

MODELLING ANALOG MULTIPLEX SYSTEM USING SIMULINK

EEEN 567 – SATELLITE COMMUNICATION SYSTEMS

Friday, 03 October 2025

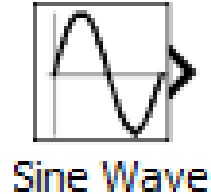
LAB OBJECTIVE

- Objective of this Lab is to develop a model for and to simulate a three channel analogue multiplex system using DSB, DSB-SC and SSB Amplitude Modulation.
- Each channel containing a sinusoidal signal with Additive White Gaussian Noise (AWGN).
- The parameters of the sinusoidal signal are:
 - Amplitude – 1
 - Frequency - 100 Hz
 - Sample Frequency - 8,000 Hz

STEP 1 - SIMULATION BLOCKS

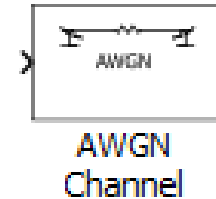
1. Go to **<Sources> Library**

Select **<Sinewave>**



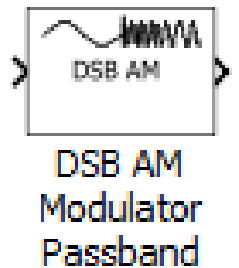
2. Go to **<Communication Systems Tool Box>**

Select **<Channels> <AWGN Channel>**



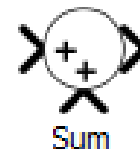
3. Go to **<Communication Systems Tool Box>**

Select **<Modulation> <Analog Passband Modulation> <DSB AM Modulation>**



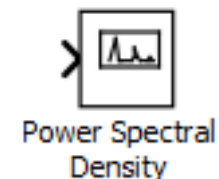
4. Go to **<Maths Operators> Library**

Select **<Sum>**

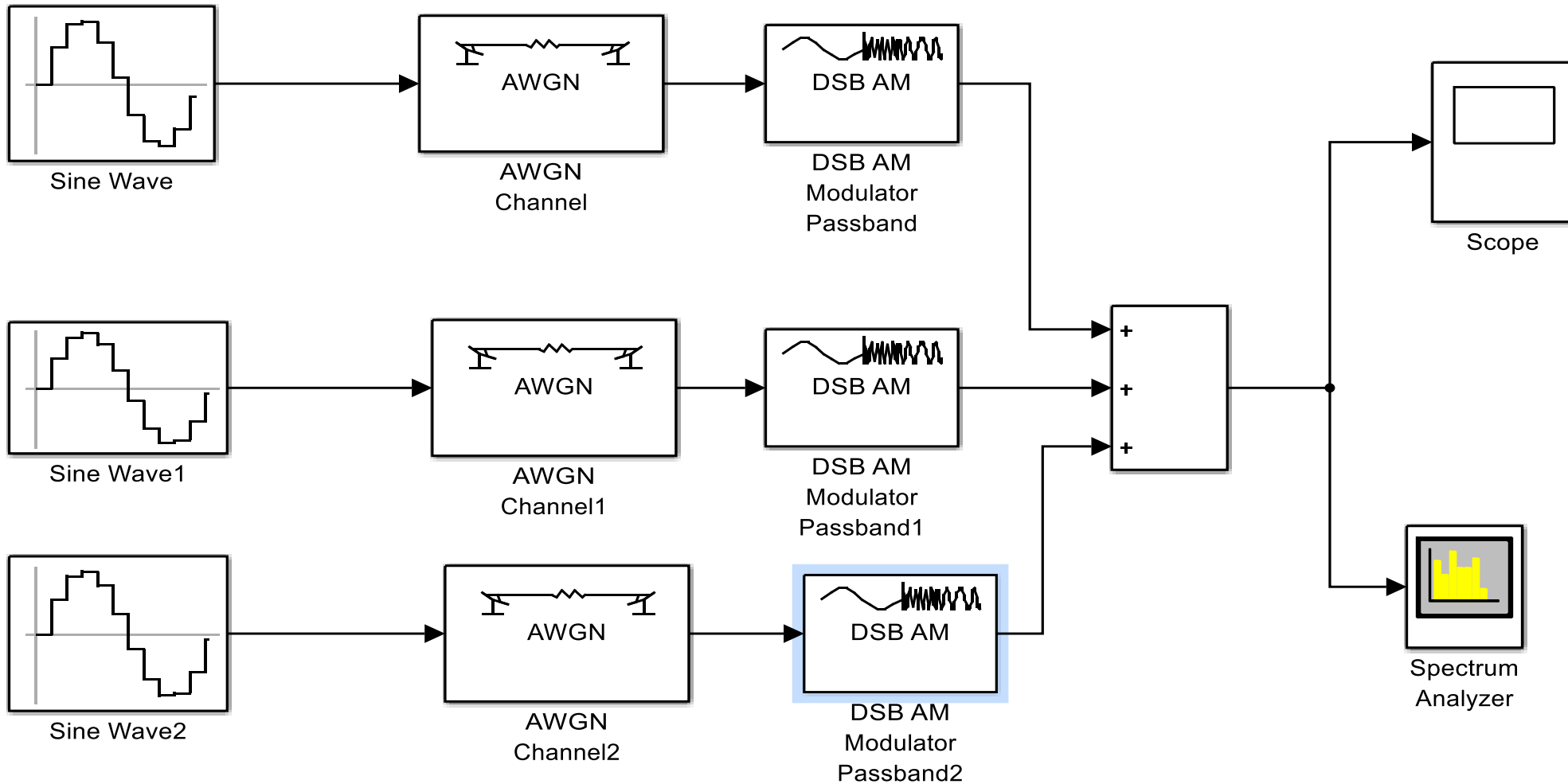


5. Go to **<Simulink Extras> <Additional Sinks>**

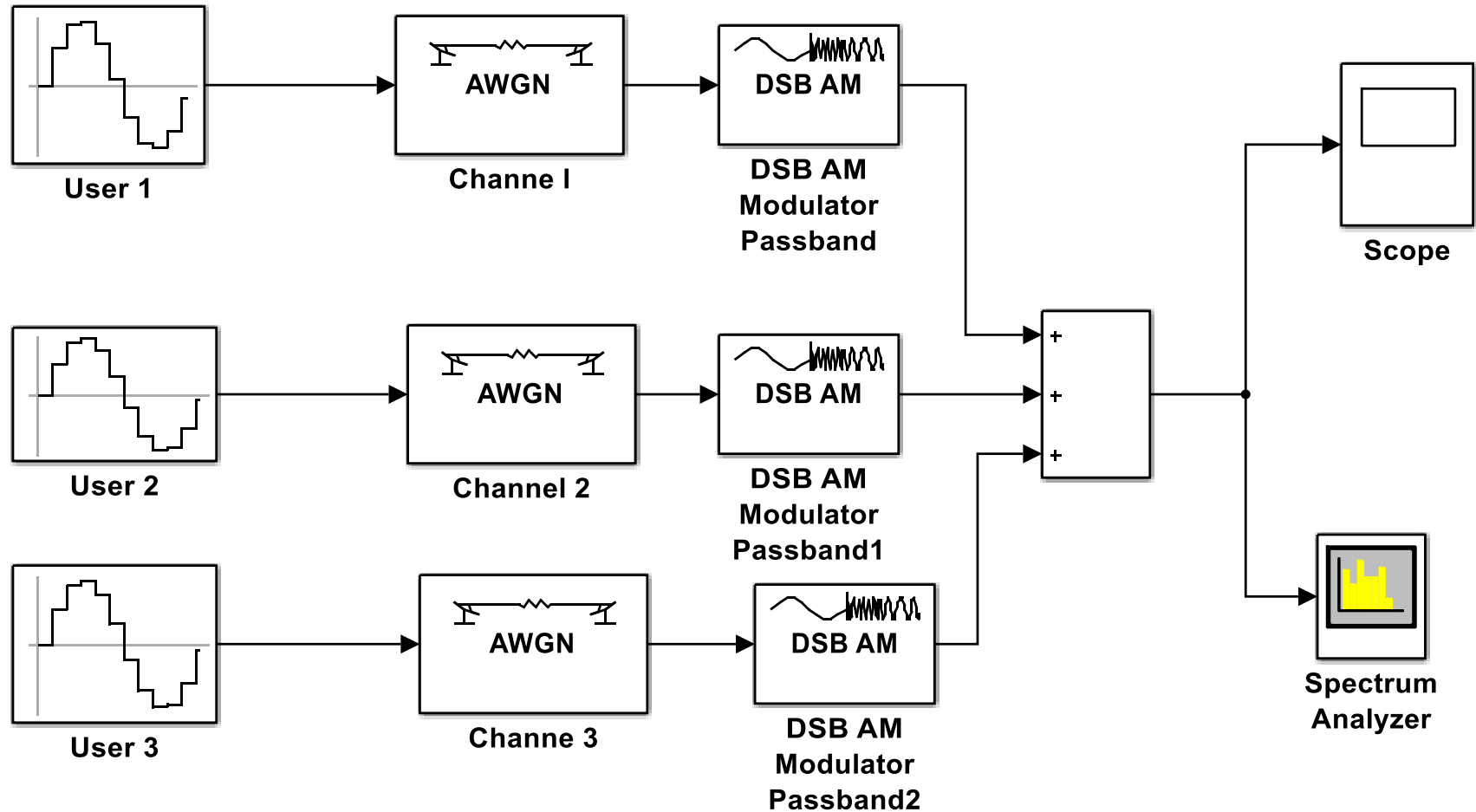
Select **<Power Spectral Density>**



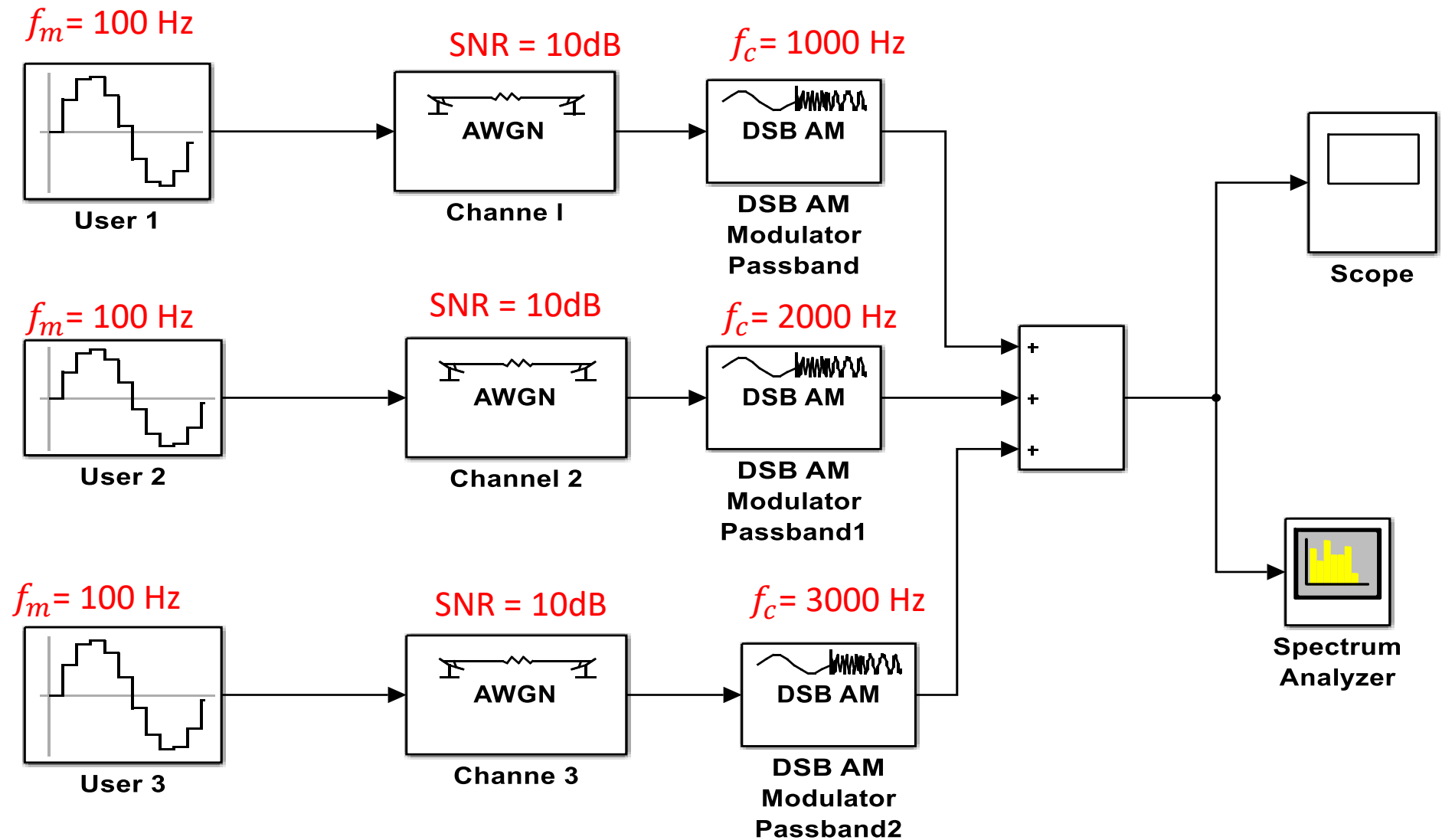
CONNECTING THE BLOCKS



NAMING THE BLOCKS



SET THE BLOCK PARAMETERS



SIMULATION PARAMETERS

Select:

- Solver
- Data Import/Export
- > Optimization
- > Diagnostics
- Hardware Implementation
- Model Referencing
- > Simulation Target
- > Code Generation
- > HDL Code Generation

Simulation time

Start time: Stop time:

Solver options

Type: Solver:

Max step size: Relative tolerance:

Min step size: Absolute tolerance:

Initial step size: Shape preservation:

Number of consecutive min steps:

Tasking and sample time options

Tasking mode for periodic sample times:

☐ Automatically handle rate transition for data transfer

☐ Higher priority value indicates higher task priority

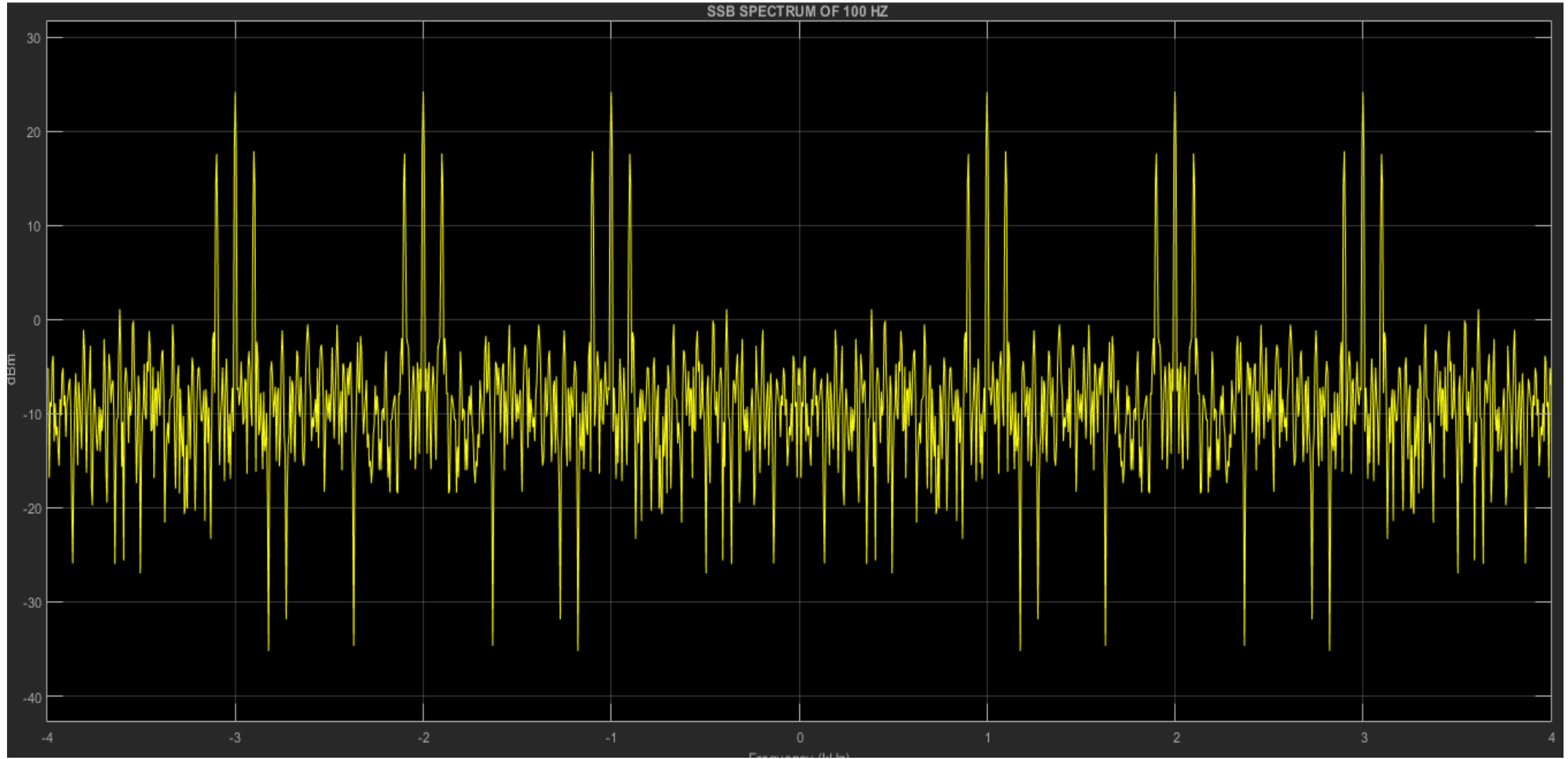
Zero-crossing options

Zero-crossing control: Algorithm:

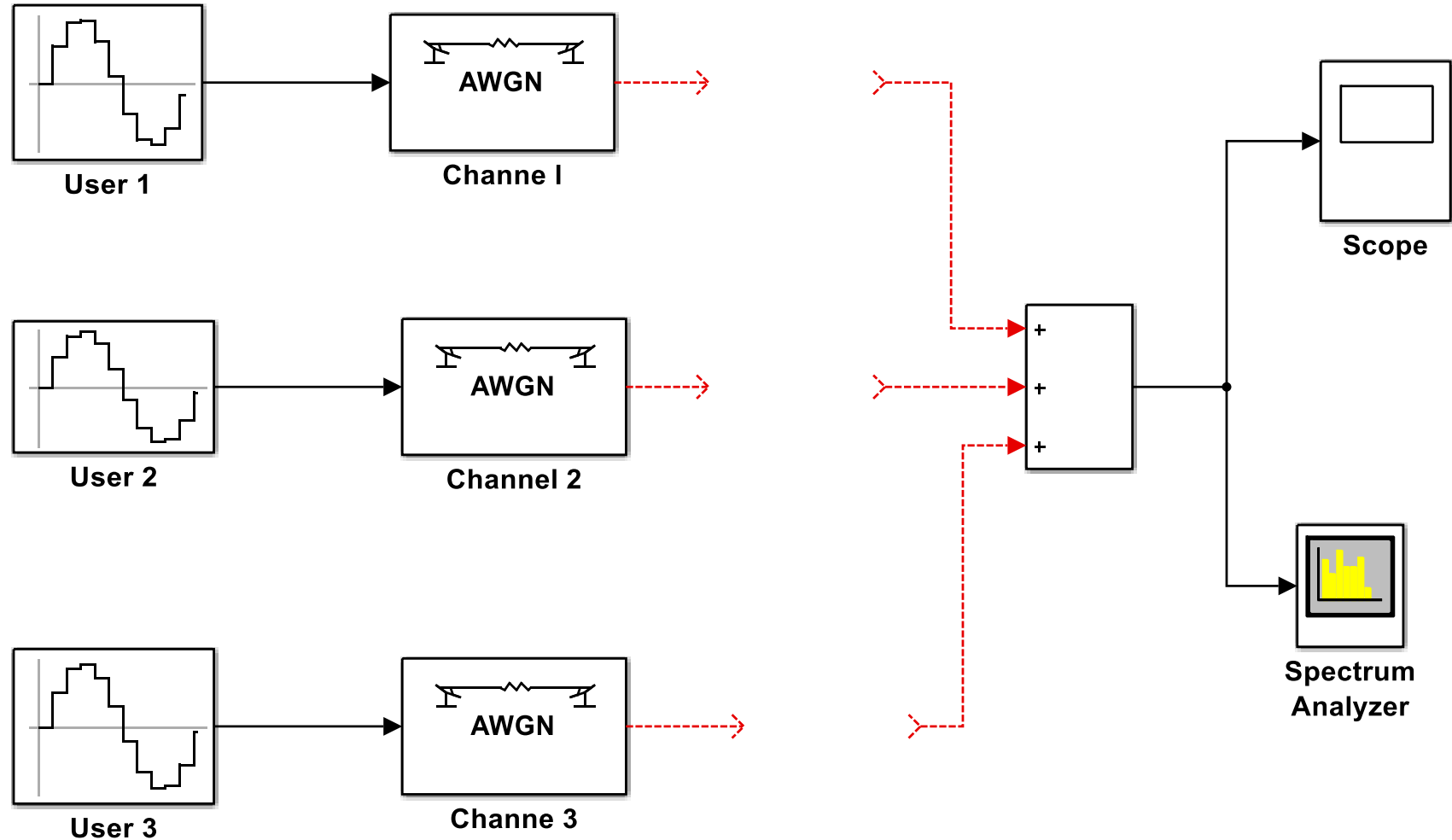
Time tolerance: Signal threshold:

OK Cancel Help Apply

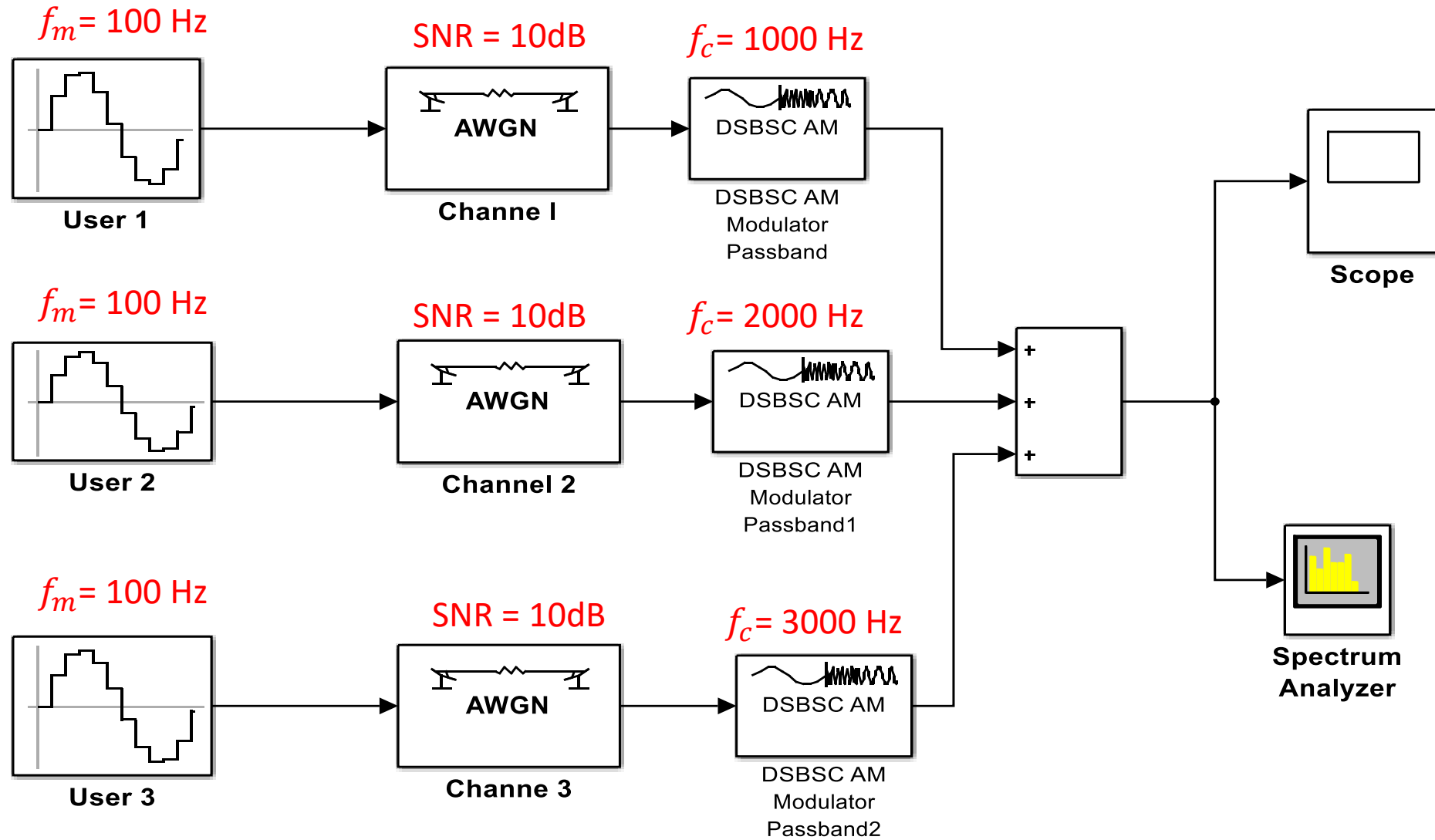
RUN THE SIMULATION



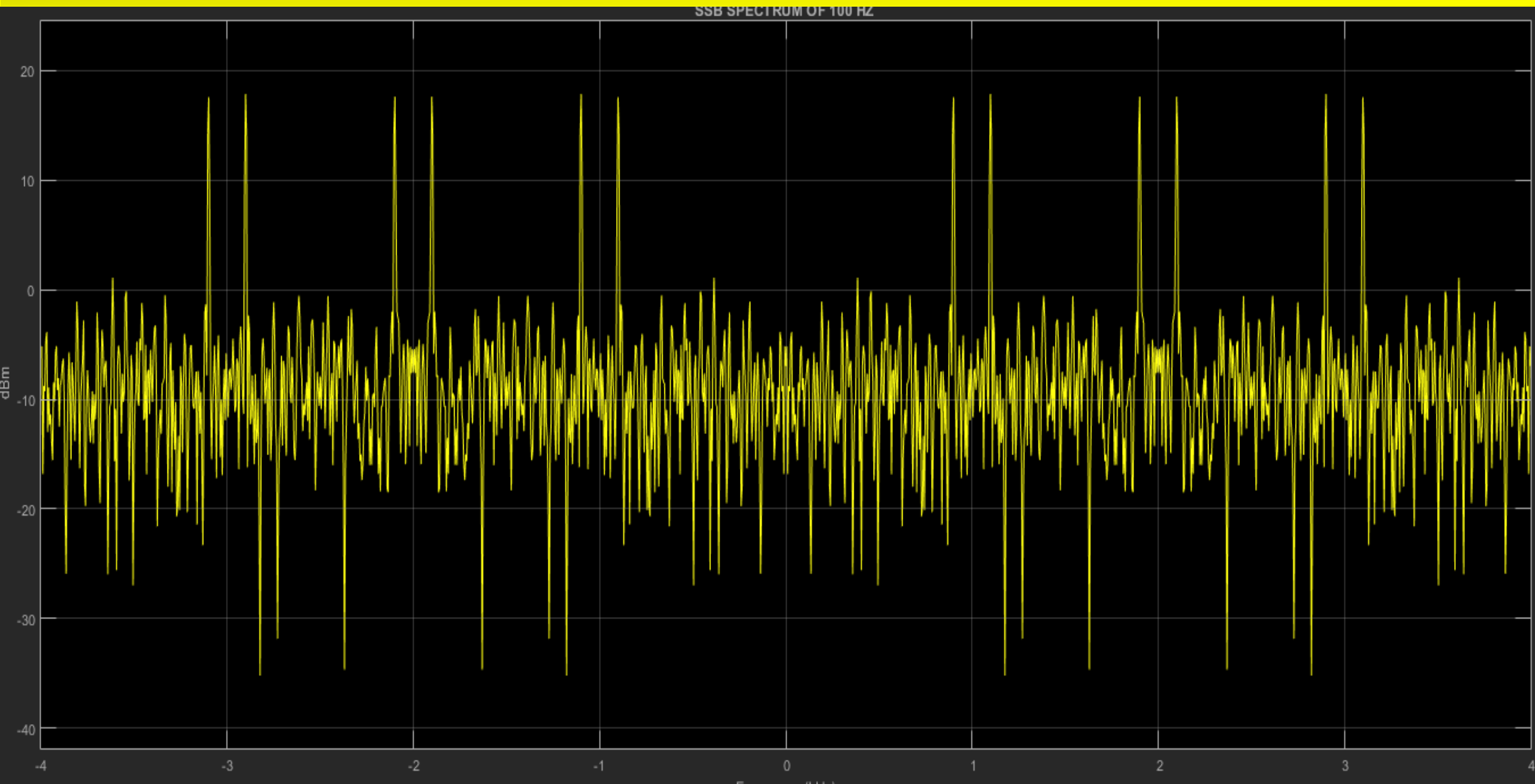
CHANGE THE MODULATION TO DSB-SC / 01



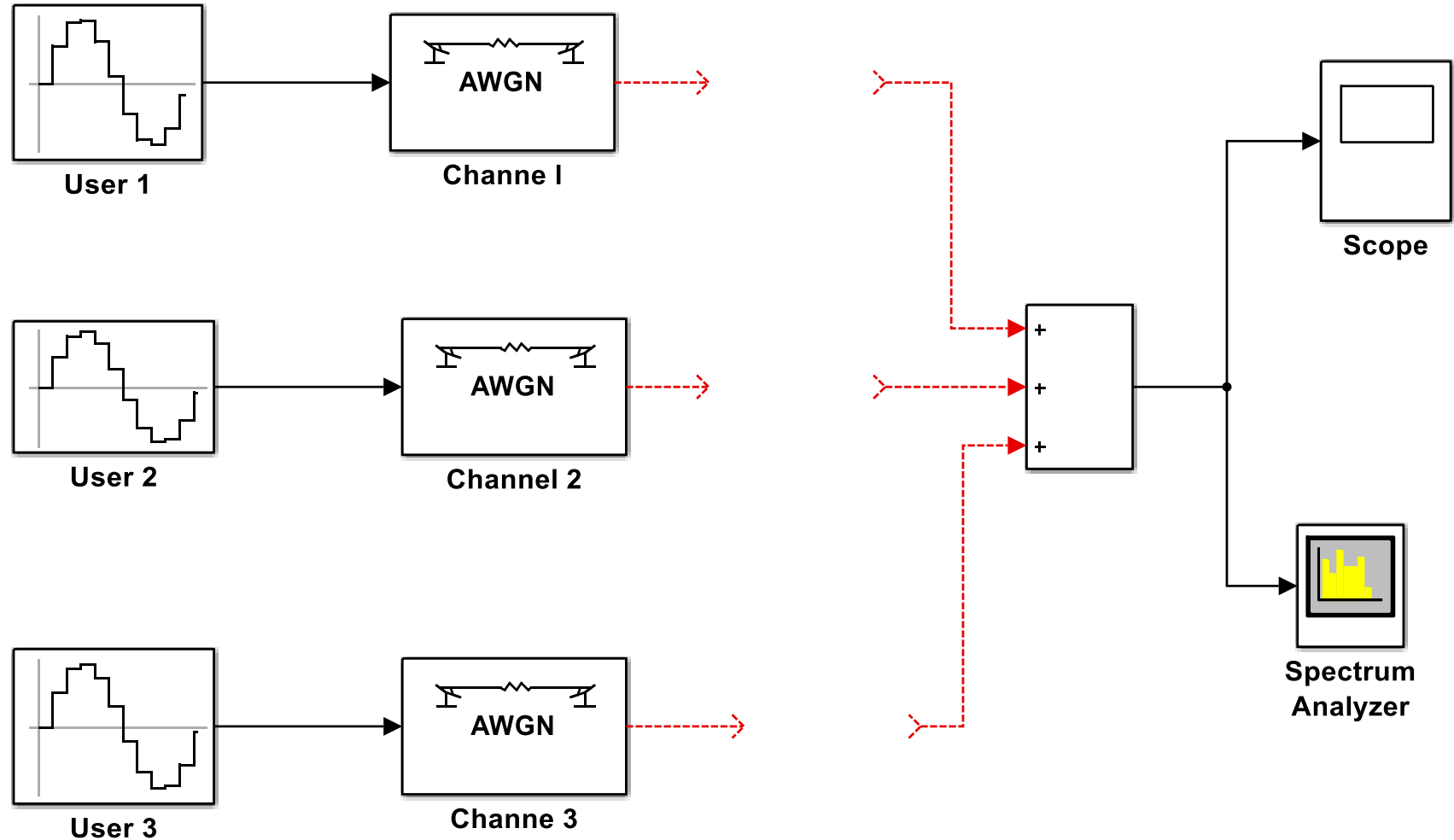
CHANGE THE MODULATION TO DSB-SC / 02



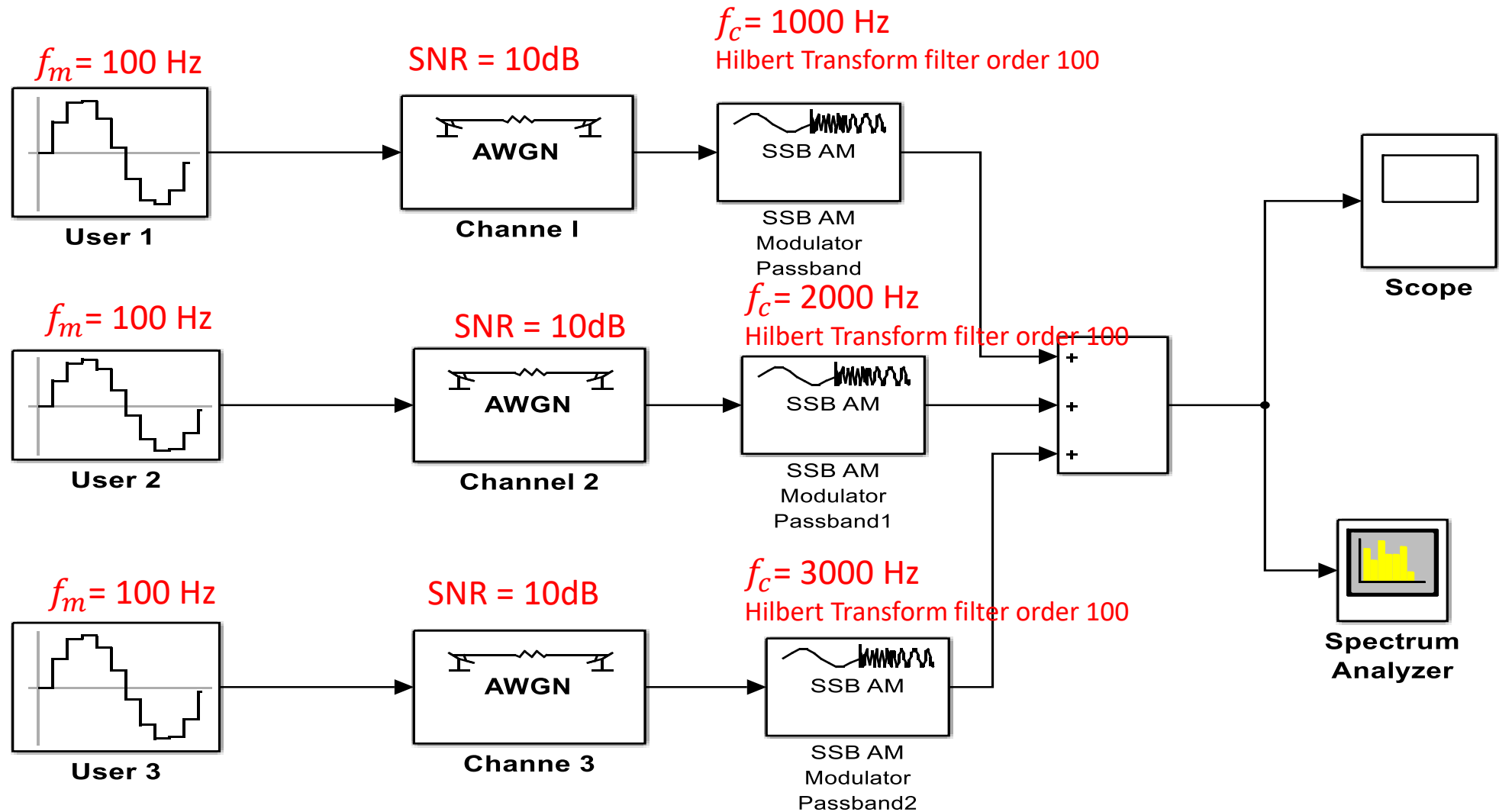
RUN THE SIMULATION



CHANGE THE MODULATION TO SSB / 01



CHANGE THE MODULATION TO SSB / 02



EFFECT OF THE HILBERT TRANSFORM FILTER

1. Alter the Hilbert Transform Filter Order in the following steps and observe the effect on the spectrum.
 - a) 10
 - b) 50
 - c) 100
 - d) 200
 - e) 300
 - f) 400
2. Comment on the effect of the Hilbert Transform Filter Order.