



CS2x

Silver Book

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Quick Start: Essentials to get Started

The CS2x Synthesizer Concept

Although based on the same “CONTROL SYNTHESIZER” concept as its predecessor, the CS1x, the CS2x is in many ways considerably more capable. Before we go into more detail on the differences between the two keyboards, here is a roundup of the main features of the CS2x.

Control Synthesizer

The **8 rotary controllers (Knobs)** allow instant manipulation of sounds. These changes can be stored as a new Performance or send as Controller data via MIDI to an external sequencer. You can also “remote control” other keyboards with these knobs, provided they can receive controller data.

The SCENE keys can be used to store the current knob positions per Performance. You can then “morph” between two differently programmed **Scenes** using the modulation wheel, i.e. smoothly change from one sound into the other.

Apart from being able to send controller information, the CS2x can of course also be controlled via external controllers or Sys-Ex data. This allows convenient control from software sequencers via the supplied EMAGIC LOGIC and STEINBERG CUBASE Mixer Maps and Environments (see chapter “Sequencer Software and the CS2x”).

Performance Synthesizer

Performance Mode offers four banks of 128 Performances each: PRESET1, PRESET2, USER1 and USER2. Each Performance can contain up to 4 sound “Layers”. Each Layer offers control over parameters such as Filter, Envelopes, LFO etc. Each Performance also has access to three global Effects: Reverb, Chorus and Variation. Finally, an Arpeggiator can also be employed.

The Performance Mode, in contrast to other XG models (e.g. the MU series), is also **multi-timbral**. You can add to the Performance Part with a further 12 Parts (single sounds or drum kits). These Multi Parts are set up externally with a sequencer. From there you can assign all XG Voices (see Data List, pages 6 - 8) and the “Material Voices” (Data List, pages 11 - 14).

XG Synthesizer

Instead of Performance Mode you can also choose the **MULTI Mode**. This mode corresponds to the familiar **XG Standard** as found in other YAMAHA synthesizers, sound modules and sound cards, and represents an enhancement of the GM standard.

This mode offers 16 equal Parts to which you can exclusively assign XG Voices.

The advantage of the Multi Mode (i.e. XG Mode) is that songs recorded in it can also be used on other XG models, provided that all sound settings are actually stored in the song itself using controller data.

CS1x - CS2x - A Comparison

This section will explain the differences between the CS2x and its predecessor, the CS1x. We will also discuss to what extent sounds are compatible between the two models.

Here now a head-to-head comparison of feature differences between the two machines:

	YAMAHA CS1x	YAMAHA CS2x
Wave ROM	4.5 MB	16 MB
Filter	XG-Filter (same as QS300, MU50 / MU80)	Significantly improved Filter
Polyphony	32 Voices	64 Voices
Arpeggiator	30 types, no MIDI Out	40 types, with MIDI Out
Rotary Controllers	6 Knobs	8 Knobs
Performances	128 Preset / 128 User	256 Preset / 256 User
Material Voices	930	approx. 1500
Effects	3 effect processors with a total of 65 effect types (11x Reverb, 11x Chorus, 43x Variation)	3 effect processors with a total of 89 effect types (12x Reverb, 14x Chorus, 63x Variation)
EQ	not available	2 Band-EQ per Layer / Part (only externally programmable)

Two features that drastically improve the sound of the Performances are worth pointing out here:

The **resonant filter** is significantly sharper, more brilliant with more “bite”. Analogue and Techno sounds in particular benefit from this improvement.

The **2-Band EQ** that can be programmed separately for each Layer/Part enables a highly transparent sound mix, especially during song production.

Now to the question of compatibility between the CS1x and CS2x.

Users upgrading from the CS1x to the CS2x can breathe a sigh of relief - the CS2x can indeed receive CS1x Performance Banks. The conversion to the CS2x format is fully automatic. You will find only few instances of annoying deviations between the CS2x Performance and its original when comparing them side-by-side. Many Performances will indeed sound better, due to the improved filter design. Further improvement can be had by fine-tuning each Layer's 2-band EQ (see section “Environments and Mixermaps for LOGIC and CUBASE”).

The CS1x Factory Performance Banks can be found on the supplied TOOL Disk as a MIDI file and can be transferred to the CS2x USER 1 Bank via a dump (see Appendix - “File List”).

You may need to carry out additional work on CS1x songs however, when comparing with the original, you should be aware of the following two points:

The *Send Level for Reverb* (Controller #91) frequently needs to be considerably scaled down.

The CS1x “*Demo Bank*” (MSB063, LSB123, Prg 074 to 128, see BLUE BOOK, page 45/46) is not available on the CS2x. If your song uses Voices from this bank, you will need to replace them with suitable substitutes. This should not be a problem however, considering the vast sound choice offered by the CS2x.

Finally, some modifications may be necessary when Sys-Ex data was used in relation to the Arpeggiator or the Scenes, due to some addresses that have changed here.

First Sound Impressions

Demos

The best way to get an initial impression of the CS2x's sound potential is by calling up a demo song. These can be found by simultaneously pressing the PERFORMANCE and MULTI keys.

Normally all demos (01 - 09) are played one after another, although you can interrupt playback at any time by pressing the PERFORMANCE key. You can also select a specific song for playback with the numeric keys (1-9).

Performances

The four Performance Banks are categorised thus:

Preset 1 =

Up-to-date Techno/Synth oriented sounds

Categories: Sq (Sequence), Ld (Synth Lead), Ba (Bass), Sc (Synth Comping), Pd (Synth Pad), Fx (Synth SFX),

Preset 2 =

Standard Sounds, Sound Effects, Sequencer Sounds, Drumkits

Categories: Pf (Piano), Or (Organ), St (Strings / Orchestral), Br (Brass), Rd (Reed), Gt (Guitar), Ba (Bass), Cp (Chromatic Percussion), Et (Ethnic), Se (Sound Effect), Sq (Sequence), Co (Combinations), Dr (Drums).

User 1 + User 2 =

Available for optional sound banks or user programmed Performances.

These banks are factory preset to the Performances of Presets 1 & 2.

Be sure to experiment with the Knobs when trying out the Performances to experience the sound altering possibilities. You can also activate the SCENE CONTROL with many of the Performances; try pressing both scene buttons together as this enables both Scenes, allowing you to "morph" between them with the mod wheel.

XG-Voices

To audition the XG voices, enable the MULTI Mode and then select the voices using the BANK and PROGRAM buttons. For a better overview of the choices available, consult the DATA LIST (pages 6 - 8). The best plan of attack here is to choose a Program first, then step through each available Bank. The number of available Banks for any given Voice (i.e. the Variations) can vary. The "foundation" voice (GM Voice) is always at Bank XG000.

For each Part, each XG voice can be changed with the following parameters:

Volume, Pan, Reverb Send, Chorus Send, Variation Send, Cutoff, Resonance.

These parameters, together with the Bank/Program selection, can be found in the bottom line of the Function Matrix.

The PART/LAYER button (left of the display) is used to select a Part.

By the way, the above described MULTI-Mode accessible parameters are only a small subsection of all the available XG parameters that can be programmed from external sequencers using Controller or System Exclusive data.

You may come to the conclusion that compared to the Performances the XG voices sound relatively "thin" and unspectacular. Don't forget however that Performances are constructed from up to four Layers and also include programmed EQ and Variation Effect. The XG voices only truly shine in the context of song production and when the externally controllable parameters are utilised. This is demonstrated to great effect by many of the XG songs.

Knobs

The CS2x's 8 rotary controls ("Knobs") enable lighting fast Performance sound changes. All Layers of a Performance are influenced at the same time. Usually a knob's middle setting corresponds to the Performance parameter setting. This behaviour may change however if a non-centered parameter setting is already stored in the Performance.

The ASSIGN knobs can be programmed freely for each Performance. You can look up the Assign settings of the preset Performances in the DATA LIST, pages 2 - 5.

Any changes made with the knobs, along with all other changes, are stored in the Performance. You can also store all knob positions as a SCENE within the Performance (see section "Performance Mode - Hands-On Knowledge")

The stored knob settings however cannot be viewed from the keyboard.

The knobs are of course also perfectly suited to recording real-time changes to external sequencers. All control settings are sent via MIDI OUT as Controller data. Here are the factory default Controller assignments for each knob:

ATTACK	= Control #73
DECAY	= Control #80
RELEASE	= Control #72
ASSIGN 1	= Control #17
HPF CUTOFF	= Control #81
LPF CUTOFF	= Control #74
RESONANCE	= Control #71
ASSIGN 2	= Control #18

You can change the knob Control number assignments like this:

1. Select UTILITY - ASSIGN CTRL NO.
2. Nudge the knob.
3. Choose another Control# with the parameter value switch.

These changes allow real-time control of other synthesizers that don't have their own knobs.

The Arpeggiator and MIDI

Unlike the CS1x, the CS2x transmits its arpeggio messages to its MIDI OUT port. It is, however, not possible to trigger the arpeggiator with messages received via MIDI IN, unless you switch it to another mode by holding down the ARPEGGIO button while switching it on. This will block the transmission of arpeggio messages to the MIDI OUT connector, while allowing the arpeggiator to be triggered by external MIDI messages. In that case, the arpeggiator's tempo should be set to "MIDI".

Saving and Managing Performances

Single Performances or complete Performance banks can be received from (and sent to) a computer (PC, Atari, Mac...) running relevant sequencer software via Bulk Dump ALL. This is also possible with MIDI data filers, such as the MDF2 or MDF3. In other words, you can easily create and maintain external archives of CS2x Performances.

A Bulk Dump ALL initiated at the CS2x always contains the USER 1 and USER 2 banks (a total of 256 Performances) as well as the system settings.

Below is a complete description of the Transmission of all USER Performances to a computer or data filer, and back again to the CS2x.

EXPERIMENT:

Call up UTILITY - BULK DUMP and select the "Bulk Dump All" function. Now start recording on the sequencer, then once the count-in has completed initiate the data transmission at the CS2x with YES. Stop recording once the sequencer is receiving no further data. You should now find a long list of Sys-Ex blocks in the recorded track. Save the recording as a song or MIDI file to floppy/hard disk.

If the sequencer didn't record any data, ensure that it isn't set to filter incoming Sys-Ex information - if it is, deactivate the filter.

Sending the data back to the CS2x is just as easy. Note: don't be irritated by the manual section "Bulk Dump Receive" (page 64) - this text should not suggest that you can call up this function from the CS2x. The data transfer to the CS2x simply happens by playing back the sequencer track, without the need for any prior setup at the CS2x. The CS2x display will show "Receiving" to confirm successful transmission.

The UTILITY function "Bulk Dump 1 Perf" allows the combining of Performances from different CS2x banks. Bulks containing single Performances are sent to the sequencer one after another, which records them as single sequences, parts or tracks. This allows you to create a data bank containing bulk dumps of individual CS2x Performances from within a song or arrangement. Later you can send these bulks one after another back to the CS2x to create a new USER bank. Unlike the ALL bulk dumps however, you will need to STORE each individual bulk, as these are transferred to the working memory of the CS2x.

As previously mentioned, the CS2x can also receive CS1x banks. One thing to bear in mind though is that CS1x banks contain only 128 Performances, and that they are always sent to USER 1. USER 2 will not be changed during CS1x bank receptions.

The CS1x Factory Banks Preset, User and Extra are supplied (see File List). The optional CS1x Voice disks (see "YAMAHA EUROPE: Sound Disks for the CS2x") can also be used with the CS2x. They will also always load into USER 1.

These are the available storage management options:

USER 1 receives CS1x banks. You can then copy individual Performances to USER 2 to make space for another CS1x bank. This way you will gradually compile a unique bank with the best CS1x sounds. Once you have evaluated all CS1x sounds, USER 1 is available for your own USER Performance creations.

The total result (USER 1 + 2) is then sent an external sequencer with BULK DUMP ALL, and stored there.

Quick Song: Essentials for Song Production

This chapter deal with the most important fundamentals of song production with Performance Mode. More in-depth and specific information about song production can be found in chapters “Song Production: Tips, Tricks, Information” and “Sequencer Software and the CS2x”. XG song production with Multi Mode is also covered there.

Experience with the CS1x has shown that most users prefer Performance Mode, so we give it priority coverage here.

Multi Part Voices

As touched on in the first section, Performance Mode offers the Performance Part as well as a further 12 Multi Parts for multi-timbral applications.

The Multi Parts can utilise the following Voices:

Material Voices (Data List, pages 11 - 14)

XG Voices (Data List, pages 6 - 8)

We will look at the Material Voices in more detail in order to clearly demonstrate the Performance Mode sound structure.

Material Voices are distributed in 21 banks (Pre 0 - 21). Table “Material Voices” (Data List, pages 11 - 14) reveals that different banks are used up in different degrees. The reason for this is that the Material Voices were a direct result of our programming of the Factory Performances, and so they are identical to the Layers of those Performances. The CS1x Factory Voices were also converted to voice banks in order to guarantee total upward compatibility with the CS1x.

You can see from the following list which Performances were used in the creation of the Material Voice banks:

Pre00 = CS1x Preset, Layer 1

Pre01 = CS1x Preset, Layer 2

Pre02 = CS1x Preset, Layer 3

Pre03 = CS1x Preset, Layer 4

Pre04 = CS1x User, Layer 1

Pre05 = CS1x User, Layer 2

Pre06 = CS1x User, Layer 3

Pre07 = CS1x User, Layer 4

Pre08 = CS1x Extra, Layer 1

Pre09 = CS1x Extra, Layer 2

Pre10 = CS1x Extra, Layer 3

Pre11 = CS1x Extra, Layer 4

Pre12 = Drumvoices

Pre13 = CS2x Preset 1, Layer 1

Pre14 = CS2x Preset 1, Layer 2

Pre15 = CS2x Preset 1, Layer 3

Pre16 = CS2x Preset 1, Layer 4

Pre17 = CS2x Preset 2, Layer 1

Pre18 = CS2x Preset 2, Layer 2

Pre19 = CS2x Preset 2, Layer 3

Pre20 = CS2x Preset 2, Layer 4

There is good reason why the banks that resulted from Layer 1 of the CS1x and CS2x Factor Performances are printed in bold - in contrast to others, these banks are fully assigned as each Performance contains at least one Layer. Banks Pre03, Pre07, Pre11, Pre16 and Pre20 on the other hand are only partly assigned, as all four Layers are rarely used.

We shouldn't forget to mention that voices from the above mentioned banks and the XG banks can also be assigned to Layers 1 - 4 of the USER Performances as well as to Multi Parts 5 - 16.

The Material Voices and XG Voices offer a massive choice of sounds suitable for creating new Performances as well as multi-timbral applications in Performance Mode.

If all this is too theoretical for you, get a little practise with our experiment:

EXPERIMENT:

Call up Performance P1-041 (BA:101 Bass) and select the Bank and Program parameters one-after-another. Your display will show "PRE13" and "Ba:BasIneA #41". A glance at table "Material Voices" confirms that this is Material Voice "Pre13 - PGM 41". Now call up Programs #42, #43, #44 etc. and compare the display with the Voice table each time. Try selecting some other banks, too. You will find the XG banks below Pre0.

This little excursion has actually brought us to "Programming new Performances". A good understanding of the Performance Mode sound structure is vital in achieving optimal sounding results from song production, and to avoid time wasted from the confusion of finding a suitable sound for a specific track.

MIDI Events

Anyone with experience of other synthesizers will expect that Multi Program song settings are performed at the keyboard. This approach won't work with the CS2x. Here the Multi settings are programmed into (and are part-and-parcel of) the song itself. The song is preceded by the Setup, stored in its first bar. Some users may initially find this approach confusing, but it has proven itself advantageous in practical applications.

The Setup data actually holds all the Multi Program settings that would usually be performed at the machine in the form of MIDI Events: Bank and Program selection, Panorama settings, Volumes, Effect Send Level and the most important parameters such as Cutoff, Resonance, Attack and Release.

With the continued use of the term Events (i.e. MIDI messages), let's discuss first the various data types you will encounter during your sequencer productions:

The most important type of event must be the note event. This is separated into "Note on" and "Note off" commands, which give the actual note value. The touch sensitivity ("Velocity") is part-and-parcel of a Note event.

The second group of MIDI messages are the "Continuous Messages", i.e. continually sent data. These include:

- Aftertouch: Sound changes created by increasing key pressure (NB Aftertouch is not transmitted by CS2x)
- Pitch Bend: Changing the sound's pitch with the Pitch Bend Wheel
- MIDI Controller: "Remote Control" of standardised parameter via MIDI

Yet another type of event is the Program Change Command, used to switch sound programs via MIDI.

The most unique of MIDI events are undoubtedly the System Exclusive messages. These are used to transmit specific parameter settings.

All these event types can be recorded and then processed with practically any hard or software sequencer. The exact procedure for this depends on the specific sequencer. Entering these events manually in the EDIT mode is often recommended, and sometimes unavoidable.

The most important event types for the Setup data are Program Change and Controller events. This is where the CS2x is leading the pack, as all controller types can be sent via MIDI to the external sequencer (and recorded there) via its knobs. More specialised parameter control however requires the use of System Exclusive messages.

All other remaining event types only play a part during the recording of the musical events, although Pitch Bend or Aftertouch settings can occasionally be used as pre-emptive sound settings.

Bank and Program Selection

Sounds for the Multi Parts are chosen with the Bank and Program Change commands. These are inserted into the first bar of every sequencer track via these three events:.

Bank Select (MSB)	Control 0	Bank Select
Bank Select (LSB)	Control 32	Bank Number
Program Change		Program

You will notice that a combination of two event types are used - two MIDI Controllers and a Program Change. These three events must occur during sequencer playback in the order given. If further Program changes are required after such a Bank and Program change command, and if the desired Programs are in the same bank as the one chosen previously, a simple PROGRAM CHANGE command can be inserted

If you are unsure how bank and program selections are performed in your particular sequencer program, this might help:

Set your sequencer to Record/Start. Now select the CS2x Preset Performance 001 and then press the PRE-SET button. Finally, stop the sequencer and call up the Edit mode. The resulting event list should look like this:

	<u>Number</u>	<u>Value</u>	
Control	0	63	BankSelMSB
Control	32	64	BankSelLSB
Program		1	

The Bank/Program selection will only occur within the CS2x when the bar containing those three events is replayed by the sequencer.

Detailed descriptions of how to enter bank and program changes in LOGIC and CUBASE can be found in chapter "Sequencer Software and the CS2x".

Turning off Multi Parts

If your CS2x is only part of your MIDI equipment, you will probably want it to only respond to certain MIDI channels. To do this, you can disable individual Parts at the machine: Select UTILITY Rcx-Ch., then use the PART/LAYER button to select a MIDI channel for each part or switch it OFF (OFF appears after Ch.16 on the display).

This can also be set via Sys-Ex (Multi Part/ Rcv Channel - DATA List, page 31).

The file "5TO16OFF.MID" (TOOL Disk, "SYSEX" folder) can also be used to disable Parts 5 - 16, so that only the Performance Parts remain active. File "5TO16ON.MID" restores Parts 5 - 16 back to their original MIDI channels.

Caution: These settings also affect the Multi Mode!

Song Setups

Many musicians will not want to spend their time programming the Song Setups with numerous Bank and Program Change, Controller or even System Exclusive events - luckily we provide prepared setups that you can use instead.

You will find a string of Song Setups on the supplied SETUP Disk in the following formats:

LOGIC PC, LOGIC MAC, CUBASE PC, CUBASE MAC, SMF- Format 0, SMF - Format 1

Each of these formats offers three Song Setups:

SetIni

This corresponds to the XG Init setting. Suitable as a basis for non-techno oriented music.

TechSet

Parts 5 - 8 are reserved for user settings and are composed of init settings. Parts 9 - 16 are pre-programmed with settings suitable for techno productions.

XGSet

For MULTI Mode (XG) song production. Composed of XG Init settings for all parts (1 - 16).

The song setups for **LOGIC** and **CUBASE** contain the following **Environments**, i.e. **Mixer Maps** - these are described in detail in chapter "Sequencer Software and the CS2x":

Performer = Easy Edit Page for modification of Performances

CS2x Part-EQ = Part EQ Edit Page for Parts 5 - 16 in Performance Mode

XG Part-EQ = Part EQ Edit Page for Parts 5 - 16 in Multi Mode (XG)

Additionally for CUBASE:

CS2x Contr = Mixer for Performance Mode, exclusively with Controllers

(for LOGIC we recommend the GM/XG Mixers as found in the more recent LOGIC versions)

The Setups of the various formats are principally identical and conform to the following structure:

- **Initialisation** XGon + switching to Performance Mode via SysEx)
- **Performance Set** Bank/Program changes + Volume Control for the Performance Part)
- **Setups for Part 5 - 16** (Bank/Progr., Controller, SysEx). The four Sys-Ex events found at the end of every Part Setup control the Part EQ (Bass Gain, Treble Gain, Bass Freq, Treble Freq). They are only required if the EQ isn't controlled with the above mentioned EQ pages.

We consciously did not make use of any other Controllers in the Performance Set, as their default settings would often deviate from those found in the Performance and would thus introduce unwanted changes to the Performance. Any additional Controllers can always be added if required. The send function of the knobs can be helpful here.

It makes sense to store all song specific modifications to a Performance as a new USER Performance (STORE), and to store those settings within the song as a BULK DUMP 1 Perf, just to be on the safe side. This also means that the Performance need not be in the USER Bank when the song is to be played back at a later time.

The Song Setups contain no Sys-Ex events to set up the system effect types for Chorus and Reverb, as the actual settings stored in the Performance are used for Multi Parts 5 - 16. The Variation Effect is only available to the Performance Layers, not the Multi Parts.

Song Production in Seven Steps

This section will serve as a quick overview of the steps required for Performance Mode song production with the CS2x.

You may choose a Performance (MIDI Ch. 1) and 12 Multi Parts (MIDI Ch. 5 - 16) for your song production. You can then customise your Performance using the rotary controllers and EDIT function at the keyboard and then store your modifications. The Multi Parts need to be set up from your sequencer program using MIDI events.

Step 1: Preparation

You should set the CS2x UTILITY = LOCAL OFF, assuming both MIDI Interfaces are cabled for two-way communication. This disconnects the keyboard from the tone generation part and only sends MIDI data to the sequencer (MIDI out). If its MIDI Thru function is enabled, the sequencer will in turn echo (re-send) incoming data to the CS2x tone generation section (MIDI in), including any modifications arising from each track's playback parameters (e.g. Transpose, Velocity). This means that you will only hear the sound of the currently selected sequencer track when playing the keyboard, not the PERFORMANCE.

It is also a good idea to verify the RCV-CH setting. Normally Layer 1 (i.e. the Performance) is set to Ch1, whilst Parts 5 to 16 will use their corresponding MIDI channels (Part 5 = Ch5, Part 6 = Ch6, etc.). To do this, select each Part with the PART/LAYER Taste (left of the display). Sometimes the MIDI channels are changed without your intervention; this can happen for example when playing back a song that has routed two Parts to the same MIDI channel via Sys-Ex (Layer sounds!).

Alternatively, the correct default MIDI channel settings can be restored via a system Reset (hold down buttons 7, 8 and 9 simultaneously and switch on the machine), although all factory USER Performances will be re-initialised, erasing any of your own creations in the process.

Another thing to bear in mind is that the CS2x is always in the so-called "Performance Top Mode", not in EDIT Mode, during the following sound change descriptions. Otherwise all received sound control data would be ignored.

Step 2 = Setting up the Performance

Find a suitable Preset or User Performance which can act as a basic structure for your song creation and then change the sound to match your ideas. You can use the PERFORMER to do this if you are working with LOGIC or CUBASE. Save your modified sound as a new Performance with STORE.

Step 3 = Loading the Setup Data

Load the file “SetIni” or “SetTech” from the SETUP Disk in your required format (Midi file, Cubase Song or Logic Song) into your sequencer. These contain all important foundation settings for Performance Mode songs. The Setup (bar 1) starts with two System Exclusive messages to restore the Multi Part settings (“XGon + Pflnit”).

Following those are Bank/Program changes and a Volume event for the Performance (MIDI-Ch.1).

The Setup data follows on with events and default settings for each Multi Part in 1/16 gaps, as found in the following table:

Song Setup Part Settings (Performance Mode)

Event	Parameter	Default Value
Control #00	Bank Select (MSB)	063
Control #32	Bank Number (LSB)	000
Program	Program Change	001
Control# 7	Volume	100
Control# 10	Pan	064
Control# 71	Resonance	064
Control# 72	AEG Release Time	064
Control# 73	AEG Attack Time	064
Control# 74	Cutoff Frequency	064
Control# 91	Reverb Send	040
Control# 93	Chorus Send	000
SysEx	Part EQ: Bass Gain	40H (Dezimal = 64)
SysEx	Part EQ: Treble Gain	40H (Dezimal = 64)
SysEx	Part EQ: Bass Freq	0CH (Dezimal = 12)
SysEx	Part EQ: Treble Freq	36H (Dezimal = 54)

You can edit the default values listed in your sequencer’s EDIT mode to create your own, customised, Song Setups.

For example, to filter the sound more heavily, you would reduce the parameter value for “Cutoff Frequency”. To increase treble you would set a larger value for “Treble Gain”.

The **CUBASE** version stores the Setup data primarily as Mixer Events in the Mixer Tracks “Perf Contr” and “Part EQ”, rather than in each MIDI track’s Setup part. You can change the Setup settings very comfortably this way by calling up the Mixer Maps, double-clicking the Mixer Parts and using the faders to make the changes. Any changes are immediately inserted into the Mixer tracks.

LOGIC also allows convenient sound control via faders, this time with the included GM/XG Mixer coupled with the supplied add-on Environment Layer “Part EQ”. Unlike CUBASE, the conversion to events doesn’t happen automatically here but needs to be initiated with the “Send Selected Fader Values” function. As a result, the Setup Parts initially contain all the events values listed in the table above. If you decide to use the GM/XG Mizer or the “Part EQ” you can delete the corresponding events from the Setup Parts, but if you only need to make a few changes to the default setup, it may actually be easier to edit the Setup parts manually rather than work with the Environment pages.

The Song Setup “**SetTech**” already contains some deviations from the default settings.

Step 4 = Trying out the Sound Settings

Before you start to play in the first few tracks, you should feel comfortable with making Setup data changes. Try to find out what kind of sound changes you can achieve by changing the default settings. Changes to the sequencer track's MIDI channel will determine which CS2x Part you control. Selecting MIDI-Ch. 1 allows you to play the Performance. Nothing happens with channels 2 - 4 as they are blocked by the 4 Performance Layers. Channels 5 - 16 control Parts 5 - 16.

Select MIDI-Ch. 5 and make changes to Part 5's Setup data. Start by switching to different sounds with Bank and Program changes. After you have tried some of those sounds, make some changes to them with the controllers.

You should now have a pretty good idea how CS2x Song Setups are programmed.

Step 5 = Recording Tracks

We have now fulfilled all the technical requirements for recording sequencer tracks.

If you are going to use the Arpeggiator, you will need to activate the sequencer's MIDI clock (Sync = intern, MIDI Clock / MIDI Control = ON). You will also need to set the CS2x Arpeggiator Tempo to MIDI.

You are free to use the knobs to record real-time sound changes on all MIDI channels, either during the first pass or later on a separate track. The sequencer processes the knob movements as Controller messages.

Step 6 = Setting up the Effects

Setting up the Effects is pretty straightforward. All Layers and Parts use the Chorus and Reverb effect types as set in the Performance. An individual Send Level is available for the Performance Layers and the Multi Parts. For the Layers, this is set at the keyboard, whilst Controllers #91 and #93 are used to set it for the Multi Parts (see table "Song Setup Part Settings"). In contrast, the Variation Effect can only be applied to the Performance Part, but you can extensively program it and enable/disable each for each Layer.

Step 7 = Saving your Data

With the exception of the Performances that are stored at the machine, all song settings are part of the song itself and are therefore saved (along with all other song data) to the sequencer. The Performance used can be sent to the sequencer via Bulk Dump 1 Perf and either archived to disk individually or integrated with the Setup data.

Song Production with XGworks

You can find a number of notes regarding the use of your CS2x with the sequencer program XGworks in your manual (pages 34 - 37).

What we have covered so far about song production applies to XGworks, too, although there's no need here to load an extensive Song Setup, as you make almost all necessary changes from the integrated Mixer or XG Editor.

More specialised Part parameters such as EQ and HPF can also be set up with the XG Editor (Voice - Detail - Part Properties).

In Performance Mode the Editor is logically restricted to Parts 5 -16.

You can't initiate Bank/Program or "Material Voice" changes from the Mixer or Editor as those sounds are not part of the XG System.

If you don't want to limit yourself to the XG Voices, you can load the file "BankIni.MID" or "BankTech.MID" from the "Setups / SMF1" directory found on the TOOL Disk. Apart from the Performance Mode initialisations these files only contain the Bank/Program changes for the Performance and Multi Parts 5 - 16. This way, Bank/Program changes are triggered from each Part's Event list.

The Analog Workshop: Sound Creation Explained

The parameter structure of the CS2x is largely based on analogue synthesis. The following step-by-step guide will serve as an introduction to the analogue building blocks used in the CS2x.

Our tips and tricks can be applied not only to analogue synthesis, but all kinds of tone generation. Naturally, we can't cover every possible detail of analogue synthesis.

Before we begin, a quick note about the fundamental differences between traditional analogue parameters and those found on your CS2x. In contrast to analogue synthesizers, oscillators on the CS2x consist of complete timbres with filter, envelope and LFO settings (Material Voices). Therefore, any parameters that you set are "offsets values" to the settings used in a particular sound, in other words the parameters you set may appear to audibly contradict the displayed values or Knob positions. As always, let your ears decide.

Please note: although the following text refers to the analogue synthesizers' classic sound components like VCO, VCA or VCF, they are of course implemented digitally in the CS2x.

Sound Central – The Oscillator

The heart of the classic synthesizer is the oscillator, or VCO (Voltage-Controlled-Oscillator). The oscillator provides the raw waveforms, which in the CS2x consist of samples with stable tuning. Usually these samples consist of sawtooth, triangle and square waves, as well as several pulse modulated waves. The VCO also controls the pitch of its wave. Coarse tuning is performed in semi-tone steps (Note Shift), fine tuning in cent steps (Detune), LFO's or envelope generators are also frequently used to modulate the pitch of the oscillator.

This also applies to the VCA, which is responsible for amplifying the oscillators' audio outputs so that you may hear them. The CS2x Volume parameter is the equivalent of the VCA.

Picture the CS2x's four Layers as four separate VCOs. Each oscillator's waveform can be selected using the Bank and Program Change commands. As the CS2x doesn't provide for Material Voices with pure synthesizer waveforms, it would be necessary for you to laboriously create unfiltered pulse and sawtooth waves... don't worry, we have taken care of this rather dry and long-winded task: you will find many variants on the classic synthesizer waveforms in the first dozen memories of the [Performance Tutorial Bank](#). You may of course employ any Performances as an "Init Voice", as a reference sound to browse through the Material and XG voices, or simply to practice on. By the way, if you haven't already injected your CS2x with our additional sound data (TUTORPFM.MID), you should do so now (see section "Performance Bulk Dumps"). You will not be able to successfully complete our Analogue Workshop without it.

Let's begin with a simple but immensely useful example: if you are using two or more oscillators to generate your sound you should always detune each oscillator a little using the Detune function. This single parameter can be used to liven up your sound. To hear this effect for yourself, try altering the Detune parameters of two CS2x VCOs.

EXPERIMENT:

Select Performance TP001. Both of this sound's oscillators are set to exactly the same frequency, resulting in a somewhat "flat" sound. Now change VCO1's Detune parameter to a negative value, and VCO2's Detune to the equivalent positive value, e.g. -2.00 and +2.00. Feel free to experiment with other values. Notice how these contrasting frequencies affect your sound. Be careful however not to detune just one of the VCOs (for example 0 and +4.00), as this can ruin the overall tuning of your sound! The two Detune values should always cancel each other out when added together. By the way, some Performances (namely TP003 or 005) use this Detune effect already.

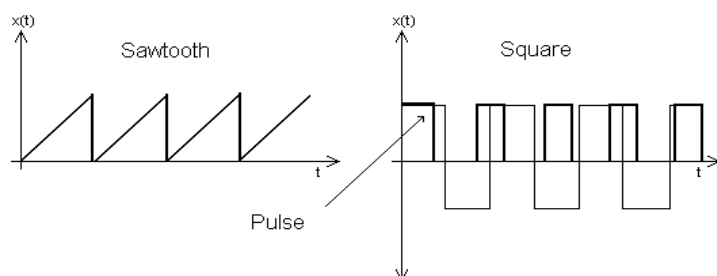
Coarse tuning is another basic tool in the construction of sounds. The most practical use of coarse detuning involves transposing a VCO by one or more octaves. When doing this however, always make sure that the Detune parameter is set to 0. You may even transpose an oscillator or CS2x Layer by a whole 4 Octaves! With a bit of luck you can program some impressive sounds using this feature. Intervals other than octaves may also be used for some specialized sounds, mostly 4ths or 5ths (5 or 7 semi-tone intervals), major or minor 3rds (3 or 4 semi-tones) as well as major or minor 7ths (10 or 11 semi-tones).

So, now you know how and when to tune the oscillators, i.e. the CS2x Layers. We all know however that “it’s the sound that makes the music”, so let’s look at the VCO waveforms in more detail. Just as different synthesizers’ filters all sound very different, VCOs, too, all have their own distinctive sound. Some analogue synths even allow smooth step-free transitions between sawtooth and triangle waves, two waveforms per oscillator and other such fun things. The CS2x isn’t the odd one out here. It is possible for instance to coax two Sawtooth Waves with different sound characteristics from it. The first wave (TP002) corresponds to sawtooth waves that have already proven successful with the Yamaha SY99 and SY85 synthesizers. What is new here, however, is the second, more transparent sawtooth waveform (TP004). We don’t wish to be secretive about this one: the sound is based on a multi-sample, transposed by an octave via the pitch envelope, which gives the sound its fresh tonal shade. There won’t be many of the dinosaur analogue synths that can serve up such a brilliant waveform – this wave is particularly recommended for Dance and Techno tracks. By the way you will probably want to use this wave as a starting point for your own analogue sounds, so we have added a second VCO and detuned both oscillators against each other (TP003/005).

Another of analogue synthesis’ strong favourites is the Square Wave (TP006): this is actually a specific pulse waveform with a peak-trough relationship of 50%. To maintain some oscillation you again have to use two VCOs and slightly detune them against each other. The square wave however is more sensitive to this than the sawtooth wave. The best results are obtained with minimal detuning. You may also need to reduce the second VCO’s level a little (TP007). To be honest, though, this really is a matter of personal taste. Pulse waveforms, unlike periodic square waves, describe the percentual relationship between the wave’s peaks and troughs. As a rule of thumb: moving further away from the consistent square oscillations (50%) results in an more nasal sound. Pulse widths less than 10% are – musically speaking – less prolific. At worst your waveform will approach a pin shaped pulse, i.e. the wave is barely audible. Contained within the wave reservoir are many useful pulse waves, with wave ratios varying between 25% (TP008) and 10%(TP009). The latter is often used to emulate the sound of a clarinet.

Another typical tool in analogue synthesis is the oscillator synchronization (or oscillator sync), originally devised to avoid the inevitable drift between two VCOs. This method opens the doors to the delectable “sync sounds”, two examples of which exist as ROM samples in the CS2x’s memory (TP010/ 011).

Illustration: The VCO Waveforms: Sawtooth, Square, Pulse



Particular attention should also be paid to the Sine Wave. This purely electronically generated wave is alone in not having any harmonics at all, and as such is practically useless for subtractive synthesis. Nevertheless, the sine wave can be found in many a synthesizer's VCO section, and is therefore also included in our Tutorial Bank (TP012). Just how this wave can be used is fully explored in the section titled "Pulling out all the Stops". Much more common is the Noise Generator, a further source of sound apart from the VCOs. In the age of digital synthesis, the poor old noise generator (TP013) has taken somewhat of a back seat. Nevertheless, noise generation still has many interesting applications.

The Filters – Tastebuds for your Ears

Let's take a look at subtractive synthesis' most important element, the Filter, or VCF (Voltage Controlled Filter). This sound component removes selected frequencies from your source material, i.e. the harmonically rich VCO waveforms. The most common used type of filter is the low-pass filter, which also helps the CS2x to produce its characteristic sound. Technically, the filter removes the upper frequencies selected by its programmable cutoff point, whilst the lower frequencies beyond this point pass through unaffected. Specifically, the CS2x filter implementation revolves around a version of a low-pass filter with a 12dB/Oct rolloff. This means that frequencies will be attenuated by 2kHz at 12dB, 4kHz at 24dB, and so on, and as such is suitable for most applications.

The filter also has a Resonance Parameter, which accentuates the frequencies near the cutoff-point. Resonance has many applications beyond the typical character it lends to many synthesizer sounds. Heavy use of resonance, coupled with the above mentioned noise generator can result in many attention-grabbing sounds. On the other hand, a gentle dose of resonance can cleverly be used to "thin out" a sound in a way not possible by simply reducing its volume. In fact, it is generally true that increasing the resonance of a filtered signal will make it sound quieter. Pay particular attention to your sound's bass region; it's here where filtering can affect the perceived "stability" of your sound. Of course you may also use resonance with the filter wide open. The following example will illustrate how and when resonance may be used on its own like this.

EXPERIMENT:

Select the harmonically rich choir sound (TP014). In the context of a rhythm heavy dance arrangement, the choir sound would benefit from a little more "transparency". But how? The filter frequency is already optimal, whilst you have other plans for the effects. The solution here is a little trick: use the resonance as a kind of "pseudo enhancer", a psycho-acoustic studio tool used to add high frequencies to "dull" audio signals. Turn up your resonance! You will find your sound has become "fresher", and will now sit better in your arrangement. Of course this trick can be used in other situations, for example to add a glossy sheen to dull bass drums, tom samples and cymbals.

Exactly how Cutoff and Resonance will affect your sound is easily revealed – simply play with the CS2x's equally labelled Knobs. Both parameters are fundamental in the creation of sound, and their ability to give shape to sound are immense. The low-pass filter's abilities range from the simple "darkening" of a sound right through to fiddly tasks. One of these is the creation of Formants. This, in simple terms, is the use of resonance to accentuate a specific frequency range, so that all partial tones in this region regardless of their fundamental root frequency are noticeably pronounced. The vowels found in human language (A-E-I-O-U) rely on characteristic formant areas. To clarify all this, take the sound (TP015). Here, the two VCOs used are filtered differently, the first without any resonance. The second however uses heavy resonance to produce typical formants, which can be changed using varying cutoff settings.

Dynamic Helpers – Envelopes

All the sound components we have looked at so far have been “static” in their effect, that is to say that they haven’t affected a sound differently over time. Enter the Envelope Generators of the CS2x. Envelope generators control Volume (AEG), the Filter (FEG) or the Pitch of your sound (PEG). An envelope follows the traditional ADSR model: Attack controls your sound’s fade-in time, Decay determines the time it takes to reach the Sustain level, Sustain controls the volume your sound will settle at whilst holding down a key, and finally Release sets how long your sound will ring out after releasing the key. The pitch envelope however also adds Intensity and Level parameters to the standard envelope model (PEG Init, Attack and Release Level).

Lets start with the Filter Envelope: It is responsible for varying the filter’s cutoff point over time, and, as mentioned above, crucial in determining the contour of your sound. More often than not, envelopes with slow fade-out times are used. This is achieved by dropping the filter’s cutoff point to the programmed FEG Sustain Level. In our example sound (TP016) this “dropping” happens quite quickly. This is just perfect for bass or sequencer sounds, which need to be “tight”. As a rule you should pay a lot of attention to your envelopes – especially within song arrangements. You will find that the decay times used have to “gel” with the rhythmic structure of a piece – a tricky piece of engineering, which sadly is often overlooked. For example, a bass sound that dies away too quickly will not “support” the rest of your arrangement properly. In extreme cases this will leave “holes” which can effectively kill the groove of your piece. Using an overly long decay time on the other hand can also cause problems; it may smear a delicately composed rhythmic line. As always, a little delicacy is required. Make sure you acquaint yourself with the properties of envelopes early on.

EXPERIMENT:

Vary the decay time of Performance TP017 to see how quickly filter frequency really drops. Try setting the FEG Decay Time parameter initially to +10, then -15, and finally -35. Important in this also is the envelope’s FEG Sustain Level. Setting this to its minimum -63 level will result in the note completely fading out. By the way, this sound has two Layers, and so you will need to edit both oscillators’ values simultaneously – this is achieved by holding down the Octave Shift key (found on the top left above the display) whilst changing any parameters.

In stark contrast, the next filter sound (TP018) typifies the classic “sweep” characteristic, i.e. the resonation filter’s frequency rises gradually (Attack Time=+55) and then drops sharply (Decay Time) to the level set by Sustain Level. Another variation on this theme is the third envelope type (TP019). Here, the filter frequency drops a little during the initial stages, and then rises fairly quickly to its maximum value (FEG Sustain Level=+63). Feel free to explore the properties of this example’s envelope more fully. You may also try Preset Performances 047 and 048 for further experimentation. These will let you compare different decay times for bass sounds.

Unlike the filter envelope, the Amplitude Envelope Generator (AEG) affects a sound’s volume level, and is therefore also referred to as the Volume Envelope. The scenario where volume levels stay the same throughout the various stages is often described as an “organ envelope”. The Tutorial Bank has many examples of this type of sound (e.g. TP001 to TP010). Because of this property, many of the sounds show the effects of the filter envelope more clearly (e.g. TP018/019).

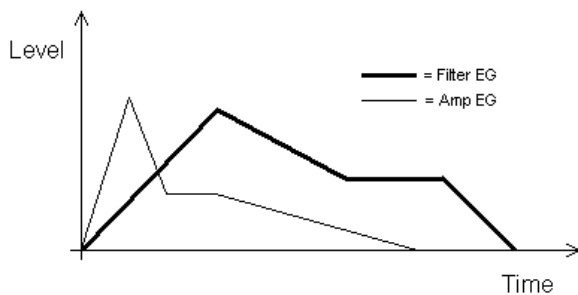
EXPERIMENT:

Using a highly percussive amplitude envelope will give a majestic filter sweep little time to develop. As an example, select Performance TP020. Although you can discern the filter effect with this sound, it is far too short lived. Organ envelopes are simply invaluable for this type of effect. Try setting both Layers' Amplitude Envelope Decay and Sustain Time to the maximum +63. Now sit back and listen to the filter as nature had intended!

Organ envelopes aren't always as useful as in our little example. It is usually important to be able to finely tune a sound's volume level over time; for example, most sounds tend to gradually "die away". A held piano note would eventually completely disappear. The CS2x however is no piano; leave the Sustain level at a high enough setting and your note will ring on and on until you release the key (TP021).

Sometimes all that's required is to "soften" a sound's initial attack (TP022), say with a brass or solo sound. Pad sounds like choir and strings usually benefit from even longer fade-in and fade-out times (TP023), but wait, it isn't quite that easy. First of all, it is always important to find the right envelope for the right job. A good example of the different effect created by fading out the filter rather than the volume of your sound can be found in Preset Performances 015 and 016. Of course it is also good to realize that a sound is the sum of all of its components. You can spend hours lovingly sculpting your filter envelope, but if your low-pass filter's cutoff setting allows all of your sound's frequencies to pass through unhindered, nothing much will happen. In short, the interplay between the filter and amplitude envelopes is vital. A few examples.

Illustration: Filter and Amplitude Envelopes



EXAMPLE:

In order for your sound to be affected by specific filter modulation after the release of a key, your amplitude envelope needs to be longer than your filter envelope. Using a short release setting for your filter envelope (Release Time=-63) will generate a "tearing" effect, typically used for E-pianos, harpsichords or acoustic guitar sounds. A slight increase in release time can produce a simple "echo effect" (TP024). Such tricks can also be applied to a sound's attack time. For instance, the hard edge introduced by a sound's fast-attacking filter envelope can be successfully softened by decreasing its amplitude attack time a little (TP025), without the loss of brilliance that would result from decreasing the filter envelope attack. The moral here is to take the interaction between both envelopes into account at all times.

Let's finally take a look at the Pitch Envelope. Unlike the FEG and AEG, this envelope is predominantly used for specialist applications, and as such is rarely found on analogue synthesizers. Despite this, the PEG has many more uses than you may at first suspect. To prove it, a number of examples... first a little practice to get you fully acquainted with this particular envelope.

EXPERIMENT:

Call up Performance TP026. We're aiming to "drift" the first oscillator gradually away from VCO2 (whose pitch stays constant). Apply the following settings to the Pitch Envelope (Layer1): our sound is supposed to drop after a predetermined time (PEG Atk Tm=+58) by a quarter note (PEG Atk Lv=-27), and then casually restore its pitch (PEG Dcy Tm=+30). When releasing the key, our sound shall then jump upwards (PEG Rel Tm=-63) by another quarter note (PEG Rel Lv=+27). If you want to hear your sound "howl" rather than jump, try setting PEG Rel Time to +40. By the way, if everything went as planned your sound should resemble Performance TP027 – try it!

All this illustrates nicely how siren-type effects can be produced without the aid of the more obvious LFO. More often than not though the pitch envelope is used in the attack phase of the sound, particularly when imitating acoustic instruments. Pretty obvious when you think about it; the pitch of such instruments is still volatile during the plucking of a string or the initial blowing of a flute or trombone. Use of this subtle effect can also give synthesizers a more natural sound.

EXAMPLE:

Obvious examples are brass sounds (TP028). Here, the initial "tearing" at the sound's pitch delivers the right feel. Ideally this change in pitch should be as inconspicuous as possible, but there is of course a time and place for drastic pitch envelope surgery to produce those classic "pitch warp" effects, like sound TP029. Tip: when using two VCOs, try setting the first oscillator's PEG to a positive value, and the second oscillator's PEG to a negative one – after all, variety is the spice of life!

Have you ever attempted to program certain drum sounds or special effects using synthesizer waveforms? Or how about using the pitch envelope to transpose a multi-sample? Let's take a look at some examples.

EXAMPLE:

Take a boring sinewave and combine it with a simple PEG envelope, and hey presto – instant E-toms (TP030)! Another popular trick when using sample ROM synthesizers is the transposition of entire multi-samples – using the pitch envelope!

Transposing a Layer up or down this way by 12 semitones can completely change the basic character of a sound. Transposing down can lure Mellotron-like sounds from your CS2x – for an example try the string sound TP031, which can be enhanced still further by the use of filters or the effects. Shifting this sound's pitch upward however will produce a harmonically richer tone (TP004/005).

It's just as easy and simple to conjure up impressive slide effects (TP032), a useful addition to any synth bass sound.

Helper Motors – The LFOs

The Low Frequency Oscillator or LFO is a special kind of oscillator. Unlike VCOs, the LFO's frequency range is roughly between 0,1 and 100Hz. Of course the frequencies aren't used for audio signals, but rather as controlling signals to modulate the VCO, VCF or VCA sound components. The CS2x calls these LFO modulation types PMOD, FMOD and AMOD.

A synthesizer, just like the human voice, violin, trumpet and many other acoustic instruments, seems "cold" without the use of some vibrato. To illustrate, select the aforementioned pad sound (TP023): although enriched by the detuning of its two VCOs it still doesn't appear as "alive" as would be desirable for a successful pad sound. Pitch LFO to the rescue. This little devil can be used to subtly modulate the pitch of a sound, thereby making it seem more "alive" – much like the natural vibration of the human voice.

To achieve this effect, use a consistent waveform like the triangle wave. Differing speeds and intensities are also useful; both VCO's LFO values should never be identical. It generally pays to offset parameters a little against each other, not just where LFOs are concerned – this gives synthetic sounds life. Our string pad (TP033) also gains "depth" from this treatment. In some cases you may even avoid the need for post-chorusing altogether. Any sounds used for solo work should use a slightly delayed Pitch LFO, i.e. Vibrato. This can best be demonstrated with a simple synthesizer sound (TP034). Here the Material voice used is already programmed to delay the LFO so that the Vibrato is less abrupt.

Just as much fun can be had with the random Sample&Hold waveform (TP035). The short melodic phrases that this waveform can produce have many uses beyond the obvious lead sounds or imaginative sound collages. An LFO with a square waveform can also be used to generate little sequencer-like phrases, such as fifth or whole octave pitch jumps. Dig deeper in the CS2x's bag of tricks though and you will find the ingenious arpeggiator, which will produce stylish rhythmic musical phrases for you. After all, the overworked LFO needs a rest now and then!

EXPERIMENT:

You may have stumbled across some sounds in the User bank that at first sound like a simple arpeggiator pattern. A quick glance to the display however reveals that the Arpeggiator is inactive. Here are the sounds in question "Sq:Cyborg" and "Fx:SinCrony". We have modified both of these performances a little – you can find them in the Tutorial Bank (TP036/037). Your task is to re-activate the LFOs (AMOD and FMOD). You will find that the LFO modulation used in this sound plays very important role.

Completely different sound impressions can be derived from use of the Filter LFO. Using this sound component to control the cutoff frequency of a resonant VCF results in the familiar Wah-Wah effects. The triangle wave is the obvious waveform to use here. Start out by using a slow LFO speed (TP038) – you can always tweak it later. An "impulsive" modulation is desirable when quick chord changes are in order, but lingering pad sounds prefer a more gentle LFO movement. The fun really starts though with the sawtooth waveform, which will generate rhythmic filter movement just perfect for a sequenced arrangement. The Filter LFO with the sawtooth wave can also be used to "chop up" filter sweeps (a la TP039). Great fun, and not just for our young techno generation.

Let's press on: the CS2x LFO can also manipulate amplitude (i.e. volume) as well as filter and pitch. This LFO, known as Amplitude LFO or "LFO AMod", is primarily used for Tremolo effects. Just so you don't get lost in the drudgery of grey theory, here's another little exercise:

EXPERIMENT:

Dial-up Performance TP040; this guitar sound can be made more interesting by applying tremolo effects. To do this, call the Amplitude LFO for both Layers into action (simultaneous edit). The modulation value shouldn't exceed +05. You may want to control when the tremolo effect is applied, rather than have it on all the time. In this case reset the modulation value back to 0. Now set (say) Assign2 to control LFO-Amplitude-Modulation. Oh, by the way, we've already done this for you, try playing with Knob8. Now you can freely add tremolo effects to your guitar sound whenever you want.

Are you getting familiar with the amplitude LFO? A little further experimentation should give you an even better idea of how and when it can be used. First in line for treatment are strings and other pad sounds (TP041). Here too natural sounding and consistent volume changes are achieved with the triangle waveform. The sawtooth in contrast produces more distinctive rhythmic patterns (TP042) which tend to be more ornate, however, than the comparative LFO Filter modulation.

Question: what's even better than an LFO? Answer: two LFOs! But the CS2x though has only a single LFO. How can we solve this?

EXPERIMENT:

Simply combine two Layers when you want to play with two LFOs. Offsetting the speeds of the two LFOs can yield surprising results. Try doubling/halving the speed of the first LFO, or vice versa. Panning each Layer here left and right helps to accentuate the interplay between both LFOs (TP043). Even "analogue echo effects" can be achieved with the LFO. For this, the sawtooth wave is most appropriate. You will need to play "staccato" (release the keys quickly) in order to achieve these echo effects (TP044).

Everything sounds reasonable so far. But what does Init Phase do? Don't panic, all shall be revealed: as the name suggests, this function is used to determine the LFO's general phase setting. All of the CS2x Low Frequency Oscillators can be synchronized to each key press using the "Retrigger" option. When this is set, a sound's modulation begins exactly when a key is pressed (TP045), something which is usually desirable. Now all LFOs are running in phase, there is no variation between each separate voice. Should you wish to involve a little randomness in this process however take a look at "Freerun" (TP046). Both examples demonstrate nicely how the different phase settings affect a sound.

About the Little Things

Now that we're approaching the end of our little workshop we should take a look at what effect the monophonic mode has on the Portamento function and other sound parameters, features which are so often neglected. This is a shame because as in life, it's the little things that count.

The Mono/Poly setting determines whether a sound can play many notes at once or just one at a time. Is this to save on voices? No, this time it's not a case of economics, it simply wouldn't make sense. Instead, the Mono function is a tool to replicate specific playing techniques used with analogue synthesizers.

EXAMPLE:

All monophonic synths respond in a certain way when a second note is pressed whilst the first is still being held. Incidentally, a polyphonic synthesizer's Unison Mode does exactly the same thing, i.e. all voices are assigned to a single note – every new voice cuts off the previous, which resurfaces however when the new note is released. This effect is used to produce fast trills in synth solos. To demonstrate, here's a sound which you can play polyphonically first (TP047), and then monophonically (TP048). Comparing the two modes should give you a good insight into the practical uses of the Mono function.

The difference between the Mono and Poly mode is even more pronounced when used in conjunction with the Portamento feature (Porta Switch or via Controller #65). This parameter is also part and parcel of synthesizer playing techniques. The Portamento function principally enables step-free gliding from one tone to the next, one of electronic music's most fundamental stylistic tools. The Portamento speed has to be selected according to the sound and interpretation used. With the sequencer this can be achieved with Controller #5 (Portamento Time).

EXAMPLE:

It is often required to be able to vary the glissando effect on impulse during a live performance. This can be particularly useful with different solo phrases. Setting Assign1 to the PortaTime function will allow you to control the Portamento speed with Knob4. The Performances TP049/050 will demonstrate this nicely. Pay particular attention to the Portamento differences in the Poly and Mono modes. Try varying the Portamento speed and observe how the CS2x reacts. A little time and effort is all it takes to deliver impressive synth solos to an appreciative audience – practice makes perfect!

The Mono mode in conjunction with the Portamento Function can approximate the Single Trigger Mode, made popular by many Minimoog bass lines: when two keys are held down at the same time during legato style playing, the second note's attack phase (usually a typical filter sweep) is inaudible – the first note's envelope stays uninterrupted. Only when the current key is released will the second note's envelope come into effect.

EXPERIMENT:

To make all this a little clearer, call up Performance TP051. Playing this bass sound staccato style will produce a percussive filter attack for each note. During legato playing however, only the first note's attack is heard. Why? Simple: the Portamento function is in effect, although the characteristic pitch glide is missing. This is achieved by setting the Portamento speed to 0 – a little trick, used here to great effect. If you want Portamento however, simply adjust the speed for the required effect. Now disable the Single Trigger Mode (TP052). Now trill a few notes - you will find that many playing techniques and much phrasing is now impossible. To demonstrate, take a listen to the short demo "TUTRDEMO.MID", which we will cover below.

Lastly, the somewhat tricky subject of Touch Sensitivity. The CS2x offers no fewer than four related functions (see section “Performance”, “Velocity” in the manual). More often than not, you will want to finely tune a Performance’s touch dynamic individually. How is this achieved?

EXPERIMENT:

The Performance’s touch sensitivity can be set using the Velocity Offset function. In order to fully exploit the whole dynamic range, Velocity Depth should be set to maximum 127. Select Performance TP053. Now gradually increase the Offset value. See what happens? The touch sensitivity is beginning to stabilize. This sounds great. Unfortunately the tone is getting brighter. That’s not quite right! Why is this happening? The culprit here is the Material Voice. It is programmed to increase the filter frequency with increasing key velocity. Therefore, increasing the offset value also increases the sound’s harmonic overtones. Beware – many other sounds exhibit this behaviour too when their touch sensitivity values are changed.

Many sound creators take particular pride in their famous Velocity Switch sounds. To prove the point, we have created four sounds, which will demonstrate the practical uses of velocity switching.

EXAMPLE:

Acoustic instruments in particular can be made to be much more dynamic using Velocity Switch, such as string sound (TP054). When played energetically, the second Layer, with its faster fade-in and out times and a more transparent timbre, will be heard at velocity value 81 and beyond to underscore your more intense playing style. The simple Rhodes sound (TP055) serves to demonstrate how different effect settings, too, can be utilised in these dynamic separations. When this sound is played particularly hard, the “Auto-Wah” Variation effect is activated for Layer3 (at a velocity range of 120 - 127). Layer 3’s Hall setting has also been reduced in order to emphasise the Wah effect.

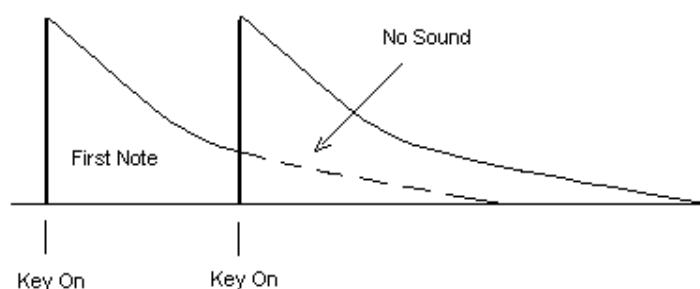
These dynamic separations can produce some pretty wild effects, particularly suited to Dance productions. Why not use velocity switching to trigger individual accord sounds for example? Try it with a house piano, way-out analogue sounds, or as we have done in our example a choir sound (TP056). Creative velocity switches are particularly effective when used with rhythmic parts. You could for example layer two drum kits (snare) and switch between them dynamically (TP057). Again, remember to make use of the effects and any of the other sound components, too - it’s a great way to create highly original sequences.

Summary

We've made it – that was a lot to take in! Now spoil yourself, relax to a little demo sequence we prepared earlier (TUTRDEMO.MID), and listen for special guest appearances by the Analogue Workshop All-stars!

- (A) The song begins with a Performance with two oscillators that are detuned against each other in real-time using Assign2 (Knob 6). We'd like to point out once again that fine tuning the VCOs can sound interesting in itself and provides for many yet unexplored possibilities. In general, today's approach to VCOs is quite different from what was in the '70s and '80s. Most TB-303 type bass sounds were programmed with just a single VCO, something that has become fashionable once again. Back then, mighty Minimoog basses using three oscillators (!) were very popular. Today, two VCOs are commonly detuned against each other, particularly with lead or sequencer sounds.
- (B) You will hear a sequencer theme starting at bar 9, which we will use to demonstrate a little trick: the sound is initially programmed without Filter Resonance, but this becomes active in the second half (bar 13-17). Note how the sound is changed. It suddenly sounds fresher and as a result is more discernible in the arrangement. If you wish to apply this little artistry to other sounds, you need to ensure that the cutoff frequency used is set to the maximum value, otherwise you will hear the typical synth bass or sweep sound resonance filter effect.
- (C) Now we move onto a good example of the interaction between the Filter and Amplitude Envelopes: at first you can hardly hear this sound's filter sweep as the amplitude isn't set correctly for it. At bar 21, however, the sound's fade-out time is increased (Assign1: AEGDcyTime) and now the filter sweep's development has become audible. To summarize: the filter envelope is only fully effective when the amplitude envelope is stable enough.
- (D) Bar 33 introduces a pad sound. The sound does seem a little bland, despite the lively beating produced by its two detuned VCOs. This becomes even more obvious in bar 39, where the same chords are played by a synth pad for comparison. The sound's richness here is due to intensive LFO Pitch Modulation. In the most extreme cases you can even forgo the Chorus effect altogether, which can be a great help, especially with the Multi mode's tricky effect assignment.
- (E) The next example will show just how and when the Amplitude LFO can be applied: it doesn't always have to involve synth sounds. An acoustic guitar sound can be invigorated with Tremolo effects, too, especially when blended-in authentically with Knob8. Pay particular attention to when the Tremolo is applied. With a little practice you'll be able to play many sounds authentically using real-time control.
- (F) Bar 54 introduces an extra classy analogue sound: no, you're not listening to the CS2x effects here, these echo effects are part of the sound! This is done with the aid of the Amplitude LFO, here using the sawtooth LFO waveform to imitate this effect. The effect is emphasized six bars later with determined filter modulation. This trick can be especially useful in the Multi mode (as in example D), where the Variation effect may already be assigned to other tasks and no "Delay" is available.
- (G) We're now playing a simple chord sequence with two different LFO Phase settings: you won't notice anything special in the first instance, as all voices start with their respective triggering as expected (Phase Init: Retrigger). If you set the LFO to "Free Run" however, the notes are triggered irregularly. This is demonstrated by the repeated chord sequence, which is now played by Performance TP064. We have reinforced these irregularities with random Pan movements ("Random").

Illustration: The CS2x Mono Function – ideal for Solo or Bass Sounds.



- (H) The focus shifts to the Portamento and Poly/Mono functions at bar 80: here we are switching between the two modes whilst playing a lead sound, to make studying these functions easier. Compare the differences between the two modes; the Portamento function is very revealing here. It would be better still to try out the behaviour of Mono and Poly sounds for yourself, so stop the sequencer and select Performances TP049/050. If you prefer to stay inactive for a while, then at least listen to the modulations of the following solo part's fade-out, Portamento speed, as well as Filter frequency and Resonance.
- (I) Whilst the finale may not be grandiose, it is certainly informative: note the Single Trigger mode's specialities, here shown with a typical synth bass sound. Hand on heart, have you ever investigated this subject? If you haven't, you really should spend some time on it. Until you have, you will not be able to arrange your bass lines for this style. Especially if you want to produce the unmistakable bass slide effects. So, acquaint yourself with the Single Trigger mode (also known as Legato mode) and its properties. Bar 118 sees a slide effect without the use of the Single Trigger mode, which kicks in however at the next bar. Take note of the two different sounds produced. The previous sequences also will clarify this interesting phenomenon.

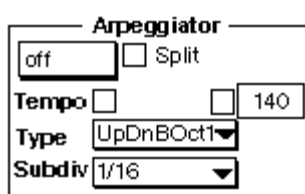
Arpeggiator: A Box full of Tricks for all Occasions

The CS2x Arpeggiator is very clearly laid out. It consists of only three parts: Type, Tempo and Subdivide. In addition, the CS2x outshines itself with 2 further settings which you should get acquainted with early on.

One of these is the Hold function, which can be activated by pressing both buttons on the left hand side above the LC-Display. This function greatly aids relaxation during live performances, as it has since its earliest incarnation; you need to play a chord only once; the Arpeggiator play will repeat it tirelessly for you. This frees both hands for other tasks and can, amongst other things, be very “handy” for trying out different arpeggios or sequencer sounds!

With the aid of the Arpeggiator Split function you can limit the Arpeggio key range to notes below the C3 key (see section “Performance Mode”, “Arpeggiator Split” in the manual). Notes above this point can then be used for accompanying fills, perhaps using a different sound altogether.

Illustration: Arpeggiator Uses at a Glance



EXAMPLE:

We have prepared two sounds for this which can be found in the Tutorial Bank. To start with, call up Performance TP058. Now trigger the Arpeggiator using a single key below C3. The sequence will keep on running, even after you have let go of the key thanks to the activated Hold function. You can still use both hands to play chords or fills on any of the keys above the Split point – go on, try it!

You need to be careful however when using Split Performances, as the Arpeggiator will distribute any chord notes over the entire note range, regardless of which sounds will be played. In other words, if you are using two different sounds split across the keyboard, it's quite possible that the Arpeggiator will mix up both sounds! Performance TP059 is a good example of this. Here a Rhodes sound used above the split point that has suffered in the process. Tip: If you want to ensure that the Arpeggiator only triggers the sound below the split point, use the following Arpeggio types: UpOct1, DwnOct1/ 2/4, UpDwA/BOct1 as well as Random Oct.

Now let's look at the three main functions. To begin with, you can select any of the 40 available Arpeggio Patterns. These can broadly be divided into separated chords and special patterns that vary in sound color, dynamics or rhythm. The second function is all about tempo. If you want to use the Arpeggiator with a drum machine or sequencer and wish to be able to react to any tempo changes or drifting, set this to MIDI. This instructs the CS2x to wait for an external “director” via the so-called MIDI Clock Pulses.

There are three things you should bear in mind: First, check that your sequencer can actually send MIDI Clock commands. If you can't hear an Arpeggio Part, the most likely explanation is that MIDI Clock is disabled in your sequencer program, so always check to make sure it's enabled.

Secondly, it is advisable to time-shift the track containing any Arpeggiator chords by a few milliseconds. This ensures more precise Arpeggio starts. Thirdly, experience has shown the value of re-triggering any Arpeggios that step through the same notes repeatedly as often as possible. The same method has also benefited the sampled drum loops by ensuring clean timing.

To begin with though you have to establish the actual length of your Arpeggio loop. To work this out, we have to deal with the Arpeggiator's third major function, the Rhythmic Resolver (Subdivide). Some of the available divisions are self explanatory: 1/32, 1/16, 1/8 and 1/4 divide a chord into 32nds, 16ths, 8ths and quarter notes. 16th, 8th or 4th triplets are however resolved and played by 1/24, 1/12 and 1/6. But wait, there's more, the CS2x also offers 3 further divisions (3/23, 3/16, 3/8). Later we'll deal with their applications with a little exercise.

EXPERIMENT:

Without knowing much about it, we wish to determine an Arpeggio's length. Just how the Arpeggio proceeds is dependent on several factors – the Arpeggio type, the rhythmic resolution and the total voice number used in an arpeggiated chord. Select Performance TP060.

Now start playing using a four note chord, for example a C major triad with an octave root note. The Arpeggiator begins by breaking down the chord into 8ths (Subdivide: 1/8) and then arpeggiates it over two octaves (type: UpOct2). You will hear that the Arpeggio repeats itself after exactly one bar (s. Note Example A). This means the loop is 4 beats long, i.e. you can re-trigger the Arpeggio after 4 beats. Now experiment with different Arpeggio types and rhythmic resolutions. For instance, select Arpeggio type "DwOct1" and a 1/16 resolution. If you now play the same chord, you will notice that the Arpeggio now loops after only one quarter (s. Note Example B). Feel free to try a few other combinations. You will soon get a feel for how the different Arpeggios sound.



Note Example A



Note Example B

First Steps

Let's deal with the simple Arpeggio patterns "Up/Down" and "Random" first. These are by no means unique to the CS2x, but can be found on many a synthesizer and therefore serve well as an introduction as to how Arreggiators automatically break up chords. What this actually sounds like isn't important right now. We want to concentrate exclusively on the sequence of notes produced. We recommend Performance TP060 or a similar percussive sound for reference.

EXPERIMENT:

Select a 1/16 resolution and a tempo between 100 and 120bpm. You can of course also set the tempo via MIDI Clock synchronization – actually that's a good idea, as you can then use the sequencer as a reference to help you understand the Arpeggio beats and rhythms better. Use the four note C major chord for all Arpeggios (triad + octave root note). Now listen how the Arpeggiator translates this chord:

"UpOct1-4" – here each chord note is playing from the bottom note to the top note over 1, 2 or even 4 octaves if desired. The opposite sequence results from type "DownOct1-4", i.e. the notes are played starting with the highest down to the lowest. "Random Oct1/2/4" however selects the chord notes randomly from a 1 to 4 octave range.

Whilst the above Arpeggio types hardly require further explanation, there is one noteworthy difference in the case of the combined Up/Down Arpeggio type. As you might expect, in both cases the Arpeggiator begins with the lowest note, ascends to the top, and then descends back down again, regardless of whether 1, 2 or 4 octaves are selected. Still, the note sequence produced is slightly different.

EXPERIMENT:

Play the C major chord using Performances TP061 and TP062. If you now follow each sound i.e. the sequences generated by "UpDwAOct2" and "UpDwBOct2", you will notice a small irregularity with type B: the root note is not played again after the highest note has been reached – all the other Arpeggio types in the last EXPERIMENT did! This results in an unwanted "shifting", i.e. the Arpeggio's root note doesn't always fall exactly on the correct beat. The following Note Examples should make this a little clearer.



Note Example: UpDwAOct2



Note Example: UpDwBOct2

Sound Rhythm Tricks

Looking at these UpDown Arpeggios may lead you to the conclusion that the chord notes are somehow “drifting across the beats”. Perhaps you have already come across this phenomenon when working with other Arpeggiators or testing some of the CS2x factory sounds. It's true: you can never separate rhythms and chords when working with the Arpeggiator! Here's an example.

EXPERIMENT:

Leave the resolution of Performance TP063 set to 1/16 and type “UpOct2”. Now play a C major triad in the basic configuration and examine which beats the arpeggiated sounds fall on. After the first cycle, the root note lies somewhere between the second and third beat, after the second cycle it falls on the fourth and after the third it's now between the first and second beats, and so on. If you set the resolution to 1/24 triplet however, the C note will always fall exactly on each beat.

Let's look at this from another angle: Trigger the Arpeggiator with a four note chord (use the C major chord with root note octaves) and you will find that the C note doesn't fall on the beat anymore. To correct this, choose an even-numbered resolution (e.g. 1/16 or 1/8). Now everything is back to normal – i.e. the arpeggiated root note falls once again exactly on the expected beats.



Note Example: 1/16



Note Example: 1/24

Are you with us so far? We have a little EXPERIMENT that will demonstrate the direct relationship between the number of chord notes and the chord's rhythmic resolution. The rule of thumb here is that you should always choose even numbered chords for even rhythmic resolutions (1/4, 1/8, 1/16 and 1/32) and (say) three note or five note chords with odd-numbered resolutions (1/6, 1/12, 1/24). That's the only way to avoid generating unwanted syncopations with the Arpeggiator.

A special case is the dotted note rhythms (3/8, 3/16 and 3/32). The above rules don't apply here. These resolutions are mostly relevant to odd-numbered beats, such as 3/4, 3/8 or 6/8. You will need to play chords with an even note number to play back these three-part rhythms correctly.

EXPERIMENT:

Select Performance TP064 with Arpeggio type “UpOct2” and a 3/8 resolution. Now playing a triad will find the root note on the first beat in the 4th bar, (in other words irregular cycles are generated). A 4-note chord however generates symmetrical 4 bar cycles, i.e. the root note is repeated after the first cycle on bar 3, after the second cycle on bar 5 and after the third cycle on bar 7 etc. - always on the first beat.



Fig. Example for 3-part / 4-part music



Fig. Example for 3-part / 4-part music

Between you and me: you don't always have to be so strictly analytical. The occasional breaking of the rules and other such mischief often produces the most interesting music! Anyway, these rules only really apply to the consistent Arpeggio types like the CS2x's Up/Down patterns. If you are planning to use more noise orientated sounds or special effects, feel free to experiment as much as you want. After all, if it sounds right, use it.

Fun to the power of 25!

If all this leaves you cold, you clearly haven't heard the CS2x's 25 special Arpeggio Types (TechnoA to MuteLine)! First a quick note: all special types don't lend themselves well to triplet rhythms. The best results are achieved with a 4/4 beat and a resolution of 1/16, 1/8 or 1/32.

No doubt, a lot can be achieved with these ready made sequences, especially when you have just run out of good ideas. But what exactly is happening here? In order to utilize these 25 Arpeggio types more effectively you will need to acquaint yourself with each of their properties.

Put simply, the special Arpeggios add filter and pan position modulation as well as more complex stepping of rhythm and dynamics to the more straight forward Up/Down Arpeggios. Chord notes, their number and octave position however are resolved differently from what you might expect. For example, playing a four note chord with some Arpeggio types will result in only two notes being played in different octaves. We will demonstrate the properties of the special Arpeggio types with a few exercises. Let's use a systematic approach and start with the filter.

EXPERIMENT:

Select Performance TP065 and play any single note. Can you hear the filter modulation already? Well no, of course not. This shows you that the filter frequency has to be set correctly in order for the filter modulation to have any effect. All you need to do is turn the Cutoff knob counterclockwise. Now you should hear the filter change across two bars: the cutoff frequency rises during the first four beats, then drops during the second half at the same rate. This is due to the Arpeggio Type "Techno-A"!

The CS2x however, boasts a second type – "SweepLine", here, too, the Arpeggio automatically modulates the filter frequency, raising it after the third quarter, and then dropping again after the third quarter of the second bar. Intrigued? Go ahead, select Performance TP066 and see for yourself.

Of course you can always change the filter yourself in real-time with the CS2x knobs. Dynamic Pan Positions are more tricky. Never fear, the Arpeggiator will once again make your life that little bit easier by providing types that take care of distributing your notes in the stereo image. Here, too, you will need to pay particular attention to the corresponding sound parameters, as the modulation can be affected by unsuitable effect settings (e.g. an excessive "Chorus Send" value) as well as the Pan Position function.

EXPERIMENT:

Using Performance TP067, hold the keys down for at least two bars. As well as rhythmically distributing the held notes the Arpeggio pattern "Techno-D" also loosens the rhythm with pulsating left-right movements. This will breathe plenty of life into your sequencer arrangement. Arpeggio type "Echo&Pan" is also a good alternative. Here, too, the Arpeggio sequence influences the sound's Pan Position. To demonstrate, try Performance TP068.

Things don't always run as smoothly as in these examples. Sometimes you need to tinker a little to actually hear the Pan modulations. For example, try getting these stereo movements to work with Performance TP069! Have you discovered how to do it yet? The key to success here lies with the Variation effect: set "Var Send" to "On" for the first Layer and bathe in the full Arpeggio effect inclusive of Pan modulation.

There is much you can do with these filter and Pan modulations. Nevertheless, the most noticeable property of the special Arpeggios is doubtless their "musicality", supported by individual rhythms, small dynamic shifts as well as the chord note variations. Let's spend a little time on these "dynamic" changes.

EXPERIMENT:

Let's examine Arpeggio "Echo&Pan" a little more closely. As the name suggests, this type automatically produces echo effects – mostly with the help of different key velocity values. Play Performance TP070 with any sound you wish: its volume audibly fluctuates within a single bar. This process is repeated every four beats. The same thing happens with Arpeggio type "TekkEcho" (TP071). Although the Arpeggio figure here is 8 beats long the dynamic pattern is the same. You can observe this, for example, with the "BaseLineB" type. Tip: if you like the Arpeggio's rhythmic and pan movements but aren't so keen on the dynamic variations, simply set the Velocity Offset value to the maximum +63.

Let's go one step further and finally examine the musical aspect. Let's look at how many chord notes the Arpeggiator actually utilizes. Particularly with respect to song production, the CS2x offers a choice of very special Arpeggio types. Their names will already give you clues as to how these may be put into action.

EXPERIMENT:

Begin by selecting Performance TP072. Playing (for example) a C major triad in its basic configuration will give you a typical bass figure. Hardly surprising when you take a look at the Arpeggio type in the display: "BaseLineC"! Now take a closer listen. The Arpeggiator plays only root notes and 3rds! Not all your held notes are being played. The Arpeggiator "filters" the notes depending on the context and what its sequence is supposed to do – just as well! This type, like the other "BaseLine" types for example simply ignores your chord's 5th.

There are some other types that also don't translate your chords in the way that you might expect. Arpeggio types "SweepLine" and "PulseLine" as well as "SyncopaA" or "Techno-C" for example accept only chords with up to three notes, in other words a 7th or even a 9th is simply ignored. Alternatively you can reduce a 7th chord to three notes by leaving out the chord's 5th. Use Performances TP073 and TP075 as a starting point to explore the polyphony and overall structure of each Arpeggio type.

Effects – used in a different way

Enough of these lengthy experiments. With the help of a few practical examples, we now would like to show you the Arpeggiator's many musical day-to-day applications.

The interplay between sounds and Arpeggio sequence is an important area that we haven't even touched on so far, but therein lies the art of Arpeggio playing! An Arpeggio that triggers hundreds of different sounds will produce just as many different results, and when used with especially flexible instruments like the CS2x, they open up a whole world of possibilities.

This is particularly emphasized when you consider that musicians used to be stuck with analogue synthesizer sounds. Many interesting tonal shades could of course be taken from their fast envelopes, heavy ring modulators or powerful noise generators, but it was sheer Utopia to envisage being able to control all imaginable samples with an Arpeggiator. Simply put, the CS2X blows the tonal "corset" to smithereens, and with it all convention and ability to imagine the things that can be realized with an Arpeggiator.

Therefore, let's start with sounds that you might never even have dreamed of using. Several years ago, when sampling technology finally become affordable, it's performance wasn't restricted to your everyday "natural" instruments like piano and strings, but extended to very specialised effects generated by a Sampler, which was particularly popular in the studio scene and could thus be heard in numerous productions. One of the most well-known of these was the "Mickey Mouse" effect. So why not use the Arpeggiator to create an unusual effect?

EXAMPLE:

The following five Performances really should convince you that this subject is seriously worth looking into. So, dial up the first sound example TP076 and play it with just one note.

If this doesn't even vaguely make you smile, select the next Performance. This too is a special kind of effect, which really doesn't require further commentary. Seriously though, don't you think it would be very "original" to use these little sequences with, or as the basis of one of your songs?

The next three Arpeggiator sounds are much easier to integrate into a sequencer arrangement. For example you could use them to program unusual rhythm tracks. As mentioned before, the Arpeggio as well as its tonal aspect play an important role in this.

EXAMPLE:

Let's deal with Performance TP078. It is based on the SFX voice "Burst" and has deliberately been transposed another two octaves (Note Shift=+24) – this is where the "Aliasing Effects" come to the fore. If you have never come across this term before, here is a quick explanation: Aliasing errors occur when a sound's frequency is greater than half that of the sampling frequency used to digitise it. The result is a frequency differential that corresponds exactly to the difference between the original frequency and the sampling frequency. Tonally speaking, Aliasing results in drastic distortion, which can however be used very effectively in sound development with ROM-Sample-Synthesizers, especially with the aid of the Arpeggiator.

Perhaps you have thought about using the CS2x Arpeggiator to imitate wave sequencing – well, you can.

EXAMPLE:

The Arpeggio found in TP079 is straight from the Wavestation. The basic sound, as in our last example, was shaped primarily with the aid of the pitch envelope. Equally important are the effects, especially the Delay (VARY TYPE). The delay times take their cue from the Arpeggiator tempo. A little tip for fiddlers: try to work with keyboard splits if you want to create even more interesting wave sequences. Assign Material voices that complement each other well for each of the four Layers.

The last SFX Arpeggio is a percussive sequence which can be applied universally. Particularly nice here is Pan Position modulation.

EXAMPLE:

Select Performance TP080 and, as in the previous examples, play only a single note. The sound's main character is provided by the Flanger effect. This effect is responsible for the regular up and down movements that you will have noticed immediately. The Flanger by the way is also sometimes referred to as the "Jet Effect". Pay particular attention to the relationship between the Flanger's LFO speed and the Arpeggio tempo. With this too, many variation possibilities can be achieved.

Feel free to experiment with the Arpeggio types and tempi of all these SFX examples. Utilizing the Hold function will save you having to constantly re-trigger your Arpeggios.

Hard Chord Work

Furthermore you can use the integrated Arpeggiator for various chord break-up duties. Particularly, musical sequences can be arranged intuitively with the special Arpeggio types, and here the same applies again; a more unusual sound results in a more original Arpeggio.

Let's however deal first and foremost with the traditional synthesizer sounds. In this area alone there are thousands of possibilities to explore, all of which can be used effectively for your arrangements. To demonstrate we have prepared two Performances.

EXAMPLE:

Performance TP081 consists of only one Layer, that is to say only one sawtooth wave. Of course you could always use two detuned oscillators to give the sound volume. If this sound however is only to be used as an arpeggiated accompaniment, then one Layer should suffice. Doing so also helps keep the voice count low, which will benefit any multi-timbral duties. Again, pay attention to the effects. Here, as with TP079, the delay is used rhythmically.

If you hold your chord down a little longer you will find that the Arpeggio generated sequence repeats after exactly two bars. Here is a simple but efficient trick: vary the length of the sequence, i.e. trigger the Arpeggio after a quarter, a half or a whole bar. This will shape your Arpeggio in ever more interesting ways and allow it to be used more distinctly.

Select the next Performance (TP082) to hear a classic Arpeggio sequence. A simple analogue sound is steadily arpeggiated up and down over four octaves. Altogether this sound is fairly delicate and can thus be utilized for graceful as well as frantic accompanying parts (ARP Subdiv 1/32). Intriguing effects can be achieved by varying the tempo during the Arpeggio process – simply use Knob 4 (Assign1). This really is a special means of expression. You can now shape the Arpeggio to any musical context (for instance to heighten chord sequences by stepping them chromatically up and down) or to your own personal interpretation.

Sounds interesting – but can the Arpeggiator only be used for Synthesizer sounds? Well, actually no, even traditional musicians get a great deal out of it. He/she may for example use it to create Tremolo effects for acoustic instruments, like the mandolin or steel drums. "UpOct1" or "DwOct1" are the most appropriate Arpeggiator types for this. Here's a little exercise.

EXPERIMENT:

Consider Performance TP012 as a "Sound Init". Now instead of the sine wave select Steel Drums (e.g. XG001/ #115) and activate the Arpeggiator (the Arpeggiator type is already set correctly). All that's needed now is a tempo between 200 and 240bpm; all entries have been made. Now play your Steel Drums, in thirds just like the original. If you are pleased with the result, save your Performance. To add even more authenticity to the sound, try setting Assign1 to control the Arpeggio tempo as in our last example and gently vary the speed of the Tremolo with Knob 4.

Naturally this isn't all there is to it. The following are another four sequences that are particularly useful for modern styles like House or Trance – you should like them.

EXAMPLE:

The Performances TP083/084 are really quite traditional. With the first you will hear a two bar Clarinet sequence. You should keep your triggering chords held down for at least four beats on account of the daring downward octave jump and special rhythm.

The next Performance is enriched with Pan and Echo effects, and would work nicely as a House piano. Here a single key triggers an entire 7th chord (minor 7). Interesting also is the real-time control via Assign1/2. Knob 8 will let you vary the chord note's volume, whilst Knob 4 is used to vary the rhythmic resolution (Subdivide). Moving this knob fully clockwise decreases the note values from 1/16 down to 1/32, which effectively doubles the speed of the sequence – one to use quickly and impulsively!

To prove once and for all that the sound used is the most important element that gives the Arpeggio sequence its character, we have assigned Arpeggio type "Echo&Pan" to a phased choir sound. The resulting sound can be found in TP085. Hard to believe that this fourth and final example (TP086) is based on the same Arpeggio type, isn't it? Particularly ingenious is the use of the differing dynamic values that are generated by the Arpeggio sequence. If the values exceed 92, an "analogue" filter sound is heard (Layer2), if they are less you hear a "digital" sound instead (Layer1).

Keeping in Line

It doesn't always make sense to trigger arpeggios with triads or other chords. Often it is better to play a single note, or the Arpeggiator may reduce polyphonic playing to a single note anyway. Naturally we have some examples for this, and will comment on them below.

EXAMPLE:

The first Performance (TP087) is a good example of arpeggio filter modulation. Combined with the distortion effect the filter movements are nicely pronounced and should set well even with Hardcore Freaks. As mentioned before, play this Performance with a single note only. Triads wouldn't really be useful here because of the fuzz effect. A second voice however may be added if you insist. A listen to the third Arpeggio Demo will reveal all.

The second Performance (TP088) is living proof that a bass line Arpeggiator type isn't restricted to bass sounds. Here we are using a particularly flavoursome sequence, seasoned to taste with a hefty dose of flanging. The Arpeggiator insists on playing only the root and 3rd notes, even if you play a triad; this is a good thing.

Perhaps you prefer to work with monophonic sequences, but the Arpeggiator occasionally produces two or more notes at once. No problem, with the aid of a small trick: simply use the Poly/Mono function to reduce your Arpeggio to one note, just like that. This opens up a whole new bag of variation possibilities, which in turn affect the Arpeggio pattern. A little example should make this clearer.

EXAMPLE:

Change Performance TP089 to POLY (Layer1). Now if you trigger the Arpeggiator, you can if so desired play polyphonic chords. This would however be a little impractical with bass sequences, especially if you use the Portamento function. As you will have already seen in the Analogue Workshop, sounds are supposed to be played monophonically with this function. We have already set up the Performance this way and thereby enabled the "Techno-B" Arpeggio type for bass lines. While you're at it, try out Performances TP090 and 091. Experiment a little with the Portamento and Poly/Mono functions to give you an idea of how Arpeggio sequences can be significantly altered with them.

Let's Groove!

Anyone who has worked with Samplers will be familiar with their quirks: you have to constantly process drum loops with the time-stretch function so that they follow your song tempo correctly – this can take some time. On top of this you can barely influence any of the loop's instrumentation, never mind edit the grooves themselves.

How about triggering a drum kit with the Arpeggiator – is this possible? Yes, of course it is. The rhythms that can be created this way at the touch of a key would be very difficult to create using the Drum Editor of your sequencer package. And there are of course other advantages – you can use the CS1x's effects and other parameters on each sound individually, you can create new grooves with the Arpeggio styles, and these can always be synched to your sequencer's MIDI clock so they always run perfectly in time with your song!

So, call-up a drum kit set and turn on the Arpeggiator: sequences will spit out drum sounds like there is no tomorrow! The uses that these drum sounds can be put to are incredible. A few tips:

EXAMPLE:

All our recommendations are based on Performance TP092. To begin with, leave the Arpeggiator set to "Techno-C" as this is perhaps most suited to the spontaneous arranging of rhythm patterns, particularly when improvising with drum sounds. Start out by triggering only single notes. You will hear special single bar patterns. A few examples follow:

F#1: Fill / Snare drum and Hihat

F2: Basic Groove / Bass and Snare drum, Toms

H2: Add Drum Sequence / Analogue Toms and Snare

D#3: Basic Groove / Bass drums and HandClap

F#3: Fill / typical for Hihats

So, how about using chords? Let's try the following combinations: F2 – Ab2 – Bb2 – Eb3. Press each chord note one-after-the-other and listen to the gradual build-up of a complete drum kit groove. We actually use this rhythm for the first Arpeggiator Demo.

Trying out several variations should pay off too – different Arpeggio types, effects or other sound modules can all give interesting results.

EXAMPLE:

Select the next drum kit (TP092) with an Arpeggio type of "DAHouse". The first thing you will notice here is the rhythmic use of the Delay effect. The sound is further processed by the pitch envelope. Using some subtle changes makes for a more lively drum sequence. You could use these grooves for effective rhythm tracks. Now add a bass drum to the groove (Four on the Floor) and bingo – you have an instant original Dance sequence! An alternative to this can be found in the next memory. Here, the Arpeggio type "PulseLine" is put to work with a clichéd Flanger effect.

Performance Mode: Practical Knowledge

Now that we have looked in detail at the CS2x sound components and its Arpeggiator, let's devote some time to its Performance Mode. The following three subjects should generate particular interest: use of the knobs and Scenes, Effect applications and, finally, tips and tricks for live applications. If you haven't already transferred the relevant sound bank ("TUTORPFM. MID") to your CS2x, you should do so now.

Scenes – what are they?

Let's begin with Scenes. You may not be familiar with this term. The principle that it is based on, however, is easily explained: each of the two Scene switches can be used to store all eight knob positions in a Performance, which can later be recalled by simply pressing the right switch. In the simplest case scenario, each switch is used to select a tonal variation of the sound used. You could for instance use the knobs to speed-up a pad sound's fade-in and out times, thereby making it more suitable for rhythmic or solo playing, and then save these settings to one of the Scene switches. Now you can effortlessly change between the two sound types without having to switch Performances.

EXAMPLE:

Let's assume you often play pad sounds, but want to use them also in other ways. The Preset sound P101 allows you to switch at lightning speed from a slow fade synth pad (Scene 1) to another variant (Scene 2) that can be used for melodic phrases or certain themes. Often it is helpful enough to be able to call-up different filter settings with the Scenes (P093), but as you can already alter the Filter's frequency with knob 5/6, using Scenes may seem a little awkward. However, ask yourself how often you have been able to spontaneously find exactly the right frequency with the knob.

Synth brass sounds also benefit greatly from having two variants ready to call-up. The Preset sound P110 reveals itself to be particularly flexible. Whilst the Scene 2 setting is suited to pad parts, Scene 1 lends itself to much more up-front keyboard riffs. The golden middle ground, a nicely balanced brass sound, is occupied by the Performance itself, i.e. when none of the Scene keys are depressed.

The tonal possibilities offered by Scenes increase dramatically, however, when both Scenes are activated simultaneously. You can now "fade" between the two stored knob positions, from Scene 1 to Scene 2 and back again. The CS2x's Utility mode factory settings assign this task to the Mod wheel as standard. Just as effective however is the use of a connected rocker pedal. Doing so will leave the Mod wheel free for other tasks like Filter or Vibrato effect. Of course you will need to assign these playing aids afresh in the UTILITY mode. Select the ASSIGN CTRL NO and press one of the Scene switches. Now use the Up/Down knob to find the "Foot Ctrl" setting – and you're done.

So, what can be done with this? Well, let's say you have programmed a high Resonance value for Scene 1, and a low value for Scene 2. Increasing the Controller value (MW/FC) will now continuously decrease the sound's Resonance. Of course if you only want to vary a sound's Resonance you can achieve this just as easily with the respective knob – the use of Scenes would be illogical here. The point is that you can control many modulations simultaneously with Scenes – a single movement can affect the central Envelope parameters (knobs 1+2+3), Filter (knob 5+6+7) and a further two freely definable Control knobs (4+8) all at once – to great effect!

The best results can be achieved with clever programming of Assign1/2. You can for instance achieve morph-like effects if you are working with volume level modulation. Put simply: a piano changes into a string sound. Or you can use Scene morphing to shape a moderate pad sound into a cutting sequencer sound – the possibilities are endless. Let's explore such sounds using the "learning by doing" principle! Don't worry, we aren't going to leave you out in the cold. We have five examples that show what can be fabricated with the Scenes.

Day to Day things

Before we begin, you should know how to store a Scene. This is basically very easy: first arrange the knobs as desired. Once you have hit on an interesting sound, you can save this variant by holding down the Store key and then pressing the first Scene switch. Now create another variant and save this one to Scene 2. It is important that the two variants complement in each other tonally. Always bear in mind that any morphing occurs first from Scene 1 to Scene 2!

Illustration: Knob positions for Scene Morphing

Scene1			Scene1		
Attack	Release	Assign1	Attack	Release	Assign1
-64	0	33	0	10	0
C.Off	Rez	Assign2	C.Off	Rez	Assign2
8	13	-64	8	-12	63

If you wish to fade in a sound you should take care that the first Scene doesn't result in a relatively loud or harmonically rich sound. Initially, both Scene settings are stored in the working memory of the CS2x. You will need to save your Scene settings together with the complete Performance or they will be lost every time you change to another Performance or into the Multi mode. Be careful, it's easy to make a little mistake here: you should reset all the knobs to their middle position before you actually store your Performance, otherwise you will have inadvertently changed your entire Performance!

You should also be aware of the following: you may occasionally have played with the knobs and wondered why no changes could be heard. It's quite simple: if you have activated one or both of the Scenes, any knob movements are simply ignored. The knob settings you have made will have no effect even when the Scenes are deactivated.

Scene Applications

Most startling first and foremost is the blending of two different sounds, which as we have already pointed out is commonly known as morphing. Most sound programmers using sample-synthesizers work with contrasting level modulations for two or more partial tones. With the CS2x this simplest and easiest method is achieved with the aid of Assign2, i.e. Knob 8. By the way: if you haven't fully acquainted yourself with the Assign1/2 parameters and functions, we would recommend you read through the relevant pages in your manual. Never fear, morphing is much more easily achieved than you may think. The next example should help you understand the rules involved.

EXAMPLE:

Select Performance TP095. Naturally you need to activate both Scene switches (the LEDs will light up). So much for the preparation, now let's have some fun: hold any note and "morph" between Scene 1 and 2 using the Mod wheel. You are now actually blending between a square wave (Scene1) and a sawtooth wave (Scene2). A glance behind the scenes reveals the programming involved. Find the Assign2 page. The Performance is made up of two partial tones. Both components are assigned Volume modulation, using different modulation intensities. The first Layer is set to a negative value (-32), the second with a matching positive one (+32) – this is the real trick. Result: turn Knob 8 fully clockwise to hear the Layer1 sound (Ld: Volfet A) and fully counterclockwise to hear the Layer2 sound (Ld: Volfet B).

The same process can be used to create other morphing sounds. If this type of Performance appeals to you, use TP095 as a starting point. Make sure you use plenty of contrasting sound combinations. As always, EXPERIMENTing is everything!

A Performance doesn't always need to change so significantly as with the previously described level modulation. Impressive sound developments can also be achieved without the help of Assign1/2. Modulating only Filter and Envelopes can be interesting enough, especially where analogue synthesizer sounds are concerned!

EXAMPLE:

Select Performance TP096. Here a heavily filtered and resonanced sawtooth with minimal fade-in and out times is transformed into a harmonically rich pad sound with the usual envelope curves. Other parameters apart from the filter sweep (achieved with only the Filter's cutoff point) are affected as well. This gives the sound more universal applications.

Let's stay with this Performance a little while, but this time deactivate the two scenes. Particularly noteworthy are the two assignable knobs: play a little with Knob8. If you listen carefully, you will notice that turning the knob counterclockwise causes LFO Amplitude modulation, whilst a clockwise turn results in LFO Filter frequency modulation. Let's now concentrate on the Assign1 knob. This is set to enable you to transpose the entire Performance's pitch by +/- 2 octaves. In contrast to the Pitch modulation with Assign2, the pitch can be changed continuously, without the usual semi-tone steps. Consider Knob 4 as an additional Pitch wheel. Let's leave this aside for a moment: Why not assign Knob4 or Knob8 with Filter modulation? But which should you choose? The central parameters Cutoff frequency and Resonance already have their own dedicated knobs, so they are out of the equation. The following example might give a possible answer to this question.

EXAMPLE:

You have selected Performance TP097. This is a classic lead sound which, thanks to Scene morphing can be played very expressively. Aside from the Filter frequency, the Filter Envelope's fade-in and out times are also modulated; this time Assign1 is responsible for the fade-out phase. All three Layers of the Performance have to use the same fade-in value if the fade-in times are to be modulated consistently (FEGAtkTime=+32). Scene1's settings result in intense filtering and a very drawn-out fade-in time. Holding down any key for more than 10 seconds will show how slow the fade-in phase really is. Not so with the second Scene. Here the Filters' fade-in time is minimal and is markedly "opened" – so, can you guess what happens during Scene morphing...?

Let's look at Pan position modulation. Marked left-right movements within the stereo image don't really cause a sensation these days. Great fun can be had however if other parameters are modulated in harmony. This really is the secret of every effective Pan modulation! Let your imagination roam free. For example, choosing the oft recited Filter modulation can never be wrong.

EXAMPLE:

For this too, we have prepared a little sound example (TP098). There is no need to work with opposite modulation intensities here as the Performance contains only the one Layer – the Assign2 setting "Pan+32" will suffice. Now to the Scenes: here the Performance is filtered quite differently and two completely different Pan positions are used. Morphing from Scene1 to Scene2 will result in a filter sweep with the added tension of the left-right movements.

In contrast to all our previous Scene examples which focused exclusively on analogue synth sounds, we would like to finish with an example to show that conventional sounds too can be played more dynamically with Scene morphing. We have just touched on one of the classic weaknesses of ROM-Sample-Synthesizers. A waveform is simply reproduced and can often seem very static. Scene morphing is a new form of modulation that, whilst not solving the problem completely, may contribute some new and interesting ideas.

EXAMPLE:

String sounds in particular are used in many different forms with sequencer arrangements. Often you will have utilised a variety of sounds to better imitate playing techniques such as Marcato or Pizzicate. You can't honestly say though that you were completely happy with this approach. The crux of the matter are the envelopes; they should react to your playing technique but instead you have to adapt your playing to them. Here the Scenes can provide a lot more flexibility. Why not try this out for yourself with Performance TP099. After a short while you will find that Scene morphing allows the string sound to be phrased much more distinctively.

The Effects

The Yamaha synthesizer offers a choice of three independent effects – Reverb, Chorus as well as a special Variation effect. Although you cannot program the first two effects on the machine itself, the Variation effect offers a plethora of parameters for you to play with. You can read up on this subject in the Appendix of the manual as well as the chapter about song production. We would like to concentrate however on a few effect types and their parameters.

In Performance mode the Variation effect can only be used with the Insert setting. In contrast to the Multi mode you can however switch the effect on and off for each Layer. There is one thing that needs to be considered though: If you activate the Variation effect for all Layers (VARI SEND=On) you can't set the Chorus and Reverb intensities separately. In the real world this is a small price to pay, but you should be aware of this phenomenon nonetheless. With the aid of a little exercise this will soon click into place.

EXPERIMENT:

Change the amount of Reverb (Rev Send) on Performance TP100. Setting Layer1 to (say) 040 will automatically set this value of Layer2 also. This doesn't happen if you disable the Variation effect for either Layer1 or 2 (Off). Now Chorus and Reverb levels can be set for each Layer individually. This ability to use different effect levels for different Layers helps to develop impressive, multi-dimensional sounds.

Only Send Levels can be programmed on the machine itself for the first two effects, Reverb and Chorus. Things get more complex with the Variation effect, which also offers Chorus and Reverb types. Here each type's parameters can be extensively programmed, and single parameters can even be controlled in real-time. If, for example you wish to control the Chorus or Reverb's "Dry/Wet" parameter, take the diversion via the Variation effect.

It isn't clear which effect parameters are available for real-time control without further documentation. We'd like to point you at this point to the "Effect Parameter List" in the manual's Appendix (page 49). On the CS2x the target parameters are tightly coupled to the Effect programmes and can't be manually defined. This list will show which parameters can be real-time controlled (right hand column – marked with a dot).

Next you will want to know which playing aid can be used to control a Variation effect parameter. You have two options: you will work with Knob4 first and foremost by setting "ASIGN1=VariCntrl". Please remember that unlike Knob8 you can't limit the modulation intensity here. This may call for a little delicacy. You can also use the foot rocker pedal (FC Vari EF) for real-time control.

So much for our little introduction. We will now bit by bit sketch the most often used Variation effect types. More extensive details can always be found in the manual.

(A) Delay

Next to Reverb and Chorus, Delay is one of the most important effect types. The CS2x offers a choice of several types. Each program delays the output signal in its own particular way.

EXPERIMENT:

You have called up Performance TP101. Just play a few notes or chords ("staccato" would be best) and listen for the effect of the Delay. Now repeat this for the other Delay types – you will soon see how each effect reacts.

Although Delay effects are most commonly used for solo sounds, studio professionals also have another application for them: using the Delay to support the rhythm track. To do this you have to carefully choose delay times that match the song tempo. In practice you will end up having to re-evaluate the Delay times constantly. This little formula makes the process a lot easier:

$$\text{Delay Time} = 60 : \text{Tempo} \times 1000$$

This result will work with quarter notes. To calculate for 8 beats per bar, simply divide by two, for half note beats multiply by 2 or divide by 4 for 16 beats per bar, etc.

By the way: Several of the SilverBook Demo Sequences also use this trick. Take particular note of the effect programming used in the second Arpeggio demo, or the sound example "SweepRun". Both sequences use Delay rhythmically. Practice this technique a little, it will come in handy sooner or later.

EXPERIMENT:

Your mission, should you choose to accept it, is to reestablish the correct Delay effect settings for TP102, so that the signal is delayed in time with the Arpeggio tempo (=120bpm). This is how we do it. You can work out the correct delay times with the above formula; it's best to choose 250ms (1/8) and 125 (1/16). Remember to consider the other parameters, too. To begin with, vary the Dry/Wet relationship which determines the intensity of the Delay effect. The Feedback Level (FB Lvl) also plays an important role. This parameter controls the number of repeats produced. Last but not least, you should experiment with the unique "Input Sel" function.

(B) Phaser

As the name suggests, the Phaser effect is created by periodic phase shifting of the affected signal from the original signal. This effect was especially popular in the 70s and was used for many a Rhodes, string ensemble or electric guitar. Today, the Phaser is often applied to atmospheric pad sounds and other types of synth sounds.

EXAMPLE:

You can find typical examples of this in the Tutorial Bank, a string pad (TP103) as well as a digital synth sound (TP104). The first thing you will notice about both Performances is a slow LFO movement; this can be accelerated by choosing a higher frequency value (LFO Fq – Hz). The intensity of the Phaser effect can be determined with three parameters – LFO Depth, FB Level and of course Dry/Wet. Playing with these values should give you a good handle on what each does.

(C) Flanger

The Flanger effect too is based on periodic Phase modulation. In principle, the Flanger works more like a Chorus which sends a programmable part of its effected signal back into itself (Feedback Level). This results in the Flanger's characteristic comb filter effect. Listen closely to the subtle differences between the Phaser and the Flanger, as they may at first sound very similar.

EXAMPLE:

Tutorial Performance TP105 demonstrates the use of the Flanger with analogue synthesizer sounds. Devote some time to all of its parameters. Carefully increase the LFO intensity and vary the LFO speed (LFO Fq). Using the Feedback Level to accentuate the comb filter effect is also very revealing. Setting a value of +63 or higher for the FB Lvl throws the Flanger into feedback. The Feedback Level is also often referred to as Resonance.

(D) Auto Wah

The wah-wah effect is commonly used with various guitars. As a rule, it is controlled dynamically with a foot rocker pedal. It actually consists of a particular low-pass filter whose cutoff frequency is periodically, i.e. “automatically” varied. The Auto Wah can be put to many uses with the CS2x.

EXAMPLE:

As a keyboard player you may wish to use this effect for Clarinet sound for example. To hear this for yourself, try out Performance TP106. In this case the sound is shaped further still with the dynamic use of the CS2x's Filter, which explains its lively play response. Of course you can apply the Wah effect similarly to guitar sounds. Alternatively it can be used to create EXPERIMENTal sound collages. Consider the Wah as a second filter that is even capable of resonance. A good example of this is Performance TP107.

(E) Amp Simulation

This effect too is a typical guitar effect. It essentially imitates the sound of an amplifier combo. The CS2x even allows you to choose between different amp characteristics (Transistor/Valve). On top of this there's a low-pass filter and the parameter “Drive” which controls how the input stage is overdriven. The entire setup requires a little practice which will pay off in the end.

EXAMPLE:

A common use of this effect is found in Performance TP108. You may not even perceive the effect on the first listen. This will quickly change when you disable the Variation effect (VARI SEND=On). The basic sound now sounds much more synthetic and carries an entirely different frequency signature.

Naturally you aren't limited to string instruments. Other sounds too can use this type “effectively”. Organ sounds for instance can use a little dirt. A good example for this is Performance TP109, which without the amp simulation would sound too “digital”.

(F) Auto Pan and Tremolo

Both these effect programs are very similar. The Pan effect is really nothing more than two combined Tremolo effects that work against each other. The Auto Pan is primarily set with the “Direction” and “LFO Freq” parameters. The Tremolo effect even offers Pitch Modulation (compare this with Pitch LFO – Analogue Workshop). First and foremost you will use the “AM Depth” function which is responsible for Volume modulation, i.e. Tremolo.

EXAMPLE:

You will find two different E-Piano sounds in the Tutorial Performance bank. Using the first example (TP110), experiment with various “Direction” settings. Here the developers demonstrated their meticulous attention to detail. The Tremolo effect is very pronounced in the second E-Piano (TP111). For a change of scenery take a good look at the Pitch Modulation as well. Of course you can also use this effect simply as an additional LFO.

(G) Rotary Speaker

The Rotary Speaker (Leslie effect) is based on the Doppler effect. It is primarily used to liven up organ sounds through the periodic varying of pitch as well as volume and tonal color that arise when a loudspeaker is rotated. Common are two rotation speeds: the slow setting (Slow Leslie) gives a kind of cathedral effect, similar to a floating Chorus effect. In contrast, a vibrating, spinning soundscape is produced by fast rotation (Fast Leslie). The increase/decrease between these two speeds are a great tool for creating musical tension.

EXAMPLE:

A slow Leslie organ can be found in Tutorial Bank memory location 112. As this example demonstrates, a medium value for both the “LFO Depth” and “Dry/Wet” parameters fares well. You determine the rotary speed with the “LFO Fq” function, which initially is set to 0,63Hz. Knob4 (Assign1=VariCntrl). It is used to control the speed in real-time and helps to play your organ authentically. With this in mind, take a look at the section “Controlling Correctly”. It goes without saying that the Leslie effect can be used for sounds other than organs. To prove the point, listen to a synth bass sound (TP113).

Live Applications

The CS2x is downright destined to be used as a Performance Synthesizer, not least because of its eye-catching looks and very portable design. As a live musician you will be confronted with a unique set of problems, so we'd like to show you a few tricks to help you achieve those tasks and keep you in control of your CS2x when on stage.

A keyboard sound's moment of truth comes especially when playing live. Fundamentally, your Performances should meet two main criteria here. For one the sound has to be endowed with plenty of harmonics. If necessary, you can boost certain frequency regions. Secondly you should mostly use fast attacks for sounds. A harmonically rich E-piano sound with a gentle attack phase would not really be suited for live performance. Here are a few tricks to help you set up your Performances for live applications:

EXPERIMENT:

The attack phase of sound TP115, as you can hear, is hardly optimal. This E-piano sound is missing the characteristic bell-like attack component. We have prepared this hammer noise for you. All you need to do to make it audible is set the Volume for Layer1 to the maximum 127. Now the Rhodes sound will assert itself in your arrangement thanks to this little insider's trick, which can of course be used for other tonal shades. The presence of a sound is especially governed by its attack phase.

Organ sounds too run the risk of sounding too dull and can often be lost in the battle for prominence in the live instrument war. This can be avoided. The solution here is to add a harmonically rich component to your basic sound.

EXPERIMENT:

We will explain how this is done with the aid of Performance TP116. Try gradually increasing the second Layer's volume. With this you are blending in a digital sound, whose sole purpose in life is to add a little transparency to your organ sound. How much of this sound you add to the organ is really a matter of personal taste. It is worth listening to this partial tone in isolation to better understand what's going on.

A word about touch sensitivity: keep your sound's touch sensitivity as low as possible. This way many sounds cut through the mix better. A pad sound that you probably often play with your left hand shouldn't really respond to touch at all. Experience has shown that it is far more practical to control a pad sound's volume with a volume pedal or fader. That way you have far better control of your sound's level. Also don't forget to "compress" your touch sensitivity values when preparing Performances.

Another important step is to ensure that your sounds' levels relative to each other are OK, otherwise you will have to constantly correct them during the performance. When setting the levels however, you should not simply rely on the "Perf Level" value as a guide. Filter and effect settings will also indirectly affect the overall volume of a Performance. Therefore, keep listening to each sound against the other – let your ears decide.

Split Performances

Musicians that don't work with "Keyboard Splits" are an endangered species. The advantages are clear: you can play several sounds spread across 61 keys without having to switch Performances. This is how it's done: - The programming effort required here is minimal and can be mastered effortlessly, even by beginners. Simply call-up the "Note Limit" function and determine the lower (LIMIT LOW) and upper (LIMIT HIGH) end points for the relevant Layer. As a rule of thumb you will usually only split two sounds across the keyboard, a pad for your left and another sound for your right hand. A little tip: always stick to the same split point, e.g. middle C (C3). If you do need to use different keyboard splits once in a while, you should make a note of it in the display (e.g. "Pad/Pno-F3").

Set out below are four Performances that we have put together to demonstrate the most important aspects of sound shaping for live performance.

EXAMPLE:

Performances TP117-120 contain typical live performance split sounds. The split point is always at C3. The sound assigned to the upper part of the keyboard can be played from this point onwards. We have programmed a combination of pad and E-piano sounds for our first example (Split-1), the second consists of a CP70 piano as well as an organ sound (Split-2). You can quickly change the sounds if you wish using Bank/Program changes. Also pay attention to the effect settings.

Now let's look at the purpose of controller "Assign2". As we already know, it is often necessary to change the volume levels of your sound during a live performance, either manually or with a foot pedal. Let's say you decide that your pad sound is way too loud. This is the trap split sounds fall into: if you change your volume with the Master Volume control, all your split sounds will be quieter and not just the pad sound. This can be a real nuisance, but never fear, there is a solution:

EXAMPLE:

A particularly elegant solution can be found in the use of Knob8. In Performances TP117/119 it is programmed to control the volume of your left hand sound only, independently of the right hand sound, i.e. only Layer1's level is affected. To be exact, you can only use the knob to decrease the level; turning it clockwise has no effect. If however you want to be able to increase the level as well, you need to ensure that the Layer's volume is not set to the maximum 127. As you can see, when using modulation, you need to take all the corresponding parameters into account.

Another dicey subject is the transposition of sounds during a live performance. A piano sound especially benefits from this ability as even 61 keys aren't always enough to fully exploit a piano's tonal possibilities. To begin with you can work with the CS2x's Shift and PART/LAYER keys to transpose an entire octave by up to +/-3 octaves. Once again, this is more tricky with split sounds where you would usually only want to transpose a single sound and not the entire Performance.

EXAMPLE:

Here too you can make good use of the "Assign2" controller. Turning Knob8 clockwise in Performances 118/120 transposes the left hand sound up by an octave, whilst the right hand sound remains unaffected.

The Assign2 value of course doesn't correspond to the Note Shift parameter. As we have already pointed out, you should always consider the relationship between the modulation intensity and its starting value. Always orient yourself first by the Note Shift value. If, for example it's set to +00 you should use a modulation value of +17 to enable a shift of exactly two octaves. If the Note shift value however is set to +12, you should use a modulation value of +25. You can try this out with Performance TP118.

Drawbar Fun

To round up this chapter we would like to look at sounds that you will want to use again and again, not just for live performance. We are talking about the Hammond sounds. These sounds are a good basis on which to explore further aspects of sound programming.

First, a look at the concepts involved. The organ's registers comply with the laws of Additive Synthesis. In contrast to Subtractive Synthesis, where certain frequency regions are selectively eliminated, here sine based tone frequencies corresponding to the position of a pipe organ or the partial-tone components of the treble range are mixed together, or "added". Individual drawbars or stops, also known as "choirs", are used to regulate the sine-oscillation levels per position (pitch).

The classic Hammond organ has a total of nine drawbars (see table). The first two bars (Sub) lie an octave below the fundamental tone (16') and a 5th (5 1/3') above respectively. The positions 8' to 2' make up the second section. The last drawbar cluster includes the upper three positions which correspond to the fifth, sixth and eighth harmonic sequence of partial tones.

Drawbar	Position	Note Shift	Note Sft - CS2x
1	16'	-12	-24
2	5 1/3'	+7	-5
3	8'	0	-12
4	4'	+12	0
5	2 2/3'	+19	+ 7
6	2'	+24	+12
7	1 3/5'	+28	+16
8	1 1/3'	+31	+19
9	1'	+36	+24

We want to emulate this drawbar principle with the CS2x exactly. To this end we are also adding single sine oscillations and tuning them for the relevant frequency behaviour. We need to improvise a little however as the CS2x is limited to four Layers. Don't panic, they are sufficient if you cleverly adopt only a part of the drawbar method. Each Layer can only be transformed however by +/-24 semi tones. In order to keep the total position's range intact you can for instance subtract -12 from all Note shift values (see the table's right column).

About sound programming: we have designed two detailed sound examples for you to make this as easy to follow as possible, broken up the entire programming session into four steps and additionally documented them. The only real difference between these two examples can be found in the different sine waves and positions used.

Step 1 = Layering sinewaves and determining Positions

To begin with we have settled on four positions and chosen an appropriate Material voice. The first organ (TP121) consists of positions 16' – 2 2/3' – 2' – 4' and a simple sine wave (PRE1#048). Not so with the foundation of the second organ sound (TP125): here you will hear a sine-like waveform along with a characteristic click sound during the attack phase (PRE7#074). With the classic Hammond sounds, this "organ percussion" occurs at 4' and 2 2/3'. We have, however, set the positions a little differently: 8' – 5 1/3' – 2' – 16'.

Step 2 = Setting Drawbar Positions

To get this right, you have to regulate the volume relationships between all four Layers. Be careful though; the biggest mistakes happen here. If the drawbar relationships, i.e. the level relationships between the different sine waves don't harmonize properly, your sound will seem completely unbalanced. The first example (TP122) emphasizes the popular 2 2/3' register (Layer2 - Volume 123). This is essential for authentic jazz registration. The remaining examples, however, reside in the middle position (Layer1/3/4 – Volume 63). The second drawbar setting (TP126) is considerably more "neutral" and can as such be applied more universally. This is achieved by accentuating, i.e. stabilizing the fundamental tone (Layer1) a little.

Step 3 = Programming the Leslie Effect

Even the most perfect Hammond sound isn't convincing until a Leslie effect is applied! Both Performances (TP123/127) utilize a slow rotary speed as a starting point, which can however be increased in real-time with Knob4. The constant changing of rotary speed via the controller is an important part of authentic organ playing and should always be taken into account when programming such sounds. We leave the choice of "Slow Leslie" or "Fast Leslie" entirely up to you. To break up the monotony we have increased the rotary speed (LFO Freq) in our last step (TP124/128).

Step 4 = Preparing the Drawbar modifications

Just as enticing as changing the speed of the Leslie effect is the spontaneous control of the drawbar positions, an effect which thanks to the wide control possibilities of the CS2x can also be recreated here. This is achieved simply by volume modulation. As you will know by now, this is the job of Knob8/Assign2. You simply need to program different modulation values for each Layer. You can emphasize the characteristic register (2 2/3') with the first organ sound (TP124) by turning Knob8 clockwise (Layer2 – Volume = +32). In the second example (TP128) a different octave position is accentuated instead (2'). Please take an extra hard look at Knob8 and its effects. You can of course always work with Scene morphing, allowing drawbar changes to be made with the Mod wheel instead. Performance TP128 is a good example of this.

Song Production: The Basics

This paragraph deals extensively with all aspects of CS2x song production and makes no attempt to filter out any “specialist knowledge”. This doesn’t mean though that it is necessary to fully explore each aspect in order to create songs with the CS2x.

Our earlier chapter “Song Production – An Easy Start” made that obvious. Everything you need to know for a quick start into multi-timbral applications with the CS2x can be found there in compressed form.

However, should you wish to take a more informative but less comfortable route through the following, often complex material, we recommend plenty of patience. Please take the time to work through each of the successive subjects and try out as many of the accompanying examples as possible. Your song productions are bound to benefit from it.

What is “XG”?

If you are planning to use the CS2x to play back or record sequencer songs, you should already have heard something about “XG” and be familiar with its most important properties.

The XG Standard is a format developed by YAMAHA and is used to control tone generators. Although XG is based on General MIDI (GM), it represents many qualitative and quantitative improvements over this standard. XG supports greater musical expression: the total number of sounds available in GM is drastically increased in XG. Furthermore, individual sound settings and real-time control of a multitude of parameters are now possible. Finally, compatibility between different XG models is guaranteed despite differences in tone processing.

The XG voices are organized into banks which, with the exception of the GM compatible Bank 0, are not fully allocated. This may at first seem confusing. A quick look at the supplied XG-Voice List however clears things up: Bank 1 and all following Banks (with the exception of the SFX-Bank) are variations of the foundation sound. The different sound characteristics can be found from each bank’s column label (e.g. Stereo, Single, Slow, Fast Decay etc.). This should greatly simplify the search for a particular sound. Please also refer to table “XG Voices” in the section “Decisions, decisions...”.

Another property of XG is that the Parts’ (i.e. the MIDI channels’) sound and effect settings are integrated as Controller and System Exclusive data in each sequencer track, rather than stored in the keyboard itself. This has both advantages and disadvantages.

One advantage is that songs recorded in the XG standard are always played back correctly, regardless of which XG model the song is being played back on. Total compatibility between a whole product range is guaranteed by the standardization of all sound settings down to the smallest detail. Time consuming sound bank transferrals and the accompanying risk of data loss are thereby avoided.

EXAMPLE:

You have recorded the foundations of a song on your CS2x and now wish to pass on this embryonic composition to another musician, so that he can develop your ideas or add further tracks. Without a common standard your partner would have to spend a lot of time in preparation – he would have to assign MIDI channels, find correct sounds and transpose octaves correctly, or even modify the drum map. Not so with XG: your partner can use your files with a MU-50 sound module, the QS-300 synthesizer, the DB50XG sound card or any other XG model without modification. He will hear the song exactly as you recorded it. This greatly aids and encourages co-operation between musicians.

One disadvantage of the standardization of XG voices is perhaps that it allows too little “elbow room” for the creation of specialized sounds. The CS2x however offers a user-friendly solution to this problem:

The CS2x can be used multi-timbrally in not just its Multi mode, but in its Performance mode also. Both modes lend themselves well to song recording or smaller arrangements. The Multi mode follows the XG model completely, however, in Performance mode you can combine the usual Layers (1 to 4) with up to 12 Multi Parts. The Multi-Parts are XG compatible, but Material Voices can also be assigned to them. These are the Performances” Layers, which can be selected with specific Bank and Program Change commands.

It doesn't really matter whether you choose the Multi or Performance mode for song production – the actual recording procedure with external sequencers is fundamentally the same and follows the XG standard. This is particularly true for sound changes using controllers or System Exclusive messages. We will therefore cover this subject for both modes simultaneously.

Before we begin though, we should take a quick look at the principal differences between the two modes. This will help you to get a better grip on which mode to choose.

Performance Mode or Multi Mode?

The Performance mode is selected with the PERFORMANCE key, and the Multi mode likewise with the MULTI key. This is of course self-explanatory. The consequences of this simple key press however aren't quite so obvious to the user – something you should know about right away. Every mode change re-initializes all of that mode's parameters, in other words they are “reset” to their standard values. In Performance mode, this applies only to the Multi Parts (5 – 16) and doesn't affect the actual Performance (Layer 1 – 4). XG experts will be familiar with this initialization, termed “XG On”.

Which mode is preferable depends on how you plan to use it. The rule-of-thumb is: if you wish to incorporate the above mentioned CS2x facilities into song production (real-time control using Knobs, Scenes, Arpeggio...) you should work in Performance mode. If however, you need to be able to record or play back XG songs, you should choose the Multi mode.

The following overview will clarify the main properties of each playing mode, and the differences between them.

Performance Mode		Multi Mode (XG)	
Layers 1 - 4 (Midi Ch.1)	256 Preset Performances 256 User Performances Variation Effect Arpeggiator Scenes Knobs Sound editing at the keyboard Layer EQ	Multi Parts 1 - 16	XG Voices SFX Voices Drumsets Variation Effect Part EQ
Multi Parts 5 - 16	Material Voices XG Voices SFX Voices Drumsets Part EQ		
Parts 5 - 16 are XG compatible		All parts are fully XG compatible	

As you can see, the CS2x can be used multi-timbrally in Performance mode too. The Performance itself consists of sound “layers” which are mapped to MIDI channels 1 to 4. The Performance is controlled however from just one MIDI channel, usually MIDI channel 1. The Performance mode increases this choice by Parts 5 -16. This means that up to 13 Parts can be utilized in Performance mode (1 Performance + 12 Multi Parts).

Using Performance mode for song production has several distinct advantages:

- You can use any Performance as the basis of your song and if so desired utilize Scenes, Arpeggio and the Knobs. An arrangement can then be created by adding to this Performance with Parts 5 – 16. The Performance however remains unchanged, unlike with other synthesizers where it has to be integrated into a Multi program, resulting in the loss of all effect settings.
- Parts 5 - 16 offer a particularly diverse sound potential - aside from the XG Voices and various drumsets, you can also use any of the Material Voices. The latter score highly with many sounds for up-to-date music styles like Dance & Techno. In contrast, the XG voices offer a wide spectrum of logically categorized conventional sounds.

Still, there are many good reasons to work in Multi mode: it follows the XG mode which is already implemented in other YAMAHA models (e.g. MU-50, MU-80, QS-300, CBXK1-XG). Songs recorded in XG mode can be exchanged between different XG models without any problems, although the choice of sounds is limited to 480 XG voices and 11 drum sets. In addition to Reverb and Chorus, you can also employ any single VARIATION EFFECT and freely program a Send Level for each Part (the Performance mode limits the use of the VARIATION EFFECT to Layers 1 – 4).

Never fear, you don't have to decide right from the start on which mode to use for your song productions. Performance Parts 5 – 16 are fully XG compatible. You can change modes as often as you like as long as you restrict yourself to these Parts and choose only XG voices for each of them!

The Standard Approach - Multi Settings at the Machine

The section presents a fundamentally different method of Song Setup creation. Here the Multi settings are actually performed on the machine itself and are *not* inserted into sequencer tracks as single events. Although this method is particularly suited to Multi Mode, it can be applied to Performance mode, too, albeit with certain restrictions.

Unlike the CS1x, the CS2x **MULTI Mode** offers a **Multi Storage Function** (see manual, page 68). You can save up to 9 Multis (STORE + NUMBER) and recall them again (MULTI + NUMBER). Don't be disconcerted by the lack of selection notification when recalling a Multi. Beware: The MULTI Store function is only available in Multi Mode (XG), *not* in Performance Mode!

A Multi stores the following parameters for each Part:

Bank, Program, Volume, Pan, Reverb Send, Chorus Send, Variation Send, Cutoff, Resonance, Mono/Poly. These parameters can be found in the “Multi” row of the Function Matrix.

The CS2x cannot perform a Bulk Dump for Multis. Being able to transmit the Multi data would be useful however so that they can be integrated into the song and saved externally. This can be achieved, DUMP REQUEST rather than a Bulk Dump. Here the sequencer requests all Multi settings from the keyboard and processes them as System Exclusive data. This process is always called for when there is no Bulk Dump available at the machine for a particular data group.

We assumed you don't know how to program a Dump Request, so we have taken care of this nuisance for you. The TOOL Disk "SYSEX" directory contains several files, all of which are listed in the FILE LIST (Appendix).

It's best to start with the "REQXGALL.MID" file. This will request all Part settings for the currently active Multi via a Dump Request. This method will query not only the settings that can be performed at the machine (see above), but all Part parameters that can be controlled via System Exclusive or Controller messages.

The following example will demonstrate how you can transmit your Multi settings to your sequencer with the help of Requests.

X-PERIMENT:

Call up MULTI Mode, record a few sequencer tracks and setup the corresponding Parts on the machine. Save the resulting data as a new Multi with STORE + NUMBER.

Now load the file "REQXGALL.MID" from the TOOL Disk ("SYSEX director) into your sequencer song. Prepare a new track to record the data transmission. Ensure that your sequencer isn't set to filter System Exclusive messages. Disable the MIDI Thru function for the time being. Now start recording. Assuming everything is working correctly, the CS2x should now receive a Request command for each Part, one after the other, and respond by immediately sending all Part settings as Sys-Ex data blocks.

You have now recorded all Multi settings into a sequencer track. Should you ever loose these settings, for example through a machine reset, you can restore the Multi by simply playing back this track. If you ever make additional changes though you will need to request the data once again to store the updates.

Finally you should make certain that the transmission was successful. The first step is to take a look at the Event list of the recorded track - it should contain 16 Sys-Ex blocks. If it doesn't, you will need to retry recording at an even slower tempo.

Now disable the Request file ("Mute") and change temporarily into Performance Mode and back to Multi Mode (this will re-initialise all Multi Settings in the EDIT Buffer). Now play the track with the Sys-Ex data. If your Multi settings are now restored, this EXPERIMENT has been a success.

As mentioned previously, this method is only available when you are working in Multi (XG) Mode. So does that mean that the Multi Part (5 -16) settings need to always be made from the sequencer in Performance Mode? Not necessarily - here too we can offer you a more elegant solution.

The Performance Mode does not allow the above mentioned Multi settings on the machine. But what are the Knobs for! Let's refer to them for the moment as Multi Part Controllers, following this layout:

Knob 1	(Attack)	Volume	Controller # 7
Knob 2	(Decay)	Pan	Controller # 10
Knob 3	(Release)	Reverb Send	Controller # 91
Knob 4	(Assign 1)	Chorus Send	Controller # 93
Knob 5	(HPF Cutoff)	Variation Send	Controller # 94
Knob 6	(LPF Cutoff)	LPF Cutoff	Controller # 74
Knob 7	(Resonance)	Resonance	Controller # 71
Knob 8	(Assign 2)	Release Time	Controller # 72

As you can see, only Bank and Program changes need to be performed on the sequencer. These Assignments can be made in UTILITY - ASSIGN CTRL NO. It's easier though to load the "KNOBMUL.MID" file ("SYSEX" directory) from the TOOL Disk and play it back. This file contains the pre-programmed Utility settings as Sys-Ex data. This is especially useful as you will probably want to change these assignments again at some point. You can restore the factory assignments using the "KNOBPFM.MID" file.

A small tip for tinkerers: If you decide to use the above listed alternative Controller assignments as standard for all your song productions, it may be wise to add additional labelling to the Knobs via mini stickers, e.g. "Volumes" below "Attack".

So how is working with these newly assigned Multi Controllers? That's right, very comfortable, as you can now change the currently activated MIDI channel in your sequencer using the Knobs. You can also record these changes to your sequencer, which particularly makes sense if you want real-time control during the course of your song. If you are only concerned with the initial settings at the beginning of your song however, you can simply play with the controllers without having to worry about fixing those values. This is because all changes are transparently stored as Part settings on the machine. This means that you will need to transmit the data via a Request to your sequencer for storage at least before you switch of your machine. The procedure for doing this is exactly as described in the above EXPERIMENT, with one exception: you should use the "REQPFALL.MID" file here, as this confines itself to Requests of the Parts available in Performance Mode (5 -16).

By the way, you can use the Knobs like this in Multi Mode, too. In this case however you can actually see any parameter changes you make in the display.

Perhaps you need only a few sequencer tracks for your song productions. If so, you may only require individual Part Requests (REQPART 1 - 16). This has two advantages: First, the total data size will be significantly smaller, as only the required settings are sent. Second, a change to a single part doesn't require renewed Requests for all other MIDI channels.

Anyone that prefers the modular approach may see a third advantage here: Single Part settings can be archived separately and re-used for other songs. How about a Part library, sorted into categories Drums, Bass, Sequencer and Hook Lines, Chords, Pads, etc.?

The recommended "data storage via Request" method may be highly advantageous even if you prefer to setup the Multi Parts from your sequencer program via faders or Mixer pages. You won't have to concern yourself with the tiresome procedure of transferring all Mixer page settings into the sequencer tracks via MIDI events. You can simply re-"Request" all transmitted, fader generated settings from the sequencer.

Despite our obvious enthusiasm for Dump Request, we will concede a few disadvantages, too.

- ⇒ Additional changes can be a little cumbersome, as they require renewed Requests. You can however add further Controller events to the end of the Sys-Ex blocks to correct individual settings without requiring a new Dump.
- ⇒ The use of Sys-Ex data blocks does not follow the professional standard for XG productions. These settings can not be followed by third parties.
- ⇒ Performance Mode does not offer visual verification of any value changes generated by the knobs, unless of course you record these to the sequencer as Controller messages.

Who's controlling Whom?

Now that we have covered the possibilities offered by changing sounds with Bank and Program changes, let's take a look at how sounds can be changed within a song with the help of Controllers.

To simplify, Controller messages are changes of certain parameters that are sent via MIDI in real-time. This Controller data is either incorporated into the song's Setup Data, together with Bank and Program changes, or is sent together with the note data as real-time changes.

The following table lists the most important controllers for CS2x song production. We also list controller values here that correspond to the CS2x factory settings.

The most important CS2x Controllers

Controller-Nr.	Parameter	CS2x Factory Setting
5	Portamento Time	0
7	Volume	100
10	Pan	64
17	Knob Assign 1 (Performance Part only)	4
18	Knob Assign 2 (Performance Part only)	64
65	Portamento Switch	0
71	Resonance	64
72	AEG Release Time	64
73	AEG Attack	64
74	LPF Cutoff	64
80	Decay (Performance Part only)	64
81	HPF (Performance Part only)	64
91	Reverb Send	40 (Perf. Mode = 0)
93	Chorus Send	0
94	Variation Effect Send (XG-Mode only)	0

The CS2x deals with relative values for sound parameters such as Resonance, Release, Attack, Cutoff and Panorama; these can be altered positively as well as negatively, relative to the sound's factory programming. This means that the controller in question should initially be set to its middle value (64) to ensure that the CS2x knob setting actually corresponds with the Controller value. This does not apply to the Volume and Effect Send controllers however. Here we work with absolute values, i.e. the machine parameter value and the controller value are identical.

The supplied song setups already contain the most important controllers as events or faders, as well as Init data in the form of System Exclusive messages that reset all of the current mode's parameters back to their default settings. This ensures that Multi settings from a previous song are not in effect anymore. It also means that you only need to change parameters that deviate from their default settings.

EXAMPLE:

Let's say you want to effect real-time Panorama changes. Knobs 4 (Assign1/Data) and 8 (Assign2), which allow free unrestricted parameter assignment, are already used up however. You assign Panorama temporarily to Knob 4. When done, you should change Knob 4 back to Controller #17 (default setting), so that the expected Performance assignment is in effect again.

The use of the Knobs isn't restricted to the actual Performance by the way. Controller data generated from knob movements is always sent to the MIDI channel that is set in UTILITY → TRANS CH. In other words, you use the CS2x to generate any desired controller movement on any MIDI channel via its knobs or modulation wheel and record these in a sequencer. This even works in Multi Mode.

EXAMPLE:

You are working with an XG song and wish to create a simultaneous filter and resonance modulation on MIDI channel 12. Set the TRANS CH in UTILITY to MIDI channel 12. Instead you can also set MIDI channel 12 as your sequencer track's playback parameter.

Now begin sequencer recording and play with the CUTOFF and RESONANCE Knobs. All movements will be recorded as Controller messages 74 and 71.

Better still: You can of course also use these possibilities to send Controller data to other synthesizers and sound modules.

EXAMPLE:

You want to remote-control another YAMAHA synthesizer's VARIATION effect Send Level with the CS2x Modulation Wheel on MIDI channel 16 in real-time.

This requires the following CS2x UTILITY settings:

TRANS CH = 16, ASSIGN CTRL NO = MW (nudge the Modulation Wheel), 94: Vari.

Now begin recording and regulate the desired Variation Effect level with the mod wheel. All wheel movements will be recorded as Controller message 94.

Everything Under Control: NRPN and RPN

The NRPN ("Non-registered Parameter Number") and RPN ("Registered Parameter Number") are special kinds of Controller messages.

A single event here isn't enough. Parameter selection follows a similar path to that of Bank Change messages, i.e. Controller messages are sent for both the MSB and LSB values. This is then followed by a third Controller message which represents the parameter value ("Data Entry"). The RPN concludes its data transmission with two more Controller events ("Reset to 0").

This multitude of events can make a sequencer track a little difficult to follow. It is possible to use a single Sys-Ex message to control any of the parameters NRPN and RPN can control, hence you should look at each case individually to decide whether NRPN/RPN or Sys-Ex messages are appropriate. For example, NRPN/RPN messages may be preferable in these two cases:

- You decide you only occasionally need to control parameters in addition to the ones listed above via MIDI (e.g. Decay Time, Fine Tune...) and don't wish to get involved with Sys Ex data.
- One of your parameters isn't just initialized at the beginning of the song but is continuously varied within the song. Once the parameter is called up, these changes only require a single Controller event, i.e. the data stream will be significantly smaller than with Sys-Ex messages!

A complete list of NRPNs and RPNs can be found in your manual's appendix (page 74). You may notice that some of the parameters with their own Controller number (see previous section) crop up in this list also (e.g. Cutoff Freq, Attack Time). We can forget about these however; it would be silly to input them via NRPN, where they would require several Controller events, when a single Controller can be used instead.

Below is a list of all the parameters that do not have their own controller no. and can only be controlled via NRPN. We have also not listed the EQ parameters, as they are better controlled using the EQ pages in CUBASE or LOGIC. Controller values here are listed using the decimal notation, as sequencers don't usually allow controller value entry in hexadecimal.

Table: NRPN Parameters

Parameter	Cntr 99 (MSB) HEXADECIMAL	Cntr 98 (LSB) HEXADECIMAL	Cntr 99 (MSB) DECIMAL	Cntr 98 (LSB) DECIMAL
Vibrato Rate	01H	08H	1	8
Vibrato Depth	01H	09H	1	9
Vibrato Delay	01H	0AH	1	10
EG Decay Time	01H	64H	1	100
Drum Cutoff Freq.	14H	note number	20	note number
Drum Resonance	15H	note number	21	note number
Drum Attack Rate	16H	note number	22	note number
Drum Decay Rate	17H	note number	23	note number
Drum Pitch Coarse	18H	note number	24	note number
Drum Pitch Fine	19H	note number	25	note number
Drum Level	1AH	note number	26	note number
Drum Pan	1CH	note number	28	note number
Drum Reverb Send	1DH	note number	29	note number
Drum Chorus Send	1EH	note number	30	note number
Drum Variation Send	1FH	note number	31	note number

All drum parameters in this list can be programmed separately for each instrument (i.e. each key). It is therefore required to specify the relevant note number which can be found in the first row of the XG Drum Map. You will not need to convert these numbers as the XG Drum Map values are given in decimals.

Any changes you make to the drum parameters affect the drum set used in the respective PART MODE track. For more detail consult the section "Part Mode and Drum Setups".

In addition to the above Controller messages #99 and #98, a NRPN transmission requires a further message, Control #06 (DATA ENTRY) to enter the parameter value. To make this a little clearer here are three short examples to demonstrate how parameter changes are achieved via NRPN.

EXAMPLE: AEG Decay Time

Control 099 001

Control 098 100

Control 006 64

The first two Controls call up the Decay Time parameter, Control 006 then sets the required parameter value. We have chosen value 64 for this example – this is equivalent to initial value +00 in the CS2x.

EXAMPLE: Drum Pitch Coarse, Key E1 (Analog Snare H):

Control 099 024

Control 098 040

Control 006 066

Control 99 calls up parameter PITCH COARSE, Control 98 sets the Note Number (40 = E1), whilst Control 06 increases the sound's initial pitch (64) by two semi-tones (66), resulting in the snare's higher tuning.

Let's stick with this example for a moment. Imagine you are working on a snare fill and decide that the snare should increase by a semi-tone with each beat during the fill. All you need to do is insert Controller 006 with the required value.

Don't forget to reset the snare's pitch after the final beat to its initial value (e.g. 66), as the rest of the song will otherwise sound a little strange.

Should the fancy take you to experiment some more with the snare, try controlling the DRUM DECAY RATE with NRPN. A value of between 80 and 100 will lend a punchy percussive edge to your snare! By the way, both Decay 1 and Decay 2 are controlled simultaneously this way.

EXAMPLE: *Drum Decay Rate, Key E1 (Analog Snare H):*

Control 099 023

Control 098 040

Control 006 096

As you can see from these examples, NRPN can be used effectively and is often well worth the effort. At the same time the XG concept's ability to perform as far as real-time sound parameter control is concerned is hereby proven beyond doubt.

We should also take a quick look at RPN messages and their applications. These messages can control three parameters (see below):

Table: RPN Parameter

Parameter	Cntr 101 (MSB) HEXADECIMAL	Cntr 100 (LSB) HEXADECIMAL	Cntr101 (MSB) DECIMAL	Cntr 100 (LSB) DECIMAL
Pitch Bend Sensitivity	00H	00H	0	0
Fine Tune	00H	01H	0	1
Coarse Tune	00H	02H	0	2

A peculiarity of RPN messages is that they require Controllers 100 and 101 to be set to 0. Strangely, this is actually done with 127.

EXAMPLE: *Fine Tune*

Control 101 000

Control 100 001

Control 006 068

Control 101 127

Control 100 127

Fine tuning is increased by 4 cents: middle value 64 + 04 steps = 68 (Control 006).

In order to change a single parameter, the poor sequencer track is flooded with 5 events. In comparison, the equivalent Sys-Ex message would only require a single event: F0.43.10.4C.08.00.09.07.44.F7. This gives us a good excuse to deal with this subject in greater detail.

Exclusive: Sys-Ex messages

You may have felt that the previously described methods of song production sound control are a little tedious. If so, feel free to skip this section. If you still want more however, it's time to get acquainted with System Exclusive messages. The following step by step guide will show just how these are put into practice.

System Exclusive data consists of a tone generator's parameter settings and can only be understood by that specific machine. Until recently, Sys-Ex messages were the domain of software programmers, who utilised them for synth editors and other software tools. The average user would only have come into contact with these messages when a BULK DUMP was sent from his or her tone generator. It wasn't necessary however to deal with the actual messages themselves.

XG elevates System Exclusive messages to a whole new plateau. There is a whole range of XG compatible machines, all of which speak exactly the same language. To clarify: an XG song will playback virtually identically on any XG machine thanks to the Controllers and single Sys-Ex messages (not blocks) used to control each sound. Therefore any songs created using a cheaper entry-level XG model will survive the upgrade to a more expensive model later on fully intact, provided they were programmed correctly. Better still: the higher quality XG machine will noticeably improve your sounds.

An important advantage of using System Exclusive messages is that they can control any CS2x parameter in real-time. It is important however to check whether these parameter values can be set using the more user-friendly Controllers. This applies particularly to Filter Frequency, Resonance, Pan Position and Effect Sends.

With this combination of different Controllers and Sys-Ex data, the XG system opens the door to unimagined sound shaping possibilities, particularly in a musical context. For example, you could play a looped bass sequence and try out different sounds and different sound parameters, all from within the sequencer. Once you have settled on the right values, these values are already incorporated into the sequencer track – it can be this easy!

The first thing you need to know when getting involved in Sys-Ex data, is that all values are given in hexadecimal. Some sequencers insist on using decimal notation for Sys-Ex input, so some kind of conversion is necessary. To this end you can utilise the table "DATA LIST" (page 27) or use the values (Hexa/Decimal) given in the following examples and tables.

By the way: hexadecimal values are often indicated with an H after the actual value. Sometimes a preceding \$ sign is used as well.

As a handle into the Sys-EX subject we will try to explain the basic structure of an "XG Native Parameter Change". This is a System Exclusive message which is used to change a single parameter on any XG model.

Table: Creation of a Sys-Ex message to change a parameter value (XG)

Value No.	Description	Hexadecimal	Decimal
1	Exclusive Status	F0	240
2	YAMAHA ID	43	67
3	Device Number	10	16
4	XG Model ID	63	99
5	Adress High		
6	Adress Mid		
7	Adress Low		
8	Data		
9	End of Exclusive	F7	247

As you can see from the table, bytes 5 to 8 are given no value. This might lead you to think that bytes 1 to 4 and 9 are the same for each System Exclusive message – this is true, but with one limitation: you will see that DEVICE NUMBER lists a value of 16. This value 16 (10H) actually represents Device Number 1, 17 represents Device Number 2, 18 represents Device Number 3, and so on. It is usually sufficient to use any value between 16 to 31 (10H to 1F), but for this to work, your XG model has to be set to Device Number ALL (ALL PART). If you are using several XG devices, you can address each device separately using different Device Numbers. This however requires that you correct the Sys-Ex messages to take this into account.

We are going to use value 16 from now on, as your machine is usually either set to DEVICE NUMBER ALL or 1. If your model doesn't respond to the Sys-Ex data, check that the correct Device Number is being used. Back to the table: bytes 1 and 9 always begin and end the message. Most sequencers don't require the entry of those two bytes as a result, and usually enter them for you when inputting a message. This sometimes happens "behind the scenes". If in doubt, consult the relevant section in your sequencer manual. Nevertheless, these two bytes are included in all our examples in brackets to remind you that you might not need to enter them.

All you need now to program your first Sys-Ex message are the Address Bytes (High, Mid, Low) and the required parameter's control range. Both can be found in the "DATA LIST" in "MIDI DATA FORMAT" documentation (pages 31 - 34).

You may at this point find yourself getting lost in grey theory, so let's put some of this theory into practice with some Sys-Ex parameter changes. With the aid of some really useful parameter values, we will show you that Sys-Ex can be fun! You will need to use the CS2x XG mode for the following examples, so press the MULTI key. The ADDRESS and DATA bytes are shown in bold type to set them apart from the ever repeating basic settings.

EXAMPLE: Reverb Return

Let's assume you wish to control the amount of reverb via the effect signal return. The correct XG address would be "02H 01H 0CH" (hexadecimal) i.e. "2 1 12" (decimal). This communicates directly with the REVERB RETURN parameter. The control range is between 00H – 7FH (0 – 127), the default value is 40H (64). To increase the REVERB RETURN level to 4EH (78), you need to enter the following Sys-Ex message:

(F0) 43 10 4C **02 01 0C 4E** (F7) = hexadecimal
 (240) 67 16 76 **2 1 12 78** (247) = decimal

EXAMPLE: Chorus Type

The Sys-Ex message required to select the Chorus Type is one byte longer, as DATA is divided into MSB and LSB values. This is also true for other effect types (Reverb + Variation) and some parameters. The CHORUS TYPE Address is 02H 01H 20H (2 1 32). The values for DATA (MSB + LSB) can be found in the EFFECT TYPE LIST (S.1 MIDI DATA). Let's take the DATA values for CHORUS 4, 41H (MSB) and 08H (LSB), i.e. 65 and 8.

OK, now the complete Sys-Ex message for this example looks like this:

(F0) 43 10 4C **02 01 20 41 08** (F7) = hexadecimal
 (240) 67 16 76 **2 1 32 65 8** (247) = decimal

EXAMPLE: Decay Time

Here we have a parameter that can't have a Controller assigned to it, the AEG DECAY TIME. You will be familiar with this parameter from the "Analogue Workshop". The Address for this message depends first of all on which MULTI PART is to be set. For Part 1, the message Address would be 08H 00H 1BH (8 0 27). The middle byte (00) is used to select the Part (Part 2 = 01, Part 3 = 02 etc.).

The Sys-Ex message to set the Decay value to 40H (64) looks like this:

(F0) 43 10 4C **08 00 1B 40** (F7) = hexadecimal
 (240) 67 16 76 **8 0 27 64** (247) = decimal

By the way, this Sys-Ex message would have exactly the same effect on MIDI channels 5–16 in Performance mode.

The following examples will show how even parameters usually set at the machine are sometimes better controlled via Sys-Ex.

EXAMPLE: Scene Mode

You cannot save the on/off state of Scene switches 1 & 2 in a Performance. It would be awkward however to have to switch this manually during song playback. Let's say you wish to cross-fade between Scene1 and Scene2 using the Mod wheel ("Scene Control"). Instead of having to press both Scene keys at the beginning or somewhere in the middle of the song, enter the following Sys-Ex message:

(F0) 43 10 63 **50 00 19 03** (F7) = hexadecimal
(240) 67 16 99 **80 0 25 03** (247) = decimal

The byte 8 value indicates that both Scenes are to be switched on. A value of 00 would switch both scenes off, 01 switches on Scene 1 and 02 Scene 2.

EXAMPLE: Switching Arpeggio Type and selecting MIDI Sync

Do you find it stimulating to change Arpeggio Type during a song? This can be achieved by programming the Performance to use Knob 4, but it is difficult to be precise in your selection with the Knob. Better to use the following Sys-Ex message:

(F0) 43 10 63 **60 00 31 00** (F7) = hexadecimal
(240) 67 16 99 **96 0 49 0** (247) = decimal

The message selects Arpeggio Type 1 (UpOct1). Responsible is byte 8 again with the value 00. A value of 01 would select Arpeggio Type 2 (UpOct2), etc.

While we're at it, we should also set the Arpeggio Tempo to MIDI via Sys-Ex, so that the Arpeggiator can be synchronised to MIDI Clock pulses:

(F0) 43 10 63 **60 00 2F 00 00** (F7) = hexadecimal
(240) 67 16 99 **96 0 47 0 0** (247) = decimal

Layer / Part EQ

The Equaliser is a most potent sound sculpting tool for CS2x song productions.

This EQ is available to:

- Each Performance Layer (1 - 4)
- Each Performance Mode Multi Part (5 - 16)
- Each XG Mode Multi Part
- Each key of the XG Drumkits (Performance and XG Mode)

The EQ can't be programmed on the machine, not even for Performance Layers. The programming must be done on the sequencer via Sys-Ex.

The settings for the Layers is then stored in the Performance, whilst the Sys-Ex data used to make the Multi Part settings must be contained in the song itself as Setup data.

The **LOGIC** and **CUBASE** Song Setups contain **Environments**, or **Mixer Maps** respectively, that allow fader EQ control for each Layer/Part.

The Layer EQ can be found in the PERFORMER page, whilst the Part EQs for Performance Mode (12 Parts) and XG Mode (16 Parts) are found in the “Part EQ” pages.

If you are using a different sequencer you can also program the **EQ parameters via Sys-EX**. The Song Setup (SMF) already contains the relevant strings at the end of the Multi Parts, so all you need to do is change the data byte at the end of the Sys-Ex message.

Here is an overview of the EQ parameters, including Parameter Range and Default Value:

<i>Parameter</i>	<i>Range Hex (Decimal)</i>	<i>Parameter Range</i>	<i>Default Value</i>
Bass Gain	00 to 7F (0 - 127)	-12 to +12	40 (64)
Treble Gain	00 to 7F (0 - 127)	-12 to +12	40 (64)
Bass Freq	04 to 28	32 Hz to 2.0 kHz	0C
Treble Freq	1C to 3A	500 Hz to 16 kHz	36

Table Layer / Part EQ in the **Appendix** lists which Sys-Ex values are used to set each parameter value.

EQ programming with drumkits is somewhat more complicated, as it is necessary to distinguish between **XG-Drumkits** and the drumkits in the “**Voices for Performances**” banks.

XG-Drumkits (Data List, page 18/19)

EQ settings are made per key in DRUM SETUP together with the other parameters, i.e. for each drum instrument separately (see DATA LIST, page 32 - MIDI Data Table <1-6>). There is no global XG Drumkit EQ settings to affect all keys.

Example of changing the **Bass Gain** for the C1 key (Kick) of an XG drumkit via Sys-Ex:

F0, 43, 10, 4C, 30, 24, 20, 40, F7.

Here is a quick analysis of this hexadecimal Sys-Ex message:

F0 = Exclusive Status

43 = YAMAHA ID

10 = Device Number (= All)

4C = XG Model ID

30 = Address High: Selects Drum Setup 1 (Drum Setup 2 = 31).

24 = Address Mid: Selects key C1 (Decimal = 36)

20 = Address Low: Selects “EQ Bass Gain” parameter

40 = Data: The data byte used to set the new parameter value. In this example, value 40 (decimal 64) corresponds to the default setting 0dB.

F7 = End of Exclusive message

Section “Part Mode and Drum Setups” shows how other XG Drum Setup parameters can be set with Sys-Ex messages.

CS2x-Drumkits (Data List, pages 15 - 17)

This type of kit involves “Material Voices” which can only be used in Performance Mode and assigned there to Layers 1 -4 as well as Multi Parts 5 - 13. As these kits are “Normal Voices” rather than XG drumkits, you cannot work at the individual key level - the EQ settings are global and affect all of the drumkit keys.

In contrast to the XG drumkits, the CS2x kits are primarily focused on modern music styles, i.e. Techno, Dance, Trance, Hip Hop, House and Jungle.

Bank Preset 12 also contains kits with kicks, sound effects (“FX”) and drum loop segments (“Chop”) in addition the actual drumkits (programs 1 - 6).

Tip: the Bank Pre 12 voices contain drumkits in their initialised state. This can be problematic with a few drum instruments (they cannot be heard! - e.g. “Ride + Crash”).

There are many voices in other banks that contain prepared versions of these kits: Pre00 - PGM 123 - 128. You are better off using these voices for song production.

Part Mode and Drum Setups

Two drum setups are available for each of the 20 XG drumkits. These allow you to program each key individually. These setups allow you to program each key individually. The most important parameters that can be used have already been listed in the “NRPN Parameter” table.

The XG drum kits are available to all Parts. The default settings however initialize all Parts, except drum Part 10, to Part Mode “normal”.

Part 10 is automatically set to Part Mode Drum Setup 1.

Choosing a drum kit for an additional Part will set its Part Mode to Drum Setup 2.

You can use the above NRPN messages or System Exclusive messages to set each drum sound.

Should you decide on the latter, you can find the necessary data in the following table. The values used communicate with Drum Setup 1, i.e. MIDI channel 10:

Table: Drum Sound Editing using Sys-Ex

Parameter	System -Exklusive message (hexadecimal)
Pitch Coarse	(F0) 43 10 4C 30 rr 00 VAL (F7)
Pitch Fine	(F0) 43 10 4C 30 rr 01 VAL (F7)
Level	(F0) 43 10 4C 30 rr 02 VAL (F7)
Panorama	(F0) 43 10 4C 30 rr 04 VAL (F7)
Reverb Send	(F0) 43 10 4C 30 rr 05 VAL (F7)
Chorus Send	(F0) 43 10 4C 30 rr 06 VAL (F7)
Variation Send	(F0) 43 10 4C 30 rr 07 VAL (F7)
Cutoff Frequency	(F0) 43 10 4C 30 rr 0B VAL (F7)
Resonance	(F0) 43 10 4C 30 rr 0C VAL (F7)
EG Attack	(F0) 43 10 4C 30 rr 0D VAL (F7)
EG Decay1	(F0) 43 10 4C 30 rr 0E VAL (F7)
EG Decay2	(F0) 43 10 4C 30 rr 0F VAL (F7)
EQ Bass Gain	(F0) 43 10 4C 30 rr 20 VAL (F7)
EQ Treble Gain	(F0) 43 10 4C 30 rr 21 VAL (F7)
EQ Bass Freq	(F0) 43 10 4C 30 rr 24 VAL (F7)
EQ Treble Freq	(F0) 43 10 4C 30 rr 25 VAL (F7)

Byte no. 6 (rr) represents the note number that is to be used, i.e. which drum sound is to be affected. The XG Drum Map lists the note number for each instrument. Finally you will need to convert into hexadecimal. For example: Snare H = Note # 40 = 28 (hexadecimal).

If you want to work with Drum Setup 2 using another Part, simply change byte 5 from 30 to 31. These Sys-Ex messages should only be sent after any Bank/Program Change message, as these completely initialize every aspect of a drum kit. By the way: the Drum Setup settings described here can be used with the XG drum kits, even in Performance mode, but not with the additional CS2x kits (Banks MSB 063 / LSB 012, Prg 001 to 006).

Things worth knowing About the Variation Effect

The CS2x effects have already been covered in detail. Still, we would like to take another look, specifically at the use of effects in song production.

The effect possibilities are essentially the same for both Performance and Multi mode. There are however two important differences:

- You can program all settings for Parts 5-16 (with the exception of Send Level) at the machine. Multi mode however requires that you use Sys-Ex messages and Controllers.
- You can only use the Variation Effect for Layers 1-4 in Performance mode; Multi Parts 5-16 cannot be used. Each Layer can only switch the effects ON or OFF. The Multi (XG) mode allows you to use the Variation Effect for any single Part using the Insert switch, or for all Parts, complete with individual Send Level using the System switch.

This has the following consequences: if it is important for you to be able to tie in 3 effects for all Parts, you may be better off recording in Multi mode. The trade-off here is that you can't use Performance mode's special features (Arpeggio, Scenes, Material Voices ...). The Multi mode however can offer a vast array of effect types, all of which can be controlled with Sys-Ex. More often than not however, one of the preset effect types may be sufficient.

The following table will help you to set effect types for Chorus, Reverb and Variation effects. All you need to add are the respective MSB and LSB values; these can be found in your manual's [Effect Type List](#).

Table: Selecting the Effect Type via Sys-Ex

Effect	Sys-Ex message (hexadecimal)
Variation Effect Type	(F0) 43 10 4C 02 01 40 msb lsb (F7)
Reverb Effect Type	(F0) 43 10 4C 02 01 00 msb lsb (F7)
Chor.Effect Type	(F0) 43 10 4C 02 01 20 msb lsb (F7)

The actual setting of effect parameters is perhaps best left to the hardiest of MIDI enthusiasts. You would need to look up the Sys-Ex addresses for each parameter in the Data List Book. To find out which parameters are available for each effect, take a look at the [Effect Parameter List](#).

The Variation Effect settings should be of particular interest. To make things a little easier, we have compiled a table with the Sys-Ex messages required for Variation Effect parameters 1 – 10. Each parameter's control range (VAL) depends on the Effect Type selected. We have included a list of parameters for our favourite effects:

Table: Variation Effect Settings via Sys-Ex

Parameter No.	Sys-Ex Message	Phaser	Distortion	Delay L, C, R
Var.Eff.Par 1	(F0) 43 10 4C 02 01 42 00 VAL (F7)	LFO Freq.	Drive	Lch Delay
Var.Eff.Par 2	(F0) 43 10 4C 02 01 44 00 VAL (F7)	LFO Depth	EQLowFrq	Rch Delay
Var.Eff.Par 3	(F0) 43 10 4C 02 01 46 00 VAL (F7)	Shift Offset	EQLowGain	Cch Delay
Var.Eff.Par 4	(F0) 43 10 4C 02 01 48 00 VAL (F7)	Feedback	LPFCutoff	Feedb. Delay
Var.Eff.Par 5	(F0) 43 10 4C 02 01 4A 00 VAL (F7)		Output Lev	Feedb. Level
Var.Eff.Par 6	(F0) 43 10 4C 02 01 4C 00 VAL (F7)	EQ Low Frq		Cch Level
Var.Eff.Par 7	(F0) 43 10 4C 02 01 4E 00 VAL (F7)	EQ Low Gain	EQMidFrq	High Damp
Var.Eff.Par 8	(F0) 43 10 4C 02 01 50 00 VAL (F7)	EQHighFrq	EQMidGain	
Var.Eff.Par 9	(F0) 43 10 4C 02 01 52 00 VAL (F7)	EQHighGain	EQMidWidh	
Var.Eff.Par10	(F0) 43 10 4C 02 01 54 00 VAL (F7)	Dry / Wet	Dry / Wet	Dry Wet
Var.Eff. Conn.	(F0) 43 10 4C 02 01 5A 00 VAL (F7)	0 = Insert 1 = System		

As you can see, only some effects utilize all 10 parameters. Some parameters (such as Delay times & EQ frequencies) will require the aid of the Effects Data Assign tables found in the manual's appendix (pages 25 - 26).

Fade Out

Many songs don't end with an arranged end part but fade out instead. This could be achieved with volume controllers for each Part. A more elegant (and more consistent) solution is to gradually fade down the Master Volume. Unfortunately this can only be done via Sys-Ex.

The file "SYSFADE" (TOOL Disk, "SYSEX" folder) contains a pre-programmed Master Volume fade over 8 bars. You can simply copy this part to the end of your song and then forget about the fade-out.

You should bear in mind though that the CS2x won't make another noise until it receives another Master Volume event larger than 0, or until you change mode. The latter happens automatically each time a song is started due to the initialisation.

Random Pan

Lively Pan modulations loosen any sequencer arrangement and create a "spacey" atmosphere. The CS2x achieves this easily but effectively with "Random Pan". This function is available in every CS2x mode: In the Performance Layers using the Pan and "Rndm" parameters (below -63) and in the Multi Parts via the this Sys-Ex message: (F0) 43 10 4C 08 nn 0E 00 (F7). Replace "nn" with the desired MIDI channel (0 - 15 for MIDI Ch. 1 - 16). Ensure that you don't follow the Sys-Ex message with a Pan Controller message (010) as this would negate the Random Pan setting.

Recording Songs with Arpeggio

One of the special highlights of the CS2x is the Arpeggiator. No doubt you will want to use it for your songs. You will need to activate the MIDI CLOCK in Song Setting (LOGIC: Song Settings - MIDI Options..., CUBASE: Options - Synchronisation...). All that's left is to set the Arpeggiator Tempo at the CS2x to MIDI (below Tempo 40). This setting can also be saved in the Performance. Now record the notes that will trigger the arpeggio on track 1. When a single note or chord is meant to control the arpeggio over a long period of time we recommend you work with repeats to avoid a gradual loss of synchronisation (e.g. repeat the note or chord every 4 bars).

Techno Drums and FX

The CS2x adds to the familiar XG drumkits of its predecessor models with a massive choice of bang-up-to-date drum sounds for Techno, Dance, Trance, Jungle, House etc. The best way to get a feel for these sounds is to try out Performances Pre 2 - PGM # 123 to 128. There you will find 6 kits using the new drum sounds. As touched on before, we're not dealing with "drum voices" here that, like the XG kits, allow individual keys to be programmed separately via Drum Setups. Rather, these are "normal voices" that can be assigned like all the other "Material Voices" to a Layer or the Multi Parts 5 - 16. These sounds are *not* available from XG Mode. The required MSB and LSB values can be found in the DATA LIST, pages 11 - 17.

Using the correct bass drum is of course essential for every Techno/Dance production. All bass drums suitable to these styles are located in the "Dr Kiks" voice (MSB 63, LSB 12, PGM #7), arranged as a kit. The Song Setup assigns this voice to Part 11.

Way-out sound effects and short vocal phrases are just as important. The voice "TechFx" contains plenty of these, grouped into a kit (MSB 63, LSB 12, PGM #9). You will find this voice as Part 12 in the Song Setup.

Construction Drumloops

At the first glance, the reason for the "Chop" voices in bank Pre12 of the Material Voices may not be obvious. These are actually various drum loop segments, arranged as a kit. With a little cunning and creative feel you should be able to create brand new drum loops from them. Hence we could also call them "Construction Loops".

For example, voice "Chop139" contains loop segments at a tempo of 139bpm. The tempo here isn't as crucial though as it is with complete drum loops as known from samplers. As we're dealing with very short segments that only create a groove once used together, varying the tempo is definitely an option. Sometimes the loop will actually groove better at a different tempo to that suggested.

The way "Construction Loops" work will make more sense once you have auditioned the "Chp-Loops" sound examples from the TOOL Disk "Loops" directory. These files contain setups for Part 5, and loop variations that change every 4 bars.

Spend some time analysing these loops constructed out of segments. Find out for yourself what combinations arise with other Chop voices loops.

Sequencer Software and the CS2x

Environments and Mixermaps for LOGIC and CUBASE

The SETUP Disk offers a whole string of Environments and Mixer Pages for LOGIC and CUBASE that allow you to edit your CS2x with the use of faders (see Appendix, FILE LIST). The pages are suited to Performance modification as well as the creation of song setups (see chapter “Essentials for Song Production”).

First a quick overview of all the pages:

Performer: Easy Edit Page for Modifying Performances (files: “SetIni” + “SetTech”)

Contains the following parameter groups:

- Performance Volume and Effect Sends
- Portamento Switch + Control
- Faders for the 8 knobs
- Volume Layer 1 - 4
- 2-Band EQ for Layers 1 - 4

The highlight of this page is the Layer EQ, as this can't be programmed at the keyboard!

The Snapshot “Reset” (CUBASE), or playback of the “Performer Reset” sequence (LOGIC), generates a standard setting that does not usually correspond to the actual Performance however. Therefore it is best to avoid using RESET to reset the faders if the current Performance will only have a few parameters modified. On the other hand, it makes sense to start with a RESET when creating a new **Performance Remix**, as the fader positions always correspond to the CS2x parameter settings here.

X-PERIMENT

Performances Pre1 - 001 to 011 (with arpeggio) are perfectly suited to testing the PERFORMER with running Arpeggiator and activated HOLD function. Take a listen to each layer individually to start with (Layer Volume/Mute) to get a better insight into the sound's components. Program each layer's EQ to taste. Create a new mix using with the layer volumes. Experiment with the knob parameters and Effect Sends.

Combine your fader settings with the parameter settings at the machine. For instance, try different effect or arpeggio types. Store the result as a new Performance (STORE).

Part EQ for Multi Parts 5 - 16 in Performance-Mode (files: “SetIni” and “SetTech”)

The EQ for Layers and Parts were organised into separate pages. The Layer EQs are an integral part of the Performance and are stored with it. The Part EQs however belong to the song setup and are saved as Sys-Ex data or fader events in the song itself.

XG Part EQ for Multi Parts 1 - 16 in Multi-Mode (file: “SetXG”)

A very effective compliment to existing XG Mixers that don't contain the EQ parameters.

Can also be used for MU90E, MU100R, MU128, SW1000XG.

In addition (*CUBASE* only):

Performance Controllers (files: “SetIni” and “SetTech”)

This Mixer Map specifically targeted at the CS2x Performance mode can be very advantageous despite the existing GM/GS/XG Mixers. Here you will find a collection of the most important CS2x parameters that can be changed via controllers. Mixer settings can be stored using SNAPSHOT and recalled at a later time. LOGIC users are encouraged to use the existing GM/XG Mixers as found in the more recent LOGIC versions.

Finally a few additional notes about working with the Environment and Mixer Maps in LOGIC or CUBASE:

Working with LOGIC Environments

Do not open the LOGIC Environments by double-clicking the relevant instrument; instead call them up with the pre-programmed SCREENSETS (numeric keys 1, 2 etc.)

When an Environment is open, do not select the Mixer instrument track when playing at the CS2x keyboard or when its Arpeggiator is activated - otherwise the Environment is burdened by note events, which could result in system instability.

To reset the faders to their default positions, play back “PartEQ Reset” or “Performer Reset” respectively once you have de-muted them.

The GM/GS/XG Mixer available in the newer LOGIC versions, in combination with the supplied complimentary Environment Layer “Part EQ” is well suited to song production. Unlike with CUBASE, the conversion to events doesn’t happen automatically here, but needs to be initiated with the “Send Selected Fader Values” function. This means that the Setup Parts are receiving all the other events that can be controlled with the Environment, too. If you are using the GM/XG Mixer or the “Part EQ” (described in more detail below) you can remove these events from the Setup Part. If you are making only a few to changes to the basic setup it may be easier to simply edit the Setup Parts with the Environment Pages

Two further tips about PERFORMER:

You can work on the EQ parameters of several layers at the same time if you highlight these beforehand by dragging the mouse.

The knob faders can be remote-controlled from the respective CS2x knobs.

LOGIC: The GM/XG MIDI Mixer

The GM/XG MIDI Mixer is perfectly suited to the special requirements of the CS2x. Don’t be fooled by the mixer’s description - it can be used for the CS2x Multi (XG) Mode as well as the Performance Mode, although channels 2 - 4 are unavailable for the latter.

You can real-time control the following parameters with the virtual faders/rotary controllers: Volume (with Mute switch), Pan, Cutoff, Chorus and Reverb. These are the default settings. In addition, you can assign other parameters to the rotary controllers. For instance, if you want to control “Resonance” instead of “Pan”, click “Pan” and change the controller number in the resulting menu to 71.

Bear in mind though that you can also control the Attack, Decay, Release, HPF Cutoff, LPF Cutoff and Resonance sound parameters with the CS2x knobs - this is often a better solution for real-time control. An elegant approach would be to establish the basic song mix using the Mixer and then perform any real-time control with the knobs and record these on a separate sequencer track.

Changes to the XG effect types for Reverb, Chorus and Variation Effect can be made from the right-hand side of the Mixer page. This is only available though if you are working in Multi (XG) Mode. As you know, in Performance Mode the current Performance effect settings (Reverb and Chorus) are always in effect, including for Parts 5 - 16. The Variation Effect however is only available to the Performance Parts.

The default Mixer settings "XG" (bottom right) should not normally be changed. One thing you absolutely should avoid is to perform a Mixer RESET in the middle of a running song production. This doesn't just reset the Mixer values to their defaults - it also changes the CS2x into Multi (XG) Mode!

Working with Cubase Mixer Maps

The Mixer Maps are opened by double-clicking the Mixer track's channel with the left mouse button.

The Mixer Maps are set to REPLACE mode in the Song Setups. This means that in contrast to the LOCAL Mode, the faders aren't reset every time the Mixer Map is called up. The Mixer events already stored in the Mixer tracks' parts are constantly updated during fader movements.

The INIT Part "XGon+PFini" should only be played back when beginning a song production. Once done you can mute the Init track and start the song afresh so that the Mixer events and Bank/Program changes become effective. Playing the INIT Parts at every song start would cause the Mixer settings to deviate from the CS2x parameter settings.

If, whilst working with Mixer Maps, you wish to play at the CS2x, proceed as follows:

1. Select channel/track "MIDI Thru".
2. Double-click the desired Mixer Part (e.g. "Performer") (the "MIDI Thru" track stays selected).
3. Set the send MIDI channel with TRAN CH (Utility) at the CS2x.

The EDIT page is opened by double-clicking the Part "VoiceGen". Once the Dump has been sent, initiate the "Basic" **Snapshot** (above the OP Level) to reset the faders to the "Basic" Performance settings.

Should you wish to use the PERFORMER in parallel with the "Perf Control" page for song production, you need to delete the channel for the Performance Part in the previously mentioned page, otherwise some Events will be doubled and presumably won't match in value.

Bank and Program Changes with LOGIC

In the CS2x Performance Mode, you can set sounds for Multi Parts 5 - 16 as well as for the actual Performance Layers (1 - 4).

If you are working with the EMAGIC LOGIC sequencer program you can try this out like this:

1. Load Song Setup “SetIni” in LOGIC Format from the SETUP Disk’s “Setups” folder

This Setup contains pre-programmed Bank and Program changes for Parts 5 - 16.

2. Viewing the Setup File

Highlight track 5’s Setup Part and open the Event List with WINDOW - OPEN EVENT LIST. All setup data for MIDI channel 5 will be shown. The first three events comprise the BANK and PROGRAM CHANGES and look like this:

<u>Position</u>	<u>Status</u>	<u>CHA</u>	<u>NUM</u>	<u>VAL</u>	<u>Length/Info</u>
1 2 1 3	Control	5	0	0	Bank MSB
1 2 1 13	Control	5	32	0	Bank LSB
1 2 1 23	Program		0	0	

Controller 0 is set to (MSB) value 0 in the first line.

Controller 32 is set to (LSB) value 0 in the second.

Finally, Program 1 is selected with value 0 (conversion always required).

3. Changing the Bank and Program Selection

You can use the above scheme for your own songs. Use EDIT - COPY / PASTE to copy the Setup Part to other arrangements.

You then only need to change two values for Bank changes:

The first line always consists of MSB value 63 for “Material Voices” for VAL. You can leave it at MSB 0 for XG voices. In the second line, VAL is always the LSB value required for the desired bank change. You can look these up in the DATA LIST, pages 6 - 8 (XG Voices) and 11 - 14 (Material Voices).

Example: You wish to select Program 25 “ObeStrgA” from Bank Pre08.

The heading of the table (Data List, page 11) shows the MSB value is 63 and the LSB value is 8. These are inserted into the Event List in the VAL columns of the first (MSB) and the second (LSB) lines. Insert Program 25 for the third line’s NUM.

4. Setting up Drumkits

Drumkits are normally assigned to MIDI channel 10. The Setup File presets this to the “Standard Kit” (XG). If you wish to use a particular CS2x drumkit instead (DATA LIST, pages 15 - 17) you will need to change the first line’s MSB value to 63 and the second line’s LSB value to 12 (each in the VAL column). You can then use Programs 1 to 22 in the third line to select the drumkit you want.

These Bank and Program changes only come into effect when all three events are played back in sequence, or when they are click-selected in the EDIT mode. The CS2x must not be in EDIT mode during playback, as it ignores all controller messages in this mode. If things don’t work as expected, ensure that the CS2x Parts correspond to the MIDI reception channels (UTILITY - RCV-CH + PART/LAYER button).

Bank and Program Changes with CUBASE

In Performance mode you can set up Multi Parts 5 - 16 in addition to the actual Performance (Layers 1 - 4). If you are working with STEINBERG CUBASE, you can try this out like this: Commands for the English language MAC version are given in brackets.

1. Load Song Setup "SetIni" in Cubase format from the SETUP Disk's "Setups" folder

This Setup contains pre-programmed Bank and Program changes for Parts 5 - 16.

2. Viewing the Setup file

Open Part 5's Even List ("Bank/Prg5") by double-clicking it. The three listed events comprise the BANK and PROGRAM CHANGES and look like this:

<u>Start Position</u>	<u>Value 1</u> (Val 1)	<u>Value2</u> (Val 2)	<u>Status</u> (Event Type)	<u>Channel</u> (Channel)
0001.01.384	0	0	BankSelMSB	5
0001.01.388	32	0	BankSelLSB	5
0001.01.392	1		ProgChange	5

Controller 0 is set to (MSB) value 0 in the first line.

Controller 32 is set to (LSB) value 0 in the second.

Finally, Program 1 is selected with value 0 (conversion always required).

3. Changing the Bank and Program Selection

You can use the above scheme for your own songs. Use EDIT - COPY / PASTE to copy the Setup Part to other arrangements.

You then only need to change two values for Bank changes:

The first line always consists of MSB value 63 for "Material Voices" for Val 2. You can leave it at MSB 0 for XG voices. In the second line, Val 2 is always the LSB value required for the desired bank change. You can look these up in the DATA LIST, pages 6 - 8 (XG Voices) and 11 - 14 (Material Voices).

Example: You wish to select Program 25 "ObeStrgA" from Bank Pre08.

The heading of the table (Data List, page 11) shows the MSB value is 63 and the LSB value is 8. These are inserted into the Event List in the "Val 2" columns of the first (MSB) and second (LSB) lines. Insert Program 25 for the third line's "Val 1".

4. Drumkits einstellen

Drumkits are normally assigned to MIDI channel 10. The Setup File presets this to "Standard Kit" (XG). If you wish to use a particular CS2x drumkit instead (DATA LIST, pages 15 - 17) you will need to change the first line's MSB value to 63 and the second line's LSB value to 12 (each in the Val 2 column). You can then use Programs 1 to 22 in the third line to select the drumkit you want.

These Bank and Program changes only come into effect when all three events are played back in sequence, or when they are click-selected in the EDIT mode. The CS2x must not be in EDIT mode during playback, as it ignores all controller messages in this mode. If things don't work as expected, ensure that the CS2x Parts correspond to the MIDI reception channels (UTILITY - RCV-CH + PART/LAYER button). Don't try to program Bank changes from Partinfo, as you cannot enter the MSB + LSB there.

Appendix

File List: Setup Disk

📁 CubasMAC	📄 Setini	(Setups + Mixer Maps)
	📄 SetTech	(Setups + Mixer Maps)
	📄 SetXG	(Setups + Mixer Map)
📁 CubasPC	📄 Setini.All	(Setups + Mixer Maps)
	📄 SetTech.All	(Setups + Mixer Maps)
	📄 SetXG.All	(Setups + Mixer Map)
📁 LogicMAC	📄 Setini	(Setups + Environments)
	📄 SetTech	(Setups + Environments)
	📄 SetXG	(Setups + Environment)
📁 LogicPC	📄 Setini.LSO	(Setups + Environments)
	📄 SetTech.LSO	(Setups + Environments)
	📄 SetXG.LSO	(Setups + Environments)
📁 SMF0	📄 Setini0.MID	(Setups as Standard MIDI File - Format 0)
	📄 SetTech0.MID	(Setups as Standard MIDI File - Format 0)
	📄 SetXG0.MID	(Setups as Standard MIDI File - Format 0)
📁 SMF1	📄 Setini1.MID	(Setups as Standard MIDI File - Format 1)
	📄 SetTech1.MID	(Setups as Standard MIDI File - Format 1)
	📄 SetXG1.MID	(Setups as Standard MIDI File - Format 1)
	📄 BankIni.MID	(Bank-/Program changes as Standard MIDI File - Format 1)
	📄 BankTech.MID	(Bank-/Program changes as Standard MIDI File - Format 1)

File List: Tool Disk

CS1xFact

-  CSPreset.MID (128 Preset Performances from the CS1x)
-  CSUser.MID (128 User Performances from the CS1x)
-  CSEExtra.MID (128 Extra Performances from the CS1x)

Loops

-  Chop113.MID (Construction Loop 139bpm as SMF - Format 0)
-  Chop135.MID (Construction Loop 144bpm as SMF - Format 0)
-  Chop136.MID (Construction Loop 139bpm as SMF - Format 0)
-  Chop139.MID (Construction Loop 139bpm as SMF - Format 0)
-  Chop144.MID (Construction Loop 139bpm as SMF - Format 0)

SYSEX

-  5TO16OFF.MID (MIDI-Ch. Parts 5 - 16 = off)
-  5TO16ON.MID (MIDI-Ch. Parts 5 - 16 = on)
-  NOBMUL.MID (Assign CTRL / Multi Mode)
-  KNOBPFM.MID (Assign CTRL / Factory setting)
-  REQPART1.MID to REQPR16.MID (Single Dump Requests for Multi Parts 1 to 16)
-  REQPFALL.MID (Dump Request for all parameters of Multi Parts 5 - 16)
-  REQXGALL.MID (Dump Request for all parameters of Multi Parts 1 - 16)
-  SYSCFADE.MID (Master Volume fade-out)

Tutorial

-  TutorPFM.MID (128 Tutorial Performances as "Bulk Dump All")
-  TutrDemo.MID (Demo sequence for the "Analogue Workshop")

Table: Layer / Part EQ

Low Freq	Hexadecimal	Decimal	High Freq	Hexadecimal	Decimal
32 Hz	4	4	500 Hz	1C	28
36 Hz	5	5	560 Hz	1D	29
40 Hz	6	6	630 Hz	1E	30
45 Hz	7	7	700 Hz	1F	31
50 Hz	8	8	800 Hz	20	32
56 Hz	9	9	900 Hz	21	33
63 Hz	0A	10	1.0KHz	22	34
70 Hz	0B	11	1.1KHz	23	35
80 Hz	0C	12	1.2KHz	24	36
90 Hz	0D	13	1.4KHz	25	37
100 Hz	0E	14	1.6KHz	26	38
110 Hz	0F	15	1.8KHz	27	39
125 Hz	10	16	2.0KHz	28	40
140 Hz	11	17	2.2KHz	29	41
160 Hz	12	18	2.5KHz	2A	42
180 Hz	13	19	2.8KHz	2B	43
200 Hz	14	20	3.2KHz	2C	44
225 Hz	15	21	3.6KHz	2D	45
250 Hz	16	22	4.0KHz	2E	46
280 Hz	17	23	4.5KHz	2F	47
315 Hz	18	24	5.0KHz	30	48
355 Hz	19	25	5.6KHz	31	49
400 Hz	1A	26	6.3KHz	32	50
450 Hz	1B	27	7.0KHz	33	51
500 Hz	1C	28	8.0KHz	34	52
560 Hz	1D	29	9.0KHz	35	53
630 Hz	1E	30	10.0KHz	36	54
700 Hz	1F	31	11.0KHz	37	55
800 Hz	20	32	12.0KHz	38	56
900 Hz	21	33	14.0KHz	39	57
1.0KHz	22	34	16.0KHz	3A	58
1.1KHz	23	35			
1.2KHz	24	36			
1.4KHz	25	37			
1.6KHz	26	38			
1.8KHz	27	39			
2.0KHz	28	40			

Performance List: TUTORIAL-Bank

NO	Cat.	Perf Name	Elm#	NO	Cat.	Perf Name	Elm#
1	--	XPER-Det	2	65	--	XPR-VCF1	2
2	--	1VCOsaw1	1	66	--	XPR-VCF2	2
3	--	2VCOsaw1	2	67	--	XPR-Pan1	1
4	--	1VCOsaw2	1	68	--	XPR-Pan2	1
5	--	2VCOsaw2	2	69	--	XPR-Pan3	1
6	--	1VCOsqr	1	70	--	XPR-Vel1	1
7	--	2VCOsqr	2	71	--	XPR-Vel2	1
8	--	1VCOpl25	1	72	--	XPR-Bass	2
9	--	1VCOpl10	1	73	--	XPR-Puls	2
10	--	OscSync1	1	74	--	XPR-Sync	2
11	--	OscSync2	1	75	--	XPR-Hous	1
12	--	1VCOsine	1	76	--	Ap-SFX1	1
13	--	Noise	1	77	--	Ap-SFX2	1
14	--	XPER-Res	2	78	--	Ap-SFX3	1
15	--	2VCF	2	79	--	Ap-SFX4	1
16	--	VCF-EG1	2	80	--	Ap-SFX5	1
17	--	XPER-FEG	2	81	--	Ap-Syn1	1
18	--	VCF-EG2	2	82	--	Ap-Syn2	1
19	--	VCF-EG3	2	83	--	Ap-Clavy	2
20	--	XPER-Swp	2	84	--	Ap-Piano	4
21	--	VCA-EG1	2	85	--	Ap-Tranc	3
22	--	VCA-EG2	2	86	--	Ap-VelWv	2
23	--	VCA-EG3	2	87	--	Ap-Line1	1
24	--	VCFA-EG1	2	88	--	Ap-Line2	2
25	--	VCFA-EG2	2	89	--	Ap-Line3	1
26	--	XPER-PEGG	2	90	--	Ap-Line4	2
27	--	Checkit	2	91	--	Ap-Line5	2
28	--	PEG-Bras	2	92	--	Ap-Drum1	3
29	--	PEG-Warp	2	93	--	Ap-Drum2	1
30	--	PEG-Drum	1	94	--	Ap-Drum3	1
31	--	PEG-Melo	1	95	--	Sc-Sq/Sw	2
32	--	PEG-Slid	1	96	--	Sc-Synth	1
33	--	LFO-ModX	2	97	--	Sc-Filtr	3
34	--	LFO-Dly	1	98	--	Sc-Pan	1
35	--	LFO-S/H	1	99	--	Sc-Strgs	2
36	--	XPR-LFO1	2	100	--	XPER-Fx	2
37	--	XPR-LFO2	2	101	--	Fx-Delay	1
38	--	LFO-VCF1	2	102	--	XPER-Dly	1
39	--	LFO-VCF2	2	103	--	Fx-Phaz1	3
40	--	XPR-ALFO	2	104	--	Fx-Phaz2	2
41	--	LFO-VCA1	2	105	--	Fx-Flang	1
42	--	LFO-VCA2	2	106	--	Fx-AWah1	1
43	--	2LFO-VCF	2	107	--	Fx-AWah2	1
44	--	2LFO-VCA	2	108	--	Fx-AmpS1	2
45	--	LFO-Trig	1	109	--	Fx-AmpS2	2
46	--	LFO-Free	1	110	--	Fx-AtPan	3
47	--	Poly	2	111	--	Fx-Tremo	1
48	--	Mono	2	112	--	Fx-Lezl1	2
49	--	Poly&Prt	2	113	--	Fx-Lezl2	3
50	--	Mono&Prt	2	114	--	Fx-3BnEQ	1
51	--	SinglTrg	1	115	--	XPR-Liv1	3
52	--	SinglOff	1	116	--	XPR-Liv2	2
53	--	XPER-Vel	1	117	--	Split-1A	2
54	--	VeloStrg	2	118	--	Split-1B	2
55	--	VeloEPno	3	119	--	Split-2A	2
56	--	VelChord	3	120	--	Split-2B	2
57	--	VeloDrum	2	121	--	ORaStep1	4
58	--	ArpSpl1	2	122	--	ORaStep2	4
59	--	ArpSpl2	3	123	--	ORaStep3	4
60	--	XPER-Arp	1	124	--	ORaStep4	4
61	--	XPR-UDwA	1	125	--	ORbStep1	4
62	--	XPR-UDwB	1	126	--	ORbStep2	4
63	--	XPER-RhP	1	127	--	ORbStep3	4
64	--	XPER-3/x	1	128	--	ORbStep4	4

The little Trouble Shooter

In addition to the "Troubleshooting Guide" given in the manual, we will describe some of the typical problems that are likely to crop up during use. It goes without saying that we will show you a way out this misery. So before you spend a lot of money on HOTLINE telephone calls or on the next SERVICE, you should read this section.

> The CS2x is resolutely silent

Did you play a sequencer song with a fade-out? If this fade-out was generated with Sys-Ex events, you will need to reset the Master Volume to a value of 127. With the sound examples this happens automatically at the beginning and end of the song. If absolutely necessary, a RESET can be performed (see your manual, page 69). Note however that this will restore the factory defaults; all of your USER performances will be lost!

Another common mistake: is the CS2x still set to "LOCAL OFF" (UTILITY)? If so, the keyboard is disconnected from the sound source, and you will hear the CS2x only when working with the sequencer. Simply activate LOCAL ON.

> Single Performances can't be heard during playback

The culprit here may be the Arpeggiator's Tempo setting. If the Arpeggio is active and it's tempo set to MIDI, the sound cannot be played from the keyboard. Equally, the Arpeggio cannot be triggered from the keyboard because the Arpeggiator is waiting for MIDI Clock signals. You can switch off the Arpeggiator, change the Tempo setting or activate the relevant sequencer function so that it sends MIDI Clock signals to the CS2x.

> The knobs aren't working correctly

Ensure that the UTILTY – ASSIGN CTRL assignments correspond with the default settings. You may have changed them during a song production. By the way, there are different ways to restore the default settings: you can set them manually, transmit them via the KNOBPER.MID file (Tutorial Disk), or perform a machine reset. Or perhaps you have activated the Scene switches? All knob changes are ignored if you have.

> A sequencer song sounds incomplete or odd

Is the song's Performance's Arpeggiator active and its tempo set to MIDI? If so, you must activate your sequencer's clock to enable synchronisation between the Arpeggiator and the sequencer.

Are the Performance Mode, Multi Part midi channels set correctly? Please check in UTILITY - RCV CH. whilst switching Parts with the PART/LAYER button (Part 5 = Rcv. Ch. 5, Part 6 = Rcv. Ch. 6, etc.).

Is the CS2x currently in EDIT mode? If so, the correct settings for Multi Parts cannot be received. Use the Performance key to switch into PLAY mode.

> An Arpeggio won't trigger over the whole keyboard

In this case you have to deactivate the Arpeggio Split function. Concentrate initially on the first Layer with Arpeggiator functions using the Panel switch. Now press and hold the first two keys to the left and above the LC-Display and press the Down key for Arpeggio type underneath the parameter matrix. This will make the "S" disappear from the display. Now you can use the whole keyboard for your arpeggios.

> The Arpeggio Split function doesn't work as desired

The Split point is set to C3. If you select an Arpeggio type whose playing range extends into the lower key half, any notes in this half will play the sound assigned to it. Simply adjust the Arpeggio type so that no notes beyond the C3 are played (e.g. UpOct1 or DwOct1).

YAMAHA EUROPE: Sound Disks for the CS2x

VD-CS1x-01 “Analog Power” , Cost 49 DM

128 Performances + Demo, programmed by Peter Krischker

This sound bank contains classic and current analogue synths for Techno, Dance, Trance, Electronic, Synth-Pop. The following sound categories are covered: Polysynths, Pads and Synthstrings, Distorted Analogue Sounds, Techno Bass Drums. “The up-to-date feel of these analogue sounds is particularly apparent when they are embellished with modulation or distortion effects... Without question, “Analog Power” offers explosive material for modern electronic arrangement and is highly recommended for Dance Floor as well as Techno music styles” (Test KEYS 2/97, page 62).

VD-CS1x-02 “Equidance”, Cost 49 DM

128 Performances, programmed by Frank Schneider

EQUIDANCE covers a broad spectrum of synthesizer sounds in the style of “Equinox” (J.M. Jarre) right through to modern Techno/Dance elements. This sound bank contains sounds for film music, Electronic, Trance, Techno, Synth Pop etc. The following sound categories are covered: Impressive Soundscapes and Atmospheres, Sound Effects, Arpeggios, Sequencer Sounds, Pad Sounds. “Atmospheric collages and effect sounds serve to inspire during the composition and arranging of electronic music. Anyone who gathers inspiration from new sound programs will likely strike gold here.” (Test KEYS 2/97, page 62).

VD-CS1x-03 “Universal Collection” , Cost 49 DM

128 Performances, programmed by Peter Krischker

The UNIVERSAL COLLECTION offers a comprehensive range of instrument sounds for all musical styles. The following sound categories are covered: Piano, Organ, Accordion, Guitar, Bass, Strings, Brass, Reeds, Leadsynths, Pads + Textures, Atmospheres, Analogue/Digital Synths, Splitsounds. “Simply put, you should pack the “Universal Collection” for live gigs with the CS1x.” (Test KEYS 2/97, page 62).

VD-CS1x-04 “Power Generator”, Cost 49 DM

128 Performances + Demo, programmed by Frank Schneider and Jörg Holzamer

These sounds are particularly suited to Techno, Dance, Trance, Electronic, Ambient, Synth-Pop etc. The following sound categories are covered: Techno Bases, Distorted Analogue Sounds, Sound Effects, Arpeggio Performances, Sequencer Sounds, Pads, Atmospheres. “This product is characterised by tight Techno bases, sequencer variants, distorted analogue synths as well as original effects and arpeggios. You notice right away that much attention to detail has gone into these sounds, with convincing results...” (Test KEYS 2/97, page 62).

VD-CS1x-05 “Synth World”, Cost 49 DM

128 Performances, programmed by Mark Lingard

Spacious, fresh, modern... Contains exemplary Arpeggio Synths and Drum Arpeggios. Fabulous Synth Bases, incredible Pad and Effect sounds, Morphing Sounds, Sweeps, impressive Soundscapes.

VD-CS1x-06 “Analog Fascination”, Cost 49 DM

128 Performances, programmed by Mark Lingard

Here the CS1x sounds like a modern analogue synth of the 90's, harder and more way-out than “Synth World”. Many Techno-capable sounds. Also ingenious Arpeggio Performances. Distorted and partially distorted Analogue Sounds. Spacious Pads...

The software is available from music dealers, or via mail order from:

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