

**polk**audio®

the speaker specialists®



*F/X® Wireless Surround*

TECHNICAL BRIEF



# F/X Wireless Surround

## TECHNICAL BRIEF

### SPECIFICATIONS

#### Active Speaker System

- 1 - 5 1/4" Dynamic Balance® woofer
- 4 - 2 1/2" full range Dynamic Balance drivers
- 3 position room selection switch
- AC mains switch
- In line power supply
- System power output - 120 Watts with DSP
- System frequency response: 48 Hz - 20 kHz
- 2.4GHz wireless transmission
- 50' transmission distance in-room
- Wireless scan button
- Energy Star rated
- 9" AC cord with in line power supply

#### Dimensions:

- 8 1/8" H x 19 1/2" W x 7 3/4" D  
(20.6cm H x 49.5cm W x 19.6cm D)

#### Wireless Transmitter:

- 1 pair line level L/R Surround inputs
- 1 pair line level L/R Surround Back inputs
- 1 pair speaker level L/R Surround inputs
- 1 pair speaker level L/R Surround Back inputs
- Wireless scan button
- Adjustable external antenna
- Wall outlet power supply

#### Dimensions:

- 1 - 1/2" H x 7" W x 3 13/32" D  
(3.8cm H x 17.8cm W x 8.6cm)



#### Included Accessories

- Two pairs of 5' long male to male RCA cables

#### Other Information

- Total weight: 18 lbs (8.2kg)
- Finish: black pica
- MSRP: \$399.95

### Design Goals

For many people, setting up a high performance component audio home theater system presents several major obstacles. These include running and hiding wires around the listening room, the cosmetic impact from 2 to 4 discrete speaker enclosures placed in the room and ensuring their correct placement. While there are several wireless products currently available, they're either wireless amplifiers that still use hard-wired speakers, or they're individual powered speakers. Neither of these products solve the issue of added clutter or difficulty of placement.

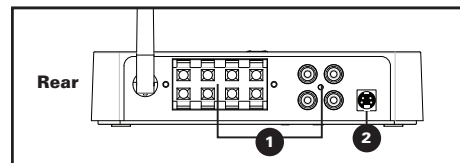
The Polk® F/X Wireless Surround addresses all of these issues with a simple and elegant single in-room wireless speaker system that can easily be placed on the floor, table or shelf behind the listening area. Through Polk Audio's proprietary Controlled Dispersion Array™ (CDA) technology, the FX Wireless Surround creates a convincing 5.1 channel or 7.1 channel surround sound stage. In addition Polk Digital Logic™ technology allows for three discrete placement options without sacrificing performance.

While the vast majority of today's surround sound receivers are equipped with discrete line level 5.1 or 7.1 outputs, there are legacy products that are not so configured. Polk's F/X Wireless Surround transmitter incorporates both line level and speaker levels surround and surround inputs.

### SYSTEM HOOK-UP & CALIBRATION

#### Transmitter:

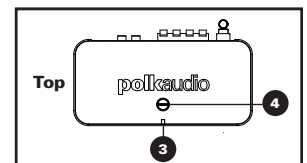
Place the transmitter in the proper proximity to the receiver or preamp based on cable length (there are two 5' RCA cables supplied). We do not recommend placing the transmitter directly on top of the receiver or DVD player. Connect the power supply and plug into a convenient outlet. The LED will glow RED until a connection with the speaker has been established. Connect either 5.1 or 7.1 line level surround outputs from the receiver or preamp to the corresponding inputs on the transmitter box.



#### Transmitter Inputs

**1. Audio Inputs**—Line level and speaker level. This is where you connect your transmitter to your receiver or processor. You may make either speaker level or line level connections, but never make both connections at the same time.

**2. Power Connection**—The transmitter power supply is connected here.



**3. Power LED**—Shines blue to indicate the transmitter is active and connected successfully to the loudspeaker. Shines red to indicate the transmitter and loudspeaker have failed to establish a wireless connection.

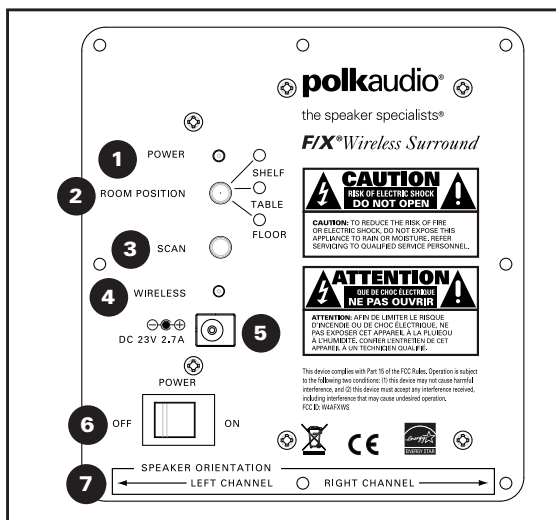
**4. Scan**—Push this button to re-establish the communication link between the transmitter and loudspeaker.

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## TECHNICAL BRIEF

### SPEAKER SYSTEM

Place the long axis of the F/X Wireless Surround loudspeaker behind the listening area. The amplifier input has arrows indicating proper left/right channel orientation. The F/X Wireless Surround can be placed either on the floor, on a table or on a shelf. Due to the unique properties of Controlled Dispersion Array, the speaker can still operate with a solid surface several feet above it, providing there is ample open area to either side of the speaker transducer array located at each end of the curved baffle. Connect the in line power supply and turn on the AC mains. Press the room position button to select floor, table or shelf depending upon you desired location. The orange LED will switch accordingly. Now push the scan button. The scan LED will go from red to blue once a connection with the transmitter has been established. NOTE: The system employs a sleep function if there is no signal present after several minutes; once a signal is detected, the system will reconnect.



### F/X Wireless Surround Controls

**1. Power LED**—Shines blue when the speaker is on, red when in stand-by.

**2. Room Position Button**—This button sets the equalization for the F/X Wireless Surround based on its location, either on the floor, on a table or on a shelf. An LED indicates which location is chosen.

**3. Scan**—Push this button should it become necessary to re-establish the “communication” link between the transmitter and the loudspeaker.

**4. Wireless LED**—Shines blue to indicate the transmitter and loudspeaker are connected wirelessly. Flashes blue/red when loudspeaker and transmitter are connecting and shines red when loudspeaker and transmitter are not connected.

**5. Power Connection**—The loudspeaker power supply is connected here.

**6. AC Mains**—The AC Mains Switch turns the loudspeaker on and off, though you may leave the switch turned on all the time.

**7. Speaker Orientation**—Indicates orientation of left and right channels. Be sure to position the speaker accordingly.

### SYSTEM CALIBRATION

#### Gain:

1. Surround Channel gain should be set so that the sound level matches or slightly exceeds the sound levels of the front stage.
2. Surround Back should be set to match the gain setting so determined for the Surround Channels.  
*Example: If +3dB is the appropriate Surround channel setting, the Surround Back should also be set to +3dB.*

#### Distance to listener:

To calibrate distance with the F/X Wireless Surround you will need to determine 2 things.

1. For Surround distance simply measure the approximate distance from the speaker system to nearest side walls.
2. For Surround back measure the distance from the speaker system to the listening position.

# F/X Wireless Surround

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### SET UP IN SYMMETRICAL ROOMS

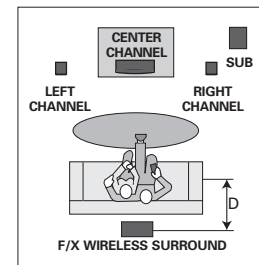
**Table 1**  
**Symmetrical Room: Surround Right and Surround Left Speaker Distance**

**Example:**

Table 1 shows that Surround Left and Surround Right delay should be set to 30' for a 20' wide symmetrical room when the F/X Wireless Surround is placed 2' behind the listening area.

| Room Width (ft) | Loudspeaker Distance In Feet Behind Listening Area (D) |    |    |
|-----------------|--------------------------------------------------------|----|----|
|                 | 2                                                      | 8  | 16 |
| 10              | 25                                                     | 26 | 29 |
| 12              | 26                                                     | 27 | 30 |
| 15              | 28                                                     | 29 | 31 |
| 20              | 30                                                     | 31 | 33 |
| 25              | 33                                                     | 33 | 35 |
| 30              | 35                                                     | 36 | 37 |
| 40              | 40                                                     | 40 | 42 |

**Figure 1**



### SET UP IN NON-SYMMETRICAL ROOMS.

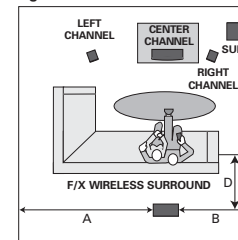
In accordance with Figure 2, measure A and B, the distances between the loudspeaker cabinet and the left and right side walls respectively. Now refer to the table below to determine the appropriate distance settings for Surround Left and Surround Right channels.

**Table 2**  
**Non-Symmetrical Room: Surround Right and Surround Left Speaker Distance**

**Example:** The F/X Surround speaker is placed 8" behind the listening area of a non-symmetrical room. The loudspeaker is 12' from the left side wall (A = 12') and 8' from the right side wall (B = 8'). From Table 2, set Surround Left distance to be 33' and Surround Right to be 29'.

| Distance from side wall (A or B) | Loudspeaker Distance In Feet Behind Listening Area (D) |         |    |
|----------------------------------|--------------------------------------------------------|---------|----|
|                                  | 2                                                      | 8       | 16 |
| 5                                | 25                                                     | 26      | 29 |
| 8                                | 28                                                     | 29 (SL) | 31 |
| 12                               | 32                                                     | 33 (SR) | 34 |
| 15                               | 35                                                     | 36      | 37 |
| 20                               | 40                                                     | 40      | 42 |
| 25                               | 45                                                     | 45      | 46 |

**Figure 2**



**NOTE:** If your room's dimensions and loudspeaker placement falls between or beyond the room width and/or placement distance values in Tables 1 or 2, then you may interpolate from the tables accordingly.

**NOTE:** Some home theater receivers require setting speaker delay in milliseconds rather than speaker distance in feet. If you have such a receiver, you may read the values in Tables 1 and 2 as time delay in milliseconds.

### SYSTEM DESCRIPTION

#### Enclosure:

The Polk Audio F/X Wireless Surround is a tri-chamber design that individually isolates left channel, right channel and the ported woofer sections. The cabinet is constructed of 3/4" MDF for rock solid density and extreme rigidity. The grille is made from an acoustically optimized high impact perforated metal grille to protect the drivers when placed on the floor.

#### Port Design:

With the aid of computer modeling, Polk Engineers optimized a single floor-firing flared J-Port enclosure. This design helped optimize laminar air flow out of the port, where turbulence can result in audible port noise (chuffing) and loss of bass detail and definition. The downward firing location of a J-Port system takes advantage of the increased bass gain when placed on a floor, table or shelf.

### Speaker Complement

The 4 - 2 1/2" drivers and 5 1/4" woofer incorporate Polk Audio's Dynamic Balance technology to minimize modal resonances for more natural midrange and low frequency reproduction. The drivers feature a neodymium magnet with doped cellulose cone and surround for optimum motor-strength-to-mass ratio in order to achieve smooth extended frequency response to 20 kHz. The long throw woofer features a 1 1/4" voice coil that employs a massive 40oz ferrite magnet structure for great low-frequency impact and punch.

#### Amplifier features:

The F/X Wireless Surround incorporates a 120 Watt multi-channel class D digital amplifier with DSP for both frequency optimization, delay and overload protection. An external power supply with a 9' power cord is provided.

# F/X Wireless Surround

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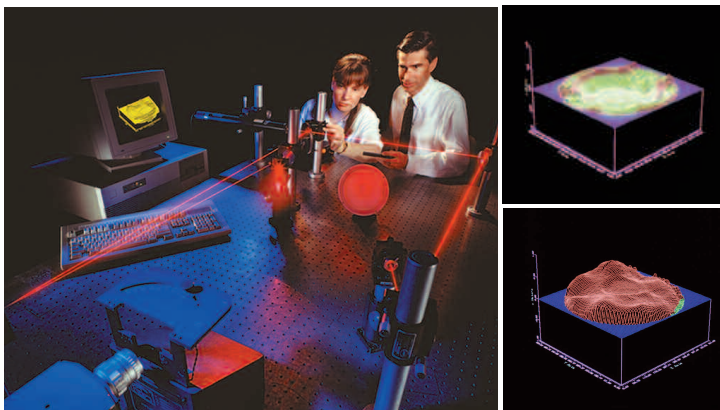
### TECHNOLOGIES

The Polk Audio F/X Wireless Surround uses the following proprietary Polk technologies:

#### Dynamic Balance

In 1988, Polk Audio embarked on a long-term research project in partnership with Johns Hopkins University. The result was a full-field heterodyning laser interferometer system capable of revealing the microscopic details of entire vibrating surfaces (such as a loudspeaker cone) in real-time. This research tool enabled us to view and analyze the entire vibrating surface of a driver or tweeter. In particular, we were able to see and understand the resonance that develops on loudspeaker cones as they move. Modal resonance is a major cause of frequency response aberrations and other distortions in loudspeakers.

Our new understanding of how resonance develops on speaker components led us to develop a design technique called Dynamic Balance. Dynamic Balance uses an analysis of the entire electro-acoustic and mechanical systems to select composite materials and geometry that reduce resonance. The resulting drive units have unusual clarity, detail and extension.



Matthew Polk and university researcher inside laser interferometer lab.

Laser interferometer images showing resonance on speaker cones.

#### Klippel Optimization:

By using a state-of-the-art Klippel Distortion Analyzer, Polk engineers were able to optimize the woofer's motor structure, voice coil alignment and suspension for the best possible performance even at extreme listening levels.

#### Controlled Dispersion Array

Controlled Dispersion Array technology was developed especially for the F/X Wireless Surround. Tightly grouped arrays of discrete electrodynamic transducers, in combination with phase and/or amplitude tapering, produce a radiation pattern characterized by narrow, steered beams. CDA permits the F/X to project sound towards reflective surfaces to produce an enveloping, spacious sound field rich with the spatial cues required for proper localization of surround sound effects. Further, Polk's pioneering analysis of head related transfer functions (HTRF) permits the F/X Wireless surround to perform optimally over a range of

placement locations. HRTFs, an important topic within the realm of psychoacoustical research, describe how we locate sound sources on the basis of their perceived frequency response. By embedding magnitude response shaping that reflects ratios of certain HRTFs, Polk's F/X Wireless Surround relocates sound sources from the speaker's actual position in the room to appropriately elevated lateral virtual locations. The net result is an exciting surround experience that simply must be experienced to be fully appreciated.

The dual speaker arrays in the F/X Wireless Surround are oriented towards side-walls and laterally radiate "narrow" beams of sound. For purposes of properly reproducing the Surround channels, the dual element arrays operate out of phase. This creates acoustic nulls — areas in front of and behind the speaker where sound radiation is greatly reduced relative to lateral acoustic output. The result is an immersive, spacious surround effect dominated by diffuse lateral reflections, as opposed to direct sound from the enclosure that would otherwise dictate the perceived location of the sound source.

To create rear surround effects associated with the dedicated Surround Back channels of 7.1 program material, we've attenuated the Surround Back channels' gain and added extra latency to ensure that Surround channel spatial cues precede in-phase SB output. This helps to preserve surround channel spaciousness, which would be lost if surround back effects were too loud or preceded surround channel spatial cues. In accordance with an accepted principle of psychoacoustics, first arriving sound waves determine the perceived location of a sound source.

#### Polk Digital Logic

Polk Digital Logic (PDL) is a suite of sophisticated audio processing tools that Polk uses to create the desired end-result acoustic frequency response shapes that reflect the appropriate Head Related Transfer Functions (HRTF) ratios for three discrete placement options: Floor, table and shelf. That PDL has been developed to manipulate not only magnitude response shapes but also the phase and temporal aspects of multichannel sound reproduction means that the F/X Wireless Surround can reproduce not only the two discrete Surround channels associated with 5.1 systems but also 7.1 systems' Surround Back channels. To that end, we've attenuated the Surround Back channels' gain, added extra latency and manipulated inter-channel phase to ensure that Surround channel spatial cues precede phase-coherent SB output. That SB channels are reproduced in-phase means that appropriately strong localization cues emerge from the rear of listening area, as intended for SB effects, but without compromising Surround channel spaciousness. With regard to the temporal aspects of multi-channel surround sound reproduction, that first arriving sound waves determine the perceived location of a sound source, (in accordance with an accepted principle of psychoacoustics), means that SB channels must be substantially delayed in order to preserve the spaciousness afforded by room-reflection dominated Surround channel reproduction.





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