WOODWARD

Application Note 51611
(Revision -, 9/2018)

Original Instructions

- For complete details on functionality of these s/w applications reference manuals 35072V1 and V2
- For details on the h/w platform required to use these s/w applications reference manual B26838-MANUAL B26838 - FLEX500 Digital Control

Vertex GAP/GUI Open Source Version Programming Guide

User Guide Information

GAP/GUI User Guide

Introduction

The 5418-7894 GAP and the 5418-7895 GUI/Qt files are 'Open Source' applications that allow qualified customers and channel partners to leverage all of the Vertex product functionality into custom applications built upon the Flex500 hardware platform. There are three modules within this GAP file that is locked and view restricted in addition to two sheets from each ASC core module, to protect Woodward's Intellectual Property and provide a licensing structure for the application code.

The distribution of these source files is restricted to Woodward OEM customers and qualifying market channel partners. Contact your sales account manager for details on how to access this site.

Proper Use

This version of the Vertex application software is 'Open Source' allowing qualified Individuals to customize the application.
Woodward cannot control the quality of the modified software. The individual modifying the software must validate that the final modified software is safe and fit for use in the intended application.
By modifying this software and providing to end customers, you take legal responsibility for the safety, fitness for use and overall quality of the software.
Woodward makes no warranties for fitness of use or quality on any modifications to the software.

NOTICE

EULA

When installing this software, you must agree to and are bound by the statements in the Woodward Software End User License Agreement. This agreement constrains and limits how the software can be use. Read this agreement before loading the software to insure that you understand the limitations.

NOTICE

Support

Woodward cannot provide technical support for end customer issues associated with third party modified software. When you create a modified application using this software, you agree to accept responsibility for direct end customer support. Please add your name and contact information as indicated in section 7.0. End customers requesting software support from Woodward will be redirected to the Channel Partner/OEM who purchased the unit from Woodward.

Source Files –
5418-7894 GAP – Flex Vertex based Control Application for Custom Systems (Open Source)
Created with Woodward part numbers:

GAP 3.14-1 or newer	9927-1591	
GAP Editor License	8928-810	**(Required to use this application s/w)**
Flex500 1.02 Template/Coder	9927-2445	

5418-7895 GUI – Flex Vertex based Display Application for Custom Systems (Open Source)
Qt Creator 3.4.2 (based on Qt 5.5.1)
Created with Woodward part numbers:

CIS Developer Kit Installer	9927-2521	
CIS Library Kit Installer	9927-2521	
CIS License	1796-3131	**(Required only to make any GUI changes)**
CIS Manual – Getting Started	35075	

S/W License Required –
8447-5008 SOFTWARE LICENSE - Vertex CORE SOURCE LICENSE (GAP/GUI) - FLEX500 H/W

This software will run on the following Flex500 Hardware part numbers:

Panel Mount

8200-1340	LVDC (18-36 Vdc) Ordinary Location Compliance
8200-1341	AC/DC (88-264 Vac or 90-150 Vdc) Ordinary Locations Compliance
8200-1342	Marine/ATEX Compliance LVDC (18-36 Vdc)

Bulkhead Mount

8200-1350	LVDC (18-36 Vdc) Ordinary Location Compliance
8200-1351	AC/DC (88-264 Vac or 90-150 Vdc) Ordinary Locations Compliance
8200-1352	Marine/ATEX Compliance LVDC (18-36 Vdc)

For Detailed Hardware Information Reference Manual 26838

This App Note document is intended to aid in general understanding of how to use these source files as a basis for creating custom applications that include the CORE Vertex functionality.

For Detailed Core Vertex Functionality Information Reference Manuals 35072v1 and V2

Some design thought and effort was incorporated into these ‘Open Source’ programs to simplify some of the items that we believe will commonly be modified, without disturbing other logic or causing errors in the GUI application.

This Application Note will cover the following items:

1. Notes for the application programmer using this code / renaming executables
2. How to License the Vertex Base application
3. How to install/modify splash screen
4. Instructions on recommended way to re-allocate I/O channels
5. Instructions on recommended way to add alarms & trips
6. Detail the info the RTR/OEM is required to place on the unit (sticker on back?)
7. Links between this file and the actual Vertex parent code (bug updates only)

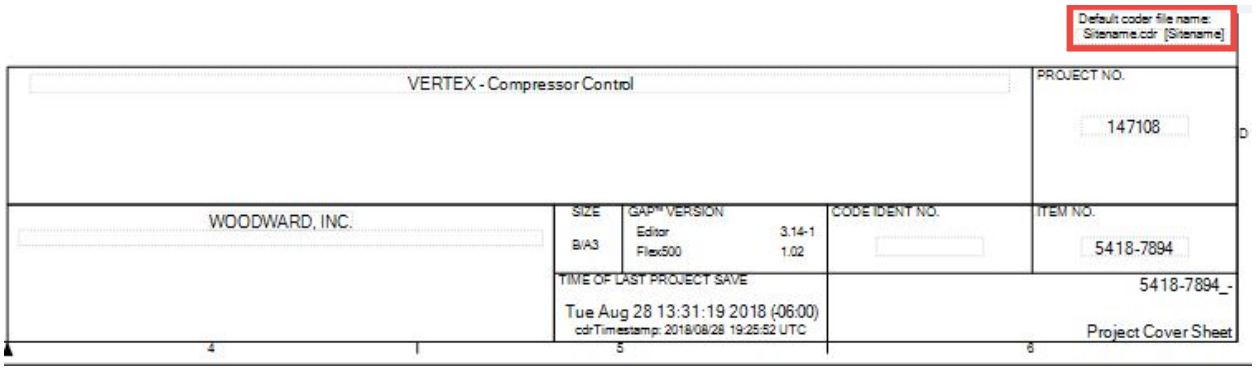
1.0 Notes about these GAP/GUI files

The following is a list of programming notes that will be valuable to understand prior to creating a custom application, using this code as the starting point.

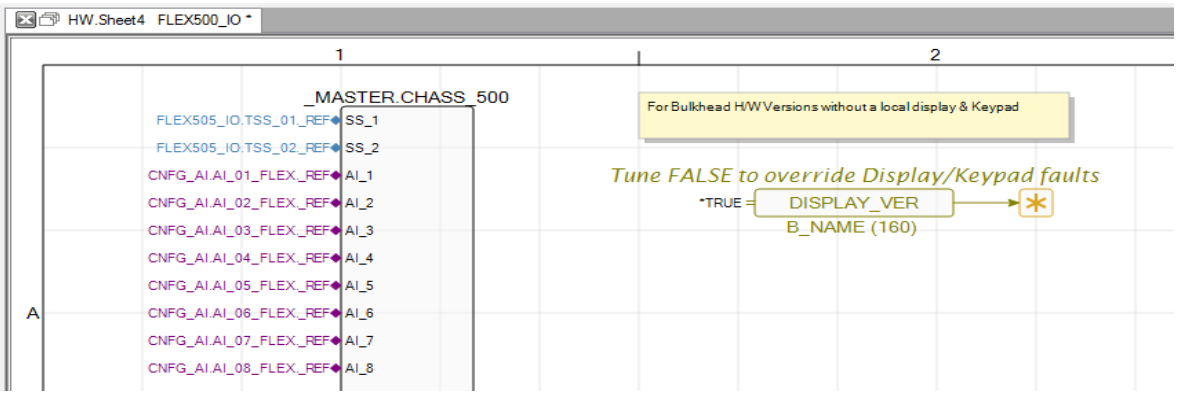
GAP: 5418-7894.SRC
This GAP file was created with the following Woodward application software design tools:

GAP 3.14-2 or newer	9927-1591
GAP Editor License	8928-5007
Flex500 1.01 Template/Coder	9927-2445

- You must provide a unique file name for your final application – even if you are not changing anything – in the lower right corner of the Project Cover page – the default coder file name for this GAP is defined as: Sitename.cdr. Once you rename the .GAP3 file, you can delete this entry and it will return to its default argument that uses the .GAP3 filename for the .out code. This is done so the part number of the source file provided by Woodward is not used for the final .out.



- The SYS_INFO block exists in the Locked / View Restricted module, so you cannot add another. All interfaces that may be needed (Ins and Outs of the SYS_INFO block) are available in the MASTER module on the Master sheet
- The intent of this program is for programmers to ADD programming and functionality, not change the way the Vertex operates. However, all source GAP is available and it can be modified if need be. Beware that this may cause faults in the GUI and deleting blocks may break connections to other blocks in the code (including blocks in the Locked module) – if you are deleting code, use completeness check often to verify this has not occurred.
- All Modbus communication blocks to users are located in the COMMS module. If additional addresses are needed they can be added which will leave the complete Vertex Modbus list intact and not 'break' any use of the standard addresses available
- For load sharing internal communication, sheet 7 LS_IFACE_IN contains programmed self-configurable IP addresses for default ENET port 4 of Ethernet communication to other Vertex controllers.
- CAN port 4 is unused by the Vertex application and are therefore available for custom usage of any kind. It is recommended to use these whenever possible for customized logic to insure isolation from any interference with the Vertex source application and help segment logic by the programmer that they may want to reuse in other applications
- The control .dll files and the wgc_io folder structure are included to provide a starting point for NetSim simulation testing via forcing input signals. **Vertex has internal simulation model for ASC1 functionalities.**
- If you are using a Bulkhead mount control – set the tunable FLEX500_IO.DISPLAY_VER.IN to FALSE to override the alarms that would normally be associated with the local display/keypad



GUI: 5418-7895.SRC
These files were created with Qt Creator 3.4.2 (based on Qt 5.5.1) which is installed by the following Woodward part numbers:

CIS Developer Kit Installer	9927-2521
CIS Library Kit Installer	9927-2521
CIS License	1796-3131
CIS Manual – Getting Started	35075

- To make any changes (even just modifying string annunciations) you will need to purchase the license and install the above CIS developer kit (Qt Creator 3.4). This is the specific Qt version and license required to modify the GUI application regardless of whether it runs locally on the control or remotely on a customer PC.
- If any modifications are made, rename the project with an appropriate file/site name
- The .wgui file name (defaulted to the qmlproject name) is located under arguments under: Tools/External/Configure/Environment/External Tools/Resource Wgui
- The 5418-x7895.wgui file (as supplied with source, or after customization) is required to authorize the use of the Vertex GAP CORE on the hardware. It can be run on the local display, or remotely.
- If Unit software is not licensed then, user will have Alarm “Un-Authorized Software Core”.

- The pages to view and enter the site license key are in English only. Any custom logic that is added will only be in English unless the translation script files (such as es_MX.ts for Spanish) for the required languages are also updated.
- This GUI file uses the ‘RemoteSid’ function, always connecting to the control (or NetSim Control Executive) and obtaining the ‘sid’ file from the device. This is the recommended method, but the main.qml file can be modified to use a local ‘sid’ file option if desired.
- The Woodward RemoteView product has its own license that is required for continuous (24/7) operation. That license is locked to a particular PC and covers any GUI applications (standard or customized) that reside on the control

2.0 How to License the Vertex Base application (Runtime License 8447-5008)

The 5418-7894 GAP can be modified and coded for NetSim freely with no restrictions or licensing required. Once the user application is complete and the code is loaded onto the Flex500 hardware, a purchased software license will be required to allow the unit to exit IOLOCK and run the compressor. The supplied 5418-7895 GUI file will be required to license the hardware (either locally or remotely).
Each control hardware serial number will require a unique site key. Consult you sales/commercial representative to purchase the License number above and receive a site key (you must have the serial number of the target control H/W at the time of purchasing this key).

The following is the process to enter the license site key onto the hardware:

Login as user level CONFIGURE or higher.
Enter CONFIGURATION Mode (which will put the unit in IOLOCK).
From the Home screen or Configuration Menu navigate to the Site Info page.

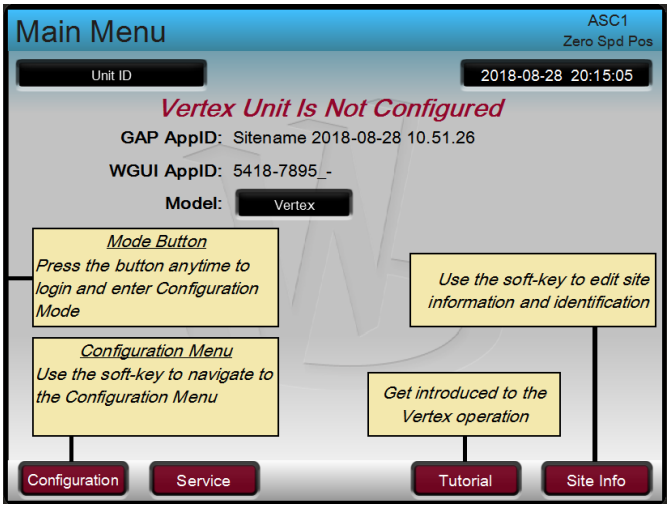


Figure 1

From this screen navigate to the CORE License page:

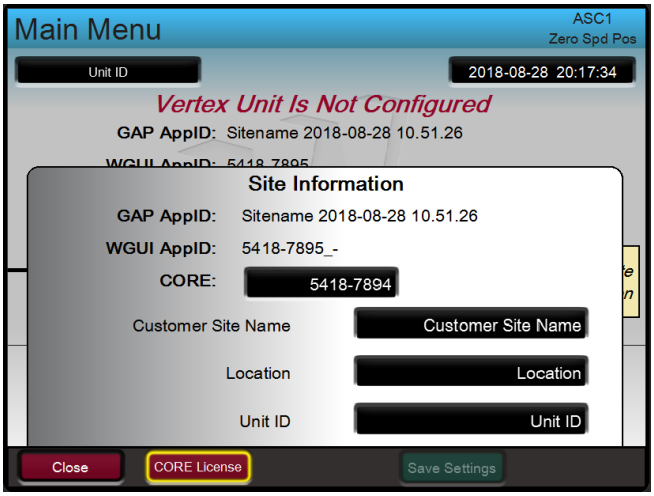


Figure 2

The CORE License page will allow you to enter a site license key when in Configuration Mode – using the keypad press Enter, then use the numeric keys to enter the site license key for this control serial number, then press Enter again to accept your entry. If the correct license key is entered for the serial number shown, the LED will turn GREEN indicating the license has been validated and accepted. An icon indication will also appear on the HOME screen indicating that the certified Woodward CORE application software is being used. Close this dialog box and 'Save Settings' to save the license key into the tunable settings for this control. When changes are made to the application – you will need to re-enter this information or load the tunable settings onto the control.

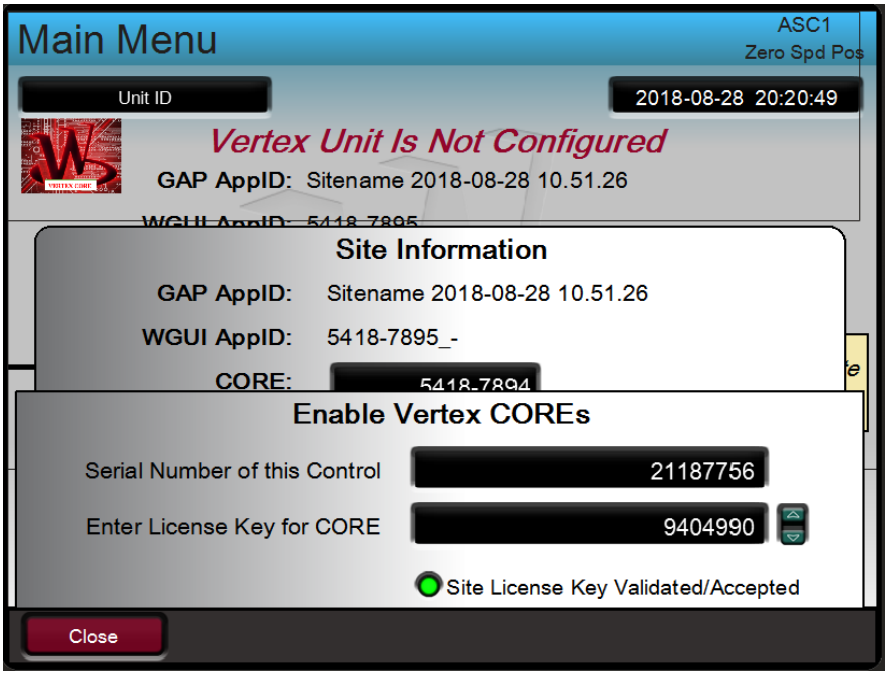


Figure 3

3.0 Changing the 'Splash screen' –

The 'Splash' screen image will appear on the display at initial boot-up and whenever there is no GUI application running.
The control footprint image file contains the 'W' splash screen and will be used if no alternate splash screen is loaded onto the control.

On the Flex500 hardware platform, if programmers wanting to display a different splash screen, they simply need to name the display file as ***SplashScreen.bmp*** in the **/HD1FX/Woodward/GUI directory** using AppManager (Explore Root Directory / Transfer files. The only requirement is that the image be a bitmap file format and have a resolution of 600 pixels X 800 pixels (H x W)

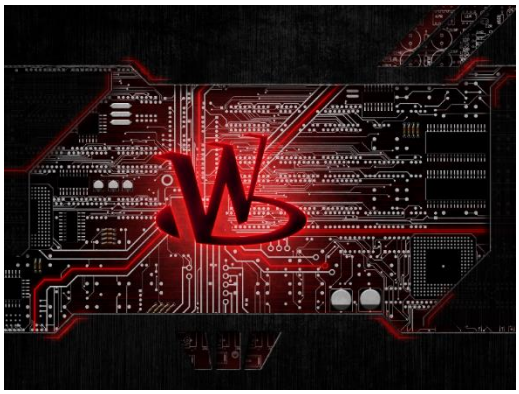


Figure 5

The screen saver is a different image file. It is called from and resides in the GUI (Qt) project. The default screen saver for this program is the 'W' file, named ***ssaver2.png*** and is located in the **GUI/5418-7895/Images** folder of the GUI project. The main.qml file makes the function call to activate this routine and uses the file listed. This function can be directed to show an alternate screen saver image.

> **Note**: all images in this file are in the .png format (Portable Network Graphics). This is the recommended file format, since it resulted in sharp quality images on our display and an economical file size. Programmers are free to use other formats if needed.

4.0 Re-allocating I/O channels in the Vertex to custom functions –

Some application logic handles have been created in this GAP file to allow programmers to utilize the I/O channels for customized functions. Using the steps below will eliminate or minimize the 'breaking' of connections to other sections of the GAP and the interface handles to the GUI. These notes are included as COMMENTs in the GAP logic near the first channel block of each I/O type.

To Re-allocate AI or DI channels for 'custom' programming, but still keep all the related functions available, follow these steps:

- Go to the channel user block (CNFG_AI or CNFG_BI) – contact input channel 1 cannot be repurposed to be generic channels
- Tune the input field GENERIC_INPUT_IN to TRUE
- Enter a string in the USAGE_C input field as a description - this field will show up on the GUI Channel Summary page
- All other fields can be used on the GUI (Tag/Range/Options...)
- Channel faults will be active – description will be the channel number

To Re-allocate AO channels for 'custom' programming, but keep all GUI and GAP functionality the same as the Vertex, follow these steps:

- Configure AO demand to be from menu selection 10, 11, 12 or 13 - these 4 menu items are tied to generic A_NAME blocks that can be connected to user defined logic.
- They are CUSTOM 1, CUSTOM 2 and CUSTOM 3 found on sheet 30 - category = AO_MUX (bottom of page)
- For the description on the GUI - modify these entries in the enumeration strings in the HW_AO_Enum_List.qml file
- All other fields can be used on the GUI (Tag/Range/Options...)
- Channel faults will be active

To Re-allocate BO channels for 'custom' programming, but keep all GUI and GAP functionality the same as the Vertex, follow these steps:

- Configure BO demand to be from menu selections:
- For Boolean States 27, 28 or 29
- These 3 menu items are tied to generic B_NAME blocks that can be connected to user defined logic.
- They are CUSTOM 1, CUSTOM 2 and CUSTOM 3 for Booleans found on sheet 35 - category = BO_MUX (bottom of page)
- For the description on the GUI - modify these entries in the enumeration strings in the HW_BO_Enum_List.qml file
- All other fields can be used on the GUI (Tag/Options...)
- Channel faults will be active

5.0 Alarm and Trip Event Messaging –

All alarms and trips are programmed with a standard structure in the EVENTS module with a single **LATCH_AE** block for each. The LinkNet I/O module has its own LATCH_AE blocks – but triggers a 'summary' alarm or trip into these main event blocks. When possible, it is recommended to extend these structures for additional alarms and trips that are added to the program.

The GUI has a special component that links to this GAP block and all triggered integer numbers (not strings) are passed to the GUI. The annunciation message strings for these lists are maintained in the GUI file under the ***EventManager*** component in the **R_Shutdown.qml** and **R_Alarms.qml** page files. These can be extended to include custom events

6.0 Recommended labeling and identification by the owner (OEM/Channel Partner)

It is recommended that the company with control of the final application source code for these units place an identification sticker on the unit to clearly indicate to the customer whom to contact for technical support. It is expected that Woodward's support of these units will only be done through the channel identified on this label, this will identify who is the owner of the source application code. The figure below highlights the area of the back label where this information should be placed. The dimensions of this space are 2" by 1", and this area is reserved and prepared for the placement of an adhesive label.

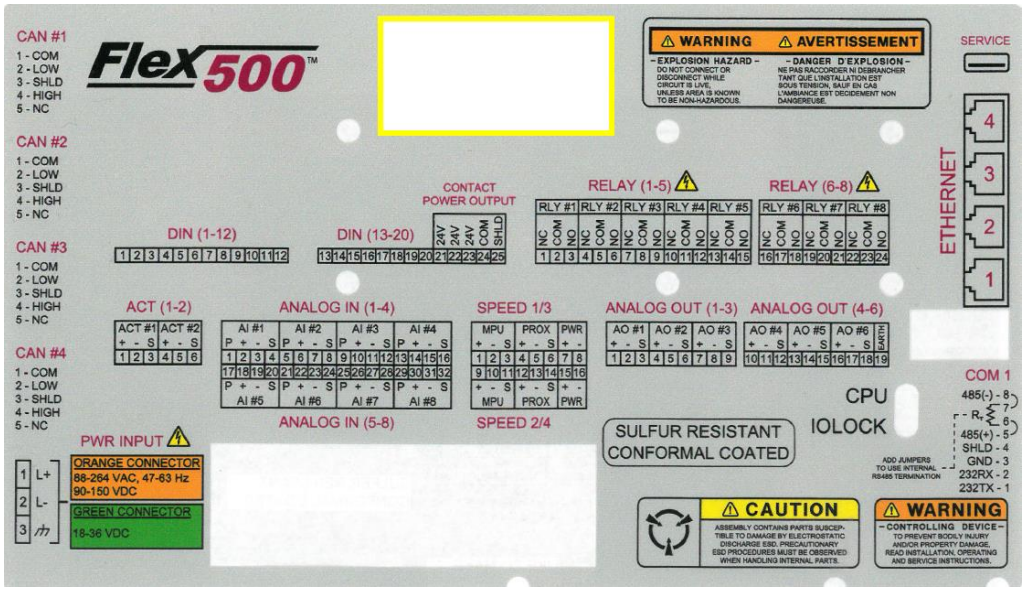


Figure 8

7.0 Woodward revisions to this application -

This file is based upon the Vertex GAP application 5418-7587 Revision B, and GUI application, 5418-7588 Revision B. Woodward does not intend to continually update these 'OpenSource' files for every revision of our standard products. Critical items will be addressed, but minor issues will likely only be corrected on model-year updates. Users of these files will have access to the release notes for each revision of the standard products – so that they can decide if they need to modify the code to address fixes for their customer's specific application.

Released

We appreciate your comments about the content of our publications.

Send comments to: icinfo@woodward.com

Please reference publication 51611.

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