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Style Creation Course

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1.1 Introduction

Anyone having a Yamaha keyboard will from time to time want to have new styles, although extremely many styles are available.

The purpose of this course is to give this user (the style programmer) knowledge, tools, ideas and tips to create new styles.

In this course we will discuss the major principles in style programming using MIDI sequencer software. Almost any MIDI sequencer software will do.

The course is subdivided in a number of parts each explaining principles and pitfalls, tips and tricks in one area of the creation process.

- In Part 2 and 3 we will create the skeleton for our new style
- In Part 4 to 9 we will create the musical content in the style (the MIDI part)
- In Part 10 we will finish the style by adding CASM, OTS and MDB data chunks
- In Part 11 we will discuss ways to enhance the style features
- In Part 12 we will discuss problems - and their solution

Part 5 - 9 are in now way meant to be a complete guide to music programming. The purpose of these parts is to give an initial introduction to style music programming.

The styles created following the principles in this course will work in Yamaha Tyros, PSR, CVP, DGX, YPG and YPT keyboards.

Please mail me (js@jososoftware.dk) for questions, comments and suggestions for extending this course. Thank you.

1.2 The overall Picture

The Yamaha keyboard styles are MIDI format 0 files with one or more additional sections. The MIDI part of the style file is divided in style parts with MIDI Text Markers, which defines where the MIDI data for this particular style part begins. Each style part matches the keyboard model features. Normally keyboards can use all style files even though they may have fewer or more style parts.

In newer keyboards valid style part names (Text Markers) are:

- "Main A", "Main B", "Main C", "Main D"
- "Intro A", "Intro B", "Intro C"
- "Ending A", "Ending B", "Ending C"
- "Fill In AA", "Fill In BB", "Fill In CC", "Fill In DD", and "Fill In BA" (Break).

Each style part can be from 1 to 128 measures in length, except Fill In parts which must be 1 measure long. Typical lengths are:

- Intro parts: 1 to 8 measures
- Main parts: 4 to 8 measures
- Ending parts: 1 to 8 measures

The first measure holds voice definitions, volume, reverb, chorus, pan etc. settings and have two Text Markers "SFF1" and "SInt". (newest keyboards: "SFF2" and "SInt") In the table is shown a part of the style parts and the corresponding Markers.

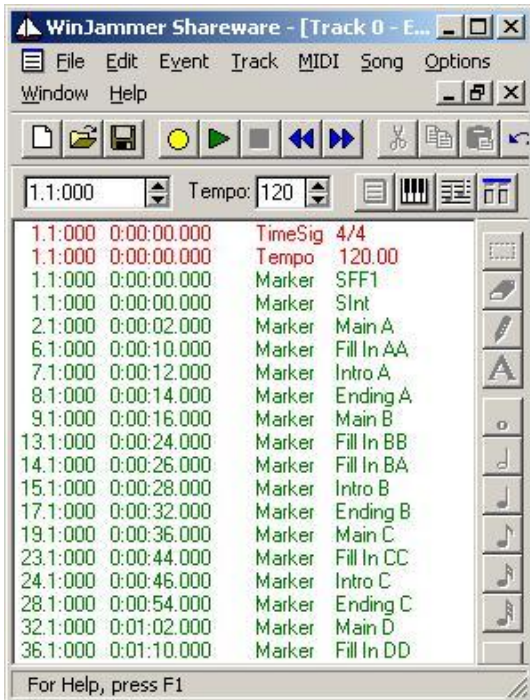
MIDI data									Non-MIDI data
Meas.	1	2-5	6	7	8	9-12	13	14 >	CASM, OTS and MDB
Style part	SFF1 SInt	Main A	Fill In AA	Intro A	Ending A	Main B	Fill In BB	more parts	

Each style part can hold information in a maximum of 16 channels. These are known as "Source Channels". The default Yamaha destination channels (output channels at the keyboard) are shown in the table.

Dest. ch.	09	10	11	12	13	14	15	16
Acc. part	Rhythm Sub	Rhythm Main	Bass	Chord 1	Chord 2	Pad	Phrase 1	Phrase 2

A "simple" style will have equal source channel and destination channel layout. If another channel layout or more than 8 channels are used in the style file the source channels must be redirected in the CASM section. This topic is discussed in part 10.

For this course we will start our style project by setting up a MIDI file, and adding Text Markers as shown in the sequencer software event list. We assume that Time Signature and Tempo definitions are added automatically when the file is created, otherwise this must be done too.



1.3 General Setup

After setting up the main structure we will add at the very beginning of the file:

- Copyright notice
 - Track Name (= Style Name)
 - System Exclusive Messages
 - GM System On = F0 7E 7F 09 01 F7
 - Yamaha = F0 43 73 39 11 00 46 00 F7
- Furthermore is often added:
- XG Works On = F0 43 76 1A 10 01 01 01 01 01 01 01 F7



Next thing to do is to add voices - and voice parameters - to the channels 9 - 16 within the first measure of the MIDI file as shown partly below. In this example we add to each voice:

- Volume, Expression and Chorus Controller data
- Voice MSB Bank, LSB Bank and Program Change - in this order

As shown we have added in Channel 10: Drums; in Channel 11: Electric Bass (finger); and in Channel 12: Acoustic Piano. There are added other non-shown instruments in channels 13, 14, 15 and 16.



You can place an instrument in any MIDI channel, except channel 10 which is a Drum channel only. In this course we will follow a "simple" layout (MIDI source channel = Keyboard destination channel). A typical setup will be:

- 09: Rhythm Sub: Often the various Latin American percussion instruments
- 10: Rhythm Main: The drum set
- 11: Bass: Any bass instrument, or piano, or tuba
- 12: Chord 1: Often Rhythm Guitar
- 13: Chord 2: Often Rhythm Guitar or Piano
- 14: Pad: Often a "floating" voice like Strings or Choir
- 15: Phrase 1: Small melodic phrases often played on a brass instrument
- 16: Phrase 2: Small melodic phrases often played on a brass instrument

1.4 Creating the accompaniment

1.4.1 Generic vs. Song Style

When creating styles you have to decide if the style is

- a generic style (e.g. a ballad style)

or

- a song style (e.g. a style for the song "Yesterday").

The generic style is intended for use in many songs, therefore the accompaniment must be flexible. This is most often done by increasing the accompaniment complexity AND number of instruments used from the "Main A" part to the "Main D". And for the Intro, the Fill and the Ending parts as well.

Example: The Main A part may have only a drum, a bass and a chord channel, all playing rather simple patterns. Main B may add another chord channel. Main C may add a pad channel. And Main D may add a phrase channel.

If we consider a song style we will have to create style parts for what traditionally are called the "A" and the "B" part. And for "the bridge" as well. This means that complexity and number of instruments used are dictated by the original song.

In song styles the Intro and the Ending parts will have to sound like the original intro and ending. Quite often these parts include both the chord progression (which in other parts is played with the left hand) and the melody line (which in other parts is played with the right hand).

If the style is created with these "melodic" Intro's and Ending's, all the performer has to do is to hit the song's root chord. Then the style will play a melodic intro, and when this is finished the performer takes over by playing one of the Main parts.

1.4.2 Creating the channel parts

We are now ready to add notes to the channels. There are several ways to do this:

- Record the notes using your keyboard
- Pick the notes you need from an existing style
- Program the notes in the sequencer software

or combinations of these methods.

When recording from the keyboard all the small variations (and the errors) are recorded. The small variations (e.g. timing, note loudness, note length etc.) will give the style a more natural sound - keep them. But of course the errors (too large variation) have to be corrected. The best approach is to correct the erratic notes individually instead of quantizing, which will remove the natural sound.

When creating the style in sequencer software, the performance often becomes too perfect. The best approach is to add some (random) variation to timing, note loudness, note length etc. Quite often the sequencer software has a "Humanize" feature for this purpose.

A pitfall to be avoided is to copy and paste too much. There is no idea in creating a 4 measure long part if all the four measures are identical. And - as stated before - it is a good idea to increase the pattern complexity in generic styles going from the A variation to the D variation.

We will discuss the above topic further in the coming parts.

All style parts should be recorded using notes in CMaj7. You are able to change chords within the parts, but the overall performance has to be in this key. The following rules are recommended:

- In Bass and the two Phrase channels: Use only C, D, E, G, A and B notes
- In Pad and the two Chord channels: Use only C, E, G and B notes

1.4.3 Intro and Ending Parts

Intros and Endings can be created in three different methods:

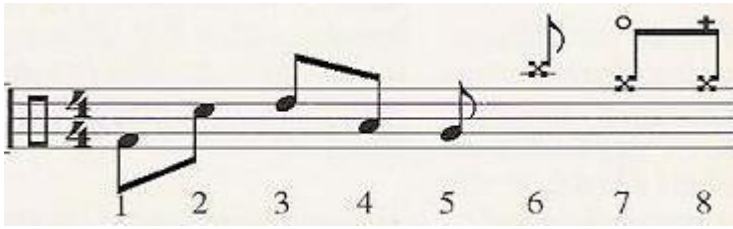
- Without chord progression and melody.
In this situation the performer will have to play the chord progression with his left hand and a melodic phrase in his right hand.
- With chord progression, but without melody line.
In this situation the performer will have to start the accompaniment by hitting the root chord with his left hand and then play a melodic phrase in his right hand.
- With chord progression and melody line.
In this situation the performer will only have to start the accompaniment by hitting the root chord with his left hand. The Intro and ending parts are in reality complete MIDI files. This method is often used in Song Styles.

1.5 Drum Channel

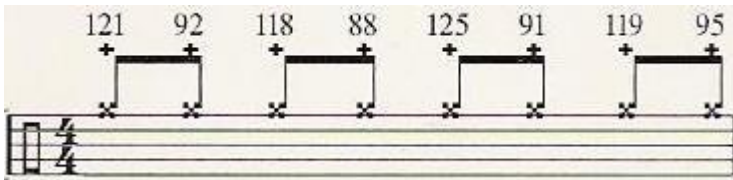
When programming the drum channel "simplicity is a virtue". Do not create too complex rhythms or use too many instruments, just because you can. Remember that a live drummer only has two arms and two legs, and that he seldom uses all of them at exact the same time.

In all the examples below: Move all strokes some ticks forth or back to give the feeling of a "live" drummer.

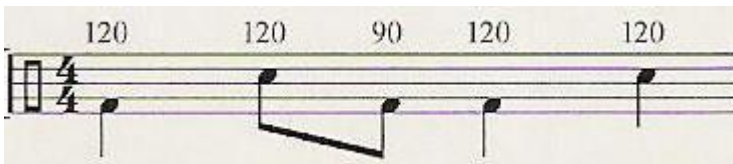
In this course we will use this notation. The numbers refer to: Bass Drum / Snare Drum / High Tom / Middle Tom / Low Tom / Cymbal / Open High Hat / Closed High Hat



Start programming the High Hat, where e.g. the velocity (volume) are all unequal; and the velocity at the beats are higher than at the "off-beats":

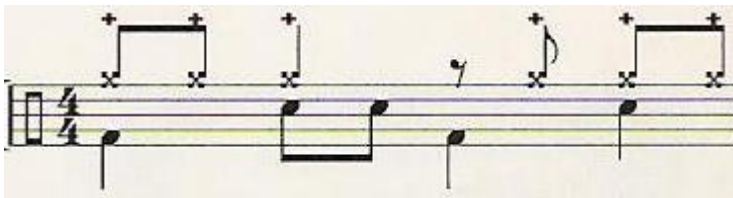


Next comes the Bass Drum and the Snare Drum, e.g. like this:

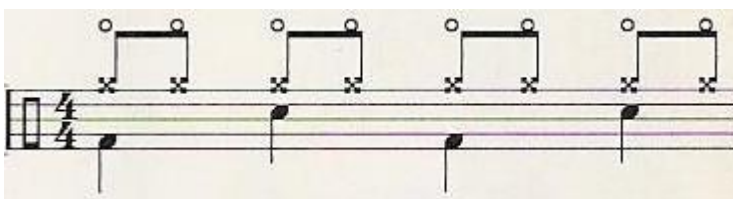


Notice that the Bass Drum velocity right before beat 3 is lower than the "on-beats".

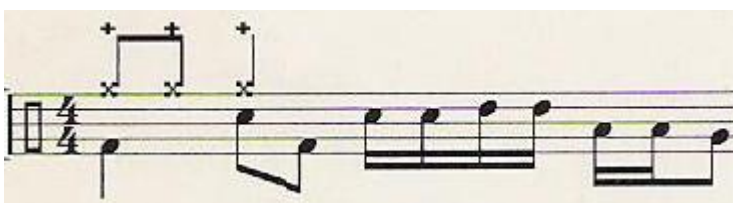
Now create some variations on these two patterns, e.g. like this, where the off-beat after 2 is a snare drum; and the high hat is removed:



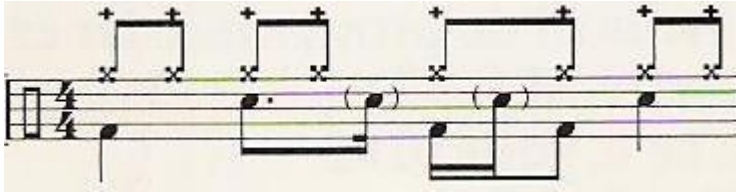
Or like this, where the high hat is open throughout the measure.



A Fill can have a roll "down" the toms while omitting the high hat. A Crash can be added too.



"Ghost Strokes" (low velocity strokes at e.g. the snare drum) can be added like this:



The low velocity means that these strokes are more "felt" than "heard".

1.6 Bass Channel

The bass uses the root note a lot. Therefore one-measure variations like these will often do:



Other notes used are the chord notes. The more accentuated a beat is, the more "basic" notes are used. This is demonstrated in most of these 2 measure variations:



The bass pattern depends of course on the music category. Here are some examples:

The image displays five musical staves, each representing a different style: Rap, March, Samba, Funk, and House. Each staff shows a bass line in 4/4 time. The Rap style features a syncopated pattern with eighth and sixteenth notes. The March style is a simple, steady eighth-note pattern. The Samba style uses a complex, syncopated pattern with many beamed eighth notes. The Funk style is characterized by a driving, syncopated eighth-note pattern. The House style features a steady eighth-note pattern with occasional syncopation.

The preset styles in the keyboard can often give good inspiration for the bass pattern - as well as for all other instruments.

The bass pattern must match the drum pattern, especially the Bass Drum. To avoid conflicts listen carefully to only these two instruments.

Another problem arises when other accompaniment instrument are playing in the same octave as the bass. If the piano plays the root notes in the left hand, the bass must play the very same notes. The lowest guitar notes may also collide with the bass.

Generally speaking this doubling of (especially root) notes has to be avoided, especially in the lower octaves. The sound simply gets too "heavy" and "stiff".

1.7 Guitar Channel

1.7.1 Rhythm Guitar

Programming the guitar channel is normally very time consuming. If you play the pattern at a keyboard you will always have to edit - often as much editing that is faster to step program the whole pattern in the sequencer software directly.

The guitar chords are played at more strings, which physically can not be hit at the very same time tick. Furthermore the chords can be played "downwards" (= the lowest note is hit first) or "upwards" (= the highest note is hit first). This means that there have to be some ticks between the "Note On" events of the single notes in a chord.

Normally the guitar player will continue his hand movement even though he might not hit the strings every time he passes the strings. Most often the "downwards" movement starts a bit too early, while the "upwards" movement starts at the beat.

Hitting all the strings in a chord will often make the sound to "heavy". Therefore not all strings are hit in all passages. The strings which are not hit will continue to vibrate (and produce sound) from the preceding time they were hit.

The image shows a musical staff in 4/4 time with a treble clef. It contains a sequence of chords: a D major chord, a G major chord, an F#m chord, a D major chord, a G major chord, an F#m chord, a D major chord, a G major chord, and a D major chord. The chords are represented by vertical lines with dots indicating the notes on the strings.

On the other hand the strings which ARE hit must in MIDI terms have a "Note Off" before they are hit again to prevent colliding/overlapping note events.

The chord itself can be played in numerous ways - some easy and some complicated. When programming an "authentic" chord, notice that the strings are tuned E1, A1, D2, G2, B2 and E3.

In rock music the Power Chord (the root and the fifth) are often used, sometimes doubling the root, e.g. C1, G1 and C2.



If you have more than one guitar channel, it is recommended not to play the chords at the exact same tick, but to move one of the guitars some ticks. (app. 15 ticks in 480 ticks per quarter note resolution, more in faster rhythms). Otherwise the rhythm will sound "mechanical". The longer between the notes the "softer" the rhythm will be.

1.7.2 Solo Guitar

The guitar can also be used as a melody instrument, e.g. in Intro and Ending style parts.

When playing as a melody instrument, bending the guitar strings is an often used effect. However the programmer must be careful not to bend too fast, which will sound wrong.

Another useable effect is Modulation. But once again, be careful: Too little is better than too much.

As using the effects above produces many MIDI events, it is recommended to strip out some of these to avoid too much MIDI traffic.

When playing a solo melody, another voice than the default voice (defined in the initial setup measure of the style file) is sometimes required. As the keyboard reads voice changes (MIDI Program Change) inside style parts, you just program this change.

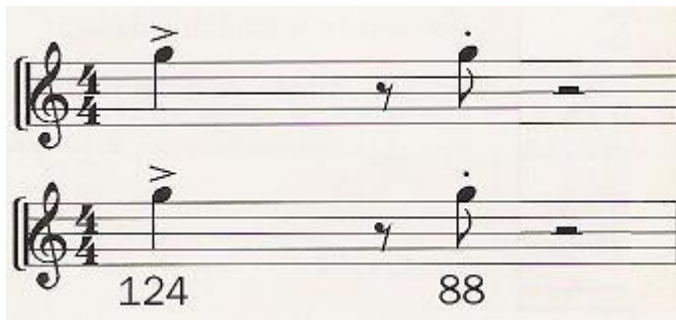
1.8 Brass Channel

Brass instruments (e.g. trumpet, saxophone and trombone) are often used as melody instruments in Intro and Ending style parts.

In other parts brass is often used as accompaniment instruments to play riffs in each measure or in the end of a 4 measure period. These riffs can be unison or more instruments can be used.

The brass instruments have lots of dynamics, meaning they can sound very aggressive, and on the hand very soft and gentle. This has to be considered when the brass channel is programmed.

Furthermore the velocity (volume) of the voice must be set appropriately, as in last of these two examples:



Brass instruments are often used to play chords, either riffs (as the examples above) or as floating voices. In riffs the brass voice velocity (volume) can be rather high; but when playing floating voices the best results are obtained if the velocity is more modest. Otherwise the brass instruments will dominate the accompaniment too much.

One way to create the pattern is shown as the first example below. Here we let the brass instruments play the chord notes from the highest note and downwards. Eventually letting the lowest note be an octave lower than the top note.

Another way to create the pattern is shown as the next example below. Here we do as before, but we get the third or the seventh note in the pattern too.

When programming styles the most natural channel to use for brass instruments are the two Phrase channels - or the Pad channel.

However we will soon run out of output channels at the keyboard. A solution may be to use one of the "Brass section" voices.

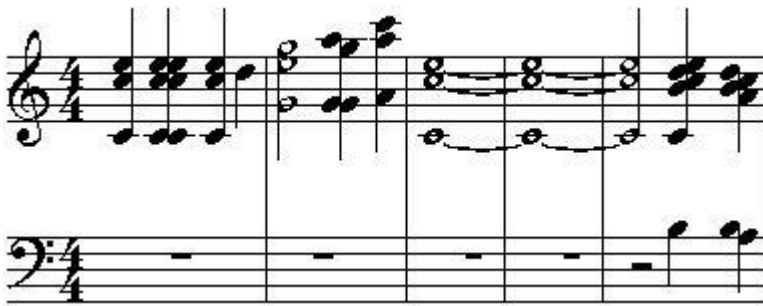
When more brass instruments are used do not copy and paste the patterns from one instrument to the other without adding some variation. But - on the other hand - do not overdo the variation.

Avoid recognizable melodies in the phrases, as this will dictate the use of the style too much in playback.

1.9 Strings Channel

The string instruments in a classical string orchestra are Violin, Viola, Cello and Contrabass. Together these instruments have a quite large note range:

In style accompaniments the strings often play Pad-like floating voices.



As we have a limited number of keyboard channels, we will have to select one of the String Ensemble voices for this purpose.

By choosing this approach we are not able to program the string instruments individually. Therefore select carefully the right ensemble voice, and add some kind of dynamics to the accompaniment.

Variations in velocity between the style parts are one way to add some dynamics to the strings. Another method is gradually increasing (crescendo) or decreasing (diminuendo) the volume (MIDI Expression Controller) within the part.

The floating pad voice may tend to be quite monotonous. Therefore let the strings have a break now and then. Or changing between legato and staccato parts will also be effective.

If the strings play more Phrase/Riff like accompaniments using fewer (or just one) instrument we have of course better possibilities for programming the instrument accompaniment.

1.10 Finishing the Style

1.10.1 Style File Format and Name

We have finished the MIDI content of the style, and have to save the file as MIDI format 0 file. Style files had some years ago always ".sty" file extension. Now a number of file extensions are used: pst (pianist); pcs (piano combo); sst (session); prs (pro); bcs (basic) and fps (free play).

Next is to add a CASM section; and OTS and MDB sections except for older keyboards, which do not support styles with these sections.

1.10.2 CASM section

The CASM section tells the keyboard how to interpret the MIDI data. CASM sections can NOT be created in MIDI software; but can be created at the keyboard if the "MIDI source channel = Keyboard output channel" layout is used. However if the style is enhanced with features described in the next part, you will have to use software, e.g. CASM Editor at <http://www.jososoft.dk/yamaha/software/casmedit/index.htm>

A default CASM section file (in zip format) can be downloaded from http://www.jososoft.dk/yamaha/articles/def_casm.zip. Unzip the file and use the Style Split and Splice software at <http://www.jososoft.dk/yamaha/software/sands/index.htm> to add the CASM section file to the MIDI part of your style file.

A CASM section file with "Bass On" can be downloaded from http://www.jososoft.dk/yamaha/articles/casm_BassOn.zip. If you want the "Bass On" feature, use this file instead of the default.

Both CASM section use the "MIDI source channel = Keyboard output channel" -layout. They also use identical settings for all style parts. You can use these CASM sections for further editing.

More about the CASM parameters at http://www.jososoft.dk/yamaha/articles/style2_2.htm

1.10.3 OTS section

The OTS section holds the 4 One Touch Settings (OTS) = the predefined voice settings at the keyboard. Each OTS has some common settings for the entire OTS, and some specific settings for 4 channels: the Right 1, the Right 2, the Right 3 and the Left voices.

The common settings are System Exclusive messages controlling Harmony, Multi Pad etc.

The channel specific settings are:

- Voice Control: Program, Voice MSB, Voice LSB;

- The 20+ MIDI Controllers for Modulation, Main Volume, Panpot, Expression, Sustain etc.
- The 10+ NRPN controllers for Vibrato Rate, Vibrato Depth, Vibrato Delay etc.
- The 4 RPN controllers for Pitch Bend Sensitivity, Fine Tune, Coarse Tune, Modulation Sensitivity
- A number of System Exclusive (SysEx) Messages for Velocity Sense Depth, Velocity Sense Offset, EQ Bass Gain etc.
- DSP Effect Settings

OTS sections can be created and edited at the keyboard or with the OTS Editor software at <http://www.jososoftware.dk/yamaha/software/otseditor/index.htm>

1.10.4 MDB section

The MDB section contains the Music Data Base records in the style file.

Each record has these data: Song Title; Genre; Keyword 1; Keyword 2; Tempo; and Time Signature.

MDB sections can be created and edited at the keyboard or with the MDB Editor software at <http://www.jososoftware.dk/yamaha/software/mdbedit/index.htm>

1.10.5 The End

Coming so far we have ended the creation of a style. However some feature enhancements can be done as describes in the next Part.

1.11 Enhancing the Style Features

1.11.1 Chord Type dependent Accompaniment

Until now we have discussed style creating, where the instruments source (MIDI) channel is equal to the keyboard (destination) channels, e.g. the bass instrument pattern is in MIDI channel 11, and is played through the Bass channel at the keyboard. Using this approach we will only use 8 of the 16 available MIDI channels (channel 9-16).

However all 16 MIDI channels can be used for all instruments except channel 10 which by definition is a drum channel. This means that the channel designation does not have to follow the above method. This can not be set up in the keyboard, but has to be done in software, e.g. CASM Editor software at <http://www.jososoftware.dk/yamaha/software/casmedit/index.htm> Here you set up a redirection schema for all the MIDI channels used.

Furthermore more than 8 channels can be used. This is an especially interesting feature, which can be used to create alternative accompaniment patterns, depending on the played chord. E.g. different patterns in the Chord 1 channel (Style Channel 12), when playing Major, Minor, and 7th chords. Neither can this be set up in the keyboard, but has to be done in software, e.g. CASM Editor software at <http://www.jososoftware.dk/yamaha/software/casmedit/index.htm>

To obtain this effect the procedure in this software:

- Create the 3 different patterns in the MIDI Part, e.g. Major pattern in channel 4, Minor pattern in channel 5, and 7th pattern in channel 6
- Redirect these 3 MIDI channels to the SAME keyboard channel
- In MIDI ch. 4 remove ALL check marks in "Active Chords Minor" and "Active Chords 7th"
- In MIDI ch. 5 remove ALL check marks in "Active Chords Major" and "Active Chords 7th"
- In MIDI ch. 6 remove ALL check marks in "Active Chords Major" and "Active Chords Minor"

When this approach is used, most often 3 alternative patterns are created as demonstrated above. However the alternative patterns can be assigned to any number and combination of the 35 chord types (check your manual for a list of these) the keyboard recognizes, e.g. a pattern solely for the "minorb9"-chord. However, as each group of chords requires one MIDI channel in practice you will soon run out of free channels.

As mentioned above you can use up to 16 channels, which means that the number of MIDI channels is too small for creating alternative patterns for all the 8 instruments. Most often this feature is used for bass and chord instruments.

1.11.2 Long Fill In parts

By definition the length of Fill In parts must be 1 measure long. To create a Fill In (Break) of any length we can use one of the Intro parts (which can be any length) instead.

When playing we have to think ahead, as an Intro part will start AFTER the current measure, while a normal Fill part will be run IMMEDIATELY when the Fill button is pressed. After the intro the keyboard will resume playing the same Main part as were used when the Intro was called.

1.11.3 Half Bar Fill In / Break parts

Often a song requires a short break (e.g. a half measure). As a style file can have one Time Signature - and consequently one measure length - only, you will have to create a "hack". Use the Style Half Bar Fill Creator software <http://www.jososoftware.dk/yamaha/software/filledit/index.htm> to create this feature.

1.11.4 Different Time Signatures in parts

As the keyboard can handle only one Time Signature, the changing of Time Signature can be faked through a combination of tempo changes and note movements. To obtain this effect use the Style Time Editor software at <http://www.jososoftware.dk/yamaha/software/stytime/index.htm>

1.11.5 Different Tempo in parts

The style parts can have unequal tempo. This can be set when creating the MIDI part of the style file. However the keyboard will continue to play in latest tempo given. To avoid wrong tempo in parts, a tempo "resetting" in the very beginning of ALL style parts has to be added. Use the Style Tempo Editor software at <http://www.jososoftware.dk/yamaha/software/stytempo/index.htm> to add different tempos.

1.12 Trouble Shooting

Symptom	Probable cause	Remedy
Silent channels	Error in redirection in CASM section	Change redirection
	Empty channels	Record something
Style doesn't work at all	Missing/misspelled "SFF1" ("SFF2") and/or "SInt" Text Marker in the first measure	Correct/add these
	Style file not saved as Format 0	Save in Format 0
Hanging notes	A "Note Off" event is missing	Check note events in MIDI part
	An error in the note length definition	Correct the note length
Chords sounds bad	Mismatch in source key and Chord Root/Type setting in CASM	Change the Chord Root/Type setting in CASM
Missing parts	Misspelled markers	Correct the spelling. Capitalization and spaces matters
Keyboard suddenly stops	Empty measures within a part	Record something
Silent keyboard (older models only)	Order of style parts	Try moving the Main A part to be the first part in MIDI
	Missing Main A part	Create a Main A part
Channels in wrong octave	Mismatch between recorded notes and Note Low and High Limits in CASM	As the Note Limit values overrules the octave of the recorded notes, define the desired octave by setting Note Low and High Limits
Balance between instruments	Some instruments too loud or too weak	Change the Master Volume in channels
Style error when loading	Missing Main A part (older models only)	Create a Main A Part
	Style file too large	Remove some style parts. Use Style ReMixer software at http://www.jososoftware.dk/yamaha/software/sremix/index.htm for this.
Wrong instruments	A wrong instrument is playing	The keyboard has a "fall-back" procedure which will make the General MIDI voice sound, if a non-existing voice in the keyboard is defined. Use Style Revoicer software at http://www.jososoftware.dk/yamaha/software/revsty/index.htm for correct voice settings.
Style sound bad in a MIDI Player	Ordinary MIDI Players can not read CASM	The style is not interpreted correctly anywhere else than in a keyboard. Always use this method to check a style.
Instrument not triggered	The "Note On" tick occurs BEFORE the part Text Marker	Move the "Note On" tick inside part boundaries