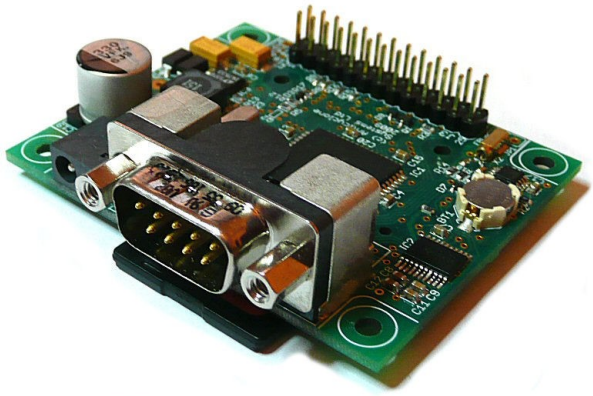
Anticyclone Systems

AntiLogReader V9.0
Command Line Application
User Guide



DOC/AntiLog/UG/2006004_4.0

01-Dec-2020

G Hatto

www.anticyclone.co.uk

Table of Contents

1. Introduction

The AntiLog range of products from Anticyclone Systems Ltd provide a very effective way to log data from RS232 signal sources. All AntiLog units write their captured data to solid state removable FLASH media. Recorded data can be appended to the media in additional recording sessions or played back or uploaded via the unit's serial ports.

If large log files are created during the recording process, it is often significantly faster to upload recorded data directly from the FLASH media using a PC media card reader rather than trying to download the data using one of the unit's serial ports.

The OEM version of the AntiLog hardware and all variants of the latest AntiLogPro hardware allow direct access to this removable media. The original boxed AntiLog unit was designed to be usable by non-technical staff and so the media is not easily extracted from the unit without dismantling it first.

V6.0 and later of the AntiLog and AntiLogPro dual channel software release support MultiMediaCard (MMC), Secure Digital (SD), Secure Digital high capacity (SDHC) and Secure Digital Extended Capacity (SDXC) removable media up to a 1TByte capacity.

The AntiLog design deliberately does not use the Microsoft FAT filing system for data storage because the FAT file system is not suited to high reliability in a data logging application where power could be removed from the system at any time. AntiLog uses a custom file system which is highly efficient and fault tolerant. It is therefore not possible to directly read the media content on a PC (using a multi-card reader for example) because the data cannot be 'seen' by a standard PC file system.

1.1 Uploading recorded data

AntiLogReader is a stand alone, PC based command line application that can upload recorded data from AntiLog and AntiLogPro units via their serial ports or from media cards extracted from these units and placed in a PC media card reader. AntiLogReader takes a series of command line arguments which are separated by space characters to control its function.

The data source can be media cards (plugged into a PC media card reader), a direct NULL modem serial port connection to an AntiLog or AntiLogPro unit (AntiLog embedded software V4.0 or later required) or from a local media image copy which has already been generated using this application and the COPY command line option. The output from the program can simulate AntiLog output formats, so embedded timestamping, headers and hex dumping options for example are available.

Using the command line options, it is possible to erase the media content following a successful COPY operation using the ERASE keyword. This is useful if you need to 'empty' AntiLog units of recorded data after you have uploaded a copy of the data to your local PC file system.

2. Applicability

This user guide refers to AntiLogReader V9.0. AntiLogReader can process recorded data from AntiLog units running V4.0 or later of the embedded software or the latest range of AntiLogPro units running V5.0 or later.

AntiLogReader can also extract recorded data from any media card (inserted into a card reader on a PC) written with any AntiLogPro unit or any AntiLog unit running the dual channel version of the embedded software. AntiLogReader is also able to read data from the original AntiLog single channel software V3.1 or later, but it is not able to process data written by earlier versions because the media file system used in these early versions used sectors on the media not visible when using a Microsoft PC card reader.

AntiLogReader V9.0 supports the new V9 file system introduced in the AntiLog and AntiLogPro V9.0 embedded software release. Previous versions of AntiLogReader will not be able to read the content of media written using the new V9 file system.

The program is also able to perform limited data recovery (using a RECOVER keyword) should there ever be an issue with the recording media so even if AntiLog is unable to play back the recorded data there is a chance it can be recovered with AntiLogReader.

AntiLogReader is currently command line based and so it is assumed that the user is familiar with the concept of command line applications and the use of file and path names in a Microsoft command shell.

The command line nature of this utility means you can always invoke the application from another application. For example it can be called from within a Visual Basic or other scripting language application to realise an automated data collection and archiving system. It does not support real time playback of data. You will need to use real AntiLog or AntiLogPro hardware to perform this function.

2.1 AntiLogReader is available in 32 bit and 64 bit builds

AntiLogReader is currently available as a legacy 32 bit PC application which is compatible with Microsoft Windows XP and later, or as a 64 bit version for the 64 bit versions of Microsoft Windows 7 and later.

The 32 bit version of the software will work on a 64 bit PC platform with very slightly less performance compared to the 64 bit version, but the 64 bit version will not run on a PC with a 32 bit architecture. If you are not sure which hardware you will be running the application on, you can download and use the 32 bit version which should work well on all PC architectures.

The command line options and software functionality are identical between the two software builds.

3. Installation

The application consists of just one file, `AntiLogReader.exe` which is downloaded in either 32 or 64 bit form from the Anticyclone Systems Ltd website depending on the PC it is intended to run on. The downloaded executable file must either be copied to the directory you intend to work in, or copied to a directory currently specified in your system path.

If you enter `AntiLogReader` at a command prompt with no arguments, the program will produce the following output:-

```
-----------------------------------------------------------------
AntiLogReader                (c) Anticyclone Systems Ltd, 2020
Version 9.0      01-Dec-2020      WEB: www.anticyclone.co.uk
-----------------------------------------------------------------

AntiLogReader source outname [opts...]
AntiLogReader source CHANNEL n outname [opts...]
AntiLogReader source CHANNEL 1 outname1 [opts...] CHANNEL 2 outname2 [opts]

source       = Drive letter A through to Z, COMn, COMn:baudrate or
               file name of image previously written with COPY option.
outname      = Name of file to create to receive output stream data.
               If not supplied, output will go to screen (CON:).
opts         = None or more of the following, separated by spaces:-
  CHANNEL n  = Extract data for channel 1 or 2 (default is CHANNEL 1)
  BUS n      = Select a unit at a given bus ID in a Multi-unit system.
  DIRONLY    = Show directory entry only.
  HEADER     = Expand session headers into output stream.
  COPY       = Create an exact copy of media content to output stream.
  ERASE      = Erases source data after download when COPY option used.
  CONFIRM    = Will not prompt for confirmation of ERASE after COPY.
  LEGACY     = Search disk media for files written before AntiLog V6.0 only.
  MAXRATE    = Negotiate maximum serial port baud rate for transfer.
  TSTAMP     = Expand timestamp information into output stream.
  TFORMAT n  = Timestamp format: 0="dd-MMM-yyyy time", 1="dd/MM/yyyy time",
               2=ISO8601, 3=RAW 6 byte binary, 4="dd-MMM-yyyy,time",
               5="dd/MM/yyyy,time".
  CHANNELID  = Expand AntiLog channel identifier into output stream.
  HEX        = Stream the output as a Hexadecimal ASCII dump.
  PROGLINES  = Show progress as lines of percentages, not a bar display.
  RECOVER    = Force data recovery of media ignoring directory size.
  FORCESEQ n = Force a data recovery for data with a given sequence number.
  MAXBADSECTORS = Set # of bad seq sectors before giving up recovery.
  VERBOSE    = Give more comprehensive debug and progress information.
```

The 64 bit version of the software displays the same output but has a modified header line to indicate 64 bit operation.

```
-----------------------------------------------------------------
AntiLogReader_x64            (c) Anticyclone Systems Ltd, 2020
Version 9.0      01-Dec-2020      WEB: www.anticyclone.co.uk
-----------------------------------------------------------------

AntiLogReader source outname [opts...]
AntiLogReader source CHANNEL n outname [opts...]
AntiLogReader source CHANNEL 1 outname1 [opts...] CHANNEL 2 outname2 [opts]
```

4. SD media card data corruption

Anticyclone Systems Ltd recommends you enable the LOCK switch on SD cards where available before plugging a card containing important AntiLog recorded data into a PC media card reader. (Note that MultiMediaCards do not have a lock switch.)

Figure 1: Setting the media lock switch

This is because many PC configurations will attempt to write small temporary hidden files to new media as part of virus checking, search caching, multimedia file indexing, etc. without your knowledge. The creation of these files should not cause corruption problems in general use with the latest edition of the AntiLog file system, but to be absolutely sure, setting the LOCK switch is the safest way to ensure the integrity of your recorded data,

If the LOCK switch is enabled on the card (slid in the direction away from the media contact pins as shown in Figure 1) then this should prevent all PC write operations and so the card content cannot be modified. If you intend to use the LOCK feature, please ensure your media card reader respects the LOCK position on the media card as some do not!

The LOCK switch is only a mechanical sliding piece of plastic on the side of the SD card with no electrical connections. A card reader will use a microswitch which will be activated by this plastic LOCK position when a card is inserted to read the lock state. You can test the operation of your card reader by trying to modify the card content with the lock switch set before using the card reader in an AntiLog application.

With V6.0 and later of the AntiLog software, you should leave the LOCK switch set on the media card when you plug the card back into an AntiLog unit. Antilog will deliberately write data regardless of the lock switch setting so it is safe to leave the LOCK switch permanently set on. The AntiLog main menu will warn you if you haven't set the lock switch.

4.1 Using the ERASE option

The one exception to setting the LOCK switch is when you intend to use the ERASE keyword to erase the data from the media card after a successful data upload. In this case you will need to disable the LOCK switch before plugging the card into the card reader to allow the erase function to modify the media content automatically at the end of a successful data transfer.

4.2 The NAND Read Only state

If you have previously used a media card extensively in a PC for other disk intensive applications, the media may fail into a READ ONLY state after a large total number of NAND memory write transactions (card specific limit). If this is the case, no further writes to the media are permitted and the card will appear with a warning if plugged into an AntiLog V6 and later unit as a READ ONLY card.

5. Making a media image copy

You can use AntiLogReader to create a complete media copy of the MMC/SD/SDHC/SDXC AntiLog media card content. This is a highly recommended course of action because you then have a local copy of every aspect of the logged data on your local storage which you can subsequently go back to and extract the embedded channel data in the format you want using further invocations of AntiLogReader.

Although AntiLogReader produces a full media image copy, only the sectors from the media that contain valid AntiLog recorded data are uploaded, not every single sector on the media.

You can perform a media image copy in one of three ways. In all three cases, you use the COPY command line argument to instruct AntiLogReader to create a media image copy. If the log file was not closed properly in AntiLog then AntiLogReader may attempt to automatically recover instead of simply copy it. Data recovery does not attempt to modify the content of the source media, only the content of the extracted output.

5.1 Uploading a media image via a PC serial port

You can upload a complete media image copy through the AntiLog serial port using a PC serial port and an RS232 NULL modem cable. Note that this will only work if your AntiLog unit is running AntiLog V4.0 or later. AntiLog units need to be switched on and in the playback mode before you start.

The following example shows the syntax to upload an image copy from an AntiLog V4.x or later unit connected to PC serial port COM3 to a local file called `myimage.antilog`. The PC serial port and the AntiLog playback menu must be set to 115200 baud, 8 bits no parity for the following example to work (the default for AntiLogReader).

```
AntiLogReader COM3 myimage.antilog COPY
```

The following example shows the same operation but with the AntiLog menu system set to 230,400 baud, even parity and two stop bits.

```
AntiLogReader COM3:230400,E,8,2 myimage.antilog COPY
```

AntiLogReader will not function with the serial port in this mode if:-

- You are using a version of AntiLog less than V4.0.
- The menu serial port settings and the AntiLogReader serial port settings are different.
- You have anything other than 8 data bits set (AntiLogReader requires 8 bit data transfers).
- Another application is already using the specified serial port on the PC.
- The RS232 cable connection is not correct, you should use a NULL modem connection – check you see the AntiLog menu with a terminal program first.
- AntiLog is not switched on or is not in playback mode.
- The log file was not close properly in AntiLog. Instead, use a card reader for the data or recover the data in AntiLog using the “Media data recovery” option in the General menu.
- You are trying to use a baud rate higher than 115,200 baud on PC serial port hardware that doesn't support these higher speeds (e.g. some standard built-in desktop PC serial ports).

5.1.1 Uploading via the serial port using MAXRATE

Starting with V5.4 of the AntiLog embedded software, the ASLMTx2 protocol now supports a new MAXRATE feature which allows a host to request the fastest possible transfer speed from a connected AntiLog unit. AntiLog will then automatically switch to this rate and the host will follow and hence the rest of the transfer is done at this rate. When the transfer has completed, AntiLog will return to its previous serial port settings.

This is a very convenient way to upload data in the quickest possible manner using a serial port connection without having to temporarily set menu baud rates in AntiLog to achieve a fast transfer.

To use this transfer method, simply use the MAXRATE keyword on the command line:-

```
AntiLogReader COM1: myimage.antilog COPY MAXRATE
```

The MAXRATE feature will not work if any of the following conditions are true:-

- AntiLog or AntiLogPro unit is running embedded software earlier than V5.4.
- The AntiLog menu system baud rate does not match the initial AntiLogReader specified baud rate (default 115200 baud). For example, if the currently connected AntiLog menu baud rate is set to 9600 baud, you will need to specify this in the command line:-

  ```
  AntiLogReader COM1:9600 myimage.antilog COPY MAXRATE
  ```

- The PC serial port hardware does not support high baud rates like 460800 and 962100 baud. This is true of all built in “standard” serial ports for PCs, e.g. the ones fitted to mother boards on desktop PCs. Most USB to serial port converters generally support the higher baud rates.
- You are trying to read data from a media card or from a file previously uploaded using AntiLogReader. The MAXRATE keyword only works with a serial port connection.

5.2 Uploading data directly from media cards

You can extract data directly from an AntiLog or AntiLogPro media card if the media card is inserted into a compatible PC media card reader. Before inserting the card, we recommend setting the card's LOCK switch if it has one as discussed in section 4. This option is not generally applicable to the original boxed AntiLog variant as the media card in this design is not easily accessible.

The card reader must be able to read the card type inserted, e.g. MMC, SD, SDHC or an SDXC card. When you have determined the drive letter for the card, use the following syntax to create an image copy of the data on the PC (the following example assumes the media card has been inserted into drive E and we are writing to an output file called 'myimage.antilog' in the current directory).

```
AntiLogReader E: myimage.antilog COPY
```

If the operation fails claiming there is no media in the drive , try re-inserting the media card and trying again as some older media card reader devices appear to miss the first disk insertion/extraction event.

5.3 Copying data from a previously copied image file

You can make another copy of a locally stored image. This function is normally more efficiently performed by the operating system itself so the example below is for completeness only.

```
AntiLogReader myimage.antilog secondcopy.antilog COPY
```

6. Multi-bus operation

AntiLogPro OEM units running V5.4 or later of the embedded software can be built into a multi-unit system (up to a theoretical maximum of 255 units), each of which can support dual port recording.

The units are linked together in parallel with their Auxiliary ports and assigned a unique bus ID number using the normal menu system. A single RS232 level shifter allows a host system (e.g. a PC) to control all of the units in the system via just one serial port connection.

The level shifter can be implemented using the secondary serial port driver on one of the AntiLogPro units in the system and some links on the pin header so no additional hardware is required to implement a fully functional multi-unit data logging system.

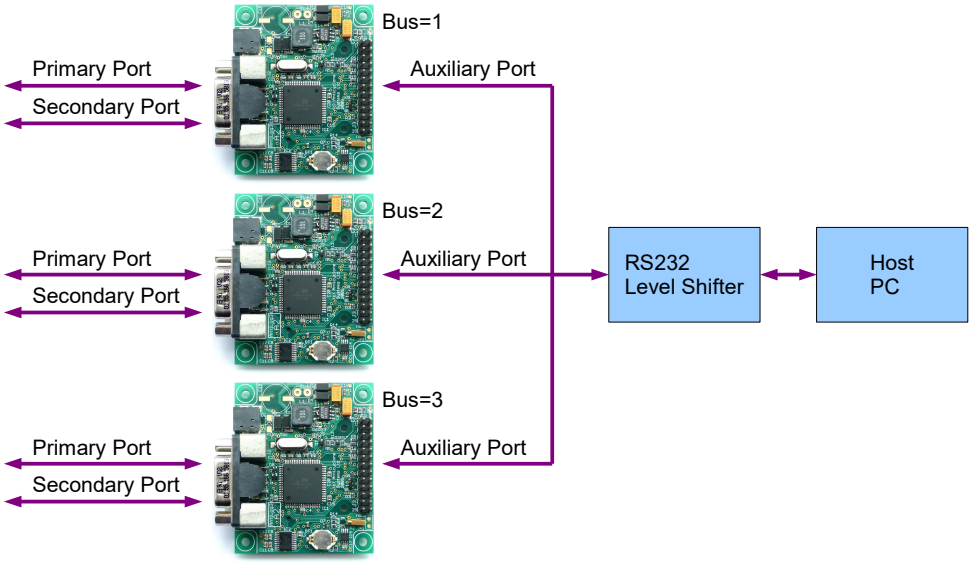


Figure 2: Multi-unit operation

Using V7 and above of the AntiLogReader software, you can select which unit you would like to target to upload data in a multi-unit system. AntiLogReader can only communicate with one unit at a time on the bus. To talk to a specific unit requires the "BUS n" keyword and value on the command line. Valid bus address are in the range 1 to 255.

Trying to use AntiLogReader without the BUS keyword in a multi-unit configuration on the Auxiliary port will not work. The following are examples of talking to an AntiLogPro OEM unit at bus address 3 in a multi-unit system.

```
AntiLogReader COM1 DIRONLY BUS 3
AntiLogReader COM1 myimage.antilog COPY BUS 3
AntiLogReader COM1 myimage.antilog COPY BUS 3 MAXRATE
AntiLogReader COM1 CHANNEL 2 ch2.txt BUS 3
```

All communications with the AntiLogPro auxiliary bus port must be at a fixed 115200 baud, 8 bits, no parity and one stop bit (the AntiLogReader default as per the examples above), but you can specify the MAXRATE keyword as shown if you are downloading data from one of the bus units to significantly improve data transfer speed.

7. Extracting channel data

Once you have created an AntiLog Media Image copy of your data, you can extract the channel data as required.

AntiLogReader allows you to extract recorded channel data directly from one of the three data sources:-

- A direct NULL modem cable connection to an AntiLog unit (AntiLog V4.0 or later).
- Direct from a media card plugged into a media card reader on the PC.
- From a local AntiLog Media Image file on the PC previously created with the AntiLogReader COPY command keyword.

The following examples show how to extract channel 1 data (the default) to a file called `ch1.txt` for the three media source types:-

```
AntiLogReader COM1 ch1.txt
AntiLogReader E: ch1.txt
AntiLogReader myimage.antilog ch1.txt
```

If you do not specify a destination file name, the output will be output to the current screen output. For example:-

```
AntiLogReader myimage.antilog
```

7.1 Extracting dual port data

Starting with AntiLog V4.0 you can record up to two channels of independent RS232 data simultaneously. To extract specific channel data from a data source, you use the CHANNEL keyword. The following examples show how to extract both channels of data (channel 1 and channel 2) from three example data sources.

```
AntiLogReader COM1 CHANNEL 1 ch1.txt CHANNEL 2 ch2.txt
AntiLogReader E: CHANNEL 1 ch1.txt CHANNEL 2 ch2.txt
AntiLogReader myimage.antilog CHANNEL 1 ch1.txt CHANNEL 2 ch2.txt
```

Keywords that appear after the CHANNEL keyword apply to that channel only. In the following example, channel 1 data is extracted as normal with timestamping enabled, but channel 2 is extracted as a hexadecimal dump. Full details of all command line keywords and options available in AntiLogReader appear in the next section (Section 8).

```
AntiLogReader E: CHANNEL 1 ch1.txt TSTAMP CHANNEL 2 ch2.txt HEX
```

You can also extract a single channel directly with the CHANNEL keyword:-

```
AntiLogReader E: CHANNEL 2 ch2.txt HEADER TSTAMP
```

8. Command line options

When extracting data to a file or to the screen, you can specify keywords on the command line to control the format of the outputs. These keywords can in many cases be combined to increase the number of output options available. The keywords are not case sensitive so they may appear in upper, lower or any other combination of case.

The channel output options available in AntiLogReader have been designed to simulate some of the playback options available in a real AntiLog unit, therefore some of the concepts discussed in this document are further covered in more detail in the AntiLog RS232 Data Logging System User Guide [1].

8.1 Keyword – BUS n

Specifies the unique multi-unit bus address of an individual AntiLogPro OEM card in a multi-unit system connected via the Auxiliary port. The bus address must be in the range 1 to 255 and match that of the target unit. Do not use this keyword in normal stand-alone use.

8.2 Keyword – CHANNEL

You can extract multiple channel data from a media image source file recorded using AntiLog dual port software V4.0 or later. Specifying the CHANNEL keyword on the command line followed by a channel number (either 1 or 2) defines the channel for which all following keywords and file names apply. For example, to extract two channels from a media image file called 'mytrial.antilog' you can use the following syntax:-

```
AntiLogReader mytrial.antilog channel 1 ch1.txt channel 2 ch2.txt
```

You can combine keywords for given channel as long as they appear *after* the channel keyword, not before. The following example shows how to extract two channels from media supplied in G:, channel 1 is output as a binary file but with a leading ASCII session header and the second channel is output as a hexadecimal dump with timestamps.

```
AntiLogReader G: CHANNEL 1 nav.bin HEADER CHANNEL 2 HEX TSTAMP ch2.txt
```

If no CHANNEL keyword is present on the command line, channel 1 is assumed.

8.3 Keyword – CHANNELID

Expand AntiLog channel identifier into output stream. The channel number is output as a single character, either '0', '1' or '2' followed by a comma. A '1' shows the data was recorded on the AntiLog channel 1, a '2' shows the data was recorded on AntiLog channel 2 and a '0' means the data was sourced from an internal event such as a button push.

If this keyword is specified with the TSTAMP keyword, the channel ID will always appear before the date and timestamp text regardless of the order of the keywords on the command line for a given data channel.

8.4 Keyword – CONFIRM

Use the CONFIRM keyword when you want to use the ERASE keyword but don't want AntiLogReader to prompt for confirmation to continue with the copy and erase operation.

8.5 Keyword – COPY

Completes a complete image copy of the media source to the supplied destination file. The local copy can then be used as the source for further invocations of AntiLogReader without having to have the original media or the source AntiLog unit present. See section 5 for more detail on performing a COPY operation.

8.6 Keyword – DIRONLY

Displays directory information on the source media image only and does not access or process further recorded data. If the source media contains dual channel data, the data count for both channels will be shown. Using the DIRONLY option is a good way to establish you have communication with the media source (e.g. Media card reader drive or serial port connection).

The following example shows the screen output when using the DIRONLY keyword for an AntiLog media card inserted into a card reader assigned to drive L:

```
C:\> antilogreader l: dironly

Processing data from drive L:

 ---------------------------------------------------------------
  AntiLogReader                (c) Anticyclone Systems Ltd, 2020
  Version 9.0  01-Dec-2020          WEB: www.anticyclone.co.uk
 ---------------------------------------------------------------

Active Options: DIRONLY
90367668 bytes recorded in 1 session
Open Time Stamp  = 03-Nov-2019 17:59:50.437
Close Time Stamp = 03-Nov-2019 18:17:10.824
```

The open and close time stamp display will change if you try and display times and dates from very old AntiLog units that do not have real time clock hardware built in as standard. In this case, the times are relative to when the unit was first switched on.

```
C:\> antilogreader l: dironly
Processing data from drive L:

 ---------------------------------------------------------------
  AntiLogReader                (c) Anticyclone Systems Ltd, 2020
  Version 9.0  01-Dec-2020          WEB: www.anticyclone.co.uk
 ---------------------------------------------------------------

Active Options: DIRONLY
254351 bytes recorded in 1 session
Open Time Stamp  = 0
Close Time Stamp = +00:00:48.803
```

8.7 Keyword – ERASE

If you specify the COPY option from a serial port connection or a media card reader source, you can erase the data after a successful data copy by specifying the ERASE keyword. AntiLogReader will prompt you to confirm the operation before the actual copy and erase operation is performed. If you do not wish to be prompted for confirmation (for example, if you have embedded the AntiLogReader command into a Visual Basic script), specify the CONFIRM keyword.

If you make a mistake and specify the ERASE keyword and you would like to 'undo' the erase operation, replace the media in a real AntiLog or AntiLogPro unit (if you erased the media with a media card reader) and run the 'Media Recovery' item in the 'General Options' menu.

8.8 Keyword – FORCESEQ

You can force a file system sequence number to use during the data recovery process with the FORCESEQ n keyword and argument. The specified sequence number must be in the range 1 to 65534. When specified, this argument will cause the data recovery process to ignore all data on the media that does not contain the supplied sequence number. See the "Data Recovery" description in section 10.

8.9 Keyword – HEADER

Expands the session header into the output stream as an ASCII text line. The session header will include a session number (starting at 1), session start time and date and the AntiLog serial number of the unit the data was recorded on. The following is a session header example:-

```
$SESSION,1,V,05-Dec-2019,22:16:23.266,ASL/16/200*29
```

8.10 Keyword – HEX

Outputs the recorded channel data in three ASCII text columns. The first column shows a byte index into the data, the second column is a hexadecimal dump of the data itself and the last column is an ASCII text representation of the data column.

If you combine this keyword with the TSTAMP keyword then you can see a timestamp followed by a hexadecimal dump until the next timestamp is encountered. This is especially useful for data recorded with the new 'N' byte binary timestamping mode in V4.0 or later.

8.11 Keyword - PROGLINES

AntiLogReader shows progress when extracting data or building an AntiLog Media Image File by depicting a progress bar on the output screen using '*' characters to make up the bar. This is OK for a stand-alone display to give the user an indication that progress is being made but when AntiLogReader is incorporated into a scripting environment, this type of progress is less suitable to give user feedback.

```
WORKING: 0% [**************************************************] 100%
```

Specifying the PROGLINES keywords turns the progress bar into a stream of printed lines showing progress which is easy to decode into an application that remotely shows progress.

```
WORKING: 0%
WORKING: 4%
WORKING: 7%
WORKING: 8%
...
WORKING: 98%
WORKING: 99%
WORKING: 100%
```

8.12 Keyword – MAXBADSECTORS

When using the RECOVER keyword, this keyword and argument define how many sectors to skip over that contain the wrong sequence number before giving up the recovery. Note that as soon as a good sector is discovered, the internal counter will be set back to zero and the search continues until this amount of bad sectors terminates the recovery or the end of media is detected. If this value is not specified, a default of 1000 sectors is assumed. See the "Data Recovery" description in section 10.

8.13 Keyword – MAXRATE

Asks an AntiLog unit connected via the serial port to set the highest possible baud rate supported by the hardware and then complete the requested transfer using this serial port speed. This keyword only applies to serial port transfers and not transfers of data direct from a media card in a card reader or sourced from a file in the local filing system.

This keyword requires that the connected AntiLog unit is running V5.4 or later of the embedded software. The AntiLog baud rates will be restored automatically at the end of a transfer. This is an efficient way of extracting data at the highest possible speed via the serial port without having to worry about setting temporary menu baud rates to achieve high transfer rates. Initial contact with the connected AntiLog unit needs to be made at the menu baud rate.

When using the MAXRATE keyword, ensure you are connecting the AntiLog unit to PC serial port hardware that can handle high baud rates above 115,200 baud (e.g. USB to serial port converters).

8.14 Keyword – RECOVER

Use the RECOVER keyword to perform a controlled COPY without using the information in the file system directory entry. For example, no assumption is made about the amount of data that has been recorded, the recovery process will determine how much data is extracted from the media. See the "Data Recovery" description in section 10.

8.15 Keyword – TFORMAT n

Allows date and timestamps embedded in the data to be expanded in one of three formats. This option is used in conjunction with the TSTAMP keyword for the specified channel. The following formats are available (TFORMAT 0 is the default):-

```
TFORMAT 0 – dd-MMM-yyyy HH:mm:SS.fff e.g. 24-Feb-2019 12:24:36.450
TFORMAT 1 – dd/MM/yyyy HH:mm:SS.fff e.g. 24/02/2019 12:24:36.450
TFORMAT 2 – yyyy-MM-ddTHH:mm:SS.fff e.g. 2019-02-24T12:24:36.450
TFORMAT 3 – RAW (See section 11)
TFORMAT 4 – dd-MMM-yyyy,HH:mm:SS.fff e.g. 24-Feb-2019,12:24:36.450
TFORMAT 5 – dd/MM/yyyy,HH:mm:SS.fff e.g. 24/02/2019,12:24:36.450
```

TFORMAT 2 is referred to as ISO8601. An example follows extracting data from media inserted in drive E: and extracting it to a file called ch1.txt with timestamps expanded in TFORMAT 1:-

```
AntiLogReader E: CHANNEL 1 ch1.txt TSTAMP TFORMAT 1
```

8.16 Keyword – TSTAMP

Expands timestamps in the recorded data into the output stream as ASCII where appropriate. Specifying this keyword when no timestamping information has been recorded to the media log file has no effect on the output. The combined date and time string is separated from the following data with a comma separator character for easy text import into spreadsheet applications, such as Microsoft Excel. Use the TFORMAT keyword to select between three AntiLog date and time formats.

8.17 Keyword – LEGACY

Starting with AntiLog firmware V6.0, data is written further away from the start of the Microsoft FAT data area on the media compared to V4 and V5. This is to try and avoid areas of the disk currently being overwritten by small search indexing files and other hidden files which can overwrite AntiLog recorded data. Setting the lock switch helps but for those using MMC media for example, there is no hardware LOCK switch on the media card.

AntiLogReader will automatically look for recorded data first in the new V6 area on the media for data and if it finds a valid AntiLog directory entry, it will look no further. However, if you need it to go back and look for a small file written by the previous release of the AntiLog software, you can use the LEGACY keyword. (Note the LEGACY keyword has no effect on SDXC media as compatibility was introduced in V6.0 and data was never written to the previous V5 area on the media).

8.18 Keyword – VERBOSE

When VERBOSE is specified, additional information is printed to the screen during operation and items such as the session headers in the extracted data will contain extra engineering information. The VERBOSE keyword causes link status information to be displayed during data upload which will show for example, the reliability of the serial port link to your PC during the transfer. Note that reducing the number of running applications on your PC may increase the link reliability.

9. The AntiLog file system

AntiLog does not use the Microsoft FAT system for media storage. The reason is, AntiLog is designed to be a high quality data logging device and the FAT, FAT32 and EXFAT file systems do not lend themselves to high reliability if power is suddenly removed from a system whilst file write access is in progress. There is also a massive overhead using the FAT file systems because you are always trying to maintain the data area at the same time as nominally two File Allocation Tables (FAT entries) as well as a directory entry. The situation gets worse as the media fills and the file storage fragments.

The AntiLogFS file system works on a completely different principle whilst utilising the data area in a FAT, FAT32 or EXFAT volume. It will nominally only lose a small amount of bytes if there is a sudden complete system power failure. When AntiLog is next powered on, it will automatically recover all of the recorded data up to the point when the logging stopped. Note that this Media Recovery function can be invoked manually using the AntiLog playback menu system or you can perform a data recovery direct from the media using AntiLogReader (see the “Data Recovery” description in section 10 for more details).

If you insert a media card from AntiLog into a PC media card reader, you will need a dedicated AntiLog support application such as AntiLogReader to extract the recorded data.

9.1 AntiLog version compatibility

Anticyclone Systems Ltd strongly recommend you use the most up to date version of the AntiLog and AntiLogPro software in your application. Upgrading to the latest release for all your units is currently free to all owners of our AntiLog products.

You can apply for an upgrade online at www.antilog.co.uk by visiting the 'Upgrades' section on the site, or you can upgrade directly to the very latest release using the 'Upgrade' side menu in our free AntiTermPro PC application. AntiTermPro is our custom GUI terminal, data upload, multi-unit and support application for all our AntiLog and AntiLogPro products range. AntiTermPro is available to download on the www.antilog.co.uk site in the 'Downloads' area.

If you record serial port data using an AntiLog system running V4.0 or later of the embedded software and extract the media, it will not be possible to play back the data from this media on an AntiLog unit running V3.3 or earlier. This is because V4.0 supports a new version of the AntiLogFS to support dual port logging and it is not compatible with the previous V3 file system.

Similarly, V5.x AntiLog systems will not “see” data written by V6.x and later and the new V9 file system can only be read and appended to using embedded software revision V9.0 and above.

AntiLog V4.0 and later can read media created with previous versions of the AntiLog embedded software. You are however strongly advised to perform a 'Media Erase' from the AntiLog menu system before attempting to record new data with a V4.x to V6.x system to allow this data to be successfully imported into AntiLogReader.

AntiLogReader is only able to process media cards containing data recorded from AntiLog units running V3.1 and above. Using the MAXRATE and multi-unit BUS feature requires AntiLog software V5.4 or later. Multi-unit operation requires AntiLogPro OEM hardware.

9.2 AntiLogFS file structure

The AntiLogFS file system uses a single file structure to maintain all logged data (single and dual channel). There is a single 'directory entry' followed by structured sectors containing all the logged data. Each sector containing AntiLog data starts with two bytes which define a sixteen bit sequence number. This sequence number is identical for all data in a single log file (even though the log file may have more than one appended session). When AntiLog plays back the recorded data, it looks for this valid sequence number to ensure all data is related to the log file. When the user selects “Erase all recorded data” in the AntiLog “Recording Options” menu, this sequence number is incremented which means that all new data written to the media will have a new sequence number.

9.3 PC compatibility

If you perform a full format (or PC 'Quick' format) on an MMC or SD media card plugged into a PC media card reader slot which has previously been used to record serial port data using AntiLog V4.0 or later, you may notice the data is still completely intact when it is plugged back into AntiLog. The reason is because the PC doesn't actually format all of the media sectors when asked to and the data area where AntiLog stores its data is not always overwritten.

Always use a particular media card for exclusive AntiLog use. Do not attempt to store PC files on the media and then use the media in an AntiLog application as well. If you need to use a media card for PC use later, simply format the card using a PC (using the Quick Format method is OK) and then you can read and write files to the media as normal.

If you need to use a card that has been used for storing PC files previously, format the card using a PC (using the Quick Format method is OK) and then start using the card for AntiLog use only.

10. Data recovery

In normal operation, there should be no reason to worry about any sort of data recovery issues. However, in certain circumstances, it is possible to have things go wrong and so we have created some recovery strategies to ensure as much data integrity as possible.

10.1 Data corruption possibilities

The following are examples of failure mechanisms which could cause data logging problems:-

10.1.1 Incorrectly closed log file

Normally, an AntiLog log file must be closed by pressing and holding the OFF button. With the Forced Power ('P' option) hardware, the log file is closed by simply removing the power. However, if for some reason the log file is not closed properly (e.g. removing power from an AntiLog unit during record that does not have the 'P' option fitted), then AntiLog will try to 'repair' the media and close the log file properly the next time it is powered on. No modifications to the media take place during this process except for the directory entry area which does get modified with the results of the recovery.

10.1.2 Sector corruption

If one or more sectors become corrupt on the FLASH media, it will not be possible to replay the recorded data successfully from that point on. This could happen for example if the media is inserted into a PC and attempt is made to write or modify the data on the media (e.g. write a PC file to the media).

10.1.3 Hardware failure

If the unit or media card have hardware faults, data replay may become difficult or even impossible. If the AntiLog unit itself ever fails, data can be retrieved by simply removing the media from the broken unit and inserting it into another AntiLog unit for data replay.

10.2 Using AntiLogReader to recover data

AntiLogReader has a RECOVER keyword which you can use to assist in recovering data from media cards with known issues. For the keyword to have an effect, the FLASH media card needs to be extracted from the AntiLog unit and placed in a card reader on a PC. It is not currently possible to perform an AntiLogReader recovery process through the AntiLog serial port.

The recovery process will create a local media copy of the file as though you specified the COPY keyword. The RECOVER keyword does not modify the content of the source media so it is safe to run it multiple times.

The recovery will search through the media until it finds the first sector with a valid sequence number on it (unless the FORCESEQ keyword and argument have been specified). It will then build up data a sector at a time based on this recovery sequence number. If a sector does not contain this sequence number then it is skipped until a maximum number of 'bad' sectors is found at which point the recovery terminates. The default number of contiguous bad sectors that can be seen before the recovery stops is 400. You can specify more (or less) with the MAXBADSECTORS keyword. If a 'good' sector is seen before the maximum number of bad sectors in a sequence is up, then the internal bad sector counter is reset ready to detect the next block of bad data.

Once recovery has completed, a summary should be displayed showing the number of bytes recovered and session headers detected. You may then use this rebuild local copy of the media as the source for log data extraction. An example of recovering media attached to drive G: follows (AntiLogReader commands are not case sensitive):-

```
AntiLogReader G: mytrial.antilog RECOVER
```

An example follows of how to extract channel 1 data from the rebuilt local copy of the media, with timestamping included:-

```
AntiLogReader mytrial.antilog ch1.dat TSTAMP
```

Note that the recovered data may not have all the data you recorded included. If sectors in the data have been overwritten or become faulty that contained session headers then the session count may not be as high as you expect. In this situation, there could be issues with the data because the session headers define how timestamping is embedded in the data per session.

11. RAW timestamps

When expanding date and time into the output stream, RAW timestamps can be specified. RAW timestamps are not output as ASCII characters like the other date and time output formats. A raw timestamp is a six byte raw binary sequence. The format of this 6 byte timestamp is as defined as follows:-

Byte	Bits Used	Description
1	Bit 0	Date: Number of days since 01-Jan-2000, bits 8 to 14
	Bit 1	
	Bit 2	
	Bit 3	
	Bit 4	
	Bit 5	
	Bit 6	
	Bit 7	Always set to 1
2	Bits 0 to 7	Time: UTC milliseconds since midnight, bits 0 to 7
3	Bits 0 to 7	Time: UTC milliseconds since midnight, bits 8 to 15
4	Bits 0 to 7	Time: UTC milliseconds since midnight, bits 16 to 23
5	Bit 0	Time: UTC milliseconds since midnight, bits 24 to 26
	Bit 1	
	Bit 2	
	Bit 3	Unused
	Bit 4	Channel Number (0 to 3, see note below)
	Bit 5	
	Bit 6	Unused
	Bit 7	Timestamp validity (0=Timestamp is valid, 1=Timestamp is invalid)
6	Bits 0 to 7	Date: Number of days since 01-Jan-2000, bits 0 to 7

Note:

Channel number 0: Data source = System or button push data
Channel number 1: Data source = Primary Serial Port
Channel number 2: Data source = Secondary Serial Port
Channel number 3: Data source = Auxiliary serial port (AntiLogPro only)

Appendix A. Glossary of terms, abbreviations and acronyms

ASCII	American Standard Code for Information Interchange
COM	Serial Communications Port
FAT	File Allocation Table (Microsoft file system)
GPS	Global Positioning System
GUI	Graphical User Interface
HEX	Hexadecimal number representation
MMC	MultiMediaCard
NMEA	National Marine Electronics Association
OEM	Original Equipment Manufacturer
PC	Personal Computer
RS232	A common physical interface standard specified by the Electronic Industries Association (EIA) for the interconnection of devices
SD	Secure Digital media
SDHC	Secure Digital High Capacity
SDXC	Secure Digital Extended Capacity
USB	Universal Serial Bus
UTC	Universal Coordinated Time

Appendix B. References

1. AntiLog RS232 Data Logging System User Guide, DOC/AntiLog/UG/2003001_9.0