



AG-100

Getting Started – AG-100 Arm Generator

Functions of the AG-100

- Produce a pattern marker from a data pattern.
- Perform marker placement automatically or manually.
- Generate a marker based on pattern match or transition time (Edge Count).
- Generate a marker for Fibre Channel, Infiniband and Gigabit Ethernet signals.
- Used in compliance testing Fibre Channel and Gigabit Ethernet devices.

Introduction

The focus of this guide is to familiarize the user with the setup and use of the AG-100 Arm Generator and its related Virtual Instruments Signal Integrity (VISI) menus. The AG-100 produces a pattern marker from a data pattern. A pattern marker is a separate signal that repeats once for each pattern repetition. When using a pattern marker in conjunction with the Known Pattern with Marker (KPWM) DataCom tool, very fast and accurate timing analysis can be made on a given data pattern. No bit-clock is used, allowing analysis of jitter independent of clock-jitter effects. This method provides a robust means of measuring Periodic (PJ), Random Jitter (RJ) and estimating Total Jitter (TJ) at a user specified Bit Error Rate (BER). Additionally, the magnitude of Random Jitter and the periodic components can be viewed as a function of frequency. KPWM DataCom tool allows the user to analyze a data pattern and characterize the jitter. Please refer to the KPWM Getting Started Guide, the VISI 6.0 software Manual and/or the VISI Help files for more detailed information on this tool.

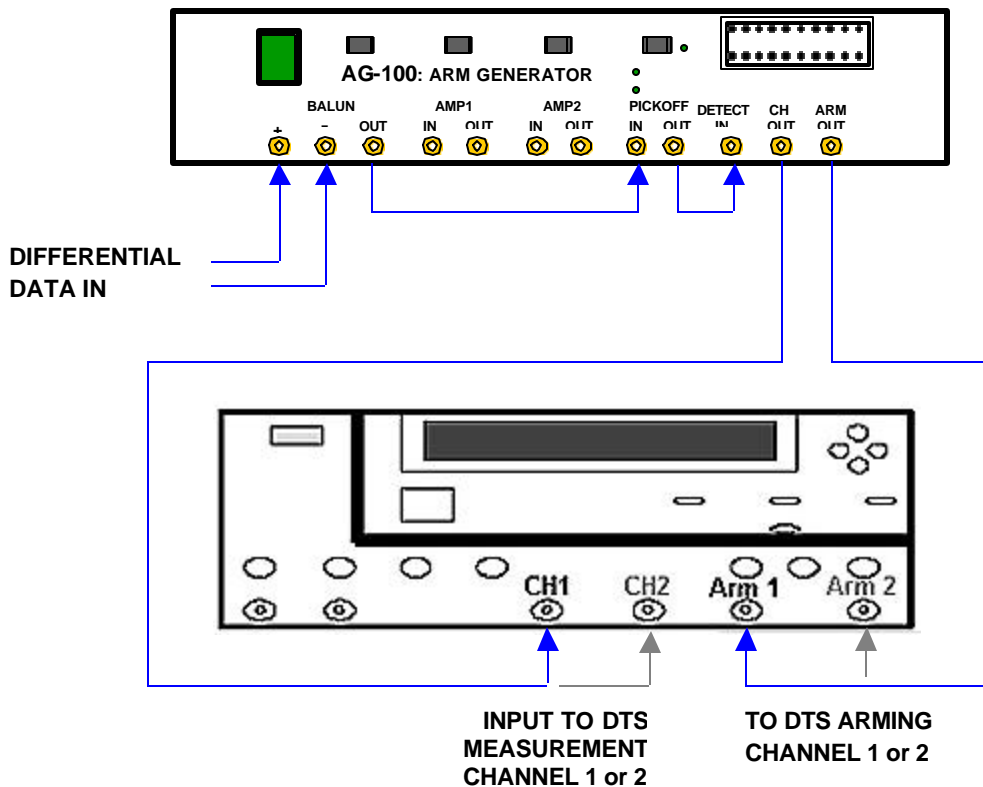


Figure 1. Typical AG-100 Setup

Instrument Features

The AG-100 works with Fibre Channel, GigaBit Ethernet and Infiniband data rates in Pattern Match mode. For Fibre Channel and Gigabit Ethernet protocols, the instrument works at both 1X or 2X speeds. For Infiniband (2.5Gb/s) the unit must be set to for 2X Gigabit Ethernet operation. In Edge Count mode the AG-100 works up to 2.5Gb/s.

The Armgen allows the user to easily adapt to various testing environments. The unit contains an internal balun used to convert differential signals to single ended signals for use by the DTS-207X. Two amplifiers are also provided for signal amplification. The amplifiers can be used to boost the input signal before the pickoff or to boost the signal to the “Detect In” port after the pickoff. If the signal at the “IN” port of the pickoff is less than 250mV p-p it is recommended that an amplifier be used. The amplifiers have a 3GHz, 3db bandwidth. It is very important to note that the amplifiers will invert the signal in the time domain. A simple way to correct a data pattern inversion is to pre-invert the data signal using the balun on the front panel. This is done by inserting the positive half of the data signal into the negative port of the balun and the negative half into the positive port. If a differential probe is being used the signal can be pre-inverted by flipping the probe polarity.

A high bandwidth pickoff is used to couple the data signal into the AG-100 in order to produce an arming pulse. For proper operation the “Channel Out” port needs to be terminated at 50Ω when it is not connected to the DTS measurement channel.

The unit may be used from the front panel or remotely via the GPIB interface. Once set for remote operation, the GPIB interface gives users full control of the unit though a module in the VISI 6.02 Software. The examples that follow will use the VISI 6.02 software interface to illustrate the setup and control of the AG-100. These examples will also be illustrated using the Automatic Marker Placement feature of the AG-100.

Taking Measurements

Illustrated in Figure 1 is a typical hardware setup of the AG-100 and a DTS-207X. Along with the front panel connections, the two instruments will need to be connected to each other via a GPIB cable to enable proper communication with the host computer. Once the instruments are setup, the VISI 6.02 Arm Generator module is accessed from the main Dialog Bar menu by clicking on **Utilities** then selecting **Arm Generator**. The AG-100 operates in one of two modes:

- Pattern Match mode:

Used when the pattern has a unique, repeating 40 Bits, somewhere in the pattern. In the case of Fibre Channel compliant patterns, the Start of Frame (SOF) can be used. With shorter patterns having fewer than 40 bits, multiple pattern lengths will be used.

- Edge Count mode:

Used when pattern lengths are not integer multiples of 20. This mode is used when testing pseudo random bit stream (PRBS) patterns. This mode should be used on systems where idle or fill words are inserted into the data stream to compensate for timing differences.

Users must select to use the AG-100 in one these two modes.

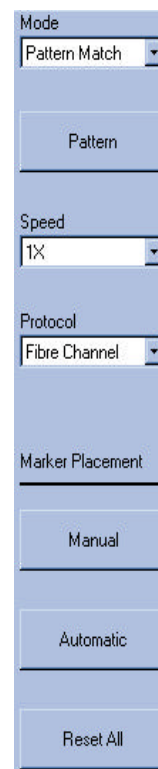


Figure 2. Armgen Main Dialog Bar

Measurements using Pattern Match Mode

The following example steps through the menu configuration of the AG-100 module in the VISI software for operation in Pattern Match mode. The steps below illustrate the setup for measurement of a K285 pattern.

- 1) On the Armgen Dialog bar (See Figure 2) go to **Mode** and select "Pattern Match".
- 2) On the Main Armgen Dialog bar, select **Pattern**. Under the Pattern Dialog Bar select **Load Pattern**. A window will appear (see figure 4) containing a list of preloaded pattern types from which to choose. Select the pattern to be matched.

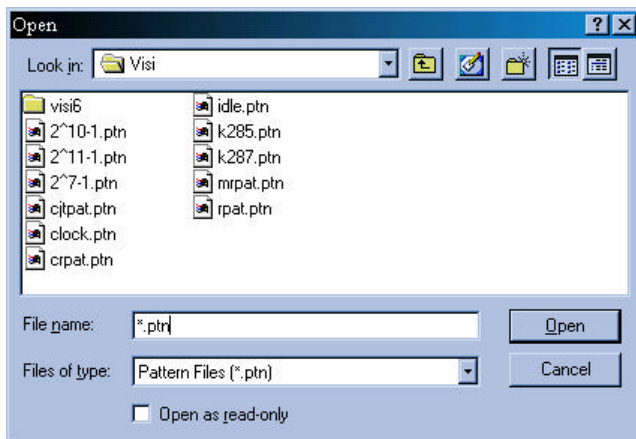


Figure 4. Load Pattern Window

- 3) Verify that the selected pattern type is displayed under **Pattern** in the dialog bar. For example, in figure 3 a K285.ptn is displayed in the field under **Pattern**. Press **Back**.
- 4) On the Main Armgen Dialog Bar, select the **Protocol** to be tested. Either "Fibre Channel" or "Gigabit Ethernet".
- 5) Next, select the **Speed** that the data is running at.
- 6) On the AG-100 front panel verify that the light labeled "ARM ACTIVE" is illuminated.
- 7) On the top of the VISI screen, press **PULSE FIND**.
- 8) On the Main Dialog Bar, select **Automatic**. In the following Arming Dialog Bar (see Figure 4), select **Perform Placement**. The AG-100 analyzes the data coming into the unit and automatically places the marker in a low transition density region of the pattern.
- 9) Go to top of the screen, press **NEW TOOL**. Go to the DataCOM category and select Known Pattern with Marker tool. Follow normal steps to perform measurement.

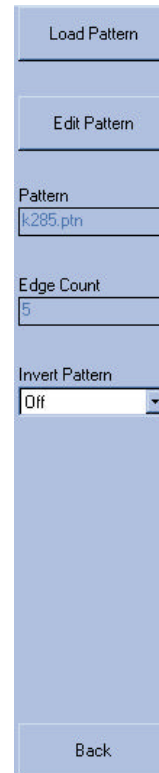


Figure 3. Armgen Dialog Bar, Pattern Menus




Figure 5. Armgen Dialog Bar, Arming Menus

Measurements using Edge Count Mode

The following example steps through the menu configuration of the AG-100 module for operation in Edge Count mode. The steps below illustrates setup for the measurement of a 2⁷-1 pattern.

- 1) On the Armgen Main Dialog bar (See Figure 2) go to **Mode** and select “Edge Count”.
- 2) On the Main Armgen Dialog bar, select **Pattern**. Under the Pattern Dialog Bar select **Load Pattern**. A window will appear (see figure 4) containing a list of preloaded pattern types from which to choose. Select the appropriate pattern.
- 3) The selected pattern type will be displayed under **Pattern** in the dialog bar. For example, in figure 6 a 2⁷-1.ptn is displayed in the field under **Pattern**. Also, notice that the appropriate edge count is now entered in the edge count field (see Figure 6). This is the number of positive or negative edges in the pattern. Press **Back**.
- 4) On the AG-100 front panel, verify that the light labeled “ARM ACTIVE” is illuminated. Note, that the illumination of this light may take ~ 30 seconds after switching from pattern match to edge count mode.

NOTE: Before selecting **Perform Placement** in step 4 during an Edge Count operation, observe that the **Arming Edge** is set to “Rising”. In Edge Count Mode, the generated marker will be inverted relative to the marker generated in the Pattern Match Mode.

- 5) Along the top portion of the VISI screen, press  PULSE FIND.
- 6) On the Main Dialog Bar, select **Automatic**. In the following Arming Dialog Bar, select **Perform Placement**. The AG-100 analyzes the data coming into the unit and automatically places the marker in a low transition density region of the pattern.

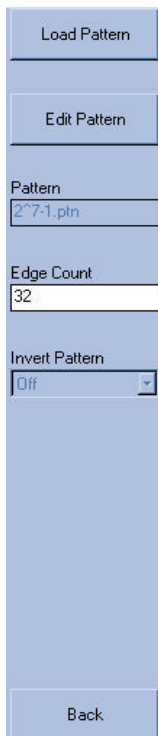


Figure 6. Armgen Dialog Bar, Pattern Menus



Figure 7. Armgen Main Dialog Bar

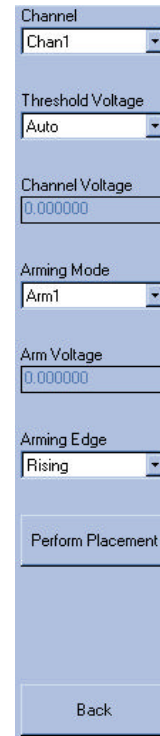



Figure 8. Armgen Dialog Bar, Arming Menus

EDGE COUNT MODE Con't

- 7) Go to top of the screen, press  NEW TOOL. Go to the DataCOM category and select Known Pattern with Marker tool.
- 8) Follow normal steps to performing measurements with the KPWM tool

Edit Pattern

The **Edit Pattern** option (see Figure 9 & 10), included in the Visi 6.02 Armgen module allows the user to either edit a preloaded pattern file or enter and save a different pattern file.

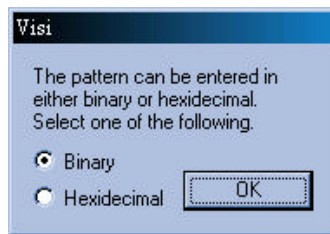


Figure 9. Pattern Entry Choices

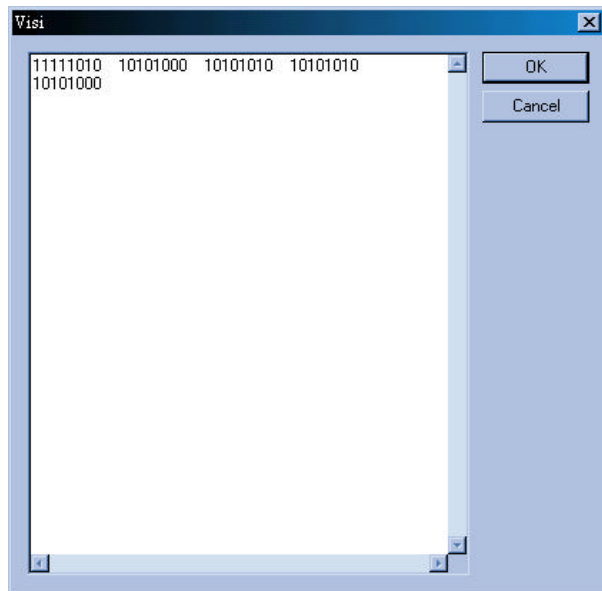


Figure 10. Pattern Entry Window

Figure 11 shows the open windows for the KPWM tool and the AG-100 module. The Top window shows the DCD-DDJ vs Edge Position view or plot of the KPWM tool while the bottom window shows the AG-100 summary window. The AG-100 summary window summarizes the current status of the most pertinent AG-100 menu settings.

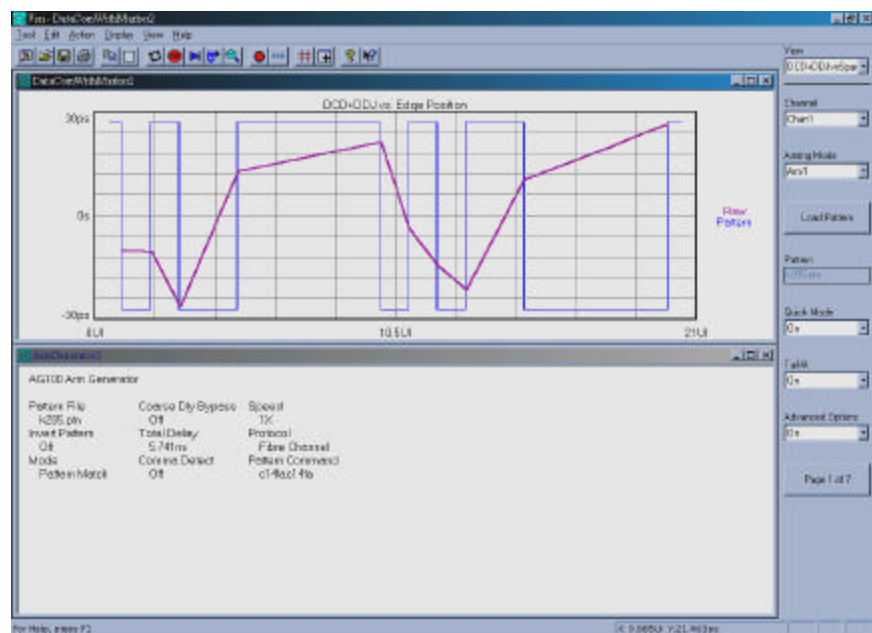








Figure 11. KPWM and AG-100



Macros

One of the useful features of the VISI 6 software is the ability of creating custom macros to easily repeat common keystrokes. This feature is useful in conducting tolerance testing when one pattern is used repeatedly to take measurements on a signal with varying levels of input jitter. Once the user has taken the initial measurement using the KPWM tool and an AG-100 provided marker, it is easy to create a macro.

The following is an example of the steps needed to create a macro that incorporates the AG-100. It is assumed that the respective windows for the DataCOM KPWM tool and the AG-100 are open and being displayed.

- 1) In the menu along the top of the VISI screen, press the  RECORD button to start recording.
- 2) Click on the Open AG-100 window.
- 3) Along the top portion of the VISI screen, press  PULSE FIND.
- 4) In the AG-100 Arming Dialog Bar, select **Perform Placement**.
- 5) After the Marker is placed, click on the open KPWM window.
- 6) Along the top portion of the VISI screen, press  PULSE FIND.
- 7) Once again, along the top portion of the VISI screen, Press  SINGLE ACQUIRE/STOP RUN button to take a measurement.
- 8) In the menu along the top of the VISI screen, press the  RECORD button to stop recording.
- 9) At the top of the screen, select **Action**, **Macro**, and **Save...**

The macro is now saved. The file will be saved as a Visual Basic Script *.vbs file. (*.vbs) files can identified are depicted with the visual basic script icon .

With the KPWM tool and AG-100 module both open, the saved macro can recalled by going back to the top of the screen, selecting **Action**, **Macro**, and **Load...** Select the saved *.vbs file. Along the top portion of the VISI screen, notice that  PLAYBACK button is now available. Ensure that the desired pattern protocol, and speed are selected in both the KPWM tool and the AG-100 module. Pressing the  PLAYBACK button will allow the user to perform one button DataCOM measurements using the AG-100.

Summary

The AG-100 Arm Generator automates and simplifies the tedious and time-consuming process of providing a marker for DataCom compliance-level testing. It generates a marker from repeating, markerless patterns including Fibre Channel, Gigabit Ethernet and Infiniband signals. This marker can then be used with a Wavecrest DTS measurement system using the VISI 6.02 Known Pattern With Marker (KPWM) DataCom Tool to perform very fast and accurate jitter measurements on a data pattern.

Feel free to contact *WAVECREST* if you have any questions.

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