

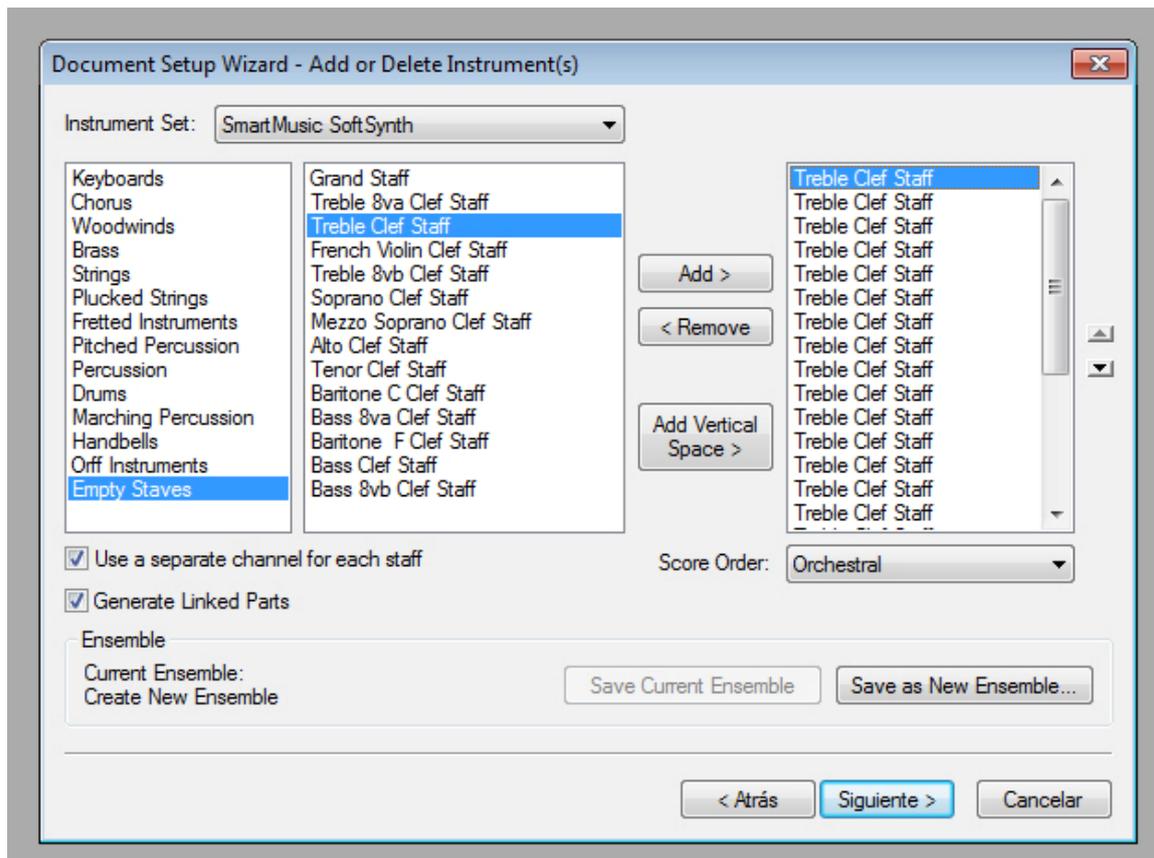
Nicolás Di Paolo

A Guide to Engrave Polytempo Music

Evgeni Kostitsyn. Macondo Swing, Page 66.

1. Configurations

Page size is A3, 600 ppi or 1200 ppi. Macondo Swing has the ordinary order of instruments inside each episode, but many episodes unfold together within the same system, so we are going to create a score with empty staves and use them as needed on each page.



I added 25 staves because that's the number of staves on page 66. However, as you will see later, we won't use all of them.

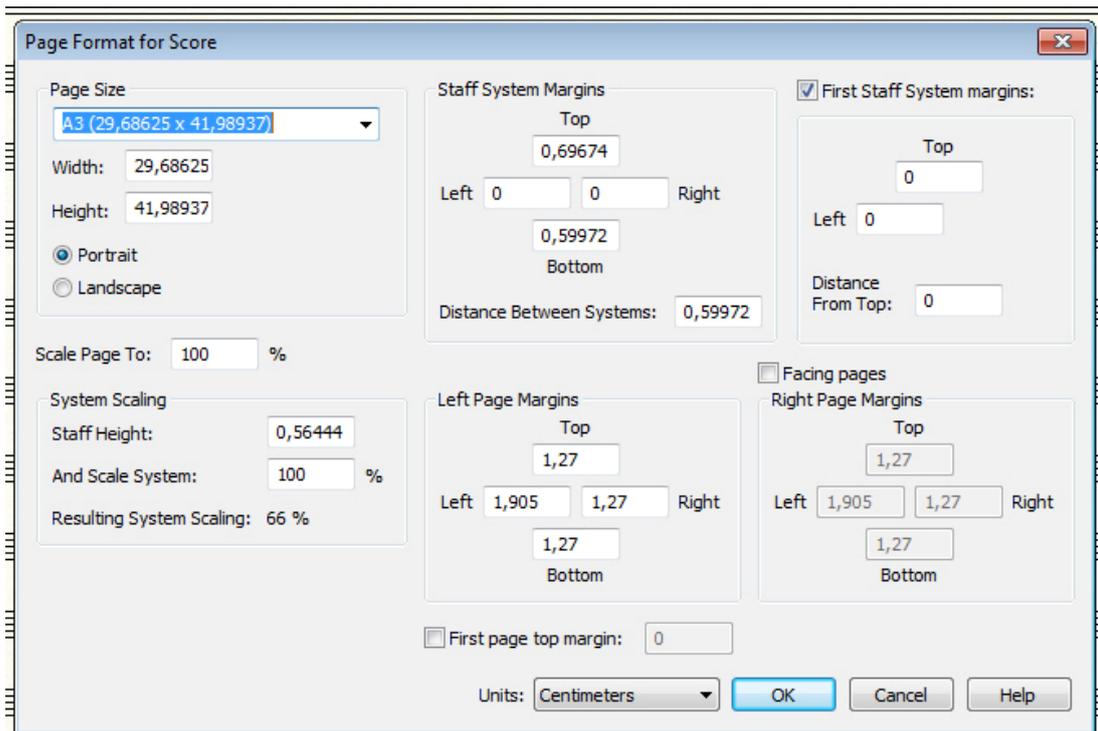
Once the score is created, we will make changes in our document options and program options. Changes that remain for all documents are made in 'Program Options'. Changes made in 'Document options' remain for each single file.

Remember that working on different scores at the same time.

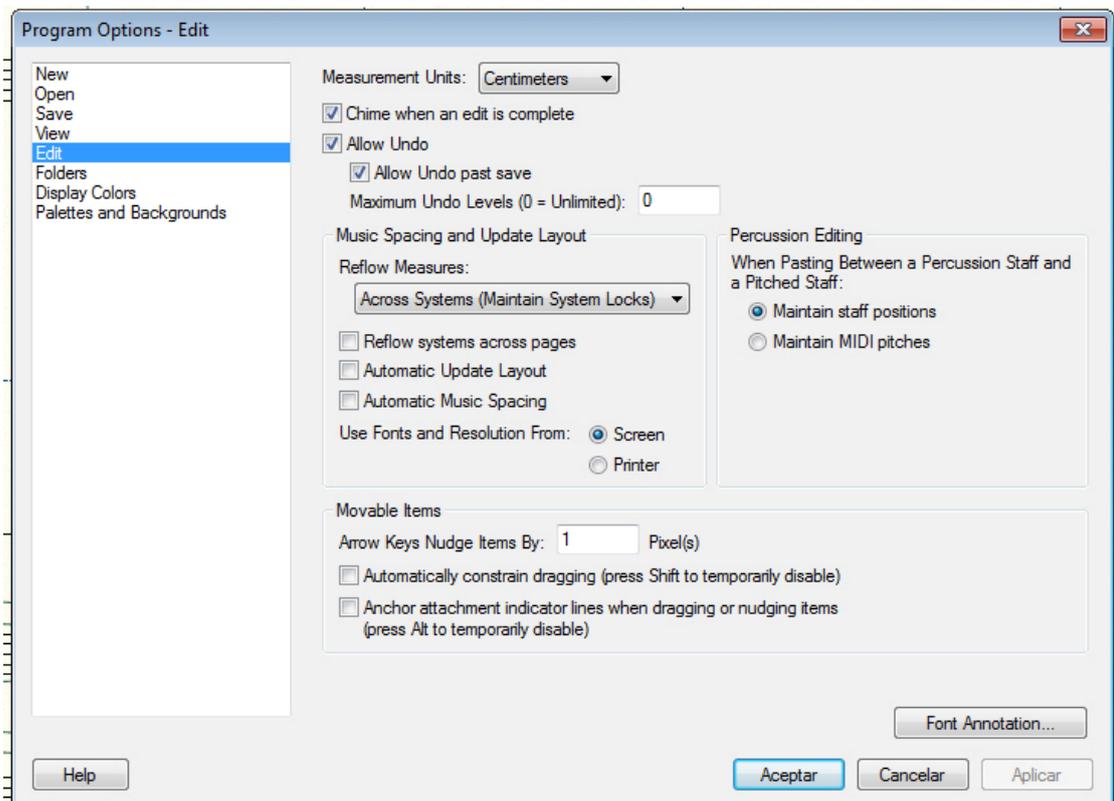
Page format:

The staff height can vary between 15 to 19 points in orchestral scores. I chose 16 points (0,56444 cm) due to the number of instruments.

In this type of scores, we do not need 'Finale automatic spacing' and 'layout update'.



Every time you add a note or other element Finale automatically updates layout. That is why polytempo music engraved in Finale may move on its own. Deselect 'Reflow systems across pages', 'Automatic Update Layout' and 'Automatic Music Spacing' to avoid it.



Now we also need to change settings in the document options menu. The changes should be:

Accidentals

Space between Accidental and Note: 0.08819

Space between Accidentals on Note: 0.07056

Augmentation dots

Space between dot on note: 0.12347

Beams

Beam thickness: 0.05994

Stems

Normal stem length: 0.84667

Shortened Stem length: 0.74965

Time signature

Vertical adjustment

Top: 1.70215

Bottom: 1.40229

Space before T.S: -0.20285

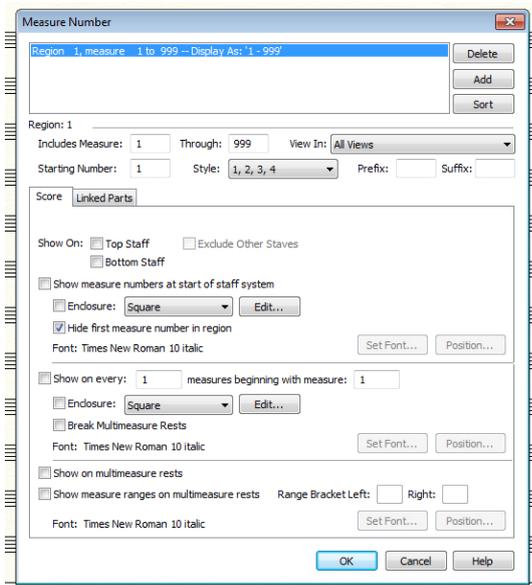
Space after T.S: 0

Piano Braces and Brackets:

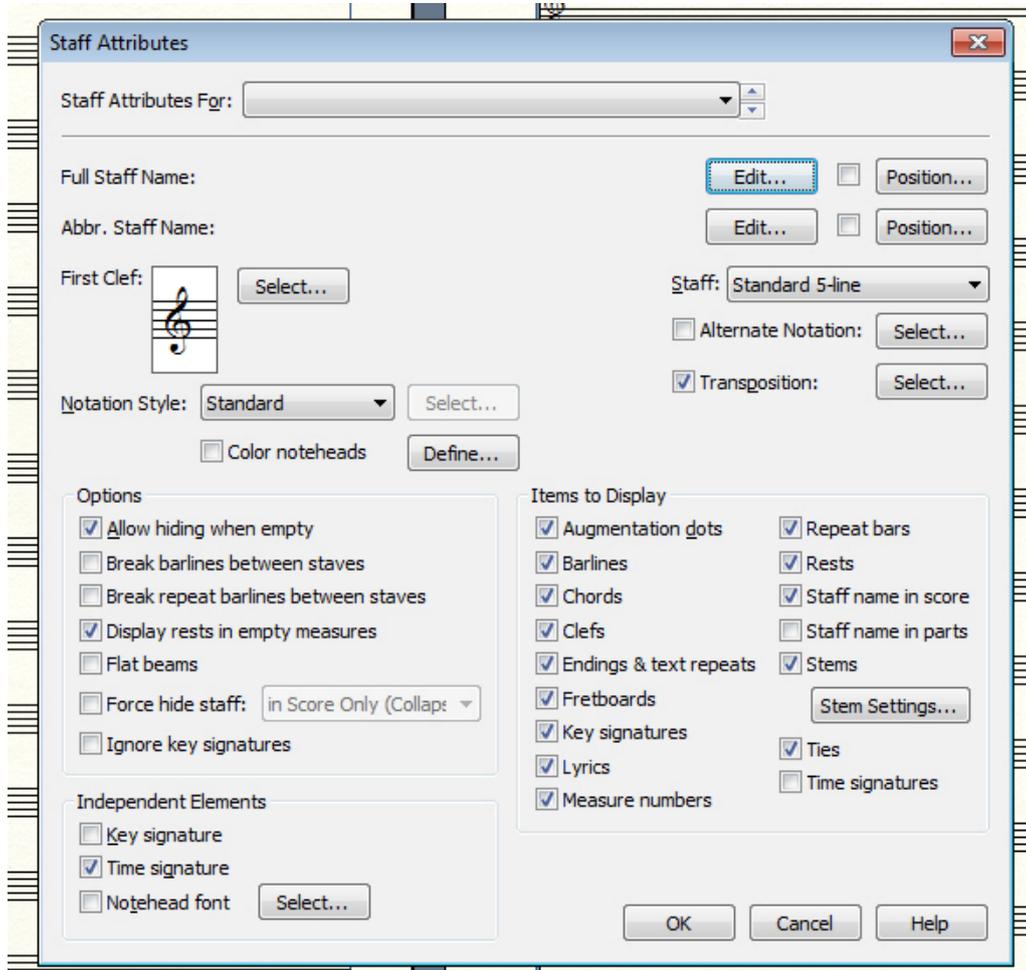
Group Bracket

Default Distance from Left Edge of Staff -0.13229

Hide bar numbers.



We need to change settings for all staves. Go to 'staff attributes' of one staff. Change its settings. Then apply the same changes to the remaining staves.



Click on 'Independent Elements / Time Signatures' and deselect 'Items to Display / Time signatures'. Staves will not have names. We will add names when needed using another tool. Rulers and guides will be your best friends. Always use 'view/show/rulers' to engrave polytempo.

2. Calculating bars sizes and their correlations

When two or more tempi unfold simultaneously we have to choose a reasonable scale - the scale which will allow us to place all elements nicely. Choose bar length for one tempo by selecting a part with the most dense texture. Then calculate precise bar sizes for other tempi. The part with the most dense texture has tempo 108. I choose a bar length of 6 cm. It should be sufficient to place sixteenth notes nicely without collisions.

Now, after I know the bar size for one tempo, I can calculate the rest:

$$108 \text{ bpm} \times 6 \text{ cm} = 648$$

$$648/78 \text{ bpm} = 8.307692307692308 = 8.31 \text{ cm}$$

So

$$78 \text{ bpm} = 8.31 \text{ cm}$$

$$60 \text{ bpm} = 10.8 \text{ cm}$$

$$92 \text{ bpm} = 7.04 \text{ cm}$$

$$52 \text{ bpm} = 12.46 \text{ cm}$$

$$66 \text{ bpm} = 9.82 \text{ cm}$$

$$72 \text{ bpm} = 9 \text{ cm}$$

$$112 \text{ bpm} = 5.79 \text{ cm}$$

$$108 \text{ bpm} = 6 \text{ cm}$$

$$44 \text{ bpm} = 14.73 \text{ cm}$$

Tempo 78. We do not know the real space of the first incomplete bar, because we did not engrave previous pages, but we have 3 quarters of music on page 66. 78 bpm 4/4 bar is 8.31 cm long. One quarter note covers 2.08 cm (8.31:4). Therefore three quarters should be 6.24 cm.

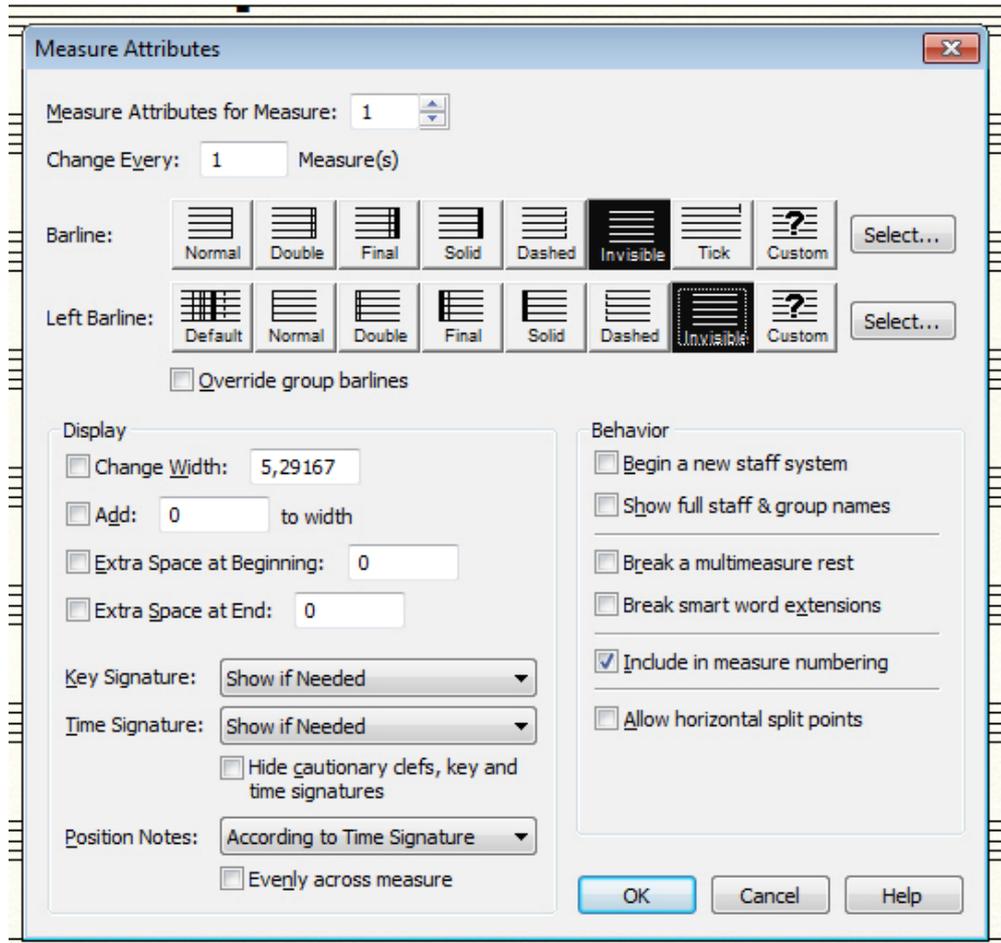
	A	B	C	D	E	F	G	H	I	J	K
1		Bar 1	Bar 2	Bar 3	Bar 4	Bar 5	Bar 6	Bar 7	Bar 8		Rest
2	8,84	17,15	25,46	33,77	42,08	50,39	58,7	67,01	75,32		2,94
3	8,31										
4											
5											
6											

For 78 bpm, barlines will be at: 8.84 cm, 17.15 cm, 25.46 cm.

The last bar at 78 bpm will have only 2.94 cm (28.4 (the right margin of the page) – 25.46 cm). If 2.08 cm is a quarter note, 2.94 is almost a 1.5 quarter note.

Now I'm calculating the corresponding (or the nearest) time signature. We have 3 beats in the first bar, two complete 4/4 bars, and the last bar with almost 1.5 quarter note. It makes: $3/4 + 4/4 + 4/4 + 1.5/4 = 12.5$ quarters. Go to 'time signature' for instruments playing at 78 bpm and type in the composite window: $12/4 + 1/8$. Remember that you set all staves to have independent time signatures, so you can not select multiple staves to set a common t.s. You have to do it one by one.

Because we have bars which do not start at the beginning of the system and do not end at the end of the system, we should edit 'measure attributes' (right click on any staff of the system - 'edit measure attributes'). We set there a system without bars.



Now we can start engraving an episode at 78 bpm but I recommend to calculate all barlines of all tempos first. It should be done to have a clear picture of the whole system.

The next tempo is 60 bpm. It starts after 2.5 quarters at 92 bpm (see the arrow indicating the start point in the manuscript). It would be better to calculate tempo 92 first. Use the same method to calculate barlines positioning at 92 bpm.

$92 \text{ bpm} = 7.04 \text{ cm}$. $1/4 = 1.76$ ($7.04/4$). $1/8 = 0.88 \text{ cm}$. $2.5/4 = 4.4 \text{ cm}$.

$2.6 \text{ cm} + 4.4 \text{ cm} = 7 \text{ cm}$ (place of the first barline). Then: $7 \text{ cm} + 7.04 \text{ cm} \dots$

Bars for tempo 92 are positioned at:

7 cm | 14.04 cm | 21.08 cm | 28.12 cm

The last bar has only 0.28 cm. That is a very small amount which means that the entire bar will be engraved on the next system/page. It will be 0.28 cm shorter. We're making the same time signature calculation:

$$2.5/4 + 4/4 + 4/4 + 4/4 = 14.5/4 = 14/4 + 1/8$$

Now we know where tempo 60 starts. It starts at 7 cm of the page - (just above the first barline in episode 73. It's composed at 92 bpm).

7 cm + 10.8 cm (a size of a 60 bpm bar)...

Barlines at 60 bpm will be positioned at:

7 cm (not a barline, but point where music starts) and 17.8 cm.

The last bar will have 10.6 cm (almost complete).

We should calculate a 'gap' for music which enters in the middle of the system. In this case, at 60 bpm, the 'gap' is 4.4 cm (7 cm - 2.6 cm).

1/4 size at 60 bpm is 2.7 cm. We will have almost 1.5/4 at 60 bpm to cover 4.4 cm. Now we need to count 1.5/4 in the time signature to make sure that the music starts at the right place and our 'gap' is precise. We will use only hidden pauses in the 1.5/4 duration.

The time signature for tempo 60 will be:

$$1.5/4 + 4/4 + 4/4 = 9.5/4 = 9/4 + 1/8.$$

I'm making the last bar (10.6 cm) as a complete bar, because the amount remaining is very small (0.2 cm). In any case, the barline will be drawn on the next system/page.

Now we have to calculate the remaining tempos the same way.

I changed the manuscript scale, therefore V-lli and C-ssi at 92 bpm will not fit this system/page.

My calculations for the remaining tempos are:

$$52 \text{ bpm} = 12.46 \text{ cm.}$$

barlines will be at:

2.6 cm | 15.06 cm | 27.52 cm (the last bar has 0.88 cm). Time signature is 8/4 + 1/16.

$$66 \text{ bpm} = 9.82 \text{ cm.}$$

We do not know the exact size of the first incomplete bar because it starts on the previous page which we did not engrave. We can assume that the first bar on page 66 has space of a 1/8 note.

1/8 at 66 bpm, with a bar size of 9.82 cm, covers 1.23 cm.

Barlines will be at:

3.83 cm | 13.65 cm | 23.47 cm.

The last bar will cover only 4.93 cm (2/4) on this system/page. Time signature will be: $1/8 + 4/4 + 4/4 + 2/4 = 10/4 + 1/8$.

72 bpm = 9 cm

Barlines are at:

8.23 cm | 17.23 cm | 26.23 cm. The last bar will cover only 2.17 cm (almost 1/4) on page 66. Though episode 68 ends at 8.23 cm, we need to calculate the 'gap' after 8.23 cm.

Time signature will be: $11/4 + 1/8$

Episode 77 at 112 bpm and episode 76 at 108 bpm start after 2.5/4 of episode 70 at 44 bpm. It means that we have to calculate episode 70 first.

44 bpm = 14.73 cm.

The first bar has 1.5/4 only. It covers 5.52 cm.

Barlines will be at:

8.12 cm | 22.85 cm. The last bar will have only 5.55 cm (almost 1.5/4)

Time signature will be: $7/4 (1.5/4 + 4/4 + 1.5/4)$

Now we go back to tempos 112 and 108. Both will start at the same place. We need to know how big 2.5/4 is at 44.

1/4 at 44 bpm is 3.68 cm, so 2.5/4 is 9.2 cm.

We count those 9.2 cm from the first barline in episode 70 (it is positioned at 8.12 cm). $8.12 \text{ cm} + 9.2 \text{ cm} = 17.32 \text{ cm}$. Both tempi start at 17.32 cm.

Offset size is different in different tempi. You can not automatically line up two first notes at '0' if they are played in different tempi and if those tempi start at the same time ('0, 1, 2, 3' stand for counting four quarters in a 4/4 bar). These two first notes need to be lined up manually (you may use a guide).

112 bpm = 5.79 cm

Barlines will be at:

17.32 cm (where episode 77 starts) | 23.11 cm and the last bar will have 5.29 cm. We also need to calculate a 'gap' of 17.32 cm at 112 bpm. 17.32 cm is the start point but it includes the margin and clef space – 2.6 cm total. So, $17.32 \text{ cm} - 2.6 \text{ cm} = 14.72 \text{ cm}$ (the music space).

14.72 cm at 112 bpm means $10/4 + 1/8$ (in fact a little more, but $1/8$ will be enough). We have a $4/4$ bar and the last incomplete bar. We can engrave that last bar as complete, but the barline will be on the next system/page.

Time signature is: $10/4 + 1/8 + 4/4 + 4/4 = 18/4 + 1/8$

108 bpm = 6 cm.

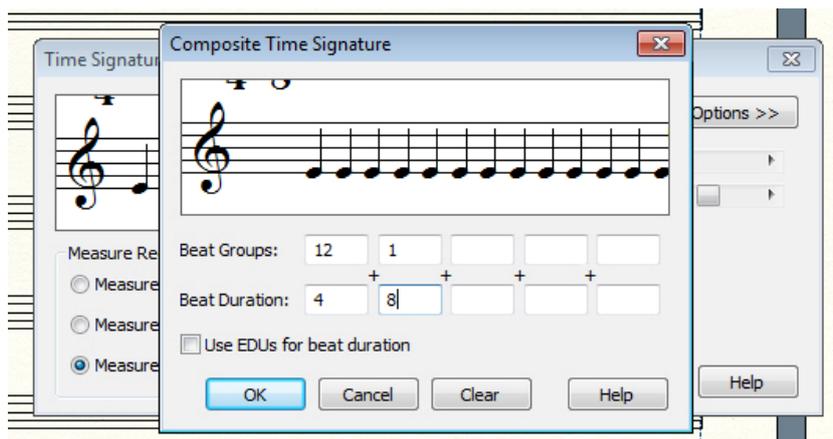
'The time signature gap' before episode 76 starts at 14.72 cm will be $9.8/4$. We can make it $10/4$.

Then barlines, starting at 17.32 cm will be:

17.32 cm (where episode 76 starts) | 23.32 cm and the last bar will have 5.08 cm. Time signature = $10/4 + 4/4 + 3/4$ (the 5.08 space) = $17/4$.

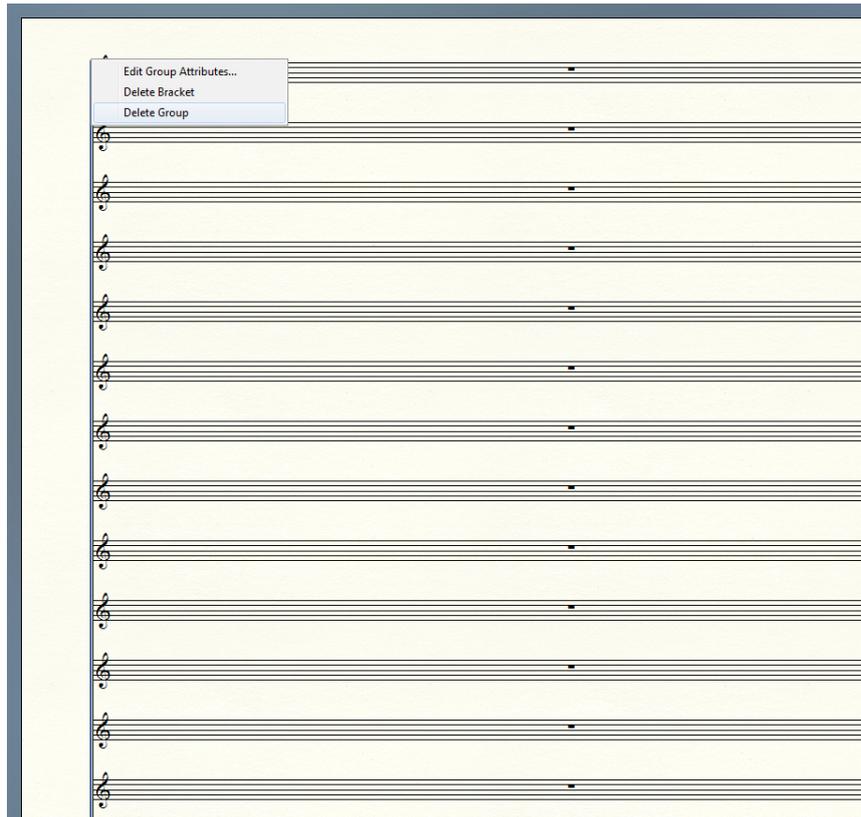
3. Engraving

Now we can start engraving. All time signatures should be applied first.



I set the space between staves for 2.5 cm. Then I will change it if necessary.

We also need to delete the 'automatic group bracket' which Finale inserts by default.



Now I start engraving tempo 78. First, I'm inserting guides where barlines will be placed, then typing music. Of course, I change clefs if needed.



The last bar at 78 bpm has 1.5/4 but it starts with a 2/4 note. We will make a trick. We will insert a tuplet in that 1.5/4 space - 4 1/8 in the space of 3 1/8. And now we can type the 2/4 note. Hide the 'tuplet number/bracket' after placing the 2/4 note.

Tr-no starts with a beamed group that is a continuation from the previous page. If you engraved previous page, you can add that beam using 'beam over barlines plug-in'. If not, you can simulate that beam with the 'beam extension tool'. It can be found in 'special tools'.

Now you see that notes are not correctly positioned in the bars. Comas have to be moved too.

Now we have to use our previous calculations. A 78 bpm bar is 8.31 cm. 1/4 at 78 bpm is 2.08 cm.

We need to put guides for all 1/4 notes in the system and position each note as accurate as possible.

Let's calculate the 1/4 guides in the first bar:

8.84 cm (the first barline) – 2.08 cm = 6.76 cm, and so on...

Now we go to the second bar. The same method, but... $8.84 + 2.08$ and so on. Instead of making the calculation of all quarter notes in the system, you can calculate them for one complete bar, and then with ctrl + click (windows users) select the guides (holding the ctrl), so you can move them to the next bar. Do not move the guides that belong to barlines.

Now notes are in their right places. Always move notes in the same 'tempo/beat' to the same offset amount. They should be lined up vertically.

Here you found the entry offset of the selected note above. That note, and the one on the staff above, should have the same offset value.

Now it's time to position comas, insert barlines, bracket and names of instruments.

Barlines will depend on the amount of space between staves and the number of staves in the same group of instruments. Episode 74 has two instruments from the same Brass group. Space between staves is 2.5 cm.

Go to 'expression tool/misc.' category.

There you will find a predefined barline for one staff only. Copy it and rename it in the 'edit dialog'. For example: 'Barline 2 stv. 2.5 cm'.

Go to the 'shape edit dialog', select the barline and open 'shape designer/line thickness/other'. Our 'line thickness' should be 0.015 cm. Now insert that barline and stretch it to cover two staves. |

use 1000% zoom for better precision. It allows to see the barline coinciding with the guide and covering two staves. We are adding the first barline to our library.

When more staves will be involved, you might not use the highest zoom, because as you will scroll down, the barline will disappear from the view (this will also depend on your screen size). You will have to work using lower zooms in those cases.



Once you created this barline, you can use it throughout the score for any two instruments of the same group and the space of 2.5 cm between staves. You may make a copy of this barline and edit it for other combinations of instruments. In a while your library will have a big selection of barlines which can be used in almost any possible situation.

Now it is time to put names and brackets. In the case of episode 74, I need one bracket for two instruments and one name for each staff. I have to add groups.

Select two staves at 78 bpm. Then go to 'staff tool'. Right click on the handle of the first staff of the group. Add group and bracket option. We use the second bracket. We have the staves grouped. Add names. We can also use 'add groups'. In this case, select only the Tr-no staff, go to 'staff tool', click the handle and 'add group and bracket'. Don't add any bracket here. Just type names in the name boxes. When inserting a group for each staff for the first time, you will need to type the name and positioning in the box of 'Full Name'. After that, you will have to type it in the 'Abbv. name box and positioning'.

Names positioning is not the Finale default. You have to change it manually in each case.

Values are:

H: -0.35

V: -0.01

The dashed line that passes through the left margin from tempo 78 to tempo 92 unifies the system.

Calculation for tempo 60:

7 cm (not a barline, but the point where music starts) | 17.8 cm (this barline will start an incomplete bar of 10.6 cm (the complete bar size is 10.8 cm)).

Time signature is $9/4 + 1/8$.

Before episode 75 starts we have a 'gap' of $1.5/4$. Place guides of the ruler at 7 cm and 17.8 cm. Enter pauses in the 'gap' space. I use small values because we will need to hide that part of the staff and the 'gap' size should be very precise:

You may also notice that I use small values for the 2nd 'bar-gap' of 2nd Ob, and V-le. Instead of a $4/4$ pause I used smaller values to fill the space. That is because we need to hide that part of the staff. We need also to hide the first clef and then add a clef before music starts, then put notes in their correct places. We use the same method to position notes as we used before. We know the space covered by a quarter note at 60 bpm. Insert the corresponding guides and move notes with special tools.

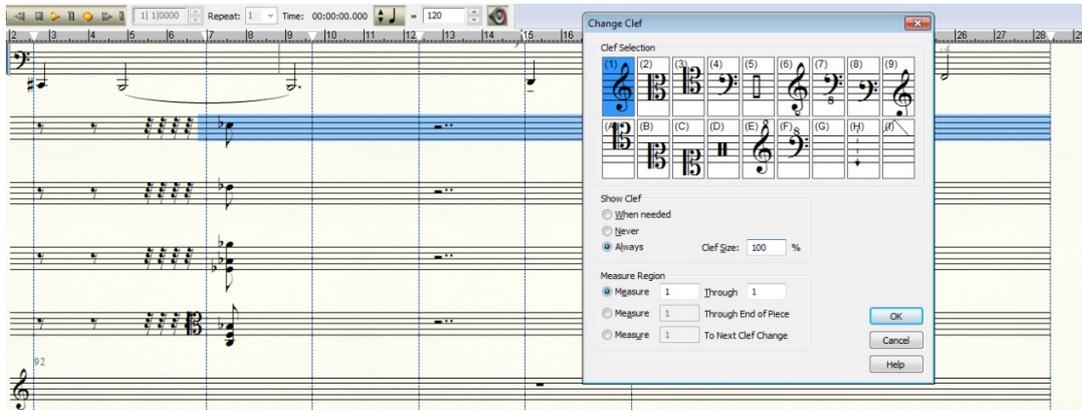
Now notes are positioned correctly.

NOTE: PAUSES ARE ALWAYS PLACED IN THE MIDDLE OF THEIR CORRESPONDING SPACE.

Now we need to put clefs before music starts and hide clefs at the beginning of the system.

To insert a clef: select the bar (or the portion of bar) where music starts, right click and go to 'clef dialog'. Select the 'desired clef' and put 100% in 'show clef'.

You can also see that I hide the clef at the beginning of the system. This is up to you when to hide clefs. If you hid it earlier, the music written in other than G clef will be automatically transposed in G clef. But when you insert the mid-clef, it will be re-notated correctly. The order of your steps will not change the results.



To hide clefs: right click on the clef (with 'Selection Tool') and select 'never' in 'clef dialog box'. Now I have four clefs where I want them to be. Another option is by selecting the blank (G) clef.



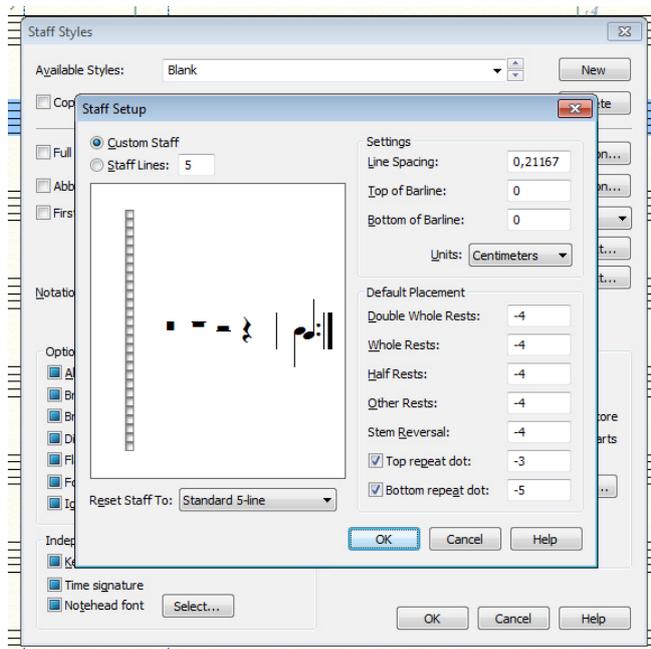
Before placing barlines I will hide those parts of the staves (and pauses) which need to be hidden. Use the hotkey "h" to hide pauses.



Now I have to hide 'gaps': I have created a staff style called 'Blank'. Settings for this staff style are:

Create a staff style, call it 'Blank' or whatever you want. On 'Staff': select 'Other'... Deselect all lines in 'custom staff'.

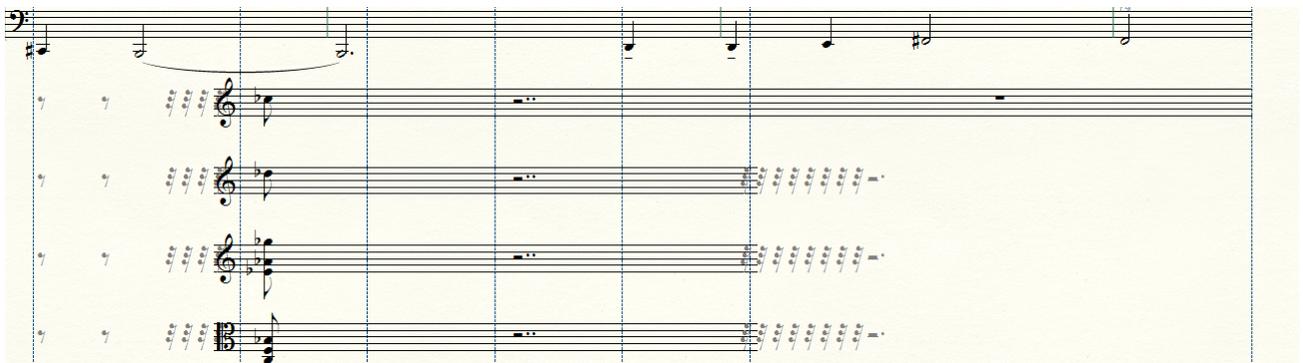
This is how it will look:



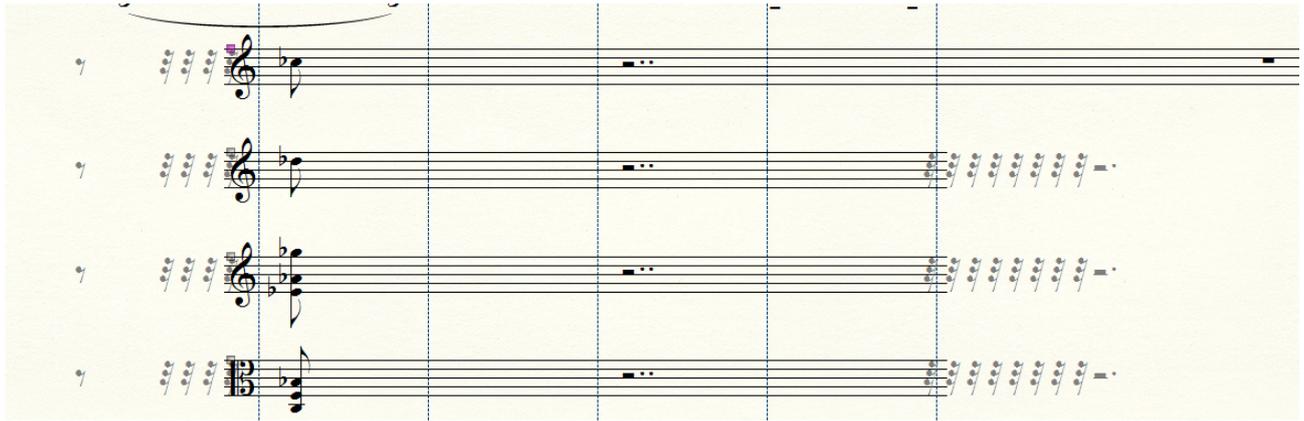
Once you have the 'staff style' created, select a 'gap'. You may select 'gap' on one staff and then select it on other staves with shift+arrow key:



Now apply the 'staff style'. Do the same at the right side of 2nd Ob. and V-le.



As you see the clefs are very close to the beginning of the staff. It would look nicer if they would be centered between the beginning of the staff lines and the first guide.



It will be good to make more space between 2nd Fl. stave and Tuba stave. We will need to add '8' and a dashed line above the 2nd Fl. stave. Select the 'Fl. stave', 'staff tool', 'respace staves'. We have 2.5 cm of space now. I will try 3 cm.

Now we can insert barlines. The first barline will be a group barline for 4 staves. You may create a new barline by copying and editing the barline you created earlier. The new barline will be called '4 Stv. 2.5'.

Look how the barline is placed at the beginning of the staves.



Now we need to put a barline at the end of the bar. We will group instruments as usual: Woods - Strings. We need 2 barlines.

For 2nd Fl. and 2nd Ob.:

The 2nd Flute part has a pause in the second bar but 2nd Oboe and V-le do not have the second bar. You may see that the 2nd Ob. part has a little portion of stave lines. We need to hide them.

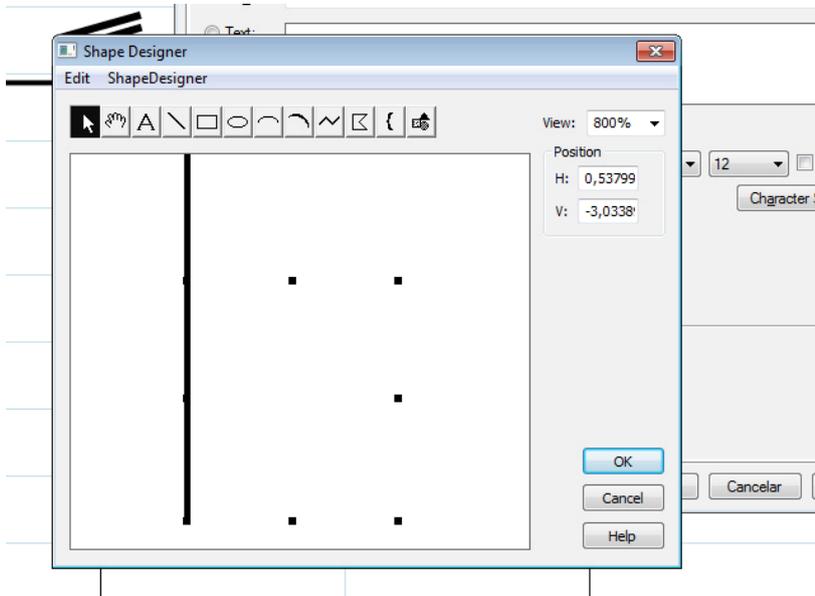
We can copy the 'Expression' we created as 'Barline 2 stv 2.5'. We will edit it. Go to 'shape', 'edit'.

We will create a blank square for a half of the barline. This way we can hide a portion of stave lines in the 2nd Ob. part but not in the 2nd Fl. part.

To create a blank square: go to 'shape designer' and select the line thickness 'none', then click 'white' to fill. Then use the square tool to create a square. You will have to put it over the barline. Use the highest zoom possible. Do not let the square to move faraway from the barline. Select

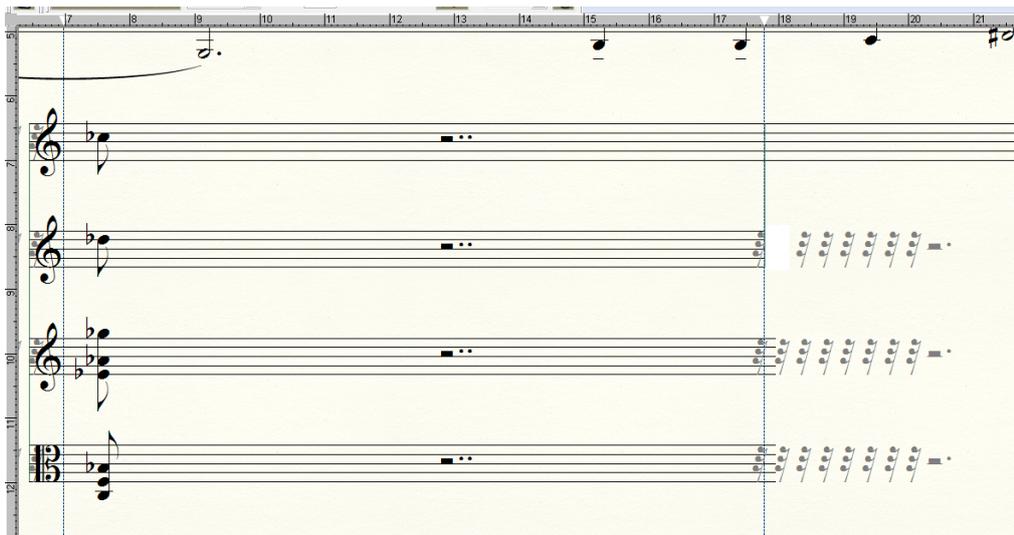
the barline, then select 'bring to front' in 'shape designer' so the barline will be always in front of the blank square.

Important: You will not see the square when you create it. Just drag the mouse to create it. Then go to the 'selection tool' and click over the place where you created it. The handles of it will appear and then you can move it.



You may call this barline 'Barline 2 stv 2.5 blank below'.

Now I have a barline for 2 staves with 2.5 cm space between them. A portion of the staff below is hidden.



We need to do the same for V-le. This time the square will hide both staves (remember always to create a new barline). You may copy the previous 'Barline 2 stv 2.5 blank below' and make the square longer). The name for this barline could be 'Barline 2 stv 2.5 blank'.

Now it's time to add brackets and names. The method is always the same, but in this case the horizontal value will be different.

I created an 'expression' to use it as a ruler. We need it for precise positioning of the bracket.

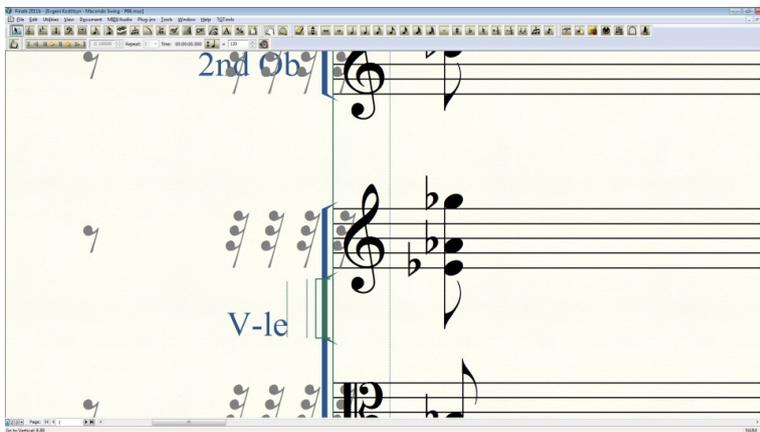
Then we add group brackets and names the same way as before. This time their horizontal position has to be in the '+ way'. You may try different values to get closer to the 'bracket/name ruler', but then you will have to drag it manually to make an accurate positioning.

A bracket positioned over the ruler:

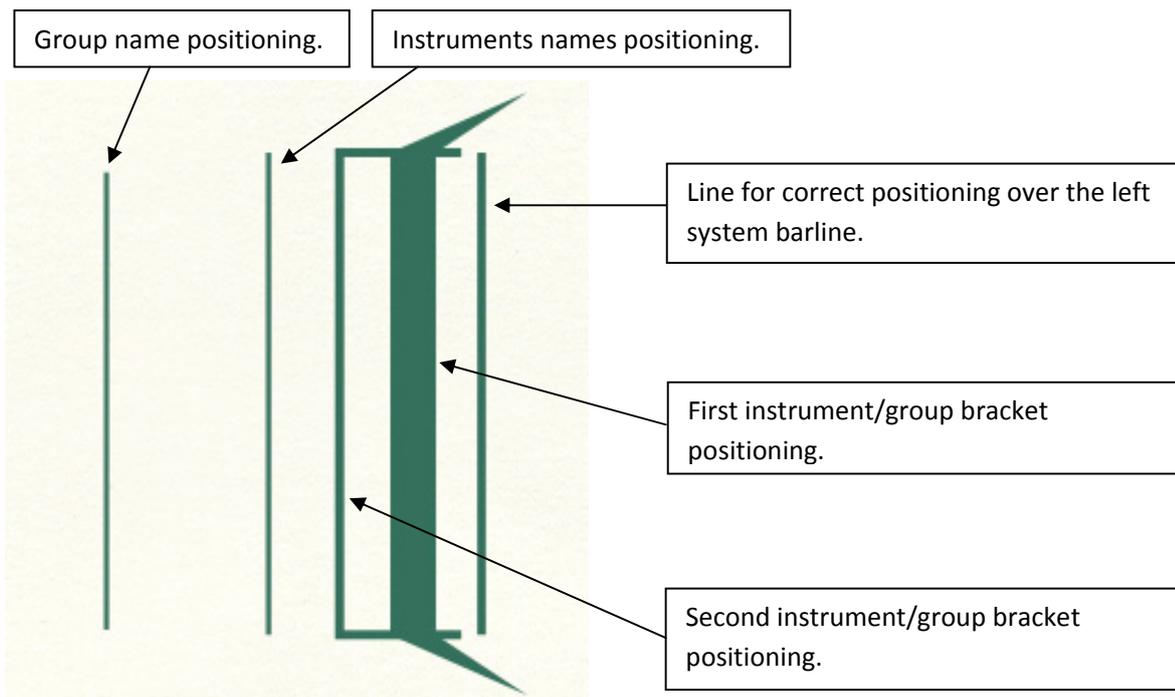
A name positioned with the ruler:



The Viole group and name positioning:



I call this graphic 'Bracket/Name Ruler'. It was used this way:



We enter the group names 123 and 456. Then Expression texts and Octava lines. I use 'expression shape' instead of 'smart shape' for Octava lines. One 'expression shape' for the line and another for the 8va text.

The method is the same for all instruments. I will comment on special situations only.

Sometimes you will need to fake a tie coming from another page. Use 'expression shape'. The tie will look natural. For example:

This image shows a snippet of a musical score. The top staff is for the 1st Flute (1st Fag.) and has a tempo marking of ♩ = 66. The bottom staff has a tempo marking of ♩ = 72 and an 8va line above it. A dashed vertical line indicates a system boundary.

If there are instruments starting in the middle of a system, we use dashed lines to show that all instruments belong to the same system.

This image shows a snippet of a musical score with multiple staves. The top two staves are Tr-nob and Tuba. Below them are 2nd Flute, 2nd Oboe, and V-le. The bottom staff is 1st Clarinet (B). A dashed vertical line indicates a system boundary. Tempo markings are present: ♩ = 60 for the upper group and ♩ = 92 for the 1st Clarinet.

Dynamic signs are lined-up vertically and horizontally. They are centered between staves whenever it is possible.

A musical score snippet showing four staves. The first staff is for 2nd Flute (2nd Fl.), the second for 2nd Oboe (2nd Ob.), the third for Violin (V-le), and the fourth for Viola (V-la). The score includes a box with the number 75, a tempo marking of ♩ = 60, and a dynamic marking of *f* (forte) on each staff. The dynamic signs are aligned vertically and horizontally across the staves. There are also markings for 'div. in 3' and '8va'.

'Cresc./decresc.' shapes are also made with 'expression tool'. 'The smart shape' does not work properly in polytempo scores.

A diagram illustrating dynamic markings and crescendo/decrescendo shapes. The top staff shows a single note with a dynamic marking of *mf* (mezzo-forte) and a crescendo shape leading to a dynamic marking of *mp* (mezzo-piano). The bottom staff shows a chord with a dynamic marking of *f* (forte) and a decrescendo shape leading to a dynamic marking of *mp*. A vertical dashed line is drawn through the middle of the notehead of the single note in the top staff, and a horizontal dashed line is drawn through the middle of the noteheads of the chord in the bottom staff.

When seconds are present in the same tempo, the vertical line-up with single notes is made from the stem of the second, and that stem should draw an imaginary line through the middle of the notehead of a single note. You can make it with a guide.

A snippet of musical notation on three staves. The tempo is marked as quarter note = 92. The notation includes various note values, rests, and accidentals.

Other considerations:

- A. Ties are shifted up and down. My positioning is +/- 0.15875 of 'vertical offset'.
- B. Accidentals on notes with extra lines should be moved a little away whenever it is possible. I set them at -0.8819.
- C. Augmentation dots for notes with extra lines should be moved a little to the right and centered with the notehead. Look how I positioned notes with extra lines and augmentation dots in the Alto Sax. part.
- D. Octava lines should start and end with corners. The octava line should cover the entire duration of the music it applies to.
- E. Our stress signs are a little bigger than Finale default. They are set to 26 point size and bolded. Stress signs should be lined up if they apply to the same pitches.

A snippet of musical notation for three parts: Tenor, Baritone, and Bass. The tempo is marked as quarter note = 55. The notation includes various note values, rests, and accidentals. The parts are labeled on the left, and the dynamics are marked as *mp*.

Example from 'Evgeni Kostitsyn – American Requiem III', page 1.

F. Our stems are longer than Finale default stems. You can find dimensions of our stems in the 'Configuration' chapter. You have to make stems even longer to avoid collisions of flags and extra lines in the cases when notes have extra lines. Look at the difference between our 'normal' stem length and the modified length. Use 'Special Tools/Stem Length Tool' to make stems longer. Check two last bars of Alto Sax. part, episode 73, to see examples of modified stem length.

