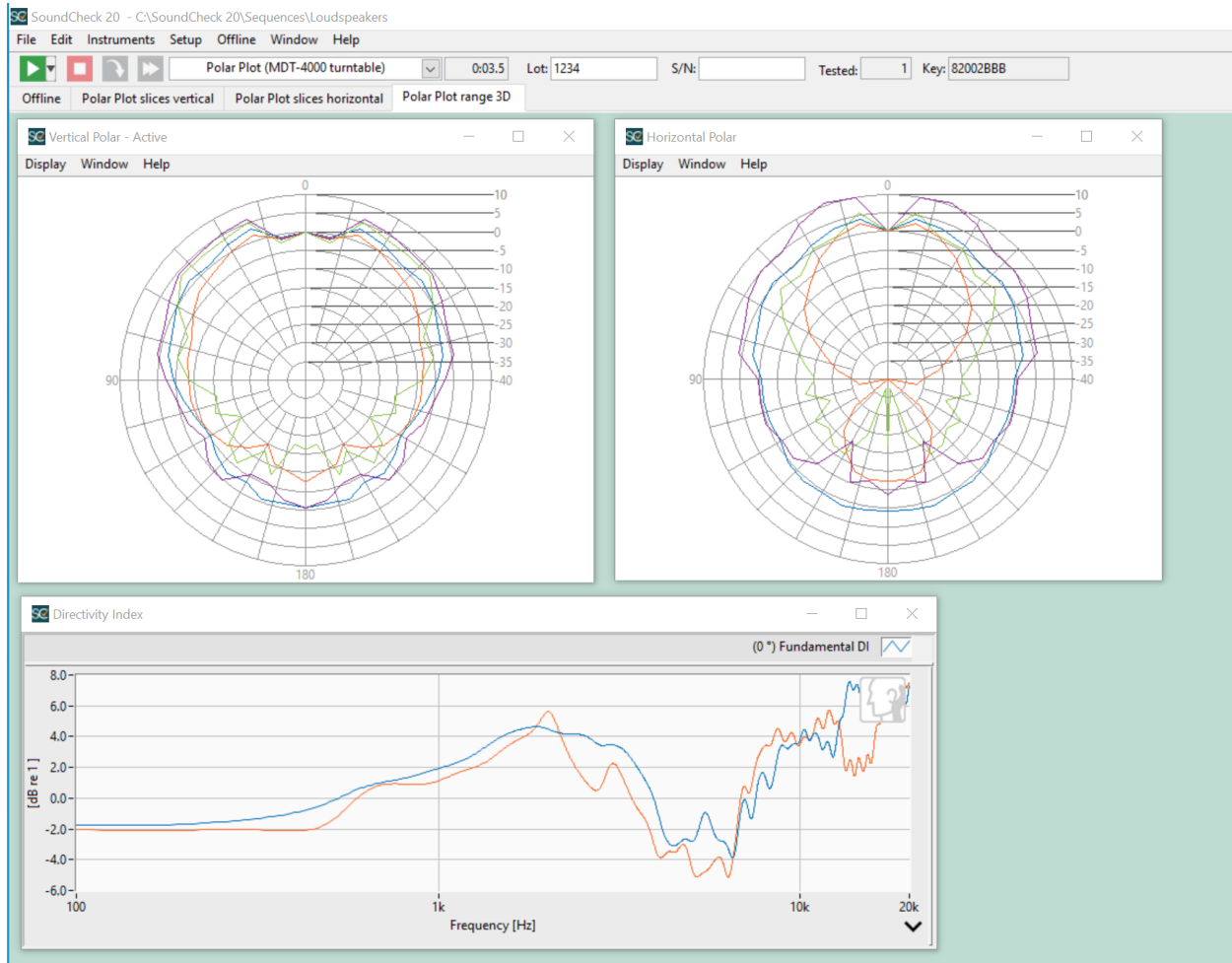


Polar Plot (MDT-4000 Turntable)

Introduction

This sequence measures the polar response of a loudspeaker in both the vertical and horizontal dimensions. It is designed to work with the Portland Tool & Die MDT-4000 turntable, and has all the necessary commands to automatically rotate it via RS-232. The sequence uses a log sweep stimulus with the Time Selective Response algorithm so that the measurements can be run in a non-anechoic environment. Note that the time window needs to be adapted to the user's measurement space.

The sequence plays the stimulus and measures at 10 degree increments from 0 to 180 degrees. This process is repeated with the speaker positioned horizontally. The two results are mirrored to display full 360 degree polar plots for each axis. A directivity index curve is also calculated for each axis and is displayed at the end of the test.



Final Display for the *Polar Plot (MDT-4000 Turntable)* sequence



Hardware Requirements

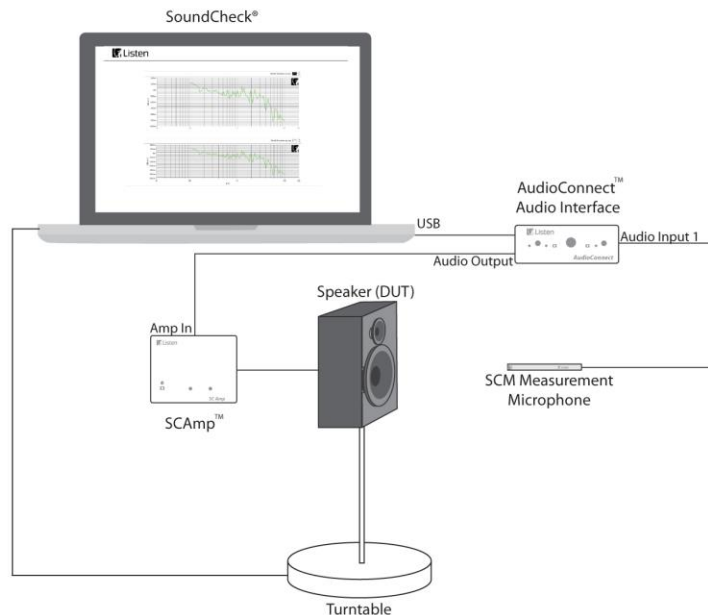
Audio Interface – Listen AudioConnect or similar
Power Amp – Listen SCamp or similar
Reference Microphone – Listen SCM-4 or similar
Portland Tool & Die MDT-4000 Turntable

Hardware Setup & Calibration

1. Calibrate the amplifier as instructed in the SoundCheck manual.
2. Calibrate the reference microphone as instructed in the SoundCheck manual.
3. Connect output 1 of your audio interface to the input of the amplifier.
4. Connect the output of the amplifier to your loudspeaker.
5. Position your reference microphone at the desired test distance from the loudspeaker, and connect it to the microphone power supply.
6. Connect the output of the mic supply to input 1 of your audio interface.
7. Connect the RS-232 connection from your PC to the MDT-4000 turntable.
8. Determine the turntable's Com Port assignment and assign it in SoundCheck's Hardware>External Devices Tab
9. Open sequence step #11 (RS232 Read Integer) and select the turntable's Com Port from the dropdown list

You are ready to start the sequence.

System Diagram





Sequence Logic

Mes	Poll for Recall	1		
	Recall curves -			
Rec	automatic	2		
	MDT Configuration			
Mes	Warning	3		
				// Set the Step Size - Degrees Per Step - 10.0 Default
Mes	MDT - DPS	4		
Mes	MDT - Velocity	5		// Set the Velocity (RPM) - 2.00 Default
Mes	MDT - Acceleration	6		// Set Acceleration Function - 10 Default
Mes	MDT - Torque	7		// Set Motor Power - 50.0 Default
	Log Sweep (100 -			
Sti	20k)	8	Amp ch 1	
	MDT - Zero			
Mes	Turntable Warning	9		
Mes	MDT - Get Position	10		
Cus	RS232 Read Integer	11		
	MDT - Home			
Lim	Rotation Direction	12		// Determines Direction for Home Rotation
	MDT - Zero			
Mes	Turntable CCW	13		// Zero Turntable CCW Direction
	MDT - Zero			
Mes	Turntable CW	14		// Zero Turntable CW Direction
	MDT - Zero			
Mes	Confirmation	15		
			Amp	
Acq	Play & Record	16	ch 1	Reference Mic
Ana	TSR polar	17		
	First Iteration			
Pos	curve copy	18		// Creates a copy of the first curve, on-axis response
	On-Axis			// Compares the current measurement to the on-axis (normalizes)
Pos	Normalization	19		
	First Iteration			
Pos	curve copy	20		
	Skip Last			
Lim	Acquisition	21		// Checks the current angle, exits the loop after 180 degrees
Mes	MDT - Rotate	22		// Rotates the Turntable one step - CW Default
Mes	Position	23		// Sees if turntable is still rotating or not.
				// Loops until reply recieved is NO from turntable (stopped rotating).
Mes	NO	24		
			Amp	
Acq	Play & Record	25	ch 1	Reference Mic
Ana	TSR polar	26		
	Skip Last			
Lim	Acquisition	27		
	Polar Plot			
Dis	slices vertical	28		// Displays vertical polar
	Polar Plot			
Dis	slices horizontal	29		// Displays horizontal polar



Mes	Rotate Speaker	30	// Just a logic step for looping
	MDT - Home		
Mes	Prompt	31	
	MDT - Home		
Mes	Speed	32	// Max Velocity when Zero Turntable
	MDT - Zero		
Mes	Turntable CW	33	// Sends Table to Zero Position - Default 0.0
	MDT - Zero		
Mes	Confirmation	34	
Mes	MDT - Speed	35	// Resets Velocity to Step 5 Default
Lim	Check azimuth	36	// Check azimuth
Mes	Rotate Speaker	37	// Prompt to rotate speaker on its azimuth
Pos	Directivity Index	38	// for vertical
Pos	Directivity Index	39	// for horizontal
Dis	Polar Plot range 3D	40	

Further sequence development

Ways in which you could modify or further develop the sequence include:

- This sequence is currently setup to test a loudspeaker, but it could easily be modified to test other devices.
- If an anechoic chamber is present, the test could be reconfigured to use a stepped sine sweep rather than a log sweep stimulus.
- Other turntables and their associated commands could be swapped out for the MDT-4000 commands.
- Example sequences for the Outline ET250-3D, LinearX, and B&K 9640 turntables are available on the Listen Website