



YAMAHA

Power User

PLG150-AN TUTORIAL

PLG150-AN Analog Physical Model

The **PLG150-AN** is a single part plug-in module. It has 256 preset voices and RAM for 128 user board voices. There are 2 preset banks of 128 each plus a user bank for your own custom board voices. The 128 user board voices are created and/or loaded in with the provided computer Voice Editor software and exist in a volatile RAM bank on the board. Think of the board as a separate synthesizer (in this case like a little AN1x). When you place the board in the mothership you can address it from the front panel and/or the Voice Editor software. The board is a complete synth. You can load in custom Voice sets, you can make variations from the preset data and with the software, you can create your own analog synth sounds from scratch. The PLG150-AN will add its own 5-notes of polyphony to the modular system. It is a 'physical model' that will let you route and control signal just like on an analog synthesizer. The virtual front panel of the software will let you get your hands on the sound. You can even create and assign four special clockable envelopes, called *Free EGs*, to control any four parameters in real time. You can assign parameters to your controller's knobs and wheels. The PLG150-AN board has its own clock which can be assigned to do one of two functions: an arpeggiator or an old style analog step sequencer for creating and sync-ing patterns. It is a *virtual* analog synthesizer, right down to the phat sounds and physically modeled filters.

Checking Installation

Check to make sure your board or boards are properly installed. Here's how:

On the host: Press [UTILITY]

Use the MENU feature (SHIFT+PAGE) or PAGE knob to navigate to the PLG Status screen:

```

◆ PLG Status> PLG1:PLG150-AN  Expand
  Plugin      PLG2:PLG150-PF  ▶----
  
```

Figure 1: Your screen may differ according to what boards you have plugged into which slots. The "Expand" parameter will be active only when you have

2 boards of the *same* type installed and polyphony expansion is possible. A second PLG150-AN will give you a maximum of 10 notes of analog polyphony in Expand poly mode. Because the System is **modular**, this polyphony **does not** take away from the 64-note polyphony of the mothership host (S30 / S80 / CS6x / CS6R).

Banks of sounds

Load the Plug-in Voices that come with the PLG150-AN. On the diskette find the appropriate file: "**anPLG_vc1.mid**" or "**anPLGvce2.mid**" depending on whether your board is in slot 1 or slot 2. Playing this file to the S30/80-CS6 synth will bulk the **Plug-In Voice** data to the 64 PLG locations associated with the board. You can save this file to SmartMedia card once you have loaded it in. PLG series boards can have many sounds on them (the PLG150-AN has some 256 preset sounds and 128 user locations), 64 can be integrated with synth and stored in the [PLG] bank as Plug-in Voices.

Load and play through the PLG bank (Plug-in Voices). Press [PLG1] or [PLG2] and select sound A01, the sound called 'Killer'. There are 64 Plug-in Voices (A01-D16). If you receive the TYPE MISMATCH error message you have played the wrong numbered file for this PLG. A type mismatch means the Voice data did not find the appropriate board in the slot. The PLG150-AN must be in the unit to be addressed by the voicing parameters.

What is a Plug-in Voice and what is a Board Voice?

The **Plug-in Voices** are found from the front panel of the host S/CS synth under the [PLG1] and [PLG2] buttons, when you have a PLG board properly installed. The host can store 64 Plug-in Voices per board (A01-D16). The PLG150-AN comes with a disk file that will load 64 Plug-In Voices to your synth. They use the mothership's parameters, routing and effects but call on synth data resident on the board, called the **Board Voices**. Instead of using ROM samples from the host, the PLG Voices point to data that is resident on the PLG board. The Voice data contained on the PLG150-AN is not based on sampled data like the internal voices. The sounds of the AN board

are generated mathematically through complex *physical modeling* technology. Physical Modeling is a technique that uses computer computations to render a result from data that is input. Physical Modeling is used in such things as architecture, weather prediction, flight simulation and other virtual reality devices. In this case, modeling is used to construct a mathematical representation of the voltage controlled analog synthesizer. With this model it is possible to recreate analog synthesis, virtually. These calculations take place in the CPU on the plug-in board. AN Board Voices are arranged in 3 banks, *preset1*, *preset2*, and *user* (128 in each) for usage from the S30/S80 or CS6 synthesizers.

Sixty-four Plug-In Voices can be made from the 256 preset and 128 user Board Voices provided on the PLG150-AN. Plug-In Voices are Board Voices that have been integrated into the mothership's setup and are stored in either bank [PLG1] or [PLG2]. The Modular Synthesis Plug-in System will let you create your own customized user controller sets to this technology. It is possible to customize the knobs, pedals, breath controller, wheels, aftertouch, etc., to help you with performing each sound.

Let's look under the hood and see where these 64 Plug-in Voices sounds come from:

The AN board has several banks of sounds as follows: The numbers represent MSB/LSB for bank select – (MSB and LSB Bank Select numbers are used to facilitate remote changes from a device like a sequencer. More on that later).

PLG - bank = INT 64 locations;

Bank = 036/000 128 preset1 **Board Voices**

Bank = 036/001 128 preset2 **Board Voices**

Bank = 036/002 128 user RAM **Board Voices**

Banks = other (XG extension) banks 084/000, 084/064~084/081, 084/096~084/107, 100/000, and 100/064~100/076 are PLG extensions for use with XG/GM*

*These are basically the preset board Voices arranged into various banks for use XG modules. They are the same 256 sounds just rearranged for GM/XG use.

To listen to the 256 presets provided, from Voice mode:

- Hold down the [PLG] button corresponding to the slot you have your AN board and use the PAGE knob or the [INC/YES] button to select the Board Voice bank you wish to explore: 036/000 = *preset1*, or 036/001 = *preset2*.
- Notice that banks will read **P1-B** for slot 1 and **P2-B** for slot 2. The 'B' denotes a board voice not yet integrated with the S/CS host parameters (effects, etc.). (To return to the

Plug-in Voices use [PLG] and the [DEC/NO] buttons to return to BANK= INT

VCE Play) **P1-B:001(A01)[--:Cracker]**
BANK= 036/001

The different banks of Board Voices are arranged by their Bank Select and Program Change numbers. If this is your first experience using MIDI MSB/LSB bank select commands it may seem a bit confusing at first but you will get used to it. The 2 preset banks (named 036/000 and 036/001) each contains 128 Voices each (A01-H16). The user RAM bank (036/002) is volatile – meaning Voices here need to be backed up before powering down. This is the bank where the AN Expert Editor software will deposit sounds. You can store your creations here and back them in a bulk type file. When the unit is powered down these voices will disappear. Each time you power up, this bank reverts to 128 voices collected from the presets that act as default placeholders. They can be saved to SmartMedia card and stored so that they are retrieved automatically on power up.

Note: MIDI provides for 128 program changes – so when a product has more than 128 sounds, the sounds can be organized in multiple banks of 128 or less programs. When you load in or create new AN voices via the computer editors you will be using this user RAM area, 036/002, writing over the default voice set. Your edits will be in volatile RAM so you will have to save your work before exiting. Like working with a computer word processor, you are working in RAM and you must save your work or document before exiting the program. You can save your work via the editor or to SmartMedia card via the S/CS synth. (SmartMedia cards can contain autoloader files that will load in certain files you choose at boot up. You can have the SmartMedia card automatically load your Plug-in and custom Board Voices at boot up. That's why they call it smart!).

Don't waste time looking through the default 036/002 bank or the various XG extension banks. All those voices are just repeats of the 256 presets that are contained in the 036/000 and 036/001 banks. [The XG banks are for use with the XG/GM 'voice substitution' system (MU-type product) interface. If you are not using XG you can ignore these additional bank configurations, for now.]

Step-by-Step: How to create a Plug-in Voice from a PLG150-AN Board Voice

Let's use UniBass (an old AN1x favorite) to learn something about how the AN synth works using only on board (S/CS) parameters. Don't be afraid to explore when you are paging through EDIT mode. This Voice features a Step Sequence bass line. This is generated on the PLG150-AN board. We will edit it so that we can play it on the keyboard as a normal bass voice.

- From [VOICE] mode select the [PLG] bank that contains your PLG150-AN, [PLG1] or [PLG2]
- Press [JOB] and select the Initialize function. Initialize the current Voice position. Press [ENTER], [INC/YES] to execute.
- Press [EDIT]
- Select the OSC Assign> page – Use the menu feature to select 'Elem: OSC'; The MENU can be viewed by holding [SHIFT] while turning the PAGE knob. The one touch Shortcut: touch button [9], then use the PAGE Knob, if necessary.
- Using Knob C select Bank 036/001; use Knob 1 to select Program Number = 127[Uni Bass].
- Use the PAGE knob to explore the Element parameter pages; Shortcut: touch buttons [9], [10], [14], [15] to arrive at a single page within that area (like bookmarks).
- Use the PAGE knob or button [15] to select the 'NTV_Param' (Native parameters) page. Native Parameters refers to parameters that address the data on the PLG150-AN board. You are offsetting data that originates on the board. Locate the **Arp/SEQ Sw** – turn it to OFF. This will stop the analog Sequence programmed with the voice.
- Experiment with making edits – you can add S/CS parameters on the COMMON level - add effects, etc. Shortcut to COMMON parameters: touch Program button [1] General. Practice navigating the edit area.
- When you press [STORE] your work will be saved to one of the 64 PLG locations and become a proper Plug-In Voice.
- When you save an ALL DATA file type the PLG bank Voice data will be saved to SmartMedia card. However, as we will see, any custom (user) Board Voices will be saved separately.

We learned a few things. The PLG150-AN has its own clock that controls the working of the its arpeggiator and step sequencer. This is independent of the arpeggiator and playback sequencer of the host unit. Also, you may have noticed that certain parameters make little or no

difference in the sound. The COMMON: POLY/MONO mode switch is overridden by the poly-mono-legato setting of the AN board Voice itself. Polyphony issues of the PLG150-AN board are always handled at the board level. Set the poly-mono-legato parameter in the AN Expert Editor. You may find some parameters make no difference when you move the knob – this can happen when the original Voice data does not use that parameter in the current configuration. To fully view the entire list of parameters available you must open the AN Expert Editor software. The S30/S80 and CS6 will give access to a smaller set (see below) of the full list (see editing software).

Explanation: The Native Parameters are parameters that are native to the technology on the board in question. These include:

Unison Switch
 Arp/SEQ Switch
 Tempo
 LFO2 Speed
 Sync Pitch
 FM Depth
 VCO Detune
 VCO1 Edge (harmonic content of source wave)
 VCO2 Edge (harmonic content of source wave)
 VCO2 Pulse Width
 VCO2 Pulse Width Modulation Depth
 Mix VCO1
 Mix VCO2
 Mix Ring Modulation
 Mix Noise
 Mix Feedback
 VCF (Voltage Control Filter)
 Filter Modulation Depth
 Filter Envelope Generator Depth
 Filter Envelope Generator Attack
 Filter Envelope Generator Decay
 Filter Envelope Generator Sustain
 Filter Envelope Generator Release
 VCA Amplitude Modulation Depth
 Amplitude Envelope Generator Attack
 Amplitude Envelope Generator Decay
 Amplitude Envelope Generator Sustain
 Amplitude Envelope Generator Release
 Distortion Drive
 Assignable Control Parameter
 Assignable Control Depth

This makes an impressive, but incomplete, list of AN parameters (there are many, many more). The others can be reached via the provided Voice Editor software. You will notice that most of the parameters in the host offer you an offset value +/- 00 or a choice that sets the value to "on", "off" or default as programmed in the original Voice (you'll see "vce"). If you see "****" – this denotes the parameter is not available. These offsets are offset from the original programming value. To get at the real AN parameters for each

setting, use the AN Expert Editor. For example, if you want to change the source waveform or change the routing of the model. This kind of editing is done on the computer. The parameters that you manipulate form the S30/80 and CS6 are those that are performance oriented.

Hook up to the computer when you are ready to sound design...put the Voice in a condition that is performance ready...download the results to your keyboard or module...back the data up on a SmartMedia card...leave the computer home and go rock-out at the gig.

Loading user RAM Board Voices

Copy the file provided with this document '**AN1xorig.ans**' to a convenient location on your computer. This is a file type that can be opened by the AN Expert Editor. Open XGworks 3.0 Lite (for PC) and launch the "AN Expert Editor" (found under the **Plug-in** pull down). If you are using a Mac, boot up the AN Expert Editor program. On your S/CS select the [PLG] button that contains your PLG150-AN board. Let's send a bank of Voices from the AN Editor to the User RAM bank in the S/CS.

- You will find the AN Expert Editor on the Windows package under the PLUG IN pull down. If you do not see it on the PLUG IN list you must install this component from the CDROM. (Follow those instructions and then come back here).
- When the Editor launches it will ask you for a Part No. – Part No. is 1. We are in VOICE mode which equals Part 1.
- On the main editor screen of the software click the [VOICE] button in the lower right-hand corner. This will open a list of Preset and User Voices.
- Click on the icon of the Open Folder on the toolbar of the AN Expert Editor.
- Locate and open the file called **AN1xorig.ans** that was included with this document – this is a file of the original AN1x Voices.

Once you have loaded this file you can view the names under the 'USER' heading in the Voice box. The first sound should be 'Relaxx'. When you highlight a name in your computer it will be sent to the S/CS edit buffer and you will immediately be able to monitor your edits as you make them. Be sure to make all of your edits via the software (**not** the front panel of the keyboard/module – otherwise the software will not accurately reflect all your edits). If you are not getting communication between the software and your host check your connections in/out and check System Setup of the Editor). Store your edits to the AN Expert Editor software – the [STORE] button is in the lower right hand corner of the virtual front panel. Be sure to back this up to disk by clicking on the disk icon on the editor's toolbar.

- On the toolbar you will see an icon for 'Check Setup' – open this dialog box. You will find that you can select whether you send 1 Voice at a time to the keyboard or ALL VOICES (128). Select ALL VOICES.
- Click on the icon of a 'MIDI connector + arrow' pointing to the right. This will *send* the data to the PLG150-AN board bank 036/002.

You will see a progress graphic as 128 custom board voices are loaded to the PLG150-AN User RAM bank (036/002)*. Now you have reason to play through bank 036/002.

*These Voices are now in the RAM area of the PLG150-AN board and will revert to the default Voices after power down. You must save these voices and reload them each time you want to use them. These Voices show off the immense potential with AN synthesis. For example, Voice 002 'Terraform' is a split where the lower half of the keyboard selects a sequence pattern and the upper part transposes that pattern.

Those of you that know the AN1x will recognize these sounds. However, the AN1x was 10-note poly (two 5-note systems) and could play 2 Scenes simultaneously when set to Dual mode. The PLG150-AN and the Voices here represent only Scene 1, therefore, if the original AN1x Voices was a DUAL sound you only are hearing Scene 1 of that set.

Edits can be made in the software on the virtual front panel of our analog synthesizer. Explore the front panel of the software, with its virtual wooden sides – a nice touch of the 70's. The word "detail" denotes a more comprehensive screen below. When a sound is completed you can store it in the software (click on the disk icon) and/or transfer it to the user RAM of the PLG150-AN (as outlined above). From there we can make an S/CS Plug-in Voice. The PLG_Native parameters that you see in the screen of the S30/80-CS6 allow you to apply offsets to what has been programmed in the Expert Editor. You can assign different parameter control to various physical controllers and you can set the depth (effective range) of the controls movement. You have an arsenal of controllers available in the S30, S80 and CS6x and you can work out a controller assignment arrangement that works for you. The PLG150-AN has as many as 16 assignable control setups and 8 assignable control devices. The software will allow you to set many parameters to "direct" control. This allows the position of the controller to absolutely control the amount of the parameter applied. For example, if in the Voice Editor, you select Filter Cutoff and assign it to Knob 1 (cc16) with '*direct*' control,

- The knob minimum setting (7 o'clock) will equal 0, filter closed

- The center position (12 o'clock) will equal 64, filter normal
- The maximum (5 o'clock) will equal 127, filter open.

A setting other than 'direct' will limit the range of the change per movement of the controller. In this way you can fine-tune the results available. A positive value like +35 will make the control work within a limited range - a clockwise movement giving a small amount of change. A negative value of 35 will have the same amount of change from a counterclockwise movement of the same distance.

This bank of Voices was originally programmed for the AN1x. There were 8 assignable knobs, (these defaulted to control change numbers 41-48) you will find AC1-AC8 referred to in the CTRL MATRIX; you can reassign these to your available control devices.

Theory of Operation Summary:

You can edit a sound in the computer software while playing it from the synth's edit buffer. You can then bulk over a single sound or complete set to the RAM bank of the board and then create PLG Voices. When you press [STORE] it will be directed to one of 64 locations in the host's PLG bank. **You cannot store or load data to a PLG slot that does not contain the board with the correct technology.** You will see a "TYPE MISMATCH" error screen if such an attempt is made.

The [PLG] bank Voices that are made from preset Board data can be backed up to an ALL DATA file. If, however, you made any **custom** Board Voices (analog sounds with the editor) you will need to reload these to user RAM in a separate operation.

"ALL" files do **not** save custom Board Voice data. Data that is in the RAM of the PLG150 series board must be backed up in a separate file (extension **.s2b**). The **bulk** file type is called '**plugin**'.

To SAVE a PLUGIN file to SmartMedia card

- Press [CARD] to enter the Card mode
- Use the PAGE knob to select the SAVE Card function
- Set the TYPE to "**plugin**"
- Name your file (8 characters).
- Press [ENTER]; and [YES] to execute
- If you name your file in the root directory (literally): AUTOLD1.S2B for PLG1, or AUTOLD2.S2B for PLG2, the synthesizer will automatically load this file when you switch it ON.

Note: It should be mentioned here that the host keyboard/module (S/CS) gives you options when it comes to how you are going to use the PLG150-AN sounds. For example, when you are performing live you will most likely want to have your favorite analog sounds stored as completed Plug-in Voices. You can have instant access to 64 completely programmed Voices based on the data of the PLG150-AN. PLG and board Voices can also be used in complex split and layer arrangements via Performance mode. Performances can house single sounds or be complex combinations. You have 128 Internal Performance and an additional 64 External on SmartMedia card.

PLG150-AN sounds in Performance Layer

Until now we have mainly been discussing the creation of PLG Voices in the host product. You can also use the sounds on a PLG Board directly in a Performance. Remember that Performance mode does double duty: it is used for multi-timbral setups for use with sequencers and it is used for multi-voice layered sounds for real time play. That is what we are calling *Performance Layers*. You can layer 4 Voices, whether from the INT/EXT (AWM2), Plug-in Voices from the PLG boards, or board Voices directly from the MSB/LSB board banks. Each Performance has its own memory for controller setups and effect routing. (When a Board Voice is used directly in a Performance Layer you have access to the Performance's Reverb and Chorus effects – when a Plug-in Voice is used in a Performance you have the option of activating its Insertion Effect as programmed in Voice mode).

You have the option of using the Master Keyboard function to create even more unique situations. It can help you setup splits, layers and zones for both internal and external gear.

When setting up Performance Layers, you can activate the LAYER SWITCH on up to 4 Voices. This includes selecting from any PLG150 series board (AN, DX, PF, and VL). Each 150 series slot, PLG1/PLG2, can contribute one sound at a time. When the Layer Switch is ON for a PART, the MIDI Receive channel setting for that Part is ignored. The Layer receives on the LAYER CHANNEL set in each Performance (Common MIDI page) LayerCh = Basic Channel is the default setting.

Phil Clendeninn
Product Marketing Specialist
Digital Musical Instrument
©Yamaha Corporation of America