the Veristore Radar Recorder provide a unique level of data security. They have dual redundant, hot swap, power supplies and an internal rolling store, which is configured as a RAID 6 array with sufficient capacity for a minimum storage period of 30 days, as specified by ICAO. The recorders:
  - utilise COTS server technology.
  - Run under a Linux operating environment.
  - are self-contained and run totally independently of any Veristore system software.

NOTE: A Windows operating environment is offered as an option for recorders which have a maximum of 32 Voice Channels.

### ***The heart of a Veristore system is the Voice Recorder***

- ◆ The Recorder Interface PC, which is used to provide access to the recorded data, communicates with the Recorder and runs under a Windows environment.
  - The Interface PC cannot affect the record process or the recorded data in any way.

***The Voice Recorder and Radar Recorder therefore offer the best of both worlds having the benefits of a purpose designed recorder with the convenience of a straightforward, intuitive software interface.***

- ◆ The voice signals are continuously recorded in a Time Division Multiplexed data stream, using 16-bit digitisation without any coding or compression of the data.

***A voice replay of this quality greatly assists the evaluation of any incident.***

- ◆ Each recorder has an internal rolling store with sufficient capacity to record the information from all of the channels, irrespective of activity, for a minimum period of 30 days, as specified by ICAO.
  - The required storage capacity for the audio data can be accurately defined with 100% confidence because the data is continuously recorded without coding or compression and hence there is no need to consider channel occupancy or to calculate compression ratios.
  - Enterprise Hard Disk Drives, which are essential for reliable, continuous, 24/7 recording are used exclusively in the recorder stores.

- Longer periods of data retention may be requested if demanded by regulatory requirements or local procedures.
- In all cases data is written directly to a permanent storage location on disk, eliminating potential errors or data loss caused by software or server errors during data transfers.
- Once data is written to the recorder internal store it cannot be altered, corrupted, over-written or erased during the 30 day retention period.
- A data block is written to the internal store each second. Each of these data blocks is uniquely time stamped with the external time, the recorder internal time and a sequential block number. This enables data to be accurately located and replayed synchronously with the data from other recorders in the system.

- ***The disks specified for use in the Veristore Recorder stores carry a full 3 year manufacturer's warranty***

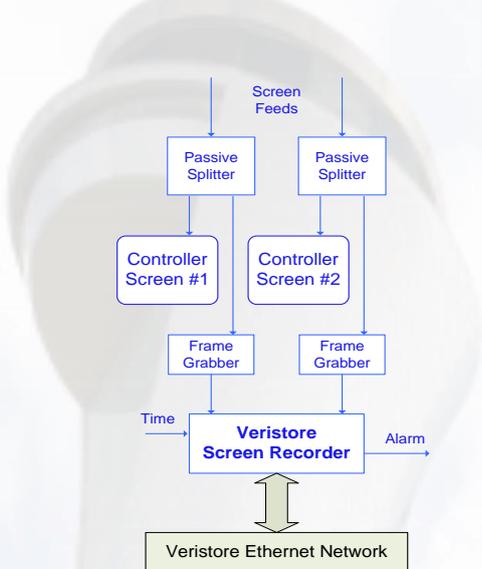
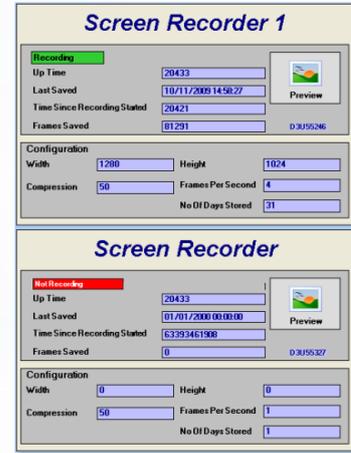
- ◆ A 'Read-After-Write' check, which ensures that the data has been received and recorded correctly, is performed immediately after each data block has been written to disk. This confirms that the data has been received and recorded, without any errors, and is available for replay in the future.

***This is not possible with systems that use either coding or compression when recording the data or intermediate data storage locations. In these cases there is no means of knowing that the data has been recorded correctly until it is requested for replay.***

- A checksum is calculated and embedded in the data block prior to writing it to disk. Once written, the block is immediately read back from disk with the checksum being re-calculated and compared with the recorded checksum.
- A sub-audio Confidence Tone is superimposed on each of the audio channels to ensure that there is a valid signal path through the entire channel.
- An alarm is raised if any errors are detected in the recorded data or if any of the sub-audio Confidence Tones are not detected. If an alarm has not been raised it is certain that the data has been recorded correctly and is available for immediate replay.
- The data, read back from disk as part of the Read-After-Write check, is immediately available for true Live Monitoring.

## Screen Recorder and CCTV Recorder

- ◆ The 'At the Glass' (ATG) Screen Capture Recorder and CCTV Recorder are identical in architecture and provide an exceptional level of data security and redundancy. These recorders have dual redundant, hot swap, power supplies and an internal rolling store, which is configured as a RAID 10 array with sufficient capacity for a minimum period of 30 days, as specified by ICAO. Longer periods of data retention may be requested if demanded by regulatory requirements or local procedures.



- ◆ The signal feed to the screen is split as close as practical to the screen ensuring that the information displayed on the controller screen is not degraded.
- ◆ The Frame Grabber captures individual frames from the video data stream output by the splitter.

- ◆ In a RAID 10 array the data is both mirrored and striped which provides an extremely high level of security because each block is duplicated on its mirror drive and excellent performance because the blocks are striped.

This means that not only will a minimum of two drives have to fail concurrently before any data is lost but also the two drives will have to be the mirror of each other. The chances of this happening are extremely remote.

- The Screen Capture Recorder records everything that is displayed on the controller screen including mouse movements, information boxes, etc.
- The incoming signals are captured and written to the recorder internal store with the recorded data being available for immediate replay which enables an evaluation to be made of any incident of interest without delay.

- Each frame is stored in a data block, which is uniquely time-stamped, using the same time source as the other recorders in the system. This guarantees that the data can be replayed synchronously with the data from all other recorders.
- The quantity of data in each frame is dependent on the information that is displayed on the screen. In all cases PALSupport (UK) considers this at the time of installation and configures the Screen Recorder to ensure that there is always sufficient storage capacity to accommodate a minimum of 30 days of data.
- Once data is written to the recorder internal store it cannot be altered, corrupted, over-written or erased during the 30 day storage period.

## **Central Management System**

- ◆ The Central Management System (CMS) is the hub of a Veristore Record and Replay System, communicating with all of the recorders via the Veristore Ethernet Network.
  - A straightforward, intuitive, Graphical User Interface enables the User to quickly and efficiently access the recorders and the recorded data.



- Information from all of the recorders is displayed on a single large screen.
- All of the functions that are available at the individual Recorder Interface PCs are also available at the CMS.
- All of the recorded data can be accessed for Live Monitoring, replay or copying to an alternative storage location.
- Alarms and system information are displayed on the CMS screen without the need to interrogate each recorder individually.

***The recorded data is always retained in its original storage location on each individual recorder. Accessing the data does not affect the recorded data or the recording process in any way.***

- ◆ Any access to the recorders is strictly controlled by passwords. The use of multiple user types and individual user passwords enable a security hierarchy to be generated and maintained.
- ◆ The Passwords and User Types are allocated by the System Administrator, allowing specific personnel or groups of personnel to be permitted or denied access to the various functions within the system, ensuring that the integrity of the system is always maintained.



- User permissions may be directly relayed to each of the recorders in the system enabling any modifications to be achieved quickly and easily.

## Live Monitoring

- ◆ Data from any source can be 'live monitored'. In all cases the Monitor Data is read from the recorder internal stores and output as part of the 'Read-After-Write' process. This confirms that meaningful data has been received and recorded without error, giving 100% confidence that it will be available for replay at a later date.

NOTE: The monitoring of Ambient Microphone channels is strictly controlled by password access.

## Data Access

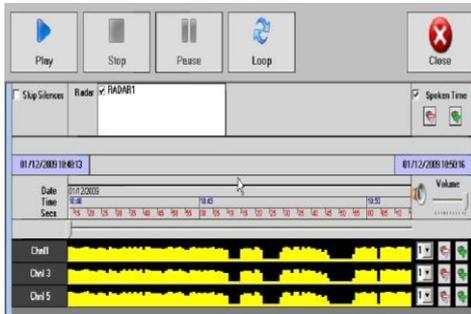
- ◆ In a record and replay system it is essential that the recorded data can be located and retrieved quickly and efficiently. With Veristore all of the data, irrelevant of its source, can be accessed within a maximum of one second of it having been received.

## Data Replay

- ◆ Initially the data to be replayed has to be identified and located. This is a straightforward operation which is achieved by simply entering the approximate start and finish times of the period of interest and the channels to be replayed. Activity on each of these channels is then visually displayed against a time axis with a zoom facility available to expand or contract the time frame. Once selected, data may be replayed with all of the audio channels and the data from all of the other sources, in perfect synchronism.



## Voice Channels



- ◆ The voice signals and ambient microphones are replayed, either through loudspeakers or a headset, using the Audio Unit. The quality and the level of the replayed signals will exactly replicate the quality and level of the signals when they were received, including any background noise.

***This will be exactly 'what the controller heard'.***

- ◆ Analysis tools are included as a standard feature in the Veristore Replay Software. These can aid an investigation by presenting information in a manner that is easier to interpret:

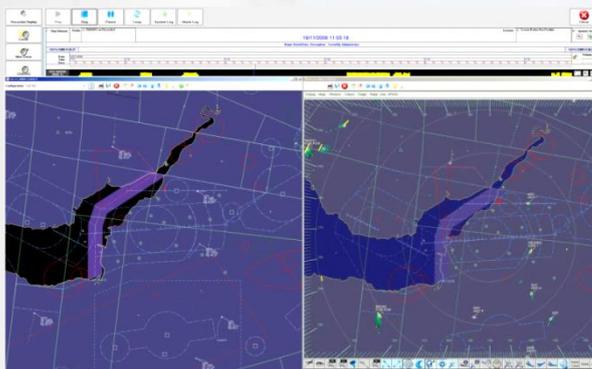
**Spoken Time:** Each data block has the timecode information embedded in the block header. This timecode information is extracted when the data is replayed, displayed on the CMS screen and can also be output as Spoken Time.

**Skip Silences:** The audio signals are recorded continuously 24/7 which means that any periods of silence will be recorded. When the data is replayed 'Skip Silences' may be selected and any periods of silence will be 'skipped' and only the audible passages will be heard.

**Loop Replay:** There is a facility to continuously replay passages of particular interest. Specific periods of data may be selected for 'Loop Replay' when a passage of information will be replayed as normal and then repeated. The replay will be repeated until 'Stop' is selected.

## **Through-the-Wall (Plot Extracted) Raw Radar**

- ◆ When the raw radar data is replayed it is displayed on local area maps. The replayed



radar display can then be directly compared with the information displayed on the controller screen at the time of recording. This will confirm whether or not the controller was able to see all of the salient details at the time of an incident and that nothing had been masked or hidden from view.

- ◆ Analysis tools are included as a standard feature in the Veristore Replay Software. These can aid an investigation by presenting specific information in more detail and in a manner that is easier to interpret:
  - The display can be scaled by zooming in or out to provide a clearer understanding of the situation, as it occurred.
  - A single aircraft can be highlighted by 'clicking' on the trail for that aircraft with the mouse. The other aircraft will still be displayed on the screen but they will be 'greyed-out'. This means that the selected aircraft will stand out from the others, reducing any possibility of confusion and permitting its course to be easily tracked.
  - Two aircraft can be selected simultaneously by 'clicking' on the trails for each of them with the mouse. The separation between them (vertical, horizontal and actual distance) will be displayed on the screen. Their separation will be continuously updated and a check can then be made to determine at which point they were closest to (or furthest from) each other.
  - Altitude limits can be applied so that only aircraft within a certain height range will be displayed.
  - The barometric pressure may be entered and the altitudes of all of the displayed aircraft will be automatically corrected for the conditions at the time of recording.
  - The tracks of individual aircraft can be exported into a spreadsheet to enable the course and progress of an individual aircraft to be analysed without the need of a radar display.
- Data can be saved as a .KML file and displayed using Google Earth. This will generate a very simple to understand 3D display of the tracks of the aircraft superimposed on a 3D map. This allows information to be displayed in a format that is easy to understand by people who are non-technical and not familiar with interpreting operational radar displays.

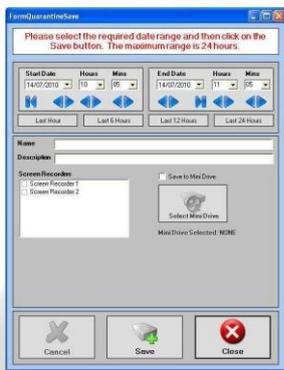


### ***At-the-Glass (Screen Capture) Radar***

- ◆ When the screen capture information is replayed the controller screens are displayed exactly as they were captured. It is not possible to alter any of the information displayed on the screens during replay. Mouse movements, the opening, closing and scaling of windows and any manipulation of the display initiated by the controller are replayed exactly as they occurred.

- ◆ Analysis tools are included as a standard feature in the Veristore Replay Software. These can aid an investigation by presenting information in a manner that is easier to interpret.
  - A zoom facility, which enables the display to be 'scaled', is available. Specific areas of the screen may be selected to aid analysis by giving a clearer representation of the situation.
  - Individual screenshots, from a replayed sequence, are available in a format that may be printed.

## **Quarantine (secure) Data Files**



- ◆ Recorded data that is needed for an investigation may be impounded by the relevant regulatory body. When this happens, the appropriate data will be copied to a 'Quarantine Storage' location, which is a separate, secure storage area. Any data in 'Quarantine Storage' must be exactly as it was originally recorded and may not be replayed, copied (other than at the request of the regulatory body), deleted or over-written until official authority is given for the release of such data.
- ◆ A Quarantine Data File may be copied to a mini drive for replay and analysis at another location. It is not possible to prevent a data file from being altered or corrupted but it is possible to monitor it and report the fact that it has been tampered with. When a Quarantine File is generated the contents of the file are read and a checksum produced. From then on, each time the file is accessed, a new checksum is produced and compared with the original checksum. Any changes, however minor, to the contents of the file are reported.

***Quarantine data files are complete, accurate and verifiable.***

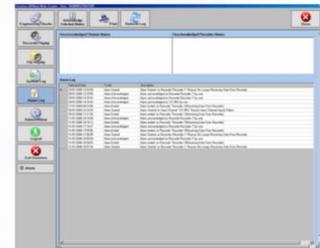
## **Alarms**

- ◆ Veristore Record and Replay Systems have a comprehensive alarm structure, which is flexible and may be tailored by the user to their specific requirements.
  - Hardware (contact closure) alarm signals are generated by the Voice Recorders and the Radar Recorders if a fault is detected that causes the recorder to stop recording. These signals are independent of the Recorder Interface PC software and can be directly connected to a remote alarm panel to indicate that the integrity of the Recording System has been compromised.

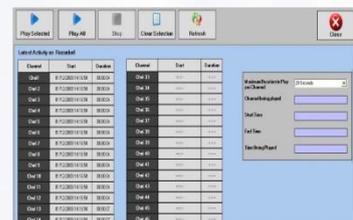
- The CMS also generates contact closure alarm signals, which may be designated as 'urgent' or 'non-urgent' and connected to a remote alarm panel to indicate that a fault in the Recording System has been identified.
- Software alarm signals are generated by each of the Recorder Interface PCs. The CMS interrogates the Recorder Interface PCs and reports any alarms that have been generated. These alarms can be designated as 'urgent' or 'non-urgent' and the user can determine how they are reported and displayed.
- Alarms may be viewed at the CMS and appropriate action taken. An alarm cannot be cleared until it has been acknowledged and the fault cleared.

## System Log and Alarm Log

- ◆ Comprehensive System and Alarm Logs are produced and maintained by each of the Recorder Interface PCs. The CMS interrogates the Recorder Interface PCs and compiles the information into System and Alarm Logs for the Recording System.



- The Alarm Log provides details of all of the alarms that have been raised, including the fault that caused the alarm, the time that the fault was identified and the time that the fault cleared.
  - The System Log includes all alarm activity.
  - All of the entries in the logs are time-stamped and have the relevant user identification attached. Any access to the recorders is therefore reported by user identification, date and time.
  - Each of the logs may be accessed by authorised users and viewed, printed or saved as a .CSV file.
- ◆ The CMS also provides the facility to display operational and statistical information for each of the recorders in the system, e.g. Channel Activity Reports, input signal levels at any channel, etc.



## Data Replay at an alternative location

- ◆ The recorded data may have to be replayed at a location remote from the original recording. In these instances, the data will have to be made available at the site where it is to be used. There are a number of different ways that this can be achieved but in all cases the data will be recovered from the recorders by the CMS and copied to transportable media:

- Data may be recovered from the relevant recorders and written to a file which is then copied to removable media, e.g. mini drive, memory stick, CD / DVD, etc. and replayed offline using the Veristore Replay Software which has been loaded onto a suitable PC.
- Data may be recovered from the relevant recorders and written to a file which is then copied to a mini drive or DVD. A copy of the Veristore Replay Software will also be written to the mini drive or DVD, enabling the data to be replayed on any off-line PC without downloading Veristore Replay Software to the PC. The replay is protected by a password which is generated when the file is prepared.
- When limited quantities of data, e.g. only voice information, are required data may be recovered and written to a file in .WAV format for off-line replay using a standard Windows Media Player.

### **Data Export**

- ◆ Any or all of the recorded data may be copied to a remote storage location.
  - There are a number of situations where this may be requirement, for example, where the information captured by the Veristore system has to be stored in a Site Storage Facility or where there are a number of Veristore systems in a single ATC recording system.
  - Copying the data to a remote storage location is a straightforward process, which is achieved by selecting the required data at the CMS and then transferring the data from the CMS to the remote storage location via an Ethernet connection.

***All of the features described above are integral to the Veristore Software Package and are provided as standard with each system. There will be no 'hidden extras' or additional charges when the system is ordered or installed. In addition, PALSupport (UK) takes pride in having the ability to write bespoke software applications for any specific requirements.***

### **Replayer**

- ◆ All of the Data Replay and Data Transfer functions that are described above for the Central Management System are available at a Replayer.
- ◆ The Replayer communicates directly with each of the recorders in the system via the Veristore Ethernet Network. As in the case of the Central Management System, it provides a straightforward, intuitive, Graphical User Interface running under Windows and any access to the recorders is strictly controlled by password.
- ◆ There is no limit to the number of Remote Replay Stations that may be added to a Veristore system to provide replay facilities at any required location.

### ***Veristore Replay Software***

- ◆ The Veristore Replay Software includes all of the Data Replay and Data Transfer features described above for the Central Management System and may be loaded on to any suitable PC to provide file and archive replay of the data recorded on a Veristore Record and Replay System.
- ◆ Veristore Replay Software is licensed for unlimited use within a user's site.

### ***Timecode Distribution Unit***

- ◆ The Master Clock is accepted by the Timecode Distribution Unit via a serial (RS 232) interface, in a number of different formats and distributed to each of the recorders, the CMS and the Replayer(s), ensuring that all of them are synchronised.
- ◆ If the Master Clock signal is lost or not recognised by a recorder or the CMS an alarm will be raised. The timecode signal from the Timecode Distribution Unit will then 'freewheel' until the Master Clock signal is restored.

### ***Audio Unit***

- ◆ An Audio Unit, which has two loudspeakers and left, right and stereo jack sockets, is supplied with both the CMS and each of the Replayers. Data to be Live Monitored or replayed is output through either the loudspeakers or a headset.



### ***Power Management***

- ◆ Power management and distribution systems can be supplied to suit any user installation. UPS and/or inverters can be built into the equipment rack and supplied as an integral component of the Veristore Record and Replay System.

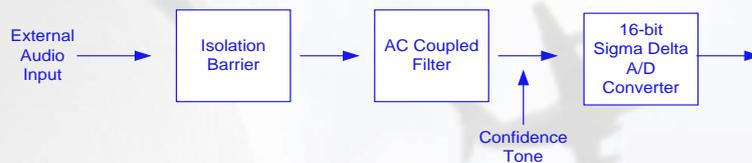
## Data Interfacing

### Analogue Audio

- ◆ The audio channels and ambient microphones are continuously recorded, 24/7, without using either VOX or AGC.
  - Voice Activation (VOX) can be the cause of data loss on account of incorrectly set threshold levels.

***Not only does this ensure that none of the information is ever lost but also that periods of silence and low level signals are faithfully recorded exactly as the controller heard them.***

- ◆ The Audio Channel Interface is purpose designed for use in applications where reliability and security are paramount. A simplified block diagram is shown below:



- The input circuitry presents a High Line Bridging Impedance greater than 30 kohms over the frequency range of 200 Hz to 4000 Hz.
- The frequency response is  $\pm 3\text{dB}$  in the range 300 Hz to 3,500 Hz.
- Isolation between the signal lines and the recorder circuits is achieved by transformer coupling which accommodates both balanced and unbalanced signals. DC currents in the transformer primary are prevented by a series capacitor, which is of the 'X2' self-healing type. The value of this capacitor is chosen to maintain the bridging impedance at the lower end of the working range without excessively extending the frequency response.
- The audio signals are sampled at 8000 Hz with a 16-bit resolution.

### Digital Audio

- ◆ Digital audio signals are becoming more commonplace with the introduction of modern technology. It is perhaps more straightforward, both in terms of interface circuits and storage capacity, to record audio signals in the digital domain. However, PALSupport (UK) recommends that the best philosophy is to always record the signals that were actually heard. These are, of course, in the analogue domain. Not only does this guarantee that the information 'heard' is accurately recorded but also allows each voice signal to be monitored for activity and alarms to be raised if faults are detected.

- ◆ In larger installations it may not be practical to record the all of the voice channels in the analogue domain and in these circumstances PALSupport (UK) is able to offer Digital Audio Interface Modules for the Voice Recorder.

### ***VoIP***

- ◆ VoIP technology is increasingly being introduced into modern communications systems, including those used at airports for ATC. A number of standards, which define the protocol for VoIP in ATM applications, have now been issued and PALSupport (UK) is able to offer a recording solution for VoIP recording to comply with these.

### ***Ambient Recording***

- ◆ From the point of view of recording, Ambient Microphones may simply be considered as another audio input and recorded using a standard analogue audio channel.
- ◆ PALSupport (UK) can supply Ambient Microphones and all of the necessary interface equipment to provide a complete recording solution.

### ***Through-the-Wall (Plot Extracted) Raw Radar Data***

- ◆ Raw (plot extracted) radar data, may be received as synchronous HDLC frames, either via a serial RS 232 / RS 422 interface or in IP format, via a LAN.
- ◆ There are numerous different radar data formats, some of which are international or national standards and some are specific to a particular radar manufacturer. A number of these are readily recorded by the Radar Recorder:
  - Asterix: A Eurocontrol Standard which is supported by many of the radar manufacturers.
  - RDIF: A UK format, similar to Asterix Category 001.
  - CAA: A UK CAA format.
  - Other formats can be accommodated and PALSupport (UK) welcomes the opportunity to discuss specific customer requirements.

## ***At-the-Glass (Screen Capture) Radar Data***

- ◆ Both analogue and digital screen formats may be captured at the following maximum resolutions:
  - Analogue (VGA or RGB) 2048 x 2048
  - Digital (DVI) 2048 x 2048
  - Digital (DVI-DL) 2560 x 1600.
  - DVI / Display Port 4096 x 2160.
- ◆ The maximum frame capture rate is 20 frames per second but a capture rate of between 2 and 5 frames per second, with a limited compression ratio, is recommended for the majority of ATC applications. This provides very high quality signal reproduction, which, when replayed, is indistinguishable from the original screen display.

## ***CCTV***

- ◆ The CCTV Recorder captures and records CCTV Camera signals either directly from standard coax cables as PAL or NTSC signals or from a LAN as IP signals. As in the case of the Screen Capture, Frame Capture Rates and Compression Ratios can be selected to achieve the best quality recorded signal whilst maintaining an acceptable storage capacity.

## **Technical Specifications**

### **Audio (Voice) Channels**

There is no limit to the number of audio channels that can be recorded.

Audio signals are connected to the Veristore system via a Krone frame mounted within the Veristore cabinet.

#### **Analogue (radio / telephone inputs)**

Connection	2 wire or 4 wire
Input Impedance	>30 kohms throughout the range 200 Hz to 4,000 Hz
Frequency Response	± 3 dB, throughout the range 300 Hz to 3,500 Hz
Dynamic Range	-60 dBm to +10 dBm
Crosstalk Rejection	>70 dB below the actual signal input level

#### **Digital**

2 wire telephone line (extension tapping)  
E1 / T1 trunk lines, using PCM 30, PCM 31, ISDN PRI

**NOTE:** Digital Audio signals, in a number of different formats, can be accepted and recorded. To obtain information and specifications please contact PALSupport (UK) who will be pleased to discuss the relevant local, national and international standards relating to the information to be recorded.

#### **VOIP**

In accordance with Eurocae Standards:

ED 136	VoIP ATM System Operational and Technical Requirements
ED 137	Interoperability Standards for VoIP ATM Components
ED 138	Network Requirements and Performances for VoIP ATM Systems
ED 139	Qualification Tests for VoIP ATM Components and Systems

**NOTE:** Please contact PALSupport (UK) who will be pleased to discuss any relevant local, national and international standards relating to the information to be recorded.

### ***Through-the-Wall (Plot Extracted) Radar***

Signal Interface	Bit Synchronous, HDLC frames RS 232 / RS 422 or IP protocol via LAN
Data Formats	Asterix A number of different categories can be accepted and recorded. Please contact PALSupport (UK) for information regarding a particular application.  RDIF CAA  NOTE: Other data formats can be accepted. Please contact PALSupport (UK) for details.

### ***At-the-Glass (Screen Capture) Radar***

Screen Resolution	Analogue (VGA / RGB)	Up to 2048 x 2048 pixels
	Digital (DVI)	Up to 2048 x 2048 pixels
	Digital (DVI-DL)	Up to 2560 x 1600 pixels
	DVI / Display Port	Up to 4096 x 2160 pixels
Frame Capture Rate	Maximum	20 frames per second
	Recommended	2 to 5 frames per second

### ***CCTV***

Signal Interface	Coax Ethernet
Format	PAL, NTSC.

### ***Alarm Output***

Hardware (Contact Closure)-	from Voice and Radar Recorders, independent of software.
Hardware (Contact Closure)	from CMS, may be designated as 'Urgent' or 'Non-Urgent'.
Software	configured from CMS, may be designated as 'Urgent' or 'Non-Urgent'.

## ***Master Time Source***

Timecode formats that can be accepted by the Timecode and Network Distribution Unit are as follows:

GPS

IRIG-B

RS 232 (various standard formats)

RS 232 (various custom protocols)

Others formats may be available on request.

## ***Power Requirements***

AC Line Input      100V to 132V / 180V to 264V auto ranging.

Line Frequency    47Hz to 63Hz.

Power                Depends on configuration.

PALSupport (UK) will be pleased to discuss the power requirements of any proposed Veristore Record and Replay System.

## ***Environmental Conditions***

Operating:-

Temperature:-

5°C to 35°C Ambient.

Relative Humidity:-

20% to 80% non condensing.

## ***Warranty***

The following warranty cover is offered as standard

2 year warranty and support

covering parts, labour and software updates on all equipment.

3 year manufacturers' warranty

on Hard Disk Drives used in the Recorder internal stores.

***All Veristore Products are covered by a comprehensive warranty which includes unlimited Remote Support.***

## ***Support***

- ◆ With equipment of this nature on-going support is paramount and may even be a legal requirement in some environments. PALSupport (UK) believes that its customers deserve prompt and efficient responses to any questions that they may have or problems that they may encounter throughout the 'in service' life of the equipment.
- ◆ Comprehensive technical support and training is offered during the installation and commissioning of the equipment and throughout its operational life.

***PALSupport (UK)'s reputation for Customer Support is second to none with any requests from Customers receiving a response in a timely and efficient manner***

## ***Maintenance Contracts***

- ◆ PALSupport (UK) offers Maintenance and Support Contracts that are tailored to meet the individual needs of specific users. These include:
  - Telephone Support
  - Remote Support
  - On-Site Support
  - Software Upgrades
- ◆ Remote Support, whereby fully qualified engineers can log into your system, enables more than 90% of faults to be diagnosed. This reduces any downtime to minutes rather than hours, or even days and also significantly reduces the need for Service Callouts which can be both expensive and time consuming.
- ◆ An efficient approach to In-service support means that the cost of ownership of Veristore products is significantly lower than that of competitive products.

***PALSupport (UK)'s customers benefit from a lower overall lifetime cost with Veristore recording solutions.***