

TELEVISION

NEW DIMENSION

IN TV SOUND

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Stereo television may not be here, but this stereo synthesis system from RCA is the next best thing.

STEREO TELEVISION SOUND IS NOT HERE yet. Several systems have been suggested by various organizations, but apparently there has not been sufficient public demand to justify the development and implementation of a practical system. Perhaps we are waiting for improvements in monaural sound quality before the possibility of stereo seems real. RCA's CTC 101 color television chassis introduces a stereo-synthesis system called dual-dimension sound. Although it is not true stereo, the system produces a "stereo" effect from the transmitted monaural sound signal.

One of the most basic stereo-synthesis systems that has been proposed in the past is the simple division of the audio spectrum into two distinct bands—high and low frequency bands defined by high and low pass filters respectively. That method is far from satisfactory because of the obvious demarcation between the two sound channels. The new RCA system disguises the synthesis by intermixing the spectral sound ranges so they are not nearly as distinguishable.

Figure 1 shows the system schematic. The key components are a dual-section

filter and two operational amplifiers, plus the two speakers necessary to produce the effect. A double-pole double-throw switch is used to disable the system when desired.

The audio signal from the sound detector feeds a 12-element R-C filter. The configuration may seem familiar to you—in fact it's dual-section twin-T filter. The two cascaded filter sections have been designed to have nulled responses at two different frequencies, one around 160 Hz and the other about 5000 Hz. The filter output is coupled to the noninverting input of amplifier IC1-a. Negative feedback between the amplifier's output terminal and the inverting input establishes the closed-loop gain. The output of amplifier IC1-a is coupled through a 100- μ F capacitor and the system mode selection switch to the channel A speaker.

Now that channel A has been set up with three peaked bands of energy due to the filter's two nulls, a complementary response must be generated for the second channel. The second operational amplifier section produces the required double-peaked response without using any additional filter com-

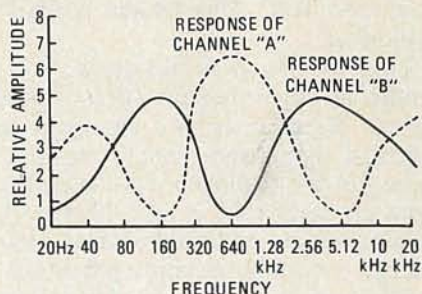


FIG. 2—FREQUENCY RESPONSE of synthesis sound circuit shows how the audio spectrum is split up to create a stereo effect.

ponents. Op-amp IC1-b is configured as a difference amplifier; the original unfiltered input signal is routed to its inverting input, while the output of the twin-T filter is fed to the amplifier's noninverting input. Subtracting the flat input spectrum from the triple-peaked filtered signal forms the double-peaked channel signal response shown in Fig. 2. A stereo balance control varies the level into the inverting input of the second amplifier and is used to optimize the stereo-synthesis effect.

The output of the second amplifier section drives the channel-B speaker. The spectrum in both channels is now distributed throughout the frequency range to give a pseudo-balanced effect. When the stereo balance control is properly adjusted, the total energy distribution in the two channels is the same as the energy content in the original input signal.

Negative feedback is also used around the second amplifier so that its gain matches the channel-A gain. Since the same filtered signal is applied to the inputs of both amplifiers and since the feedback is similar for the two channels, the output-signal levels are the same for both channels. The stereo balance potentiometer makes up for any tolerance imbalances that could disturb the important relationship between the A and B channel energy distributions.

When the mode switch is in the MONO position the system is bypassed, feeding the audio-input signal directly to the two speakers.

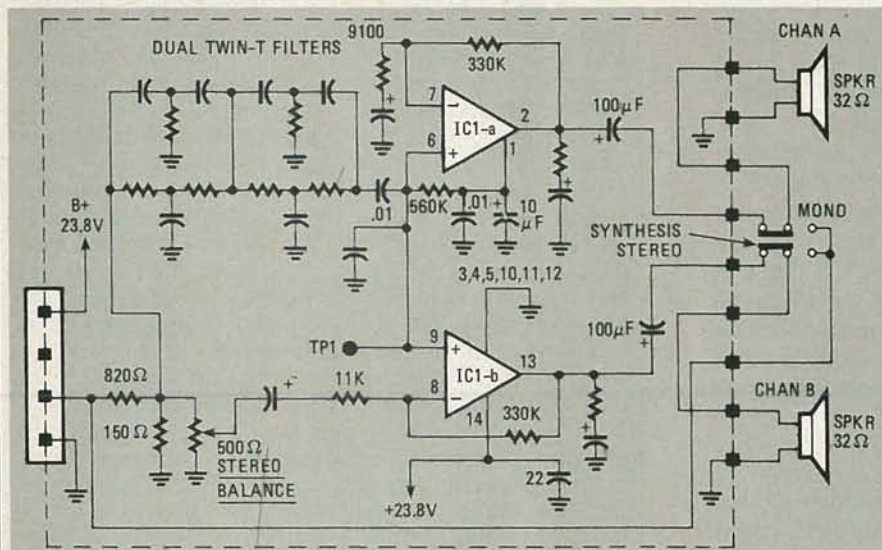


FIG. 1—SYNTHESIS SOUND CIRCUIT found in RCA's CTC-101 TV chassis produces a simulated stereo effect.