

Understanding The Key System

An in depth, level 1a tutorial by Lou Stonehill aimed at providing the guitar player of any ability a complete knowledge of the key system, all sharps and flats (black notes), what they do and why, and of course total understanding of 'The Cycle of Fifths'

WARNING: This tutorial may be seen by some as 'heavy going' and/or 'lengthy'. I can only assure you that this is for good reason and that with time and patience, you will be astounded at just how logical music theory is - once you understand it! I have taught this subject to students as young as twelve, so press on; the reward will be worth it, promise!

The biggest problem with this topic is that it seems never-ending and difficult to comprehend, yet it is so straightforward it frightens me. By the same token, it is so essential to really understand as it will provide the fundamental building blocks upon which all harmony can be based.

In the last article we looked at the good old Semitone, two basic intervals, and the structure of a major scale. Please be aware that unless you fully understood that tutorial this one will potentially seem like rocket science (which it most definitely is not or I would not have classed it as a level 1a tutorial).

What we're basically trying to explain here is this: (those with a nervous disposition please look away now!)

C Major/A Minor

F Major/D Minor

G Major/E Minor

Bb Major/G Minor

D Major/ B Minor

Eb Major/C Minor

A Major/ F# Minor

Ab Major/F Minor

E Major/C# Minor

Db Major/Bb Minor

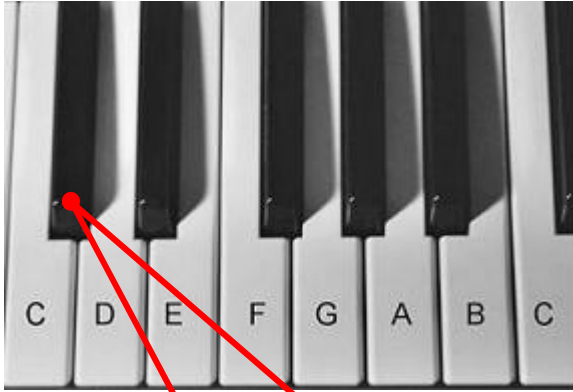
B Major/G# Minor

Gb Major/Eb Minor

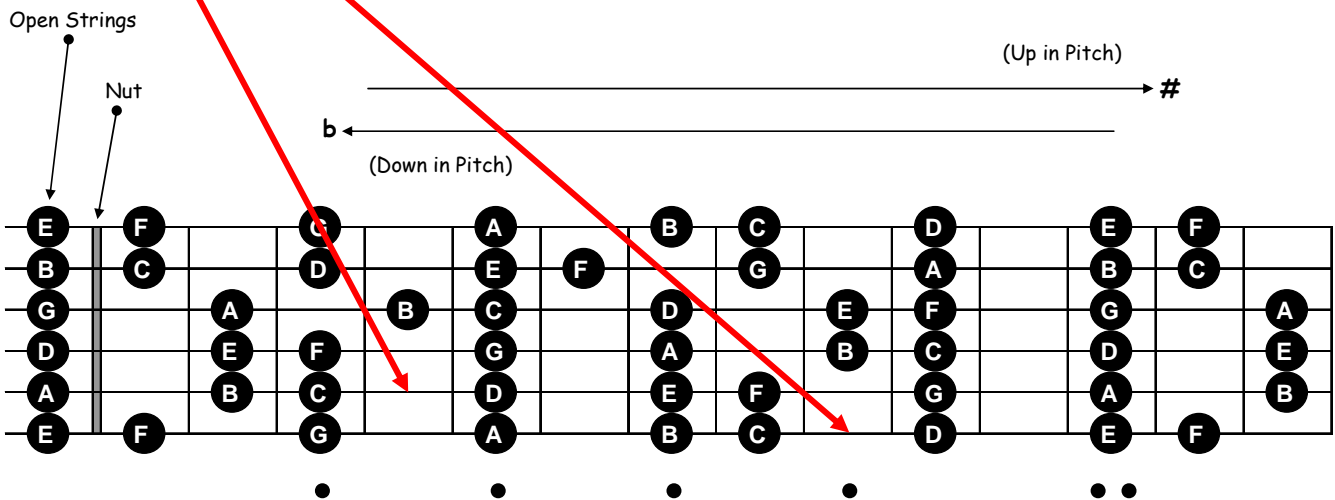
F# Major/D# Minor

What the.....?

Ok, so in order to really know what's going on, it would be a good idea to back-track slightly. Take a look at our keyboard again,



Then of course there was the *Guitar* fretboard,



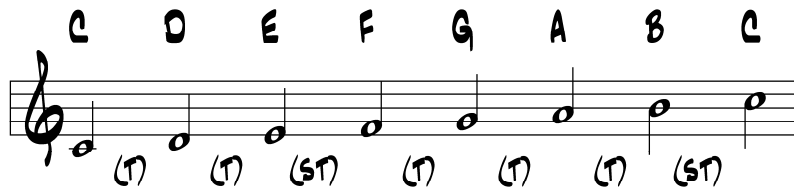
The first thing to make clear is that the black notes in the top picture correspond to the spaces left empty in the fretboard diagram.

Meaning what exactly Lou?

Well, take the far left black note between the C and D in the photo. This note, when played, will give the same letter name (pitch) as that produced on the 5th string at the 4th fret, (or 6th string 9th fret) between the same C and D. (More on fretboard knowledge in a subsequent tutorial)

Now would be a good time to recall our C major scale structure of 2½ 3½ Tones. This time however, I'd like to present this to you in a more musical manner as follows. Don't panic!

I'm not intending to use these tutorials to teach you how to sight read Van Halen solos, but you would benefit tenfold by having a very elementary knowledge of music notation for it is again logical once you understand it. Briefly, all music is written on five lines grouped together called a staff. Notes of varying time values (length/duration) are placed on or below/above the staff according to the pitch required, i.e., low notes towards the bottom and high notes towards the top. Moreover, the alphabet follows a logical line-space-line-space pattern. When writing notes (itches) below or above the staff, these are placed on much shorter lines called ledger lines as in the C at the beginning of this example.



More on this later, but for now the note names have been added to aid recognition, and the intervals between each pair labeled. If you compare this with the keyboard photo above, you'll see once again there's no black note between E and F or B and C as we've already learned, and that these intervals are of course are our only 'Natural' semitones (the ones that occur 'naturally').

Now for some hieroglyphics:



A 'Sharp' placed in front of a note raises its pitch by 1 semitone. (1 Fret)



A 'Flat' placed in front of a note lowers its pitch by 1 semitone. (1 Fret)



A 'Natural' placed in front of a note cancels any previous sharp or flat.

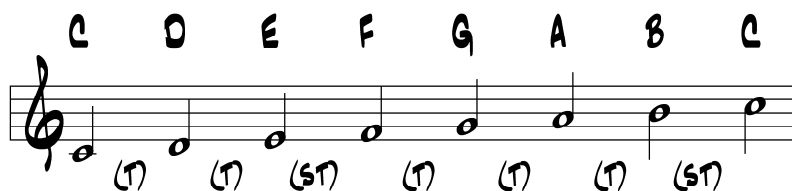
These guys have as their collective noun the word 'Accidentals'. The 'enclosed' areas of each symbol are always placed on the line or space of the note to which they relate. (Well worth remembering!)

So then, is this note shown by the connected red arrows above a C which has been sharpened or a D which has been flattened?

Good question, but the truth is folks it can be either depending solely on the 'grammar' of the key you happen to be in!

Now you're completely baffled right? Well, I did say at the start that this is a tricky one even when face-to-face with a student, let alone in a tutorial!

Let's get into this by remembering once again the major scale interval combination of $2\frac{1}{2}$ $3\frac{1}{2}$ tones. In the last issue I mentioned that this is critical to maintain, regardless of which note you start from - black or white. Let's consider this - we know the following is a Cmaj scale:



So let's now consider this:

Is the following a Gmaj scale? After all we've started on a G, the note names match up, and we've done the same stuff with the alphabet and all that!

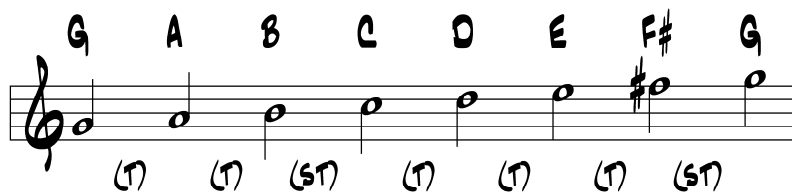


Fine, but close examination reveals that there is no way on earth this will sound like a G major scale as our interval structure is simply wrong for a major scale. The penultimate interval is a semitone instead of a tone and the last interval is a tone instead of a semitone! Other than that everything is fine and dandy!

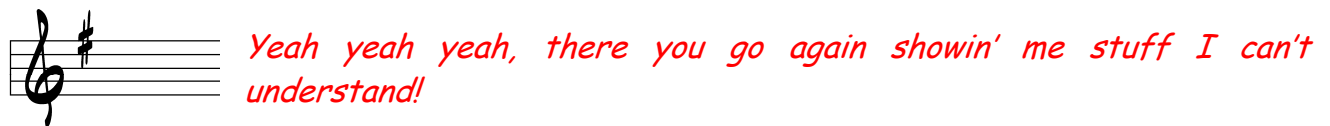
In short the pitch difference between the 6th and 7th notes is too small, and between 7th and 8th too large! BUMMER!

Enter (with all verve and gusto) our sharp to sort things out! Ultimately, if we make the pitch difference between the E and F larger, then we will automatically make the pitch

difference between the F and G smaller and thus effectively 'Kill two birds with one stone' as follows:



From now on you know that in order to play in the key of G major you must have an F# to maintain the correct 2½ 3½ tone/semitone combination. This would be musically represented in the following way.

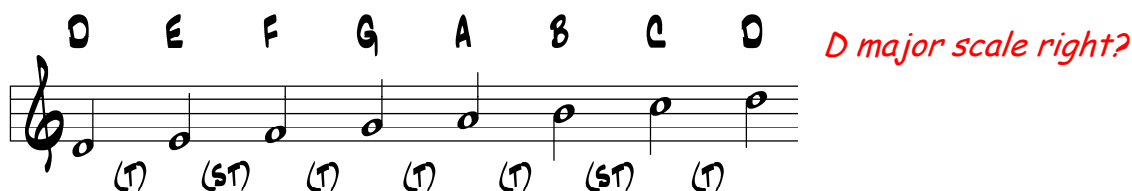


NO, PEOPLE! What this actually is, is what is known as a 'key signature' A 'sharp' symbol has been placed on the 'F' line of the staff to let any musician know that, in the music to be played, all the 'F' notes must be sharpened (played one semitone/fret higher) or, "this tune is in G major". At this point I must say that it could mean something else, which will be explained in the next issue!

Ok, before we go any further, let's look at what we've actually discovered a little more literally. To create the sound of a major scale when starting on the note G, we must include an F# to maintain the correct interval structure. The good news is that this is the only major key to have just one sharp or, if you prefer, the first time we have to include a sharp in our 'key system' is when we happen to start from the note G. Finally on this point and to shed some light on the mad looking diagram at the start of this tutorial, all other keys within the system have varying numbers of sharps and flats within them for precisely the same reason as G major - to maintain the correct interval structure of 2½ 3½ tones.

Now for a bit more logic, since the key of G requires an F# and this is the first time we've needed to use a #, we'll always put the F# first on the staff in our key signature no matter how many sharps appear later in other keys! Cool.

Let's see if we can progress this order of stuff thing a little further:



Nope!

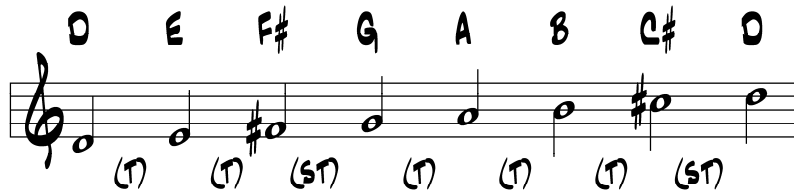
For exactly the same reason as before. The structure is wrong - $1\frac{1}{2}$ $3\frac{1}{2}$ 1 is never going to sound like a major scale!

How the hell do I sort that out?

Dead easy, look at what's wrong and then 'fix' it!

No, sorry Lou, you're talking B\$*\$*"@s!*

Right, look carefully. The 2nd and 3rd intervals are the wrong way round as are the 6th and 7th. Solution? The good old sharp again as it can 'kill two birds with one stone' and effectively swap these intervals around as shown.



'Rockin'. All sorted!

Yes, indeed sorted and we now have the F# from our G scale together with the C# needed within our D scale which would LOGICALLY give us the following 'key signature'



In other words this shows that all the F notes and now all the C notes as well, in our piece of music, must be played 1 FRET (semitone) higher 'cos we's in D, Dudes' and since C is the second # to appear in the key system we'll always write that second in our key signatures!

Thus my good friends, "for the rest of your natural lives" the key of G major will always contain one sharp - F#, and the key of D major will always contain two sharps - F# and C#.

Now from this point we could keep going through the system until we arrive at six or seven sharps, but I feel it would be much more beneficial to you chaps to explain what happens with the flats, try to clarify the grammar thing I mentioned earlier (C#-Db), and ultimately put the whole thing on the page in front of you and show you how to learn it quickly and thoroughly.

With this in mind then, is there an instance where by starting a major scale on a specific note, we have to employ the use of just one flat? Place your bets Gentlemen please!
Damn right there is or why would I ask the question?

Here then, is something else to consider:

F major scale yeah? Alphabet all there, notes match, gotta be right!

OK you should all know by now that I love this stuff, and the truth is, you might be saying to yourself, "Lou, I get the point Man; I can see the intervals are wrong"

Great, if that's what you're thinking then for me I'm nearly done, until I point out of course, that the main reason you can see it's wrong is because I've labeled all the intervals in every example. This is to help you see the very logic I mentioned at the top of this article; believe me folks this is NOT rocket science!

So let's check this out by accepting that our alleged F major scale above is incorrect since the 3rd and 4th intervals are the wrong way round. For the more enthusiastic of you, 'sharpening' the A to create a semitone as the 3rd interval will of course ruin the second interval by making it a tone and a half!

Figured it yet? All we need to do is basically the opposite of what we've already done!

Huh?

To convert (ST) (T) to (T) (ST) use sharps, and to convert (T) (ST) to (ST) (T) use flats.

Confused? No need to be, honest. If you look at the pairs of bracketed intervals in the line above, remember that there will always be three notes involved! After all, the 'interval' part is only the pitch difference between 'two' different notes! So in essence what you're actually trying to do is either move the middle note closer in pitch to the third note (higher - sharp) or, alternatively, move the middle note closer in pitch to the first note (lower - flat). Take a look.

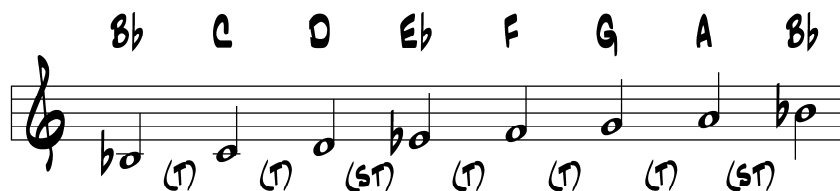
In simple terms, by flattening the B we've just got closer in pitch to the A, and further in pitch from the C. Job done, and now we have a potential 'key signature' of one flat meaning F Major.

Since this is the first time we've had to employ the use of a flat and it happened to be a B, will that always be written first in our 'key signatures' that contain flats?

I won't dignify that with a reply! (But, yeah - told you this was logical!)



'Key Signature' for F Major, but what about when we start a major scale on Bb?



'key signature' for Bb Major clearly showing the Bb (that's the note we started on!) from the key of F major and the additional Eb required to yet again maintain the correct interval structure.

OK, one crucial thing to remember is that as we progress through the 'key system' (up to 7 sharps or flats) nothing ever gets replaced, instead, we merely add 'accidentals' (sharps and flats) to what we've already got and here is that list of (major) 'key centers' again.

(b) <u>keys</u>	<u>(natural Key)</u>	(#) <u>keys</u>
F Major	C Major	G Major
Bb Major		D Major
Eb Major		A Major
Ab Major		E Major
Db Major		B Major
	Gb Major	
	F# Major	

This table is as logical as anything already mentioned. Simply count down the rows to reveal how many sharps or flats are contained in each key!

E \flat Major is on the 3rd row down in the 'Flats' column so contains 3 flats. Similarly, B Major is on the 5th row down in the 'Sharps' column and so contains 5 sharps. The next thing I need to really clarify is this 'Musical Grammar' topic mentioned earlier.

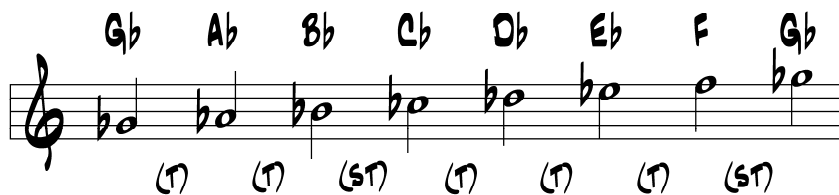
I've met very few students who were not thoroughly confused with the fact that in certain situations it becomes necessary to 'flatten' (or lower) the pitch of a C to create a C \flat ! (not B), or to 'sharpen' (raise) the pitch of a B to create a B \sharp (not C). The same scenario can occur between E and F, meaning, that sometimes we could have an E \sharp and very occasionally an F \flat . These are the somewhat weird times when 'sharps' and 'flats' can end up producing white notes instead of black!

A couple of rules that will ensure you never get this wrong. Firstly, in a major scale at least, you must always maintain the alphabet, which in turn means that you'll never mix sharps and flats in the same key. These two fundamental rules however, only apply to major keys. (More on this in the next issue). This concept means that in reality it's possible to make our scale look musically ridiculous yet sound correct. I'll try to show you what I mean by plunging you guys into the deep end! Let's consider the key of G \flat major and see if we can't make it look completely wrong.



Believe it or not if you were to play these notes as shown they would produce a perfectly correct-sounding G \flat Major scale, since the intervals as labeled are themselves correct.

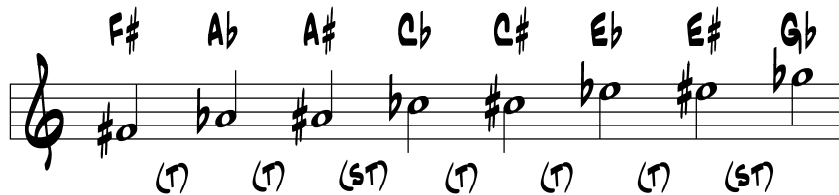
You might want to take a moment to verify this. What you can also see here, is the cardinal sin of not maintaining the alphabet which has caused a very confusing mixture of sharps and flats. In other words, whilst a tone above G \flat is G \sharp , it would be correct in this context to call it A \flat and not G \sharp . This maintains the alphabet and THE GRAMMAR!



If we now examine the correct way to write a G \flat scale you'll see exactly what I'm driving at. By comparing the notes between these two versions in columns, it becomes clear that both will

sound the same (G \sharp =A \flat , B=C \flat , etc) yet only one has been written with the correct Musical Grammar, giving us a key that would, in fact, contain six Flats.

Allow me to conclude the grammar point by explaining something you've possibly already questioned. Just as the note Gb will sound the same as the Note F#, so too will the key of Gb sound the same as the key of F#. This is why these two keys appear in the same place within our table. It's possible to create some hilarious examples of bad musical grammar in the key of F# major but here's just one for your perusal!



You really would struggle to make this example look more incorrect, but I can assure you, it would sound totally correct!

What we actually should have is this:



Again by comparing the two versions in columns you should be able to see that they will sound the same, but

only the bottom example shows the correct 'grammar' for the key of F# Major. These last two illustrations hopefully clarify a need for the occasional Cb or E#, to on the one hand, maintain the correct interval combination ($2\frac{1}{2}$ $3\frac{1}{2}$), and now of course to maintain the correct musical grammar.

These illustrations also give me the opportunity to let you in on a seemingly 'graduate level' of theoretical terminology, the 'Enharmonic equivalent of' Right, now all this is, (and don't ever let any 'muso snob' tell you differently) is the posh arsed way of saying "the same as", by that I mean that it would be correct to say that Gb is enharmonically equivalent to F#, i.e. they sound the same! Cb is by the same logic enharmonically equivalent to B, A# is "blah blah" to Bb! Etc etc. This terminology crops up all the time so please do not be put off by the 'big word' nature, as I've said "this aint rocket science-honest"

OK, for the really dedicated of you who are still with me, congratulations! We're almost there, but we need to draw this subject to its logical conclusion since, to be honest, if you end up totally grasping my first two tutorials, you're only one away from really being able to crack in with attitude to the good stuff and your guitar playing will soar to new heights you never dreamed possible! Please remember however, that all theory is rendered useless until you apply it creatively. More on this in subsequent issues.

So then with this in mind, we lastly need to present the whole 'key system' thing musically, show you how to learn it quickly so that it can be applied practically, and finally discuss the 'Cycle of Fifths bit' then I'm out of here till next time! Here goes, hold on, and keep calm!

(natural key)

C Maj /
A Min

('flat' keys)

(No #'s or b's)

('sharp' keys)

(Bb) 1b

F Maj /
D Min

(F#) 1#

G Maj /
E Min

(Bb, Eb) 2b's

Bb Maj /
G Min

(F#, C#) 2#'s

D Maj /
B Min

(Bb, Eb, Ab) 3b's

Eb Maj /
C Min

(F#, C#, G#) 3#'s

A Maj /
F# Min

(Bb, Eb, Ab, Db) 4b's

Ab Maj /
F Min

(F#, C#, G#, D#) 4#'s

E Maj /
C# Min

(Bb, Eb, Ab, Db, Gb) 5b's

Db Maj /
Bb Min

(F#, C#, G#, D#, A#) 5#'s

B Maj /
G# Min

Cycle of Fifths

(Bb, Eb, Ab, Db, Gb, Cb) 6b's

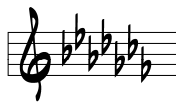
Gb Maj /
Eb Min

F# Maj /
D# Min

(F#, C#, G#, D#, A#, E#) 6#'s

For the Royal Academy Associates amongst you checking that I know my onions, yes it is possible to go just one step further and generate a key with 7 flats, (Cb) and one with 7 sharps (C#). Whilst these keys do exist it's worth returning to our 'enharmonic equivalent' stuff to of course point out that Cb is 'enharmonically equivalent' to B (sounds the same as B Major and we already have that in our system), and that C# is 'blah, blah, blah' to Db (sounds the same and we've got that one too)! However, to leave no stones unturned, these key signatures would look similar to Gb/F# but with the additional accidental, as shown.

(Bb, Eb, Ab, Db, Gb, Cb, Fb)
7b's



Cb Maj / Ab Min

(F#, C#, G#, D#, A#, E#, B#)
7#'s



C# Maj / A# Min

If you examine the last two accidentals from either side, you can now clearly see the need for Cb, Fb, E# and B# in certain keys, remember however that these notes are of course 'white' notes and not 'black'

Believe it or not you now have the un-enviable task of learning this 'Cycle of Fifths' diagram thoroughly, so that you can recall any part of it instantly!

*You've gotta be b£@@*y joking, I'll never memorise all that!*

To be fair, it will naturally take time to commit this to memory, but I can show how to work *any* of it out quickly and easily - seconds in fact, and, like your average twelve year old, you don't need to be able to read music to do it!

Big claim, 'nerdy boy!'

Firstly, to explain the diagram fully yet simply, the **red numbers** show the number of accidentals contained in each key. The **green letters** explain what these accidentals are, and the **blue letters** indicate the names of the (Major) key centers themselves. (Don't worry about the black letters after the slash marks for this issue).

Right, the most important factor to remember, as mentioned earlier, is that as we progress through the system, nothing ever gets replaced; we merely add more accidentals to those already present. With this in mind take a look at the two keys above; Cb and C#. Then, examine the **green letters** shown on either side. What you have here is the exact order in which all the sharps and flats appear throughout the system.

In short, take any number of accidentals from either of these keys, (first two, first five, whatever) and compare the same number of accidentals within the full diagram and you'll notice that they're exactly the same, eg, the first three flats in Cb are Bb, Eb and Ab, now look at the key which is the third row down on the 'flat' side of the diagram and bingo the same three accidentals appear giving us the key of Eb Major. If we were to consider the first five sharps shown in C#, and then looked down to the fifth row of the 'sharp' side of the diagram we would see that again they're exactly the same, namely, F#, C#, G#, D# and A# giving us B major. At this point you need to trust me a little since I know you'll be saying,

"Yeah, but how do I know that 3 flats is Eb Major or 5 sharps is B major?"

I'll get to this, but firstly, you need to remember the order in which the sharps and flats appear. Enter the good old 'Mnemonic' (memory aid). A simple sentence, where the initial letter of each word within the sentence, corresponds to the letter name of our accidentals in order. As an example, these are the two expressions I learned when I was a kid and have used every time I've taught this subject to students but you can, of course, create your own.

(flat) keys **B**ritish **E**uropean **A**irways **D**o **G**ood **C**heap **F**lights

(sharp) Keys **F**red **C**an **G**o **D**own **A**nd **E**at **B**ananas

As you can hopefully appreciate with a mnemonic, generally speaking, the more stupid or even untrue the expression is, the easier it becomes to remember. One thing to notice is that rather interestingly, the order in which the flats appear is the same as the sharps but backwards! (Something the mathematicians amongst you will not be in the least bit surprised about) That's Logical! (I'll leave it to you to figure out why!)

From this point on you now only need to understand three very important rules and you'll be able to rattle off the 'accidental' contents of any key in an instant!

1. Is the key in question a 'sharp' key or a 'flat' key?
2. Which expression do I apply?
3. How do I apply it?

Ok, we know that C major is, if you like, the 'natural' key and consequently contains no sharps or flats, so we can disregard it for these purposes. Now examine all the **blue letters** on the left hand side of our main Cycle of Fifths diagram (all the 'flat' keys).

With the exception of F major all our flat keys have flats in them when we mention them, i.e. Bb, Eb, Ab, Db etc and since we now know we never mix sharps and flats in a major key, they must very obviously be keys that contain flats. Similarly, (and this is where the logic becomes too much to bear) again with the exception of F Major all our sharp keys (**blue letters** on the right hand side) are merely letters on their own, G, D, A, E etc, and of course when we get to F# and C#, these are so obviously sharp keys for the same reason as the flat key situation before since we don't mix sharps and flats in a major key.

Now you can appreciate why I've often said to students that the key of F Major becomes 'the one to watch', since according to the above rules, being a letter on its own one would conceivably think it was a sharp key when in fact it's a flat key.

So then, how to remember which expression goes with which column, 'sharps or flats'

For me this is certainly the simplest part to explain. The 'flat' symbol looks for all the world like a lower case 'b' and the word Fred (from our mnemonic) doesn't begin with a b, but British clearly does.

Finally, how to apply the expressions followed by some examples to get you started on the right track.

For any 'flat' key, count through the required expression until you get to the required key, and then add 1.

For any 'sharp' key count through the required expression until you get to the required key, and then subtract 2.

Here come the examples folks. If you were to consider Ab Major, you would know instantly for reasons already discussed that this is a 'flat' key, so applying the correct expression in your head, you'd simply say: "British, European, Airways (this represents the key we're trying to sort out) plus 1, Do, answer? The key of Ab contains 4 flats and they are Bb, Eb, Ab, Db. Try this with any of the others, it works!

How about E Major?

Well because this a letter on its own (and not an F!) you immediately know this is a 'sharp' key, so again applying the correct expression, you'd say (and count) in your head: "Fred, Can, Go, Down, And, Eat (this represents the key in question) now subtract 2, and hence the key of E Major contains 4 sharps and they are F# C# G# D#. Once again try this out with any of the sharp keys, it will work. You will need however, to apply a little

common sense for F# Major and C# Major. "Fred", subtract 2, (F# and B#) leaves 6 sharps. Or, "Fred, Can", subtract 2, (C# and F#) leaves 7 sharps.

Lastly on this point, if you learn the order in which the sharps or flats appear, and how to apply this knowledge as described, you'll be able to work out the harmonic content of any key so quickly, that committing the whole system to memory will seem a breeze.

And finally! No honest I'm gagging for a beer after this little lot its taken ages! The 'Cycle of Fifths' bit.

Now would be a good time to remove any outdoor footwear to prevent you from hurting yourselves!

The 'Cycle' side of this would naturally imply some circular movement of one form or another, our diagram is no exception!

Starting from, and including our natural key of C Major, count up five scale steps in this key as follows: C, D, E, F, G. Where we end up is of course at the start note of our next key within the system, namely G. If we now did exactly the same exercise starting on G that would give us the following: G, A, B, C, D, and from D? Oh yes this is so, so, logical, D, E, F#, G, A, and on and on until we travel in a complete clockwise circular fashion right back to good old C!

Please try this for yourselves, but keep in mind that you must stay 'grammatically correct' to the key you start from to make sure your 5th note, and hence your 'new key', are both correct. eg, B, C#, D#, E, F#. / Gb, Ab, Bb, Cb, Db and so on!

So in short, the diagram is called 'The Cycle Of Fifths' for no other reason than the fact that, all the key centres in the key system, when presented in a logical way according to the number of accidentals contained within them, happen to be a 'Fifth' apart! Just cast your eyes around the red numbers in the diagram starting from G, and you'll immediately see that the number of accidentals in each key in a clockwise order is as follows:

(C Maj) 1#, 2#, 3#, 4#, 5#, 6#/6b, 5b, 4b, 3b, 2b, 1b (C Maj)

In case you're interested, you now also know something behind the humour of the classic Jazzers gag:

"What goes around comes around!"

That's it for this issue chaps, thanks for reading and again I hope you've found this tutorial useful and informative. You'll probably need to read through it a couple of times to really get to grips with it, or of course you could left click drag, right click copy, and then paste the whole document into word ready for printing. In any event it'll be worth it as it will provide you with the essential harmonic knowledge to help with all other topics still to be covered!

In the next issue I'll be laying this whole tutorial to rest, by explaining the parts of our main diagrams not already discussed, namely, taking you through the subject of 'Relative Minors' and their role within the Key System.

No I'm not talking about younger nieces or nephews!

Until the next time, pint time now!

Regards,

Lou.

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