

K6JRF's Page

formerly W6FZC

ESSB Audio Techniques Page

(New: Nov 3, 2014)

This new section shows the results of Spice analysis on the FTdx3000 Mic Preamp Ckt showing the "stock" response.

Just as in the FT2000, the mic preamp ckt has limited audio response and needs to be modified in order to get LOW Freqs (below 100Hz) and HI Freqs (above 3Khz) that many ESSBers require.

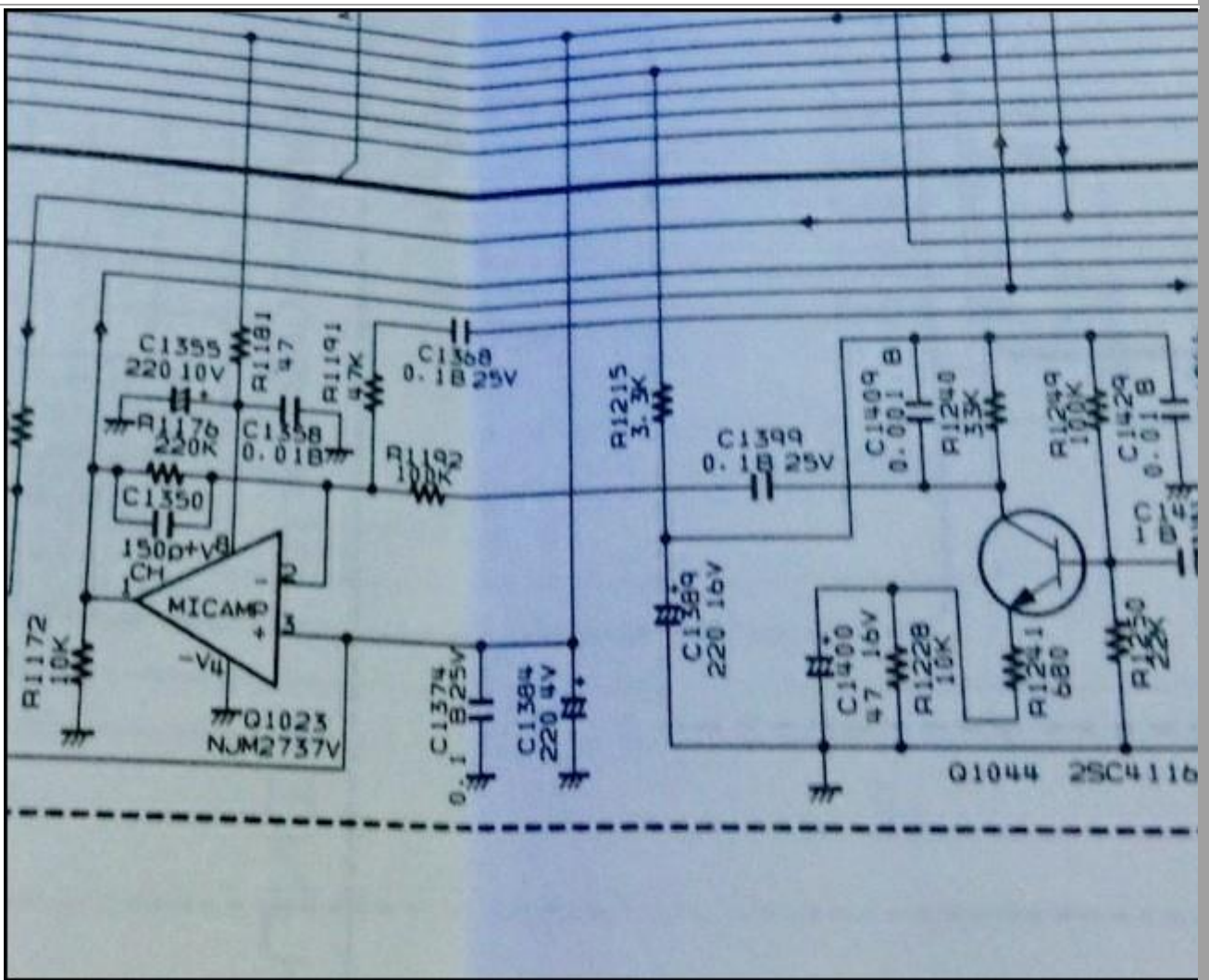
I continue to use an excellent Spice program called "5Spice" written by **Andresen Software**. It features almost intuitive operation, has many powerful features and allows the import of various Spice models so that the ckt can be simulated using the actual real world parts. Click [here](#) to see more information on this fine circuit analysis product.

Frequency Response from MIC Input

= Statement =	===== Discussion =====	= Comments =
Feed the audio into the back AF input (LINE) to get 50hz Tx response	If you take the time to checkout the schematic tracing the connection from the front panel "mic" input and rear panel "LINE" input, you will find that the mic input goes through a "preamp" stage while the "LINE" input is directly summed into the 2nd stage opamp in the TX mode. The 5Spice results are shown in the sections below.	Checkout the charts the Tx sweep simulation showing each ckt's low frequency response.

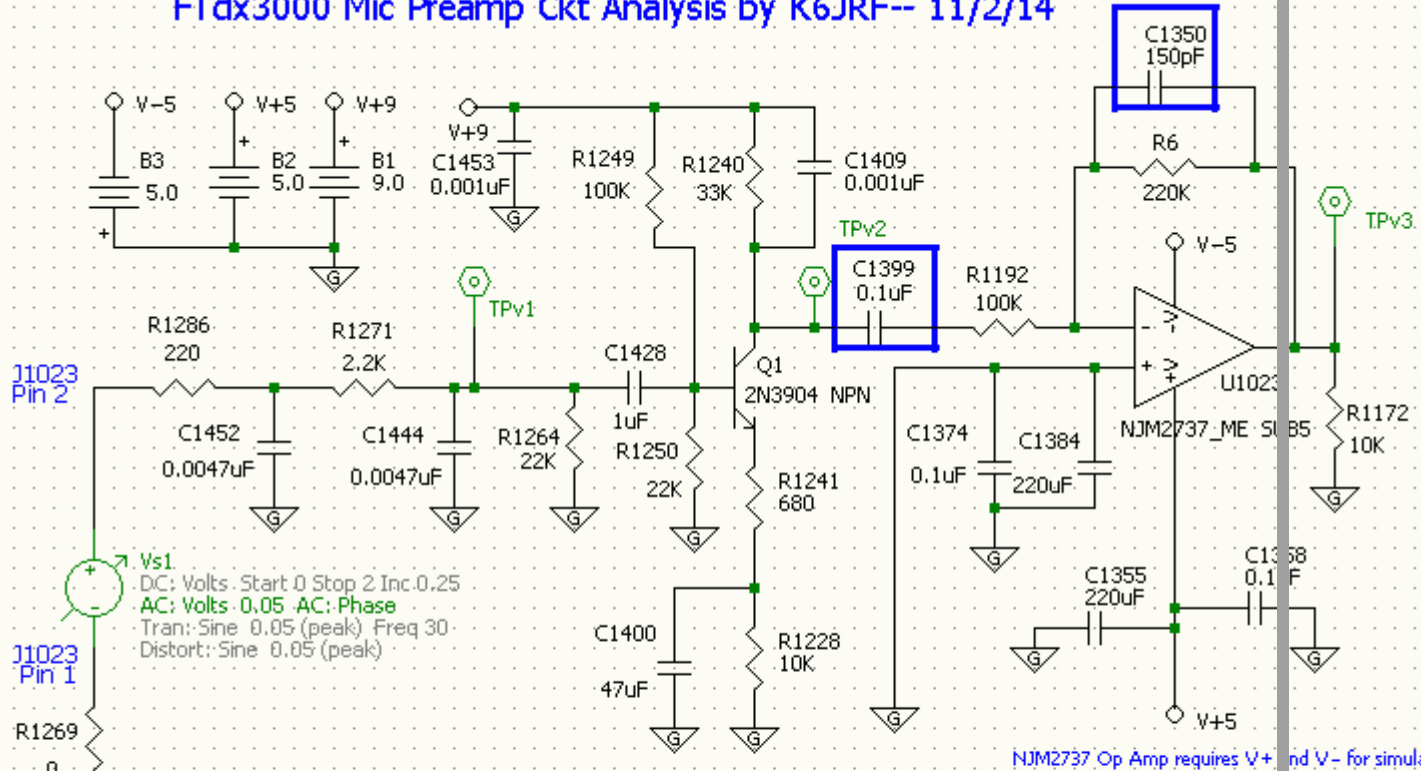
FTdx3000 5Spice Mic Preamp Analysis

The picture here shows a section of the actual FTdx3000 Main Board schematic centering on the Mic Preamp input ckt. The schematic is courtesy of Frank, **W6APO** from the User Manual. Tnx, Frank!



The picture below shows the "capture" of the ckt values in a format that is acceptable for 5Spice. The analysis will accurately show the ckt's response as a function of 'frequency'. Here the front panel input ("Mic" = Vs1) as the ckt exists in the current FTdx3000. The reference designators (Ref Des) have been preserved and are as shown in the schematic if you wish to verify.

FTdx3000 Mic Preamp Ckt Analysis by K6JRF-- 11/2/14



J1023 Pin 1
 Vs1
 DC: Volts Start 0 Stop 2 Inc.0.25
 AC: Volts 0.05 AC: Phase
 Tran: Sine 0.05 (peak) Freq 30
 Distort: Sine 0.05 (peak)

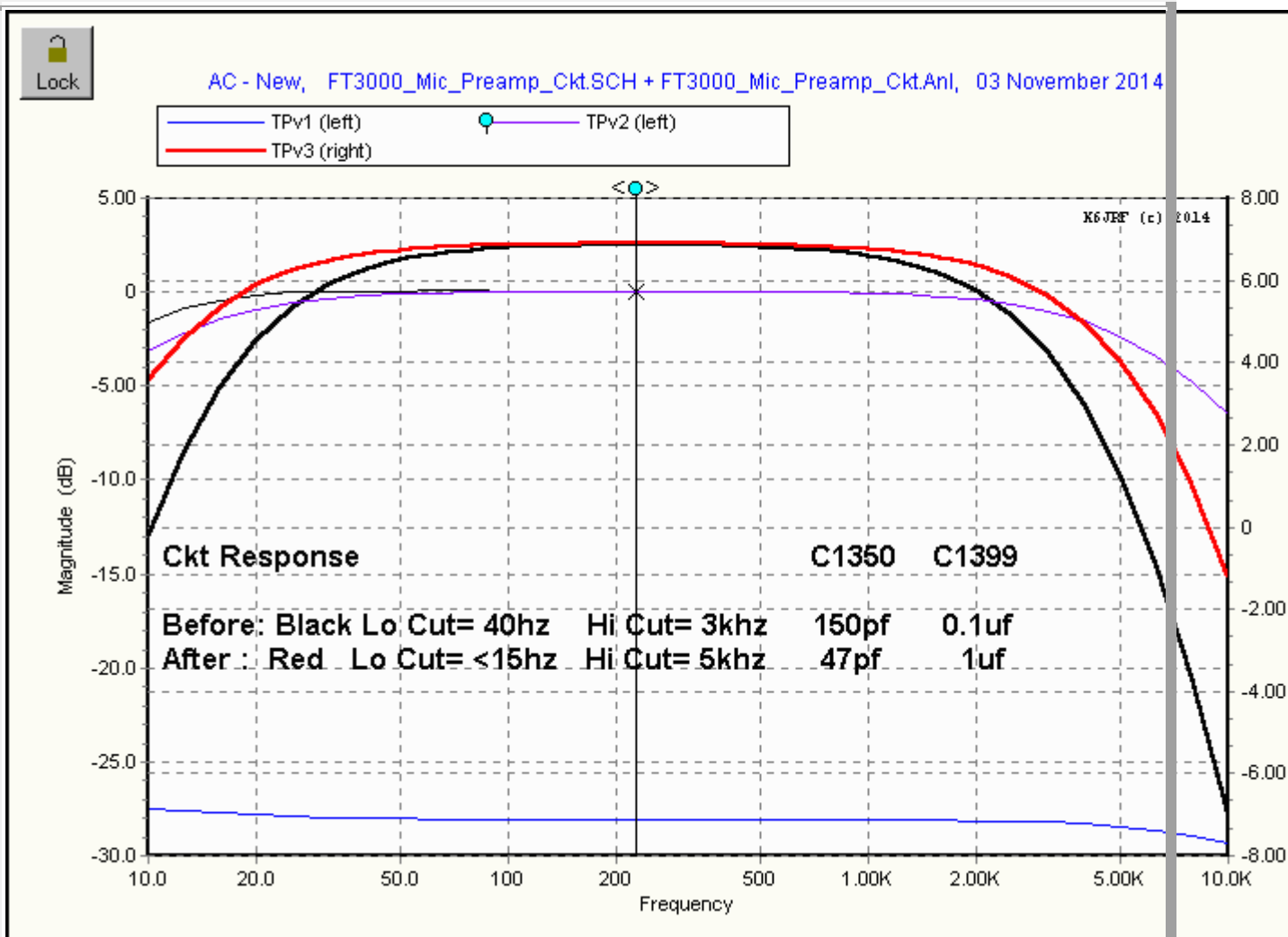
Ref Des	Was	S/B
C1399	0.1uF	1uF
C1350	150pF	47pF

NJM2737 Op Amp requires V+ and V- for simulation

Title	FTdx3000 Mic Preamp A
Number	
	K6JRF c) 2014
Date	November 5 2014
Sheet	1 of 1
File:	FT3000_Mic_Preamp_Ckt.SCH

The ckt "form" is identical to the Mic Preamp ckt in the FT2000 series. Check out the similarity [here](#). Note that the ckt is identical except for some R-C time constant changes. Also on the 2nd stage amp (NJM2737M), the rolloff cap (C1350) was omitted. This shows that there was a definite attempt to rolloff the high frequencies. Not the best design for a 4Khz TX BW radio!

FTdx3000 5Spice Mic Preamp Analysis



For the MIC IN, the -3dB point is below **15Hz**. Changing C1350 increases the Hi Freq cutoff to **5Khz**.

5Spice has shown that replacing two (2) parts will give the required ESSB audio BW. The following chart shows what's needed.

Detailed Chip Cap Info: [FT2000 Part Designation]

The part numbers for the chip-caps has been taken from the FT2000 Service Manual [SM] since I don't have a FTdx3000 SM.

All of the chip-caps are *mounted on the top side of the PCB* so you can access them without having to remove the Main Unit Board. The following parts are available from Yaesu/Vertex Parts Department at **714-827-7600**.

Ref Des	Value	Part Number	Yaesu PN	Price/Ea
C1350	1uf	T-B-D	T-B-D	\$??
C1399	47pf	T-B-D	T-B-D	\$??

Comments:

The Mic Preamp Ckt changes dramatically open the Mic Input TX audio path which will give you more room for low-bass experimentation. My personal comment is that there's really **NO AUDIO** information below 40hz other than "rumble" but you are now not limited by the radio's hardware. Audio at 50hz and above will come through w/o loss.

No other mods need be done prior to this modification.

FTdx3000 Internal EQ Settings

This section feature settings for the internal EQ stages in the new FTdx3000 radio released last year. These settings are shared so that others can see the EQ settings make some very natural sounding ESSB Tx audio. **NO external audio processing equipment is required.**

Internal Menus Access:

To access the internal FTdx3000 menus, press the [MENU] button momentarily, to engage the Menu mode. The display will show the Menu Number, Menu Group Name, and Menu Item. Press the [SELECT] knob momentarily to toggle the display between "Menu Number, Menu Group Name" and "Menu Item". The Multi-Display Window shows the current setting of the currently selected Menu item.

Rotate the [SELECT] knob to select the Menu item you wish to modify. Rotate the [CLAR/VFO-B] knob to change the current setting of the selected Menu item. When you have finished making your adjustments, press and hold in the [MENU] button for one second to save the new setting and exit to normal operation.

Recommended Menu Settings



The settings here reflect the latest FTdx3000 FW update

KK6FR: FTdx3000 w/ "EV RE27" mic plugged directly into front of the radio

RE27 settings: switch in the 'FLAT' position for best overall ESSB response.

W6APO: FTdx3000 w/ "EV RE20" mic plugged into the BACK of the radio into "LINE"

RE20 settings: switch in the 'FLAT' position for best overall ESSB response.

Menu#	KK6FR Settings 	W6APO Settings 	---	Settings	---	Settings
104	ttbf	ttbf	---		---	
159*	300	300	---	OFF	---	
160*	-6	-15	---	-	---	
161*	1	2	---	-	---	
162*	700	700	---	OFF	---	
163*	-5	-10	---	-	---	
164*	2	2	---	-	---	
165*	3200	3200	---	OFF	---	
166*	10	10	---	-	---	
167*	2	2	---	-	---	
168**	200	OFF	---	OFF	---	
169**	-6	--	---	--	---	
170**	1	--	---	--	---	
171**	700	--	---	--	---	
172**	-5	--	---	--	---	
173**	1	--	---	--	---	
174**	3200	--	---	--	---	
175**	+10	--	---	--	---	
176**	1	--	---	--	---	

* the "low" [EQ1], "mid" [EQ2] and "high" [EQ3] EQ ranges should be set at shown. These settings compliment the male voice and work w/ the RE27 mic.

** the PE1, PE2 and PE3 ranges are used with the "PROC" = ON set to "10" in the 'ttbf' mode; the values here are set to give punch to the SSB TX signal to emulate an "HC5" mic element for DX operation.

Site download at: