

Star Networks At The Singing Point

Star network: a set of three or more branches with one terminal of each connected at a common node.

Assemble a diverse collection of both fixed and variable passive circuit elements such as:

inductors (toroids, chokes, coils)
transformers (impedance-matching, interstage coupling, phase-shifting, pulse, rectifier, variable-voltage, etc., windings tuned or untuned)
capacitors
potentiometers, rheostats, L-pads
passive delay lines
rectifiers
crossover networks, passive filter blocks, or other found networks

Cover a wide range of values in each class; include parts of unknown values.

Arrange these elements so that they may readily be connected in various ways. Use patch panels, proto-boards, switch or pin matrices, spring terminals, clip leads, or any other breadboarding system to provide flexibility. Let the passive components be visible.

Freely connect the passive elements to form

- complexes of interconnected star networks -

which provide both a number of ports to which external gain and output stages may be connected, and a number of interconnected signal paths, the impedance and phase characteristic of each of which varies with frequency.

By feedback through such networks around high-gain stages such as:

preamplifiers (microphone, phono, tape head, etc., flat or having fixed or variable equalization)
differential input amplifiers
differential output amplifiers
small power amplifiers

form oscillating circuits having multiple interactive loops. Provide control of both gain (from zero to maximum of each amplifier) and polarity of each gain stage. (Control of polarity may be provided, for example, by switching in an active inverter or by switching the polarity of an input

or output transformer, where one is used.) Optionally, a mixer (matrix or other) may be used to control the assignment of the gain stages.

Use no other signal-processing elements, either in the feedback loops or at the output stage; no automated control or servo systems should be used.

Take output signals from various points in the networks, preamplifying where necessary, and provide for release to a speaker.

- One speaker per network complex is preferred.
- Provide a small, independent monitor speaker for use when tuning a network.

In performance:

Monitoring over the small speaker, vary loop gains, the value of variable elements, the assignment of the gain stage or stages, and the connections in a network; tune a sound.

- Look for unstable oscillatory modes.
- Operate either at the very onset of oscillation (low loop gain), or at very high loop gain (clipping is permissible, and may be desirable).

When the sound of a network is tuned, release it to the appropriate speaker. Allow each tuning to sing at least five minutes, longer when appropriate.

- When a sound is singing in a speaker, change the tuning only if necessary to preserve instability of the oscillation.
- Always switch to the monitor speaker when searching for a new sound.

At least five network complexes should be heard at a given time; in a solo performance, therefore, the performer should operate at least six networks. In ensemble performances, the number of networks operated by each performer may be decreased if desired.

Make a number of regions characterized by different modes of network operation. If desired, all the networks may be connected together at one point in the piece. Always observe strictly terrace dynamics, avoiding crescendo and diminuendo.

Duration approximately 60 minutes.

Ralph Jones
Grand Island, NY
1978