Using the KAM / MEM / 113

TEC / NOT / 083

The KAM/MEM/113 is a CompactFlash® memory module that records parameters from the Acra KAM-500 backplane in a PCAP format using either IENA and/or iNET-X packets.

This paper discusses the following topics:

53.1 Setting up the KAM/MEM/113 using DAS Studio 3

This section explains how to set up the KAM/MEM/113 using DAS Studio 3. For the example screens shown, you need to add a chassis, controller module, a KAM/TCG/105, and a KAM/MEM/113 module to the configuration. For information on adding modules, see the *DAS Studio 3 User Manual*.

53.1.1 Parameters

To see available parameters in the KAM/MEM/113 module, select the module in the Navigator and then click the Settings tab.

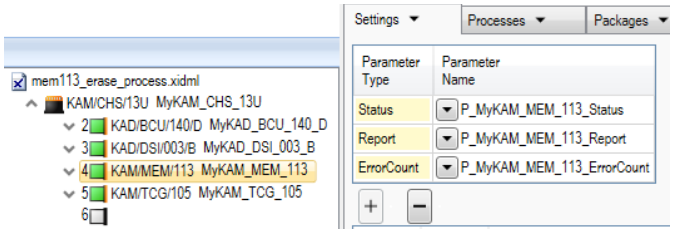


Figure 53-1: Parameters available in the KAM/MEM/113

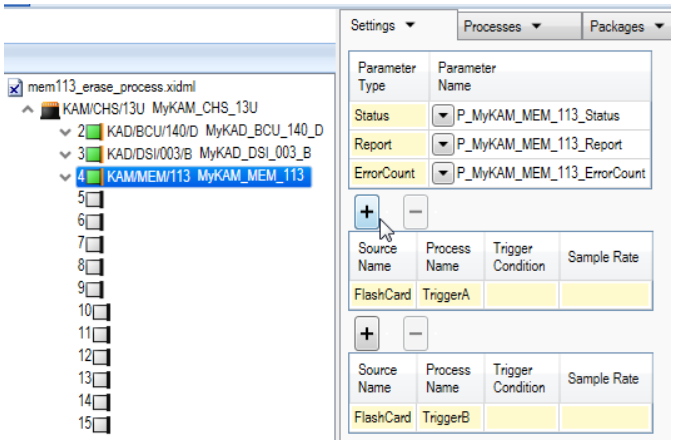
Only the Report parameter can be recorded in KAM/MEM/113 packets. For information on the Status and Report parameters, see “53.4.8 Status and Report parameters” on page 14.

For details on the ErrorCount parameter, refer to the *KAM/MEM/113* data sheet.

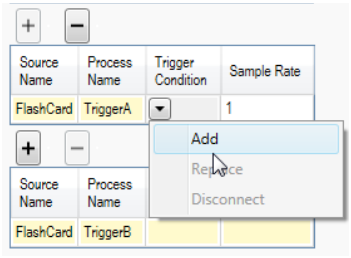
53.1.2 Triggers

Triggers from any available 16-bit parameters on the backplane can be used to trigger recording on the KAM/MEM/113. The following example shows how to trigger the KAM/MEM113 when a KAM/TCG/105 module has GPS lock.

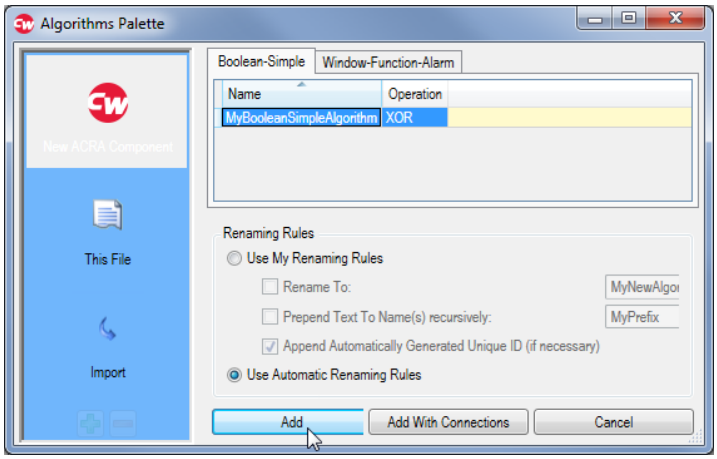
1. On the **Settings** tab for the KAM/MEM/113 module, click the + icon to add a process.



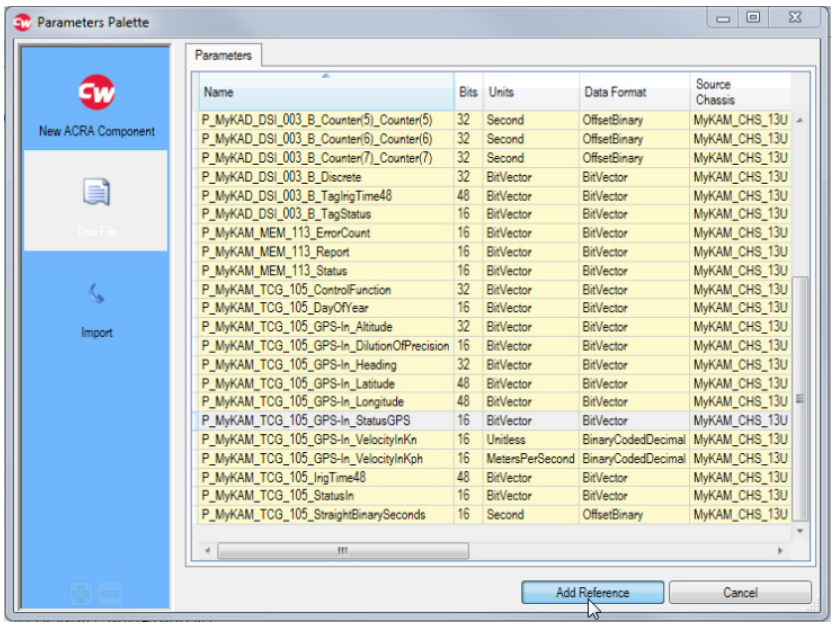
2. In the **Trigger Condition** field, click the drop-down arrow and then click **Add**.



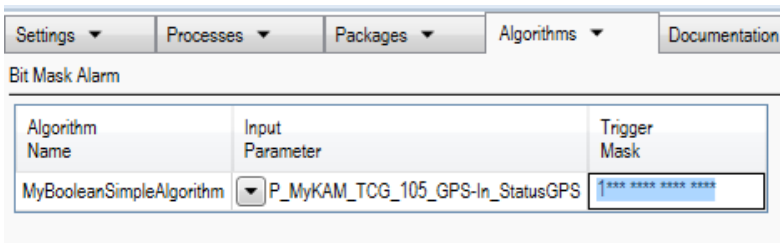
3. In The **Algorithms Palette**, select **MyBooleanSimpleAlgorithm** and then click **Add**.



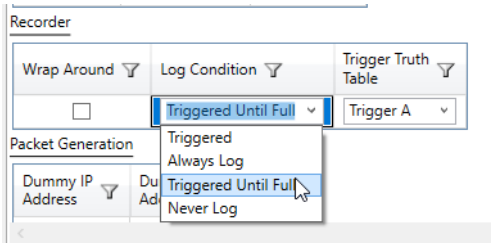
The **Parameters Palette** opens.



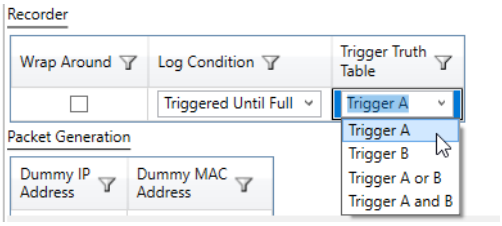
4. Click **This File**, then select **TCG_105_GPS-In_StatusGPS** and then click **Add Reference**.
5. To set the trigger mask, click the **Algorithms** tab.



6. In the **Trigger Mask** field, type 1*** **** **** ****.
   This mask ignores all other bits except bit 15 and triggers (via GPS status lock) when bit 15 is 1.
7. Under **Log Condition**, click the drop-down arrow and then select **Triggered Until Full**.



8. Under **Trigger Truth Table**, click the drop-down arrow and then select **Trigger A**.



NOTE: If **Log Condition** is **Triggered**, recording stops as soon as the trigger condition is removed.
For example, the trigger is bit 15 when 1 on parameter P1, recording starts when bit 15 is 1 on P1; recording stops when bit 15 is 0.

For more information, refer to the “Algorithms tab” chapter in the *DAS Studio 3 User Manual*.

53.1.3 Other settings

Refer to the *KAM/MEM/113* data sheet for a description of the fields in the following figure.

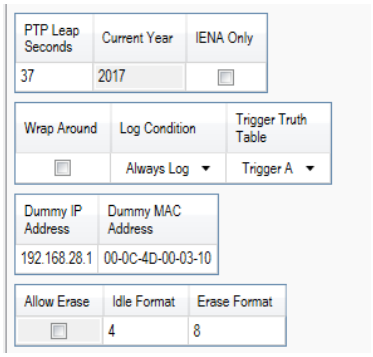


Figure 53-2: Other settings

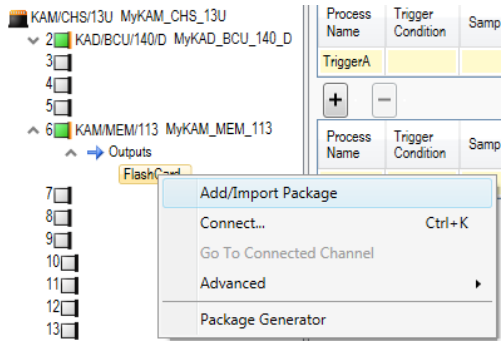
For the Erase/Format fields at the bottom of the screen, refer to “53.3.1 Format a CF card using the erase format from the KAM/KAM/MEM/113” on page 6.

53.1.4 Adding packets to the KAM/MEM/113

Just as with an Ethernet transmitter, you can define which packets are logged to the KAM/MEM/113. Refer to the following.

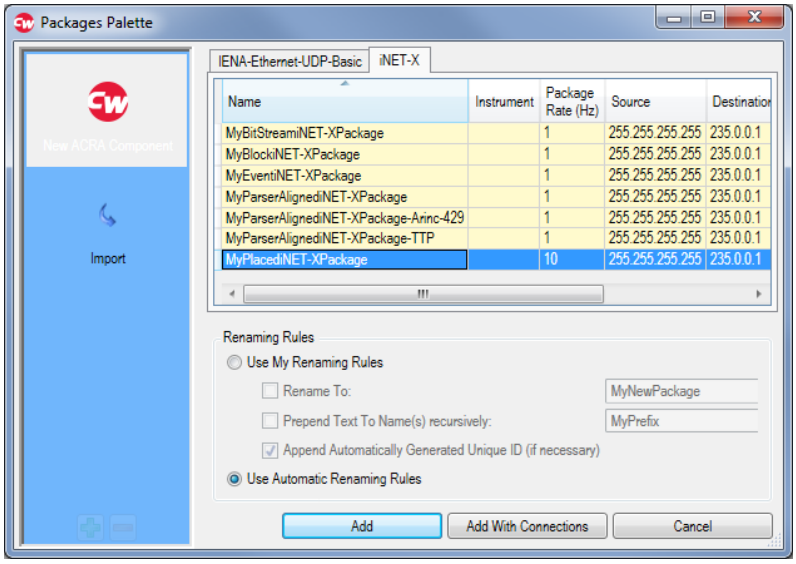
1. In the **Navigator**, click the **KAM/MEM/13** and then click the **Outputs** node to expand it.

2. Right-click the **Flashcard** output and then select **Add/Import Package**.

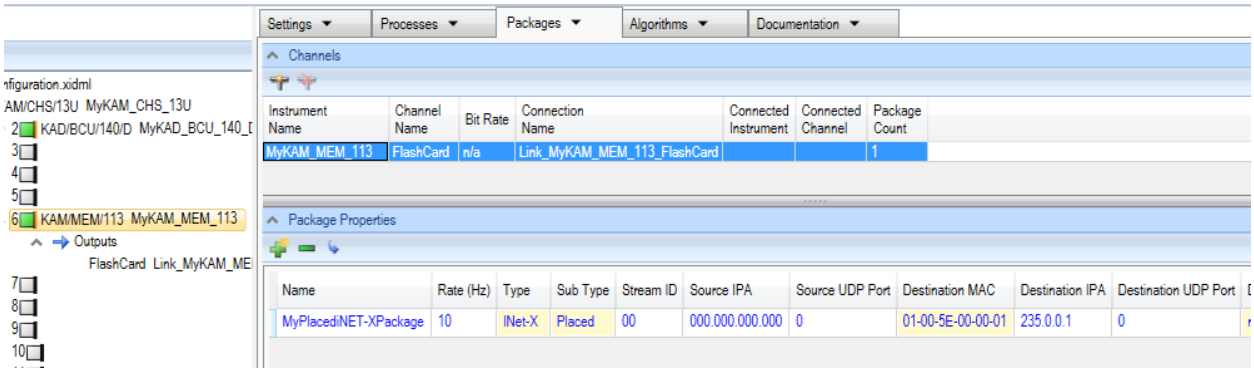


Packages Palette opens.

3. On the **iNET-X** tab, select a package such as **MyPlacediNET-XPackage** (this is a transmission package, and is empty by default), and then click **Add**.



On the **Packages** tab you can define the Package Name, Stream ID, Destination IPA and Destination UDP Port. You can also add parameters as you would with other Ethernet transmitters.



For further information, refer to the “Packages tab” chapter in the *DAS Studio 3 User Manual*.

53.2 Setting up the KAM/KAM/MEM/113 using KSM-500

This section explains how to set up the KAM/MEM/113 using KSM-500.

53.2.1 Parameters tab

Refer to the *KAM/MEM/113* data sheet for descriptions of the bit settings of the parameters shown in the following figure. In KSM-500, all these parameters can be recorded into KAM/MEM/113 packets.

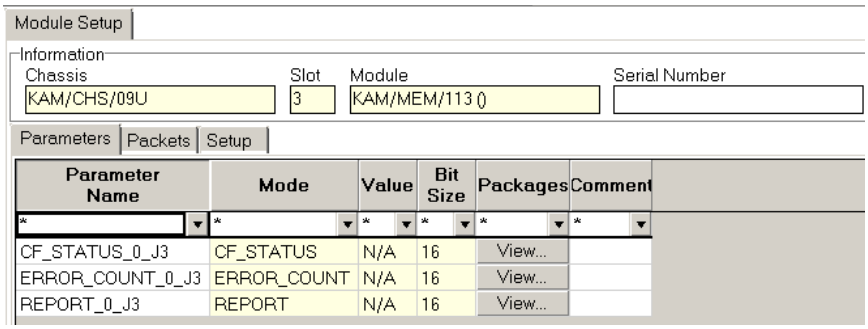


Figure 53-3: Parameters tab

NOTE: CF_STATUS is referred to as STATUS in the *KAM/MEM/113* data sheet.

53.2.2 Setup tab

The following screen shows setup options for the module.

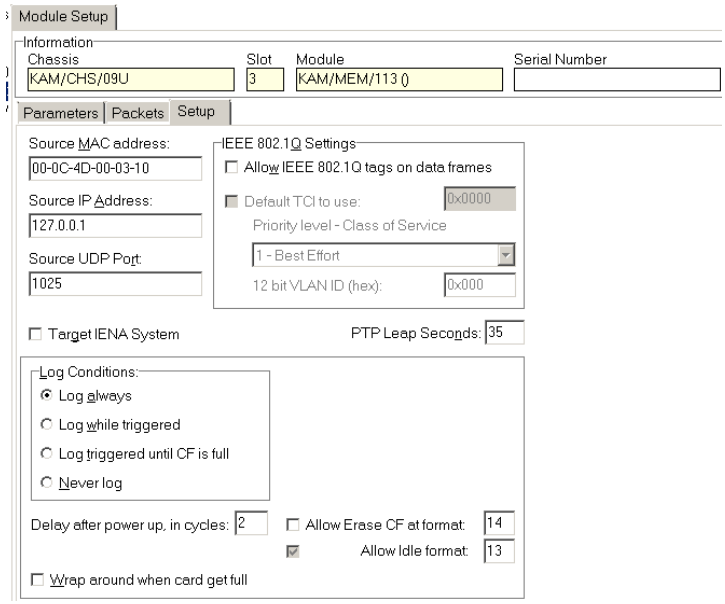


Figure 53-4: Setup tab

IEEE 802 Q tags are specific Ethernet fields, which can be added to Ethernet packets. For more information, contact Curtiss-Wright support (acra-support@curtisswright.com).

Delay after power up, in cycles means that the KAM/MEM/113 does not record, even if triggered for the amount of acquisition cycles specified.

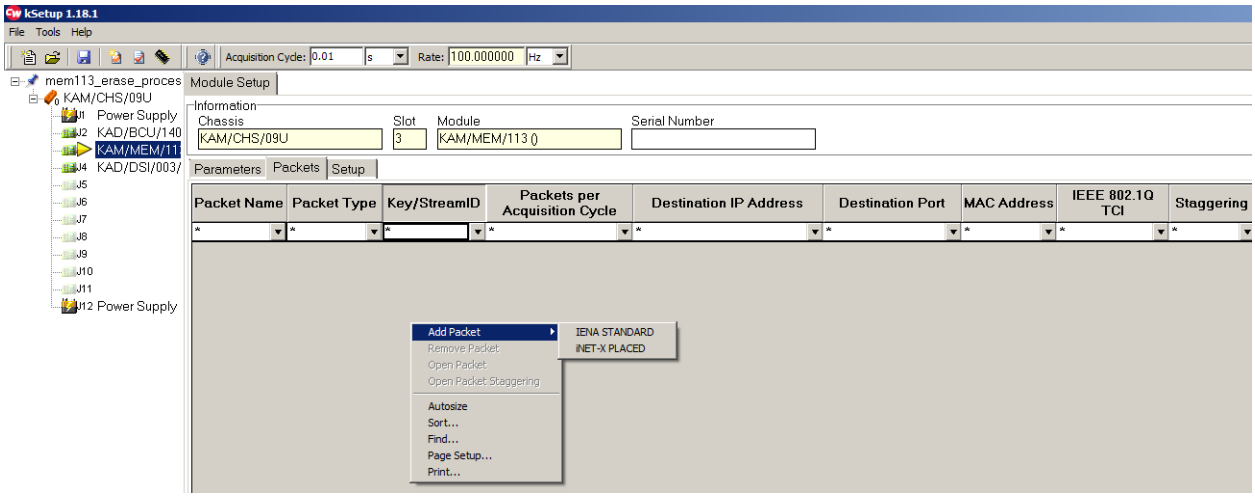
The other fields are explained in the *KAM/MEM/113* data sheet.

53.2.3 Building packets

This user interface is the same as for other Ethernet transmitters in KSM-500. To add a packet.

1. Click the **Packets** tab.

2. Right-click the **Packets** pane, click **Add Packet**, and then click **IENA STANDARD** or **iNET-X PLACED**.



As the procedure for adding parameters is the same for both IENA and iNET-X placed packages, you can refer to the “Adding IENA packets” section in *TEC/NOT/053 - Using the KAD/BCU/105* for more information.

NOTE: If there is a packetizer module in the chassis, such as a KAD/ABM/103, packetizer packet types can be added.

53.3 Formatting the CompactFlash card to be used on the KAM/KAM/MEM/113

Each CompactFlash (CF) card must first be formatted before it can be used in the KAM/KAM/MEM/113. One of the following methods can be used for formatting:

- Format a card using an SSR/CHS/001/B (see the *Multi-role Recorder’s User Guide*).
- Format a card using the erase format on the KAM/MEM/113.
- Format a card using a software utility (ssrformat) to format the CF card on a PC. Note, this software utility can only be used if the card has already been formatted using one of the above two methods.

53.3.1 Format a CF card using the erase format from the KAM/KAM/MEM/113

Formatting the CF card creates pre-allocated empty files for storing recordings in a flat directory structure. The purpose of formatting the CF card is to allow the KAM/MEM/113 to record in contiguous locations on the CF card and to ensure that no other files are stored or created on the CF card.

The KAM/MEM/113 can be configured to enable erase and the user can select the format number.

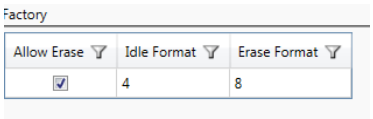


Figure 53-5: DAS Studio 3 example of Allow Erase and Erase Format

The erase/idle format number has to be used in conjunction with the Backplane Controller Unit (BCU). The BCU must support format select (such as on a KAD/BCU/101) or Shunt Mode (such as a KAD/BCU/140/C and subsequent revisions).

The KAD/BCU/101 format support has to be selected through the physical pins on the module (refer to the *KAD/BCU/101* data sheet for further information). If Allow Erase is enabled and Erase Format is set to 8, providing 5V (BVDD) to the Format(3) pin starts the erase format process of the KAM/MEM/113.

The KAD/BCU/140/C (and subsequent revisions) can initiate the erase format on the KAM/MEM/113 by sending an event packet from a PC to the BCU. Contact Curtiss-Wright support (acra-support@curtisswright.com) to request the *TSD-AC-021* support document. This support document contains a python script that sends this event packet from PC to BCU.

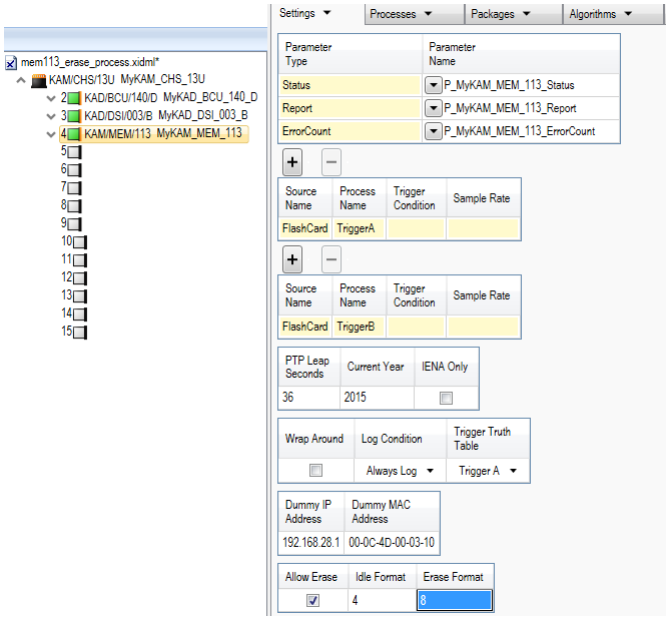
The KAD/BCU/140/C (and subsequent revisions) can also initiate the erase format on the KAM/MEM/113 by sinking a parameter (such as the Discrete parameter of a DSI module) with the value of the erase format into the shunt process of the BCU.

NOTE: We don't recommend using KSM-500 to format a CF card.

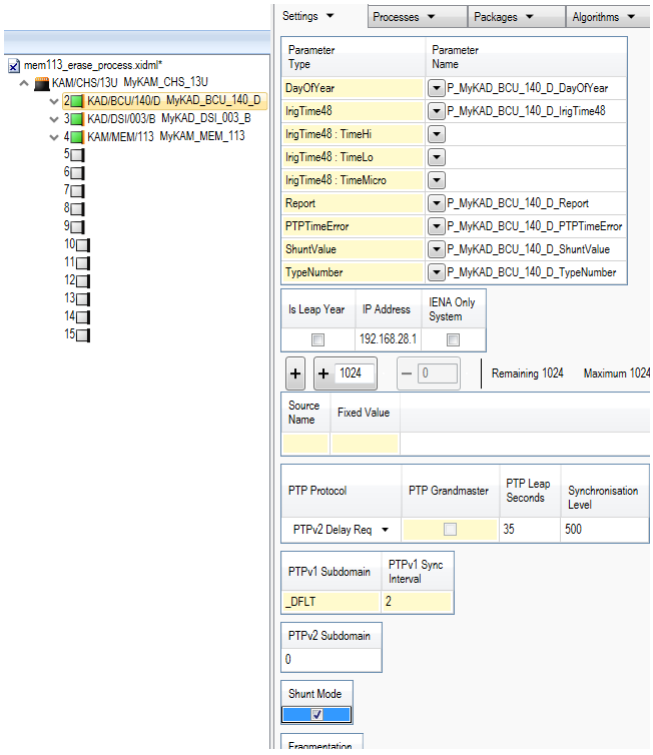
53.3.2 Formatting a CF card on a KAM/MEM/113 in DAS Studio 3

For the following procedure, you require a chassis with a KAD/BCU/140/C (/C subsequent revision), KAD/DSI/003/B, and KAM/MEM/113 modules.

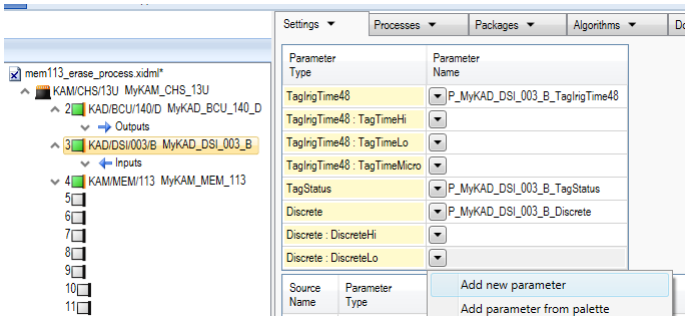
1. Go to the **Settings** tab of the KAM/MEM/113.
2. Select the **Allow Erase** check box and set **Erase Format** to **8**.



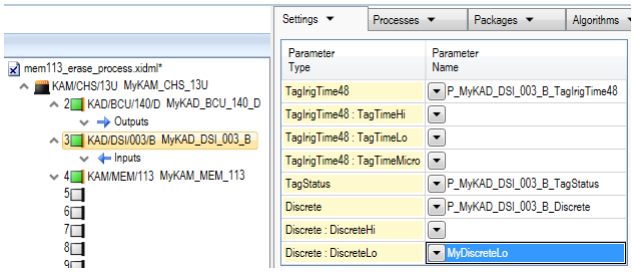
3. Go to the **Settings** tab of the KAD/BCU/140/D.
4. Select the **Shunt Mode** check box.



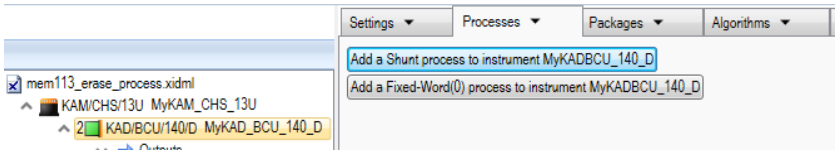
5. Go to the **Settings** tab of the KAD/DSI/003/B.



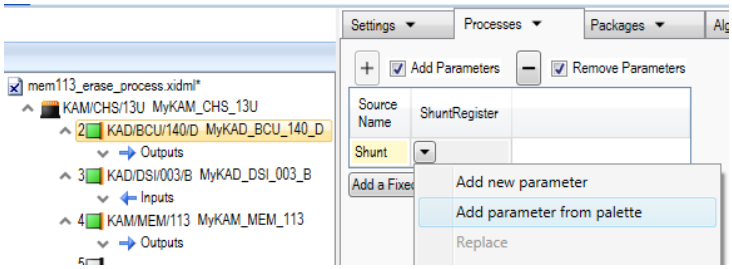
6. In the **Discrete : DiscreteLo** row, click the drop-down menu and then click **Add new parameter**.
A **MyDiscreetLo** parameter is added.



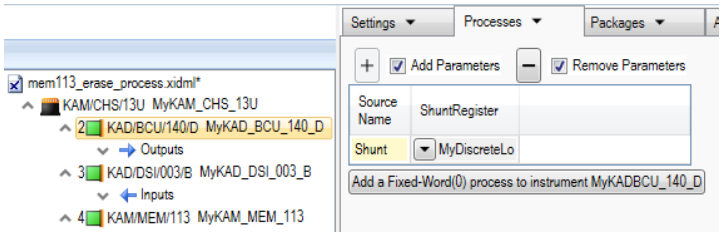
7. Go to the **Processes** tab of the KAD/BCU/140/D and then click **Add a Shunt process to instrument MyKADBCU_140_D**.



8. Click the **ShuntRegister** drop-down menu and then click **Add parameter from palette**.



9. In the **Parameters Palette**, click the **This File** library.
10. Click the **MyDiscreteLo** parameter and then click **Add Reference**.
The MyDiscreteLo parameter from the KAD/DSI/003/B is sunk into the shunt register on the **Process** tab.

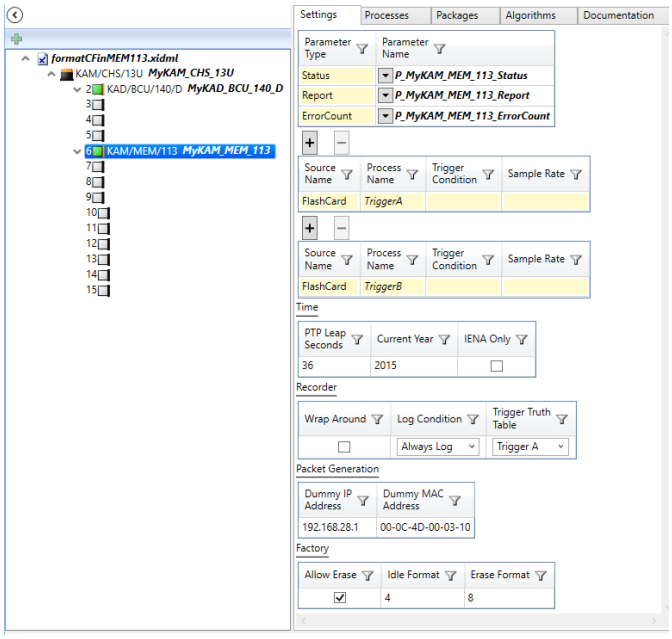


11. Apply a voltage above the threshold defined in the KAD/DSI/003/B Discrete(3) and a voltage below the threshold defined in the KAD/DSI/003/B Discrete(0), Discrete(1) and Discrete(2), to get 1000 in binary, which is 8 in decimal into the Status_15_0 parameter.
The erase format on the KAM/MEM/113 starts.

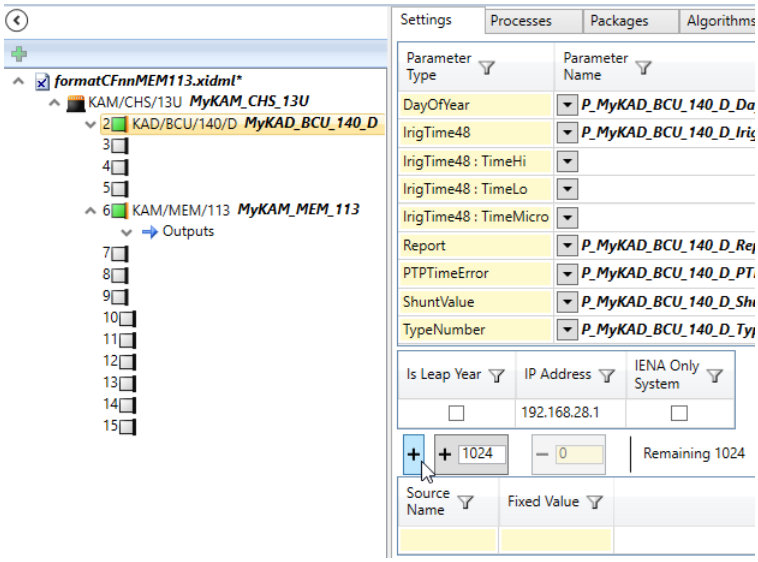
53.3.3 Formatting a CF card on a KAM/MEM/113 using fixed data in DAS Studio 3

For the following procedure, a chassis with a KAD/BCU/140/C (/C subsequent revision) and a KAM/MEM/113 module are required.

1. Go to the **Settings** tab of the KAM/MEM/113.
2. Select the **Allow Erase** check box and set **Erase Format** to **8**.

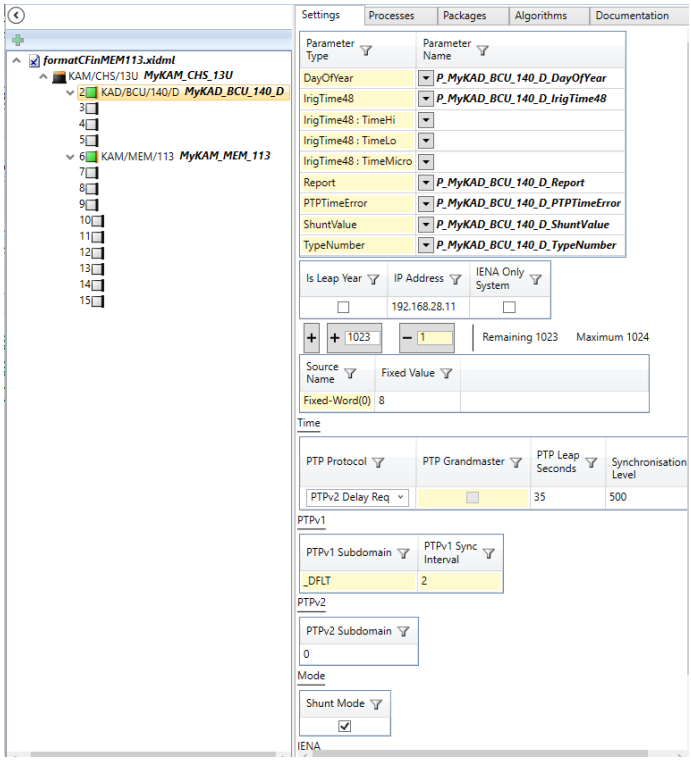


3. Go to the **Settings** tab of the KAD/BCU/140/D.

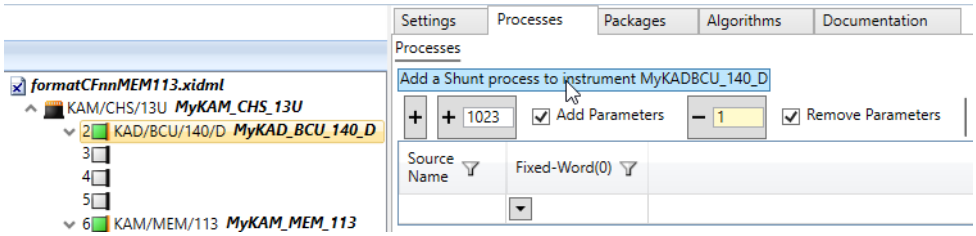


4. Click **+** (Adds a single process).
   A **Fixed-Word(0)** is added to the **Source Name** field.

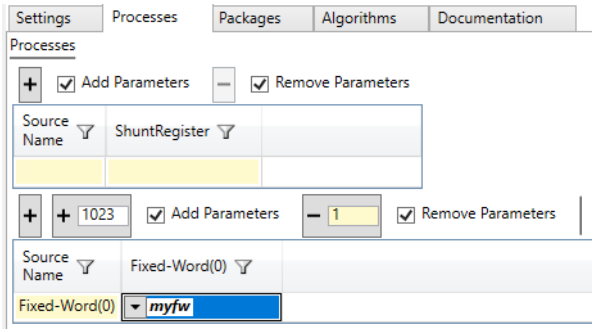
5. At the **Fixed-Word(0)** field, add a fixed data with a fixed value of **8** and then select the **Shunt Mode** check box.



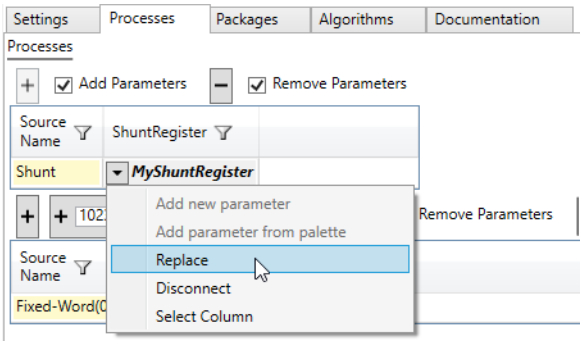
6. Go to the **Processes** tab of the KAD/BCU/140/D and then click **Add a Shunt process to instrument MyKADBCU_140_D**.



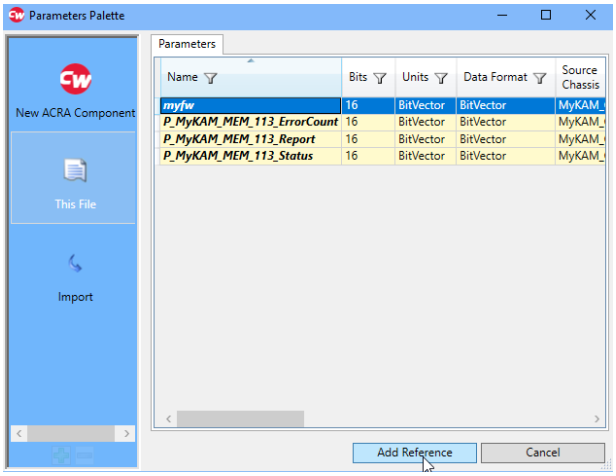
7. Click **+ Fixed-Word(0)** and rename to **myfw**.



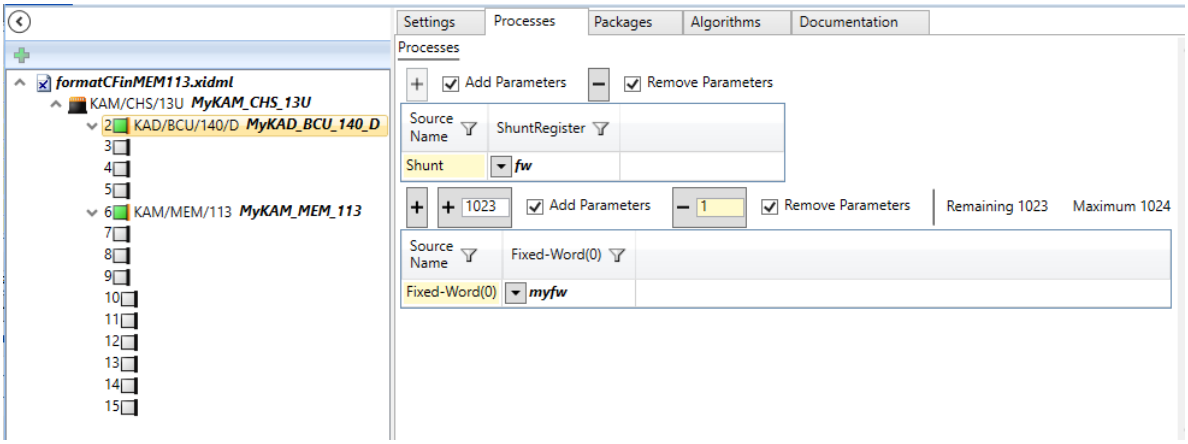
8. Click **+ Processes**.
   A shuntregister is added.



9. Click the drop-down arrow and then click **Replace**.



10. From the **This File** library, select the **myfw** fixed data parameter and then click **Add Reference**.



11. Program the system and monitor the KAM/MEM/113 status word. You should see bit 2 (formatting) at 1 and the bit[15:8] incrementing.

   NOTE: It should take only few minutes to format a 32-GB CF card. When formatting is done, bit 2 should go to 0 indicating the system is ready for programming.

53.3.4 Formatting a CF card using a software utility (ssrformat) on a PC

SSRformat.exe (AcraCD_SWS-FMT-001-01, version 1.1.0.2) supports the file system used on the KAM/MEM/113.

Use the below command line:

ssrformat.exe -2 -n <Drive Letter>

where:

-2 = the file system to use.

-n = no trim (trim only applies to SSD disks)

<Drive Letter> (optional) drive letter for the CF card which is plugged into the CF card reader connected to the PC. In this example, the drive letter is H.

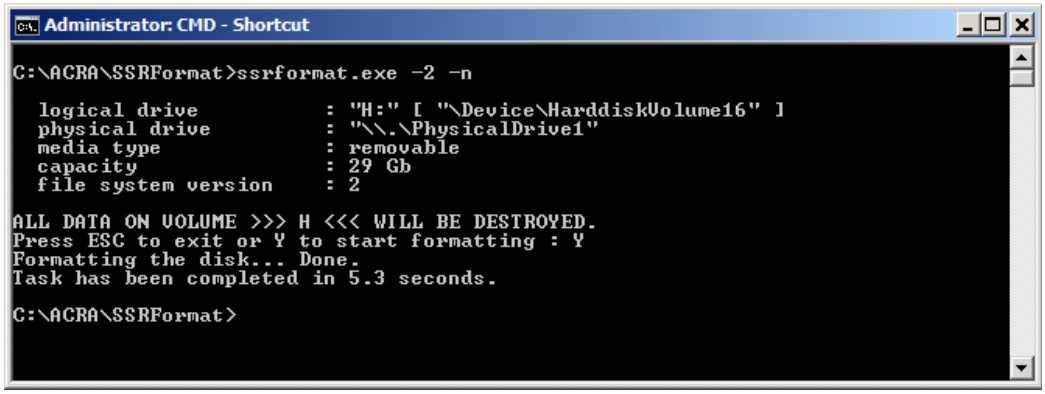


Figure 53-6: Example of ssrformat result run successfully with CF card on drive H

NOTE: When the drive letter is added to the command line of ssrformat, the formatting process for a 32-GB CF card should take a few seconds; ssrformat does not provide information to indicate successful formatting of the card.

The following screen shows the ssrformat result if the CF card was not previously formatted on either an SSR/CHS/001/B or a KAM/MEM/113. If the drive letter is displayed in the command line, nothing is reported. However, if the drive letter is not displayed in the command line, ssrformat scans all devices connected to the computer. If the CF card is not attached to the computer—or the CF card was not pre-formatted for use in the KAM/MEM/113—ssrformat returns a *cannot find any disk suitable for formatting* message.

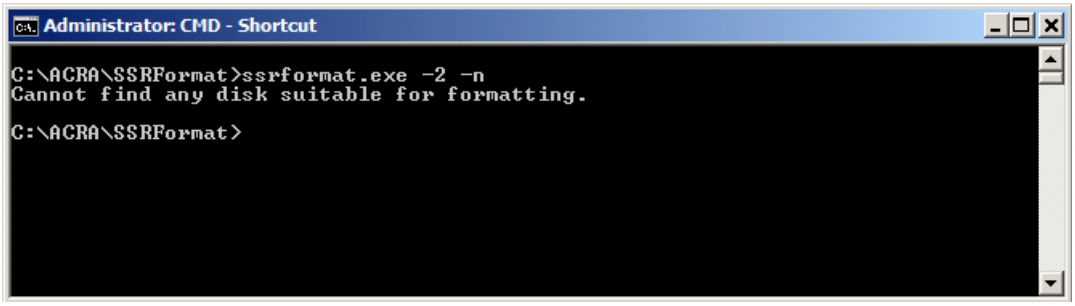


Figure 53-7: Example of ssrformat result if CF card not previously formatted on SSR/CHS/001/B or KAM/MEM/113

53.4 Troubleshooting and tips

53.4.1 Hot plug

Hot plug is supported. However, unplugging while recording on the KAM/MEM/113 can cause the last PCAP file to be corrupted.

53.4.2 Power loss or power off during recording

The KAM/KAM/MEM/113 has a capacitor bank that finishes writing PCAP files during a power out. However, the last PCAP file may be corrupted, which may cause new and old data to be mixed (this is due to the module not having enough time to update the FAT).

By comparing file dates you can determine old data, which can then be discarded. You can also use the SSRFormatEmpty utility to erase all data from the CF card. Contact Curtiss-Wright support (acra-support@curtisswright.com) to obtain this utility.

53.4.3 Always log

Always log is supported, however the first few PCAP files may be corrupted.

53.4.4 How to fix a corrupted PCAP file

GS Works 9 has the capability to read corrupted PCAP files.

If you open a corrupt PCAP file in Wireshark, the following screen is shown.

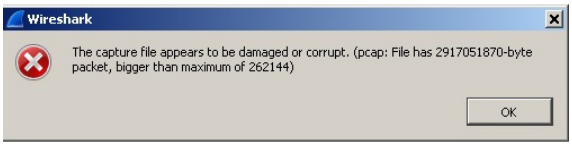


Figure 53-8: Example of a corrupted PCAP file loaded in Wireshark

Click **OK** and then use **Save As** to repair the file.

NOTE: Some versions of Wireshark (including v 1.12) cannot repair the file using **Save As**. Instead you must use **Export specified packets** on the **File** menu.

53.4.5 PCAP file size

Regardless of the size of the CF card, the maximum PCAP file size is 32 MB when formatted with a KAM/MEM/113 and 156 MB when formatted using ssrformat.. This is hard-coded into the FPGA and is not configurable.

53.4.6 PCAP file name

As shown in the following figure, recorded data can be read directly from the CF card on a PC with any off-the-shelf card reader.

NOTE: If the CF card folder is empty but you know the card has been formatted on the KAM/MEM/113, then most likely the PCAP files are hidden. See Windows Help for how to show hidden files.

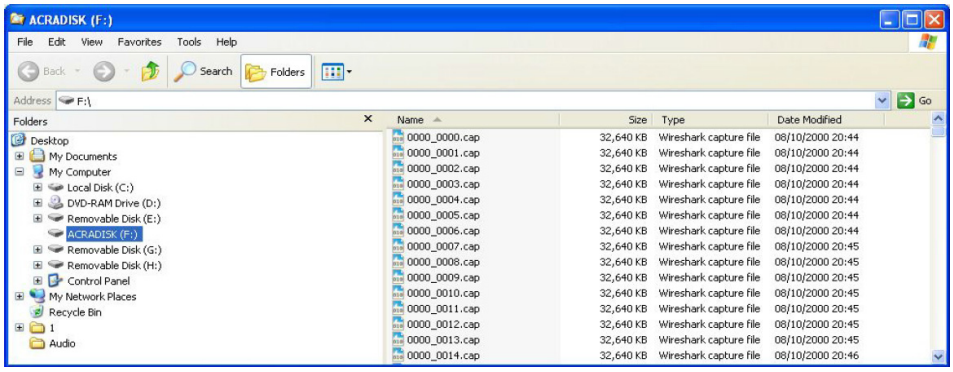


Figure 53-9: CF card viewed in Windows explorer

Each filename is automatically generated by the KAM/MEM/113 during the formatting process.

Filenames have the generalized format <DATA_sss_fff.cap> where:

- ssss: is a session number (0-9999). This number increments when the KAM/MEM/113 starts using the CF card, that is, when the CF card is mounted in the KAM/MEM/113. The CF card is mounted when it is inserted in the KAM/MEM/113 or after a power-cycle.
- ffff: is a file number (0-9999). This number resets to zero on the start of a new session, that is, if 0011_0006.cap is the last file in a session, the next file is 0012_0000.cap

53.4.7 PCAP structure

For information on how data is stored in PCAP files, see *TEC/NOT/051 - Ethernet frames, Wireshark® and FAT32*.

53.4.8 Status and Report parameters

These parameters are important to monitor. Status indicates if the CF card is logging, how full the CF card is, if the CF card is valid, and if the CF card is present. The Report parameter indicates when events or errors occur.

53.4.9 CF card type supported

DRE/CFM/007/32GB is the only CF card which has been design verified at the time of writing. This CF card has been tested successfully at 2 megasamples per second, that is, 32 megabits per second at 85 degrees.

53.4.10 PCAP replay

GS Works can replay PCAP files recorded in the KAM/MEM/113, however, you must only select packets in the XidML file that were recorded in the KAM/MEM/113. Packets from other modules (such as Ethernet) that may be in the XidML file must not be selected.

PCAP files must be copied from the CF card to the PC for viewing. If you open a PCAP file directly from the CF card, Wireshark may write to the CF card and render it invalid for use with the KAM/MEM/113. If this occurs, you need to reformat the CF card before use in the KAD/MEM/113.

53.4.11 No date on first PCAP recorded

When recording with a KAM/MEM/113 that has the Log Condition set to Always Log, and using a KAM/TCG/105 module as the Time master, the first recorded PCAP file may not show a date in Windows Explorer.

This occurs when the KAM/TCG/105 is powered on, its time defaults to 1 January, 1970 until it seeds time from its internal RTC timer, which takes about 2 seconds. (This behavior is true for any mode GPS, IRIG, or RTC.)

As recording on the KAM/MEM/113 begins in this 2-second window prior to RTC time being seeded, the file would be dated 1 January, 1970. However, Windows Explorer considers the date invalid as it pre-dates the FAT (File Allocation Table) file system.

A way around is to trigger the KAM/MEM/113 with the DAY OF YEAR parameter when it is greater than 1, however that means the module will not record on the 1st of January.

53.4.12 Reading a CF with Windows 10

Windows 10 has a feature that creates a System Volume Information folder on external drives such as USB and SSD. This feature must be disabled when a CF card is accessed from Windows 10. Otherwise the CF card will be unreadable when used again with a KAM/MEM/113.

Contact Curtiss-Wright support (acra-support@curtisswright.com) to request the document *TSD-AE-002 Prevent System Volume Information folder creation on USB in Windows 10.pdf* to resolve this issue.

53.4.13 IENA timestamp and PCAP timestamp

PCAP time is the same as PTP time except that the lower 32 bits are a count of microseconds instead of nanoseconds.

IENA time is the number of microseconds since the start of the year and is based on UTC.

PTP time is ahead of UTC by PTP leap seconds which is currently 37 seconds.

53.4.14 Recording packetizers

Packetizers can only be recorded on the chassis where the KAM/MEM/113 is located.

53.4.15 KAM/MEM/113 and mode select

When a mode is changed, for example during shunt from mode 0 to mode 8, the KAM/MEM/113 resets and a new PCAP file is created. Then if you revert to mode 0 a new PCAP file is again created. This is an explicit function of the FPGA for mode/reset.

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