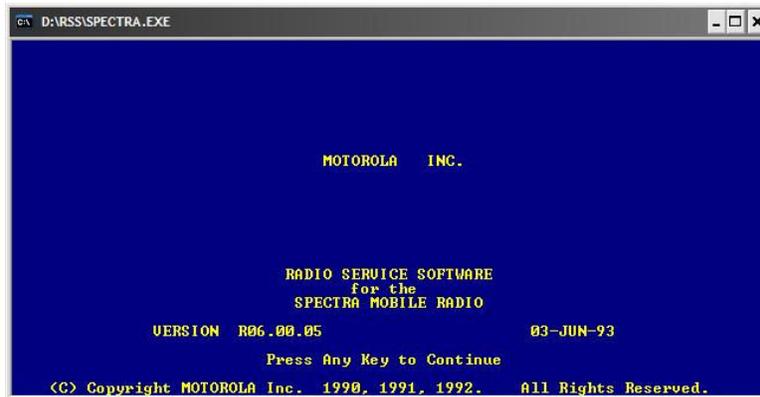


Bypassing the "16 Mode Scan Limit" on a Motorola Spectra Radio

Found by: linkinpark9812

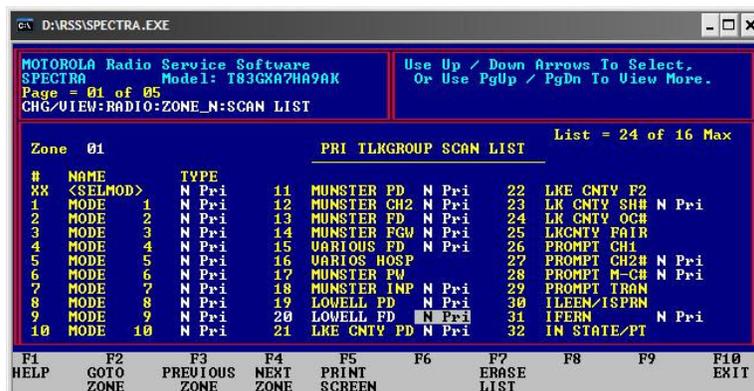
This Guide Written by: linkinpark9812



Go from this:



To this!!!



Yes! It has finally been done! I was very surprised that it was easier than I thought it would be. Doing this is pretty much flawless, but there are some setbacks with front end programming of the scan lists for the zones you exceed the 16 limit on. I have not tried this with mode based scan list, but I would assume they are the same. This tutorial is just going to talk about zone based scan lists.

First, my idea came about when kc7gr posted on the Bat labs forums about exceeding the mode limit from 128. He found a bit that you could bit bang and increase the amount. However, it hit a dead end due to the space limitations of the 28C64 chip on the MLM that stores the whole code plug. Then tvsjr mentioned that he got a Spectra Radio to scan more than 16 modes. He posted and said that something happened that caused one of his zones to show "17 of 16 Max" for his scan list items. He was then able to select as many items as he wanted. However when going below 16, you couldn't go back.

Well, surprisingly enough, one of my zone scan lists did the same thing. I am not sure when it happened, but this allowed me to play around with the code plug and I saw how the RSS handles that number that determines how many modes are selected. I found out that the RSS does NOT do a calculation in comparing the selected modes to scan vs. the maximum 16 (which is a STATIC value that is hardcoded into the RSS). It DOES do a calculation in determining how many modes are selected though. The RSS will see how many modes are selected to scan and put in a value, such as 15. However, when determining if you can add more, it seems to just compare.

The program seems to just look at the value of the selected modes to scan. If you try to add more, it checks to see if it EQUALS 16. If it doesn't, it lets you add more. If it DOES, then it gives you the error about the limit being reached. If it did an actual calculation, this memory "hack" probably would not work. You could put 17 in, but if the RSS did the calculation and found out you are AT 16 OR OVER, then you would get an error. But since the RSS just checks to see if it EQUALS 16, then this memory "hack" works, because if you enter the value of 17, every time you add a mode to the scan list, that number will go higher but will NEVER HIT 16 again, and the RSS just thinks that you haven't reached the limit yet!

However, unfortunately, the Radio's Firmware is smarter (at least 6.15 is. That is what I have). This limits, but does not completely eliminate, front end programming of scan lists for the zones that you have exceeded the 16 mode scan limit. Read on!!!

Pretty neat how it all works! 😊

Ok, so let's get to it!

Ok, so here is the deal. With my method, this has to be done on a Windows machine (which makes it easier anyways). The latest RSS for the Motorola Spectra runs on my 1.6GHz Celeron M processor just fine. Just don't do any programming/reading on the radio in Windows!!!!

First, you are going to need to get the RSS running on your Windows PC. Copy it from your DOS PC using a floppy or whatever.

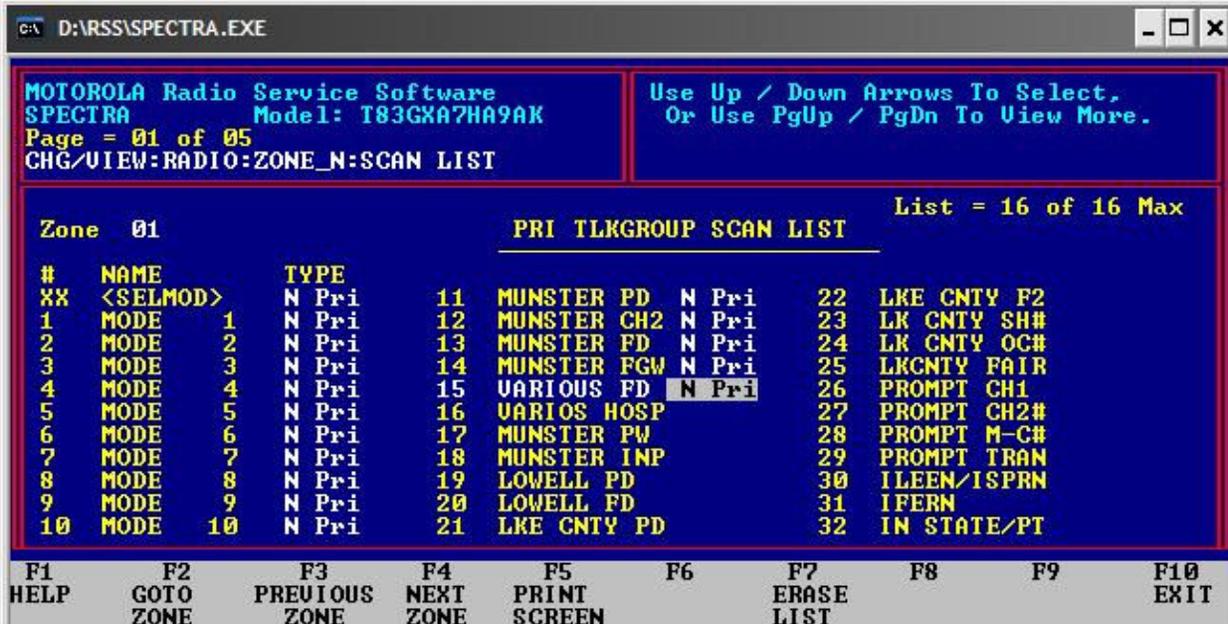
Then, you need to get the code plug that you wish to edit. I assume it is on your DOS PC, so copy it over to a windows PC to be edited on.

Then, you are going to need to get this program. This is the memory editor I used to do the job. When I was thinking about changing the RSS scan limit, this program came to mind, because I used the same method to cheat money in games! I know, I shouldn't! ☹

Here is the link to Art Money: <http://www.systemsoftlab.com/artmoney731eng.exe>

Install it.

Now, open up your RSS, load your code plug, and go to one of the scan lists that you want to expand. I am going to assume you are already maxed out at 16, since you want to expand it.

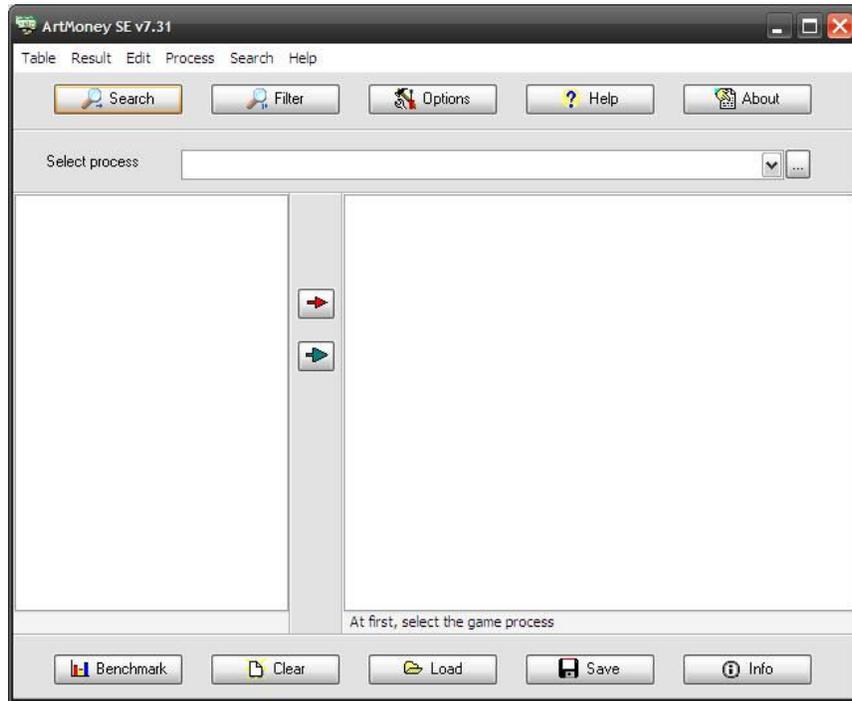


The screenshot shows a DOS-style window titled "D:\RSS\SPECTRA.EXE". The main display area has a blue background with yellow and white text. At the top left, it says "MOTOROLA Radio Service Software SPECTRA Model: T83GXA7HA9AK Page = 01 of 05 CHG/VIEW: RADIO:ZONE_N:SCAN LIST". At the top right, it says "Use Up / Down Arrows To Select, Or Use PgUp / PgDn To View More.". Below this is a header "Zone 01 PRI TLKGROUP SCAN LIST List = 16 of 16 Max". The main content is a table with columns for #, NAME, TYPE, and a list of 32 entries. The entry at row 15 is highlighted with a white background. At the bottom, there is a function key legend: F1 HELP, F2 GOTO ZONE, F3 PREVIOUS ZONE, F4 NEXT ZONE, F5 PRINT SCREEN, F6, F7 ERASE LIST, F8, F9, F10 EXIT.

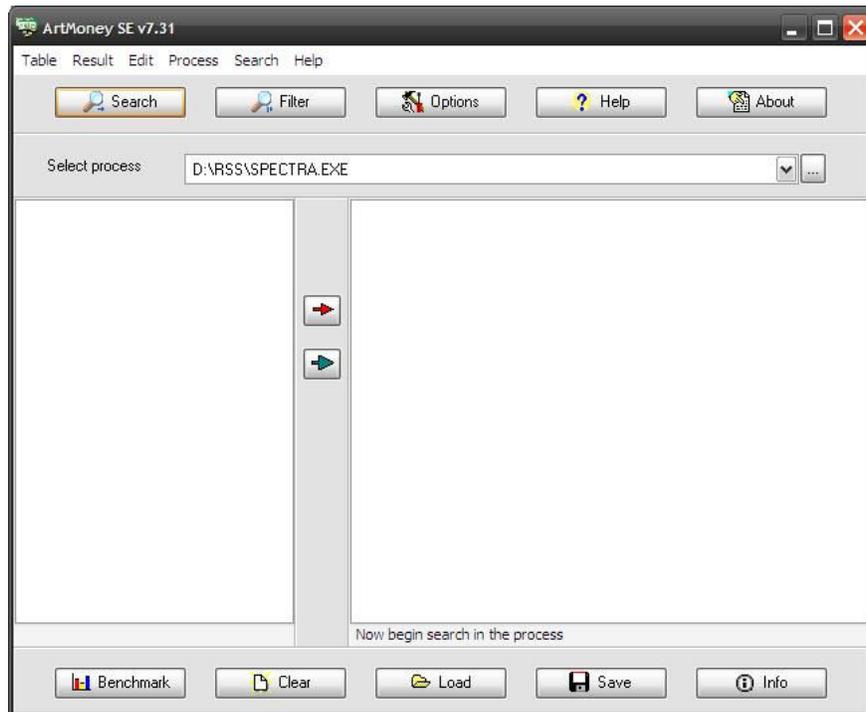
#	NAME	TYPE								
XX	<SELMOD>	N Pri	11	MUNSTER PD	N Pri	22	LKE CNTY F2			
1	MODE	1 N Pri	12	MUNSTER CH2	N Pri	23	LK CNTY SH#			
2	MODE	2 N Pri	13	MUNSTER FD	N Pri	24	LK CNTY OC#			
3	MODE	3 N Pri	14	MUNSTER FGW	N Pri	25	LK CNTY FAIR			
4	MODE	4 N Pri	15	VARIOUS FD	N Pri	26	PROMPT CH1			
5	MODE	5 N Pri	16	VARIOUS HOSP		27	PROMPT CH2#			
6	MODE	6 N Pri	17	MUNSTER PW		28	PROMPT M-C#			
7	MODE	7 N Pri	18	MUNSTER IMP		29	PROMPT TRAN			
8	MODE	8 N Pri	19	LOWELL PD		30	ILEEN/ISPRN			
9	MODE	9 N Pri	20	LOWELL FD		31	IFERN			
10	MODE	10 N Pri	21	LKE CNTY PD		32	IN STATE/PT			

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Now open up Art Money, agree to the terms, close any boxes that pop up, and you should see a screen like this:



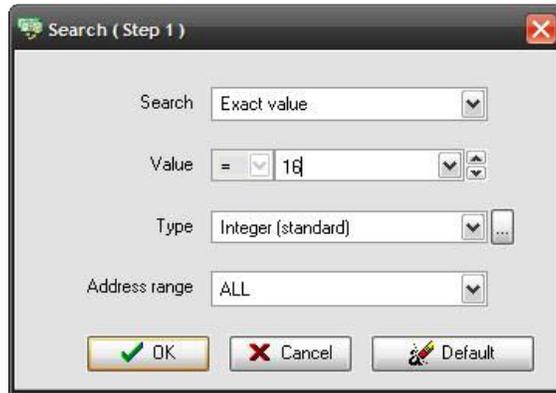
Now go up to where it says "Select Process" and pull down the drop down menu, and pick the SPECTRA.EXE (which is the RSS that is running in the background at the moment).



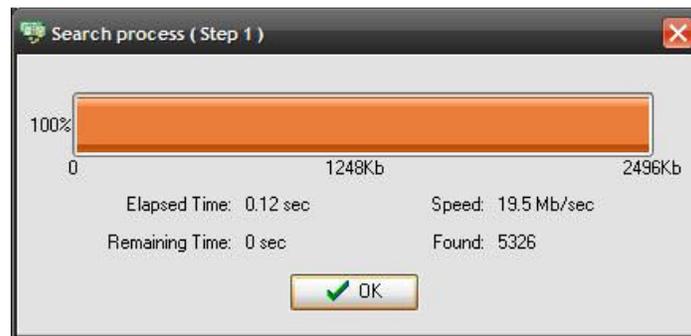
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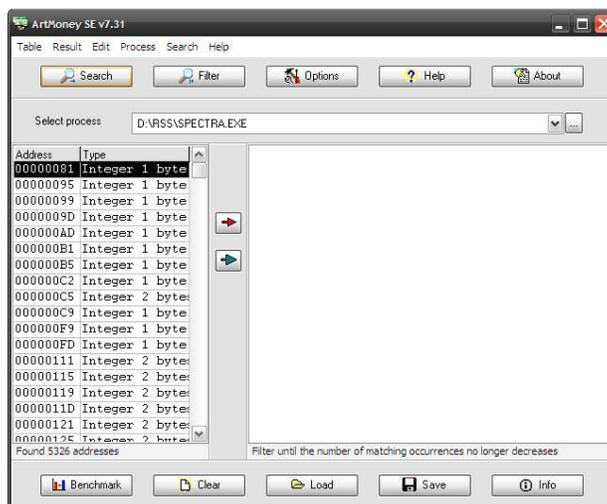
Now click the “Search” button at the top to bring up this dialog box.



For “Value”, put in the current number of selected modes to be scanned, which should be 16, since you want to exceed 16. (Remember, if you drop below the 16 modes to be scanned when editing the scan list in RSS, you will have to do this again!) Then Press OK, and let the program do a search and then you will get this dialog box.



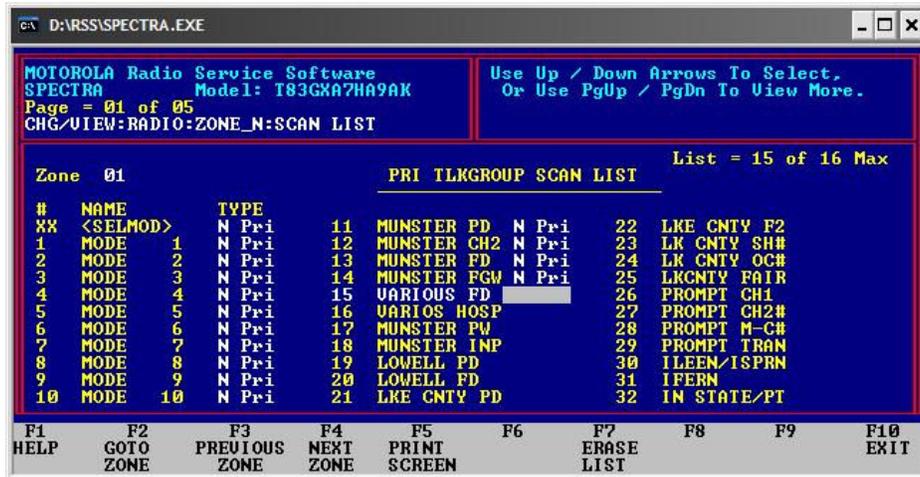
Click “OK” and you will see that there are many values. Don’t worry! It will be narrowed down with the next steps! 😊



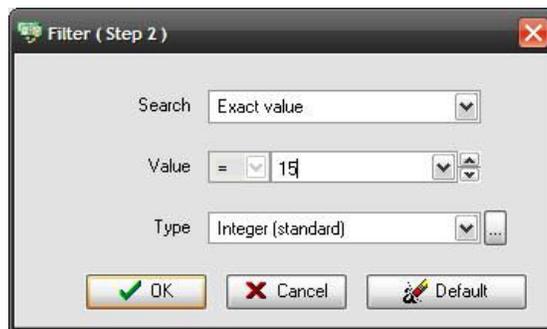
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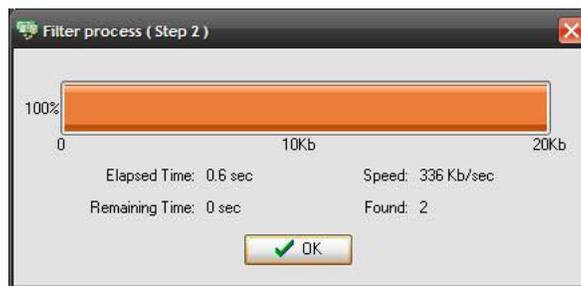
Now go back to the Spectra RSS (DO NOT EXIT ART MONEY!). Deselect one of your modes to scan, so it reads "15 of 16 Max". Some of you may see where I am going with this.



Now go back to Art Money without exiting the Spectra RSS and click "Filter" and that will open up this dialog box.



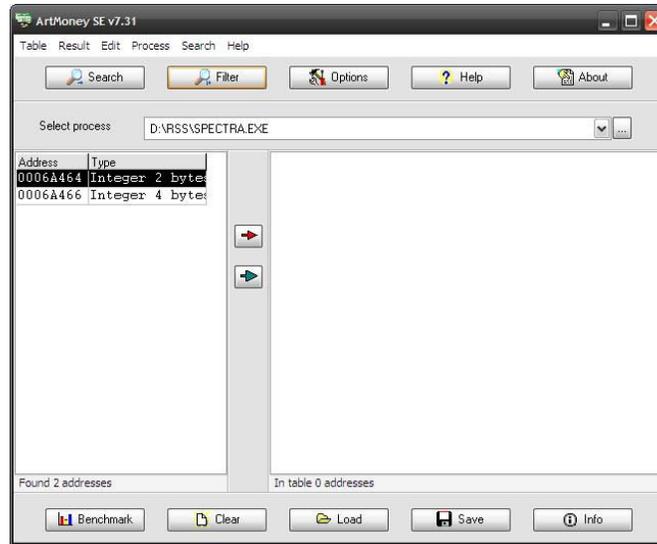
The whole point of this is to see which of those many "16" values changed to "15". This will then narrow it down to which memory location stores this value. Change the "Value" to "15", since you eliminated one of the modes to be scanned. Click "OK" and after it is done searching, you will get this dialog box.



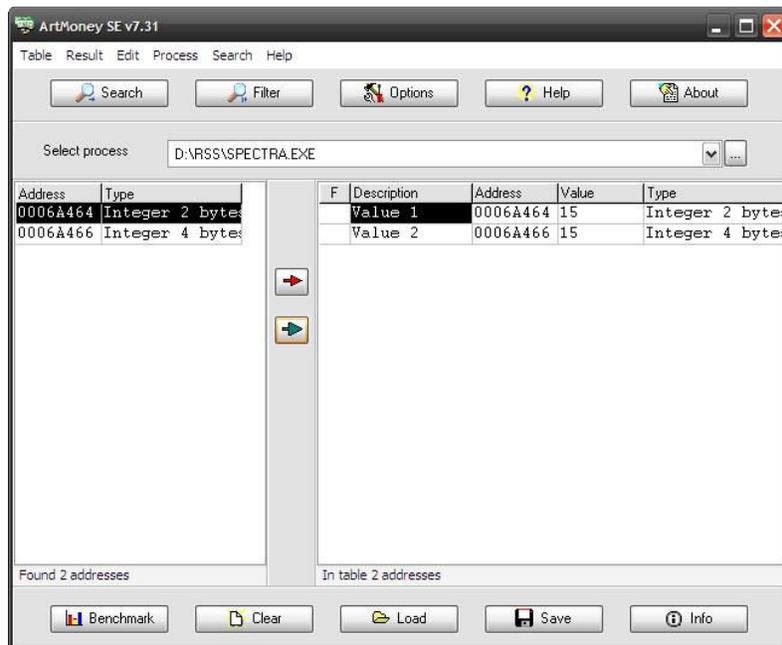
As you can see, it narrowed it down to only 2 Values! Click the "OK" button and you will see only the two values in Art Money.

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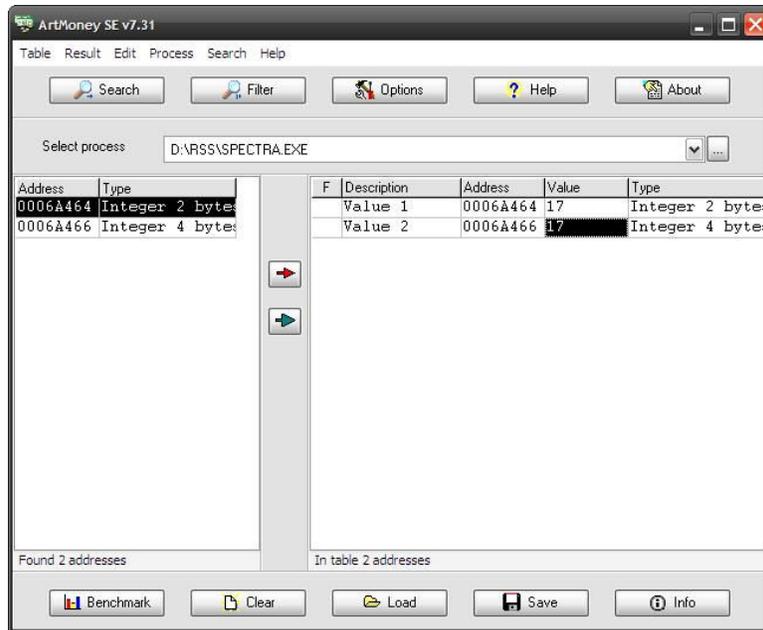
Press the Green arrow that is pointing to the right. That will add all of the values it found in the left table and put them in the right table where they can be edited. Then the screen should look like this.



As you can see, both values are "15", which is what the RSS currently reads. Click one of the "15"s in Art Money and type in "17" and PRESS ENTER (very important). Do this to both of the values. Then your screen should look like this.

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Now both values are “17”. Now when you go back to the RSS, it will still read “15 of 16 Max”. This is because it isn’t doing any calculation. However, when you go to ADD TWO MORE MODES to the scan list, the program is going to use your value of “17” and add “+2” since you are adding two more modes. Then the RSS will read “19 of 16 Max”. Yes, I know this is incorrect so just hold on! So go ahead and ADD TWO MORE MODES to the scan list and your screen should look like this.



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Now, to have it recalculate how many modes you really have selected scanning now, press "F10" to exit the screen, and then press "F7" to go back to the scan list. Now it will recalculate the number of modes to be scanned and will look like this.



Now, it reads "17 of 16 Max". Go ahead and add more modes to scan. Just be sure to NEVER DROP IT TO 16 OR BELOW. If you do, you will have to repeat the process. Here is an example of an exceeded scan list! 😊



To do this to other zones, go to that zone's scan list and just click back to Art Money. The memory locations should be the same! 😊

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Now before you go and program your radio, you need to read this if you plan on making the scan list front end programmable.

If you don't want to make the scan list front end programmable AT ALL, go to the "Scan List Options" for that Zone and make sure that "Non Priority List" and "Priority List" (If you have it set as a Priority enabled scan list) to "Zone Slaved". This will still allow seeing what is being scanned by holding the SCAN button down, but anytime you try to select or deselect a mode, it will give you an error beep.

If you want to make the scan list front end programmable, then here is what I recommend and also different ways you can do it. I am assuming you have a Priority enabled scan list. You can do this by making sure "Scan Type" is set to Priority. If it isn't, you will only have non priority modes and I actually recommend making the non priority modes "Zone Slaved" so it cannot be changed on the front panel. You will see why later.

ANYWAYS here is how it works. If you set "Non Priority List" to "Zone Slaved", that means that any modes that you select as non priority in the RSS WILL NOT be able to be removed or it's priority changed on the control head. You may ask "why should I do this"? Well the reason is that the Radio's firmware is smarter than the RSS and cannot be manipulated much. To leave the boring stuff on how it does it, the radio does some calculation where it knows that there are too many modes. So trying to add modes when over the 16, the radio will just give you a "LIST FULL" message (you will see that there is an exception to this though). Let's say you have 19 modes, all non-priority, to scan. You want to remove 2 for now. So you go into the scan list and remove those two. Now you only have 17 modes scanning. Well you won't be able to add those two back unless you reprogram the radio with the RSS. However, if you are careful, you can leave the "non Priority List" to "Op Select". When you go to the scan list on the control head, however, you still CANNOT remove those modes from the scan list. If you do, the same thing above happens. BUT, you can change the Non Pri mode to Pri 1 or Pri 2. Now you may be thinking that you do have to cycle to the deselect option to do this. This is why you have to be careful. If you accidentally leave the mode in the deselect position and exit the scan list editing OR CHANGE TO A DIFFERENT MODE BY USING THE MODE KEYS OR RCL KEY, it will be removed from the list and cannot be added back because the list is full, according to the Radio. Cycling the mode will make the change permanent. So if you want to have it like that, that is fine.

Now let's talk about setting up the "Priority Scan List" to "Zone Slaved" or "OP Select". If you put it in Zone Slaved, you can't edit any mode that is Pri 1 or Pri 2. However, I recommend that you make set "Priority Scan List" to "OP Select". The way the radio handles these seem to be different. This gets a little confusing so bear with me. I am going to lay out different scenarios in the tables below.

This is if you have "Priority Scan list" set to "OP Select" and "Non Priority Scan List" set to "Zone Slaved". This is the configuration I recommend and use currently for all zones that have been "hacked". When set up like this, you cannot accidentally delete modes permanently from a scan list, requiring you to reprogram the radio with RSS.

What Mode	Set to scanning option?	What you can do:
Any Mode (besides SEL MODE)	"Pri 1" or "Pri 2"	When going to edit these modes on the control head, they can be cycled to "Pri 1", "Pri 2" AND deselected. However, even though deselected, you can go back to them and set them to "Pri 1" or "Pri 2". The only downside is that they can NEVER be set to "Non-Pri".
	"Non Pri"	When going to edit these modes on the control head, you cannot remove them, nor change their Priority setting. Nuisance delete during scan still works though.
	Not selected to scan at all	Same as "Pri 1" or "Pri 2"
SEL MODE	"Pri 1" or "Pri 2"	The same as "Pri 1" or "Pri 2" above, but it cannot be removed. However, it CAN be selected as "Non-Pri" as well as "Pri 1" and "Pri 2", unlike other modes.
	"Non Pri"	Actually never tried this. Either it will be stuck at "Non-Pri" or can be cycled to "Pri 1", "Pri 2", and "Non-Pri".

So it is somewhat customizable. Basically any mode (excluding SEL MODE) can be set to "Pri 1", "Pri 2", or nothing at all in the RSS, and can be changed to "Pri 1", "Pri 2" and not selected at all on the control head, and can be interchanged without the radio complaining. Still remember that you can only have ONE "Pri 1" and ONE "Pri 2" mode. SEL MODE is the same except it can be cycled to "Non-Pri" as well (and of course can't be deselected).

This is if you have “Priority Scan list” set to “OP Select” and “Non Priority Scan List” set to “OP Select”. This gives you a little more customization of scan lists on the control head but you risk accidentally permanently removing any mode originally programmed as “Non-Pri” through the RSS.

What Mode	Set to scanning option?	What you can do:
Any Mode (besides SEL MODE)	“Pri 1” or “Pri 2”	Haven’t really tried this one , but based on experimenting, it is probably similar to how “Non Pri” works below.
	“Non Pri”	Can be changed to “Pri 1”, “Pri 2”, “Non-Pri, and deselected. BEWARE If you remove these from the scan list and exit programming the scan lists or cycle modes, you will lose this mode from scanning PERMANELTY unless you reprogram with RSS.
	Not selected to scan at all	Haven’t really tried this one , but based on experimenting, you will probably get the “LIST FULL” error since you are over 16 modes scanning.
SEL MODE	“Pri 1” or “Pri 2”	The same as “Pri 1” or “Pri 2” above, but it cannot be removed.
	“Non Pri”	Can be cycled to “Pri 1”, “Pri 2”, and “Non-Pri”, but not be deselected.

You should do either of those two or set both to “Zone Slaved” to disable scan list editing all together. You shouldn’t set “Priority Scan List” to “Zone Slaved” and “Non priority Scan List” to “OP Select” unless you have good reason too (or your scan type is set to Non-Priority only). If you’re going to do that you may as well set both to “OP Select”. Unless you really don’t want your “Pri 1” or “Pri 2” to ever be changed, don’t use that combination.

Tired of reading yet? 😊

Well then there isn't much more left! There is only one thing, though it may be a "problem" at my end. I am not sure if others will have this problem, because I originally had 1 zone exceeded and had this problem. But then I exceeded 2 more zones and those zones don't have this problem. I guess this is just in case you have the problem. It isn't really a problem, but when reading the code plug from your radio after you uploaded a code plug with your exceeded zone(s), you may be confused at first. I had two variations of the problem.

The first was after I uploaded my code plug to my radio (using my recommended settings for those zones), everything worked fine. I have everything set to "Non-Pri", one mode set to "Pri 2" and SEL MODE to "Pri 1". When I read the code plug from the Radio, SEL MODE was set to "Non Pri". I could cycle it normally to "Pri 1", "Pri 2", or back to "Non-Pri". But later I found out as long as you don't mess with it, and you upload the code plug to the radio, it will be set to whatever you had it, like in my case "Pri 1". All the other "Non Pri" modes, as well as the "Pri 2" mode, showed up fine.

The Second problem was a more intense version of the first problem. It was the same thing, except you could never select "Pri 1". You could try to cycle the SEL MODE and the only thing you could select was "Pri 2" or "Non-Pri". This applied to any other mode I tried it on. There really was no fix, but I think I may try erasing the scan list, "hack" the zone again, and set my scan list up again. Anyways, if this happens to you, just leave the "Pri 1" mode alone in the RSS, even if it says "Non-Pri". If you know for sure the radio says its "Pri 1", then just leave that mode alone. But what if you want to change your Pri 1? Remember, depending on what table you choose to use above, any mode that is set to "Pri 1", "Pri 2", or not selected at all in the RSS can be freely set on the control head to "Pri 1", "Pri 2", or not selected. So if you want something as "Pri 1", just deselect it from the scan list and set it on the control head. If you want SEL MODE to be "Pri 1", just set it to "Pri 2" and change it on the radio.

Well, that's it! 😊

I hope that this guide is pretty easy to follow. I tried to make it easy but wanted to put a lot of details in it so others can go more in depth with it. I know many others (and I) wanted the ability to expand the scanning capabilities of the Spectra, like the Syntor was. I hope this guide was helpful to you!!! 😊😊😊😊 Thanks for reading and happy (safe) programming!!! 😊😊😊😊

--linkinpark9812