

# The Orban 245F Stereo Synthesizer

Convincing pseudo-stereo from mono sources.



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# Performance Highlights

## Description

The Orban Model 245F Stereo Synthesizer has been designed to take any mono signal and create lifelike pseudo-stereo. Unlike many other techniques, the patented Orban stereo synthesis technique causes no change in spectral balance, does not blur the transient definition, and adds not the slightest audible noise or distortion to the mono original. The stereo output sums back to the original mono for total mono/stereo compatibility. And the simple controls adjust in seconds to create an optimum stereo effect from any mono original. The major new features added to the 245F are a standard active balanced input and provisions for mounting optional output transformers to provide balanced outputs. Enhanced RFI suppression is provided on both audio and power leads. In addition, front-panel cosmetics have been revised.

## How It works

The Orban Stereo Synthesizer creates a stereo effect by dividing the mono source signal into five frequency bands. Three of these bands are placed in one stereo output channel; the remaining two are placed in the other channel. The filters are synthesized so that the sum of the two output channels is identical to the mono input. In addition, the sum of the powers in the left and right output channels is equal to the power in the mono input signal, guaranteeing that the stereo will have the same perceived frequency balance as the mono source.

The bandcenters and bandwidths of the midrange bands are adjustable by means of two **dimension** controls, one controlling lower midrange and the other controlling upper midrange. These controls act like frequency-band panpots, and are used to get good left-right channel balance for a given piece of mono source material. With practice, adjustment takes no more than five or ten seconds for a given mono source.

Also provided is a **separation** control which adjusts the level of the stereo difference signal anywhere from zero to the same level as the sum signal. The control is useful for adjusting the audible separation, and also controls the vertical component on a stereo disc or the sub-channel modulation (and therefore the stereo and mono loudness) in FM stereo broadcasting. All controls can be adjusted freely throughout their range without fear of losing stereo/mono compatibility.

## Recording Studio Applications Reissuing old mono material

The most obvious application for the Orban Stereo Synthesizer in the recording studio is the reissuing of old mono masters in pseudo-stereo. Because of mono compatibility, this can be done without offending those purists who

- Creates a convincing pseudo-stereo effect from any mono source
- Total mono/stereo compatibility for FM broadcast applications
- Patented design offers seductive space and depth enhancement

have been turned off by some of the more bizarre and tasteless pseudo-stereo efforts of the past.

In cutting discs from mono masters, there is no need to go through an added tape generation—the disc can be cut directly through the Stereo Synthesizer.

## Dimensionally spreading single tracks in multi-track mixdowns

No matter how many tracks are available on a multi-track recorder, there never seem to be enough. And the first thing to be sacrificed is usually stereo recording of material like drums, strings and horns. All is not lost—mono tracks can be spread in space in the mixdown through the use of the Stereo Synthesizer. Electric or electronic instruments like synthesizer, guitar and organ can be given a sense of space and depth. And the mono input of an echo chamber or artificial reverb generator can be spread in a lifelike way.

## Cable TV and Satellite

The 245F is the ideal solution to providing a full-stereo format at the cable headend. When used in conjunction with FM multiplex systems, the 245F is a cost-effective way of providing FM stereo audio from cable audio. The unit can also be used with satellite systems for a similar purpose.

## FM Broadcast Applications Reducing stereo cart phase cancellation

Ever since the advent of the stereo tape cartridge machine, FM stereo broadcasters have been plagued with mono signal degradation due to phase shifts between the two stereo channels. The Orban Stereo Synthesizer can greatly alleviate this problem.

The phase cancellation problem arises because there are usually several frequencies in the high-frequency audio band where the left and right outputs from the stereo cart machine are 180° (or

- Saves tracks in multi-track recording situations
- Allows for stereo cart transfers with no phasing problems
- Simple and easy-to-use

odd multiples thereof) out of phase. At these frequencies, material having equal level on the left and right channels will totally cancel, and at frequencies close to the 180° frequencies, the mono sum will be greatly attenuated.

Because of its filters, the Stereo Synthesizer places most frequencies on the left and right channels with unequal levels. Therefore, even at frequencies where the cart machine is 180° out of phase, cancellation is greatly reduced and the mono sound is notably improved.

The 245F can either be used at the output of a mono cart machine to create a pseudo-stereo effect, or it can be used when transferring material to a stereo cart to reduce phase cancellation due to cart phase problems. In either case, the result is a convincing pseudo-stereo effect with no mono signal degradation.

## Stereoizing old mono material, announce mikes, etc.

The Stereo Synthesizer is an ideal way to create a "total stereo" format for AM or FM stereo that includes old LP's, "golden oldies" 45's, agency spots, PSA's and commercials. This material can be recorded on automation tapes without danger of mono phase cancellation. And DJ announcements, live or recorded, can be processed, eliminating the gross inconvenience of stereo-miking the announcer.

**orban**

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## SPECIFICATIONS

### Frequency Response of the Stereo Sum Signal:

± 1 dB (re mono input) 20-20,000Hz

### Frequency Response of the Sum of the Right and Left Channel Powers:

± 1 dB (re mono power) 20-20,000 Hz

**Total Harmonic Distortion:** (+ 19 dBm, 20-20,000 Hz): Less than 0.1%; 0.02% typ.

**Noise:** (Unweighted, 20-20,000 Hz): less than -80 dBm; -83 dBm typ.

**Available Gain:** approximately 9 dB (MONO); 14 dB peak (STEREO)

**Input:** greater than 100 K ohms, balanced bridging. Absolute overload occurs at +26dBm.

**Output:** approximately 47 ohms unbalanced. Will drive greater than +19 dBm, 20-20,000 Hz into 500 ohms or higher load impedance. Optional transformer-balanced output available.

**Input/Output Connector:** Type 140-Y barrier strip (#5 screw)

**Power Requirements:** 115-230 volt 50-60 Hz AC, ± 10%, 2 VA. Supplied with "U-Ground" grounding-type plug to United States standards.

**Mounting:** requires 1 3/4" (4.5 cm/unit) of vertical space in an EIA Standard 19" (48.3 cm) rack.

**Shipping Weight:** 7 pounds (3.2 kg)

# Lab Report

## Orban 245F Stereo Synthesizer



**General Description:** The Orban Stereo Synthesizer is a signal processor that turns any monophonic signal source into a pseudo-stereo program. The resulting pseudo-stereo is created in such a way that it does not degrade the quality of the mono recording.

Synthetic stereo in the Orban 245F is created by a complementary comb filter derived by a patented phase cancellation technique. The spectrum of the incoming audio signal is divided into five bands, each approximately two octaves wide. These bands are alternately placed in the left and right channel outputs to produce a convincing stereo illusion of channel separation, depth, directionality and even channel balance.

One of the chief virtues of a device such as this is that it provides complete mono compatibility. This occurs because the electrical sum of the two output channels is proportional to the mono input to the synthesizer. A listener/user can recover the original mono signal simply by summing the two "stereo" channels. This means that FM mono listeners, for example, will hear the original mono source when listening in mono to an FM stereo station that employs the synthesizer for creating a stereo effect with mono program sources. It also means that, in the case of a stereo disc that was mastered using the synthesizer, lateral modulation on that disc will also represent the original mono signal, since lateral modulation is the sum of the left and right stereo channels.

**Control Layout:** All of the controls on the slim front panel of the Orban Stereo Synthesizer are clustered near its center. Two DIMENSION controls at the left vary the relative positioning of the comb-filtered frequency bands. A STEREO/MONO switch just to the right of the dimension controls allows for a

quick comparison between the original mono sound and the stereo-synthesized outputs. A SEPARATION control further to the right on the panel allows for reduction of the apparent stereo separation by partially re-mixing the channels together. According to Orban's instruction manual, this control may prove useful in permitting more natural headphone listening or in reducing the vertical excursion of a disc cutter during the making of a master disc. Reduction of apparent separation will also tend to increase mono loudness in FM stereo broadcasting.

A GAIN control located to the right of the separation control is located between an active-balanced input stage and the signal processing circuitry of the syn-

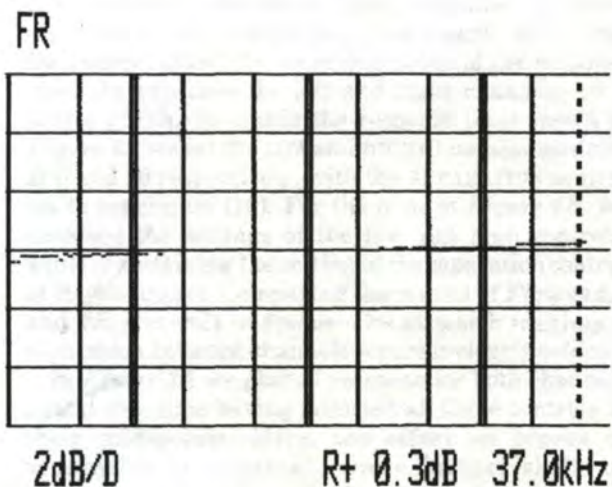
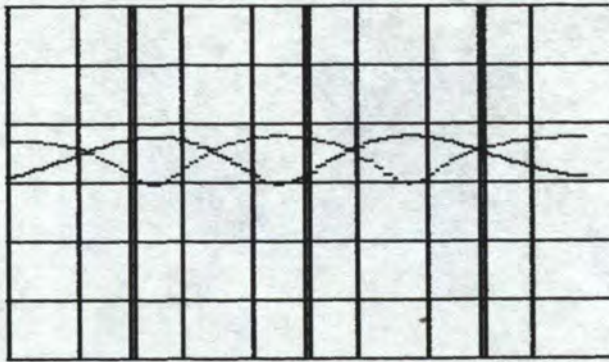


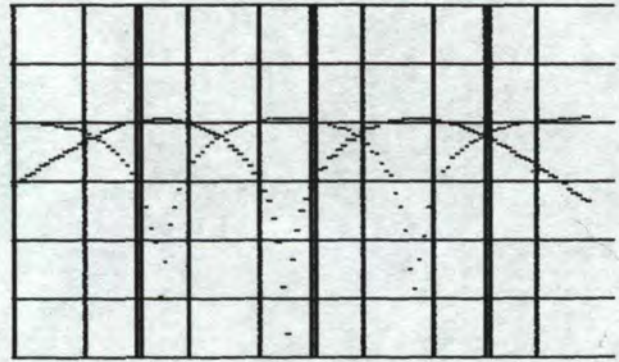
Figure 1. Frequency response of the 245F with switch set to mono. Vertical scale is 2 db/division. Sweep is from 20 Hz to 40 kHz.

FR



10dB/D L+ 1.3dB R+ 7.7dB 1.00kHz

A)



10dB/D L- 0.8dB R+10.6dB 1.00kHz

B)

Figure 3. Response plots, as in Figure 2. However, dimension controls are both set to mid-point ("5"). Separation is set to 5 (A), and to 10 (B).

maximum setting. Note that only the amount of maximum separation has increased, while center frequencies (those frequencies at which the maximum difference in amplitude between channels occurs) remain as they were in *Figure 3A*.

**Comments:** Being something of a purist myself, I questioned how effective a stereo synthesizer could be, no matter how cleverly it was designed. Having listened to this device with a variety of program material, I must confess that my respect for Orban Associates has grown tremendously. Of course, much is dependent upon the nature of the program source and, as suggested by Orban, each type of program material requires a somewhat different setting of the 245F's controls for optimum stereo synthesis. We found, as did Orban, that if a single "best compromise" setting is desired (in other words, if you don't want to keep readjusting the dimension controls with every change of musical material), that best setting is around 3.0 for the LOW dimension control and about 7.0 to 8.0 for the HIGH dimension control.

As an experiment, since our lab is fully equipped with FM stereo generating equipment, we fed the

outputs of the stereo synthesizer to our FM stereo signal generator, picked up the resulting program material on a high-quality FM tuner, and conducted a series of A-B comparison tests with the FM tuner set to the mono mode. The comparison tests were made by switching the Orban 245F's Mono/Stereo switch back and forth between the two settings. Once we adjusted all gains correctly, there was no audible difference, confirming Orban's claim regarding mono compatibility of the sum signal derived from the two synthesized stereo channels.

Of course, a more important test is the one we conducted with the tuner set to its FM stereo mode and the synthesizer set to simulate or synthesize a stereo effect. I won't claim that the effect delivered was as good as some of the best stereo program material I've heard on records or over the air, because it wasn't. But I will say that the effect (call it stereo, synthesized stereo, or whatever you please) was a good deal better than some of the poorer stereo mixes I've heard in recent years that were "real" stereo to begin with. And that, believe me, is meant as a compliment to the Orban designers. If you have need of a stereo synthesizer for whatever purpose, this is definitely one to listen to and consider.

### ORBAN 245F STEREO SYNTHESIZER: Vital Statistics

#### SPECIFICATIONS

Frequency Response  
(Stereo sum signal)  
Total Harmonic Distortion  
Signal-to-Noise Ratio  
Available Gain  
Absolute Overload Level  
Maximum Output (into 500 ohm load)  
Power Requirements  
Rack Panel Requirements  
Shipping Weight  
Suggested Price:

#### MANUFACTURER'S CLAIM

20 Hz to 20 kHz,  $\pm 1$  dB  
Less than 0.1%  
Better than 80 dB  
9 dB mono; 14 dB peak, stereo  
+26 dBm  
+19 dBm  
115-230 V 50/60 Hz, 2 VA  
1 1/2" x standard 19"  
7 lbs.

#### LAB MEASUREMENT

20 Hz to beyond 40 kHz  
0.009% at 1 kHz; 0.01% at 20 kHz  
78 dB (82 dB A-weighted)  
Confirmed  
+26 dBm  
+20 dBm  
Confirmed  
Confirmed  
Confirmed

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**ORDERING GUIDE &  
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Revision 15; Effective 1 February 1986

Changes: Add 275A, 275A/RC

No price changes

Change Security Cover from "GY" to "WH"

Professional Audio  
Products

<u>Model</u>	<u>Description</u>	<u>Suggested List</u>
111B/1	Spring Reverberation (2 channels)	\$899.00
245F	Stereo Synthesizer	\$399.00
275A	Automatic Stereo Synthesizer	\$1,895.00
275A/RC	Remote Control for 275A	\$295.00
412A	Compressor/Limiter (1 channel)	\$425.00
414A	Compressor/Limiter (2 channels)	\$799.00
418A	Stereo Compressor/Limiter	\$899.00
422A	Gated Compressor/Limiter/De-Esser (1 channel)	\$629.00
424A	Gated Compressor/Limiter/De-Esser (2 channels)	\$989.00
536A	Dynamic Sibilance Controller (2 channels)	\$539.00
622A	Parametric Equalizer (1 channel)	\$569.00
622B	Parametric Equalizer (2 channels)	\$879.00
672A	Mono Graphic Parametric Equalizer	\$689.00
674A	Stereo Graphic Parametric Equalizer	\$1,299.00

Prices are domestic U.S. only; F.O.B. San Francisco. Prices based on Buyer's acceptance of Orban Standard Terms & Conditions of Sale are subject to change without notice. All units are supplied for 115V, 50/60 Hz operation unless otherwise specified.

See reverse side for accessories.

PROFESSIONAL AUDIO PRODUCTS ACCESSORIES

ACRYLIC SECURITY COVERS

All security covers are 19" wide. Add suffix in place of xx to specify color. Screws supplied. Fits most EIA-standard panels. 1 1/4" maximum protrusion.

CL Clear  
BL Blue transparent  
WH Opaque White

Suggested List

ACC-11xx	1 3/4" panel (1 rack space)	\$43.00
ACC-12xx	3" panel (2 rack spaces)	\$45.00
ACC-13xx	5 1/4" panel (3 rack spaces)	\$47.00
ACC-14xx	7" panel (4 rack spaces)	\$49.00

ACCESSORIES FOR 622A/622B

RET-05	Balanced output transformer. Order one per output.	\$16.00
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ACCESSORIES FOR 672A

RET-06	Balanced output transformer. Order one per output.	\$16.00
RET-21	XLR connectors for input and both outputs.	\$18.00

ACCESSORIES FOR 674A

ACC-03	Plexiglass security cover for filter section controls.	\$9.00
RET-07	Balanced output transformers (2) for main outputs.	\$32.00
RET-08	Balanced output transformers (4) for both outputs.	\$64.00
RET-10	TRS phone jacks for inputs & all outputs.	\$13.00
RET-12	XLR connectors for inputs & all outputs.	\$30.00

ACCESSORIES FOR 422A/424A

RET-14	XLR connectors for input and output. (422A)	\$12.00
RET-15	XLR connectors for both inputs and both outputs. (424A)	\$24.00

ACCESSORIES FOR 245F

RET-19	Balanced output transformers (2) for both outputs.	\$32.00
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ACCESSORIES FOR 536A

RET-22	XLR connectors for both inputs and both outputs.	\$24.00
RET-23	Balanced output transformers (2) for both outputs.	\$32.00

ACCESSORIES FOR 412A/414A

RET-28A	XLR connectors for input and output. (412A)	\$12.00
RET-28B	XLR connectors for both inputs and both outputs. (414A)	\$24.00