

### 13.4.2.6. Options

**Copy Parameters.** This window allows you to copy your settings for all functions to any number of other channels. Select the channel you want to copy from by first selecting the receiver, then the channel. From the Options Menu, choose Copy Parameters. You will see your selected channel displayed in a red field labeled “Copy Parameters From.” Select the channels you want to copy to from the Available Channels list, then check the boxes of the parameters you wish to copy. Once you are sure of your selections, hit Copy Now and your settings will be pasted to the selected channels. Note that RF channel selections cannot be copied.

**Reset Parameters.** This window allows you to selectively reset any of the functions in your receiver. Choose Reset Parameters from the Options Menu, then check the boxes of the functions you would like to reset to their default settings. In order to reset FBX filters, use the dedicated button on the Command View. If you wish to load the factory default for the entire receiver, choose Preset 00 from the Program drop-down on the Command View and select the Load button.

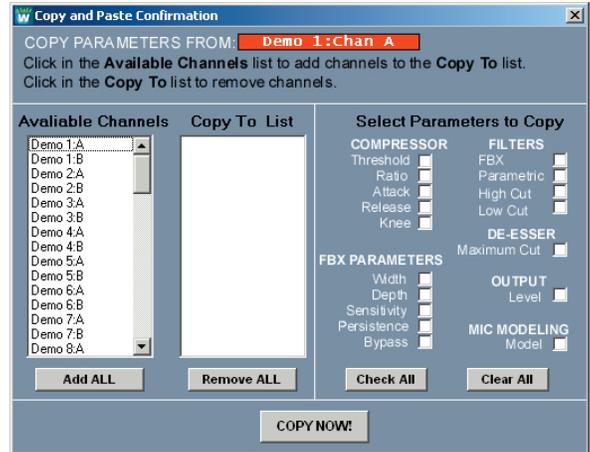


Fig. 13m Copy Parameters window

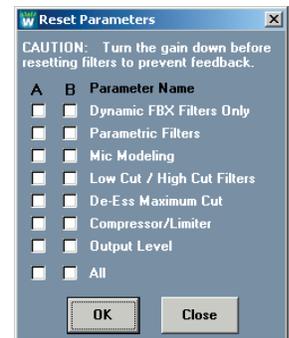
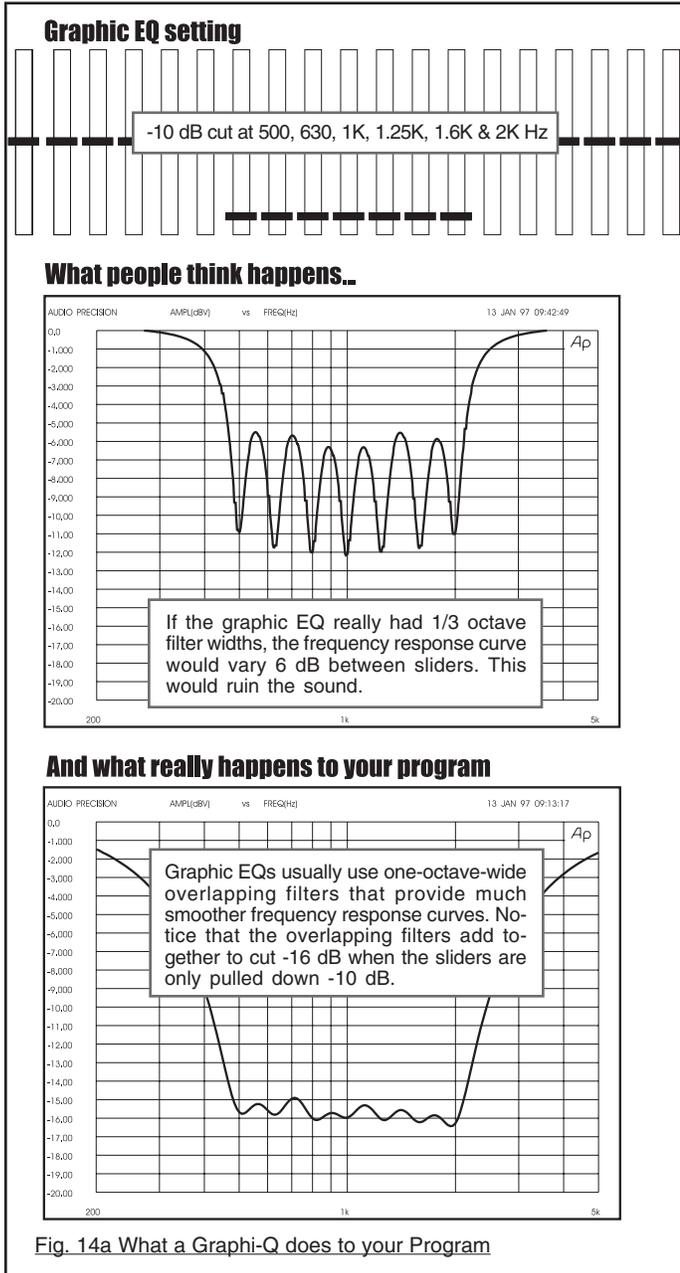


Fig. 13n Reset Parameters window

## 14. FEEDBACK CONTROL THEORY & PRACTICE

### 14.1. Introduction to FBX®



**WHY FBX?** Feedback is certainly the most pervasive challenge to the audio industry. The potential appearance of sudden, loud, out-of-control feedback is every sound engineer's and musician's nightmare. Unlike more subtle audio quality problems or shortcomings, feedback is embarrassingly obvious — it disturbs the performer, the audience, and the technician, and can damage equipment and just generally ruin your day.

Feedback is a potential problem in any amplified sound system that places a microphone or pickup in proximity to a loudspeaker. Poor acoustical conditions or misguided use by unsophisticated sound system operators only aggravate the situation. To make matters still worse, a non-Sabine variety of wireless microphone adds yet another level of feedback danger to the picture. Since feedback erupts whenever the distance, location, and gain relationships between a speaker and a microphone reach a critical combination, a mic that can move anywhere results in an ever changing potential for feedback. A step in the wrong direction may change a clear sound to a piercing shriek in less than a second.

This enhanced potential for feedback with a wireless system gets worse if lavalier microphones are used. Such microphones are usually placed farther from the mouth than handheld or head set microphones, thus requiring more gain. Also, the polar pattern of a lavalier microphone is frequently omni-directional. Thus, the likelihood of feedback increases, due to the microphone's increased off-axis sensitivity to the sound emanating from the loudspeakers.

The Sabine True Mobility™ SWM7000 wireless systems solve feedback problems by precise attenuation of very narrow bands of feedback-prone frequencies. The process is automatic, simple to use, adaptable to changing acoustical conditions and relationships, powerful in its application, and has minimal consequences to the audio fidelity of the signal. We call this automatic filter a Feedback Exterminator® filter, or FBX filter for short.

### 14.2. The Advantages of FBX Filters

Before the invention of FBX, the most common device for controlling feedback was the 31-band graphic EQ. However, an FBX filter offers three distinct advantages over graphic filters.

1. First and most obvious is the automatic nature of FBX filters. When feedback occurs, FBX responds more quickly than even the most experienced engineer. Automatic FBX placement works even in the presence of audio program material, intelligently distinguishing feedback from music or speech.

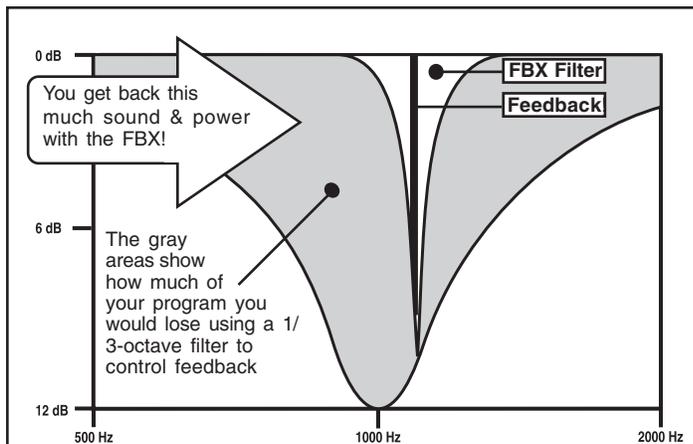


Fig. 14b - What FBX Gives Back to your Program

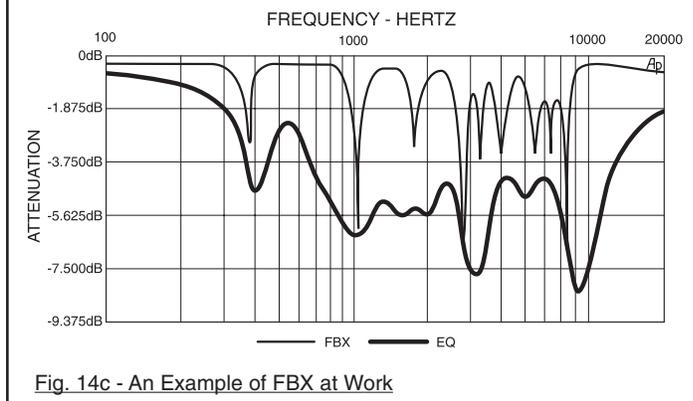


Fig. 14c - An Example of FBX at Work

2. A second advantage is that FBX micro-filters are precisely placed anywhere feedback occurs (with 1 Hz resolution), while graphic EQ filters are limited to 31 fixed center points. An FBX filter represents a direct hit on feedback! In contrast, a graphic EQ filter can only approximate the exact frequency of the feedback, and the filter (or filters) with the closest center frequency must be pulled down. Such filters are deepest at their centers, and such imprecise attenuation takes a big (and unnecessary) chunk out of your sound (see figure 14b).

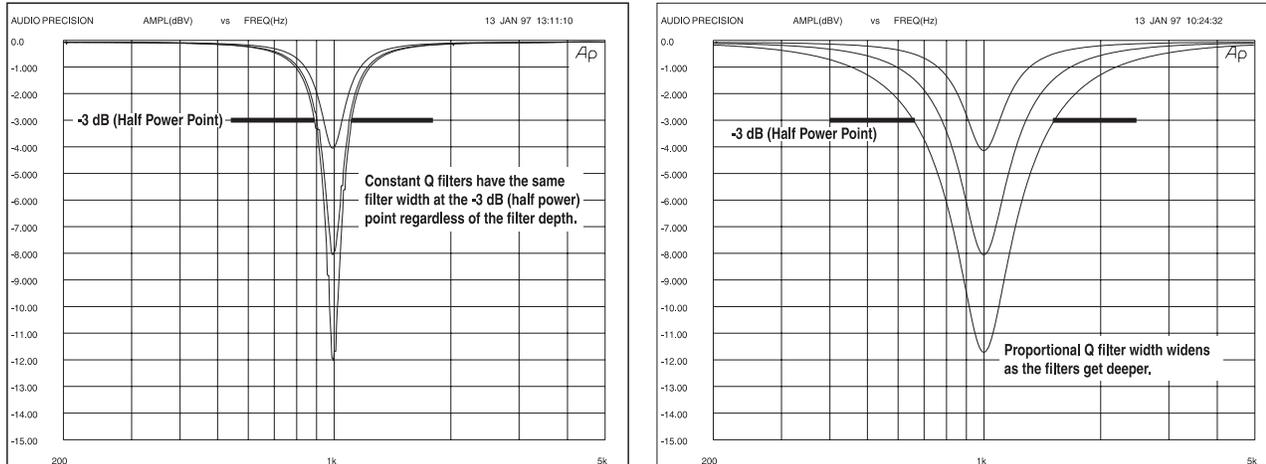
3. Increased clarity and gain-before-feedback are further accomplished by the third and most important advantage of FBX: Sabine's micro-filters are ten times narrower than 31-band EQ filters. Using FBX micro-filters will return up to 90 percent of the power removed by EQ filters.

Here's a good place to make a very important distinction. Graphic EQ filters are typically called "1/3-octave," but it's important to understand that this term refers to the *spacing* of the filter centers (1/3-octave apart), and not the *width* of the filter (usually a full octave). Graphic filters thus overlap one another, and affect frequencies well above and below the center point frequency, including frequencies of adjacent bands. This makes graphic equalizers very practical tools for shaping sound "with broad strokes," such as dialing in overall system EQ, but results in destructive audio quality overkill when they are used to eliminate feedback. A graphic equalizer would need more than 10,000 narrow-band sliders to be as precise and powerful as your FBX.

As an example of the power of FBX, figure 14c shows test results measured with a PA set up consisting of a microphone, mixer, FBX Feedback Exterminator®, power amp and two speakers. The system's gain was first raised until the FBX removed nine feed-

back points. Next, the FBX was replaced with a graphic EQ. The EQ was adjusted while the system gain was raised to the same level achieved with the FBX. The frequency response curves of each device were then plotted and are compared in figure 14c. Note how much more of the program (the "good audio") is eliminated using an EQ — whereas only feedback is eliminated using FBX filters.

### Sabine Constant Q Filters



It is common to describe a filter's quality factor, or "Q," as the center frequency of the filter divided by the filter width (in Hertz) measured at the -3dB point. Filters that have the same Q, or width, at the -3dB point regardless of the filter's cut or boost are called Constant Q filters (see p.14, Figure 6a). Filters that get wider as the filter gets deeper are called Proportional Q filters (see p.14, Figure 6b). Lately, however, the definition of Constant Q is becoming less distinct. Many equalizer manufacturers claim their equalizers have Constant Q filters, when in fact they get substantially wider as they get deeper. The only way to know for sure if the filters are truly Constant Q is to inspect their frequency response curves. Sabine FBX Filters are true Constant Q filters.

## 14.3. Parametric Filters and FBX

Of course, many savvy sound engineers, realizing the limitations of graphic equalizers in removing problem feedback, prefer to use a different type of equalizer, called a parametric EQ, for such applications. If you're one such audio engineer, you'll be comforted to know that FBX filters share much in common with parametrics.

Compared to graphic filters, parametrics allow more precise adjustments — specifically, control of filter width, the amount of boost or cut, and the mid-band frequency of the filter. This greater precision, however, comes at a price, as parametric filters are not nearly as intuitive or simple to use as graphic equalizers.

Nothing, however, is easier to use than an FBX filter, which enjoys the precision of a parametric filter, yet deploys instantly and automatically whenever feedback is detected. Effectively, an FBX filter is a parametric filter set to a tenth-octave width, restricted to cut-only activity, and automatic in its choice of frequency band. If you want hands-on control, use the Sabine True Mobility™ Remote Software to change FBX filters to parametrics, and tweak frequency, width, and depth to your liking.

### 14.3.1. The FBX & True Mobility™ Advantage

After inventing FBX technology and refining it for over a decade, Sabine has brought our patented automatic feedback control to its fullest realization with the Sabine SWM7000 True Mobility™ wireless systems. Our latest advance in maintaining the highest quality audio signal is due to the placement of the signal processing in the input chain of the microphone signal. Many times signal processing (compression and equalization) is placed after the output stage of a mixer, meaning it is applied to a combination of inputs mixed together into one output and passed through the processor. Particularly in the case of equalization and feedback control, one consequence of such placement is that filtering appropriate to only one microphone may be applied to all mics in the same mix bus. In other words, unnecessary filtering may be applied to microphones that, due to variations in position and microphone

characteristics, will feedback at a different set of frequencies. Although the filters are very transparent, why add filtering if you can avoid it? And why divide your processing power among multiple signals?

Placing the filtering and other signal processing in the input signal path is a concept called Targeted Input Processing. It means each microphone so equipped will have customized, unique signal processing applied — and no unnecessary processing.

With FBX technology, your microphone will finally sound loud enough, everyone in the audience will understand each word, and feedback will be far less likely to make an unwelcome and unexpected visit—and you'll be comfortable knowing that protection is extended to anywhere a wireless microphone might be taken.

### **14.3.2. FBX Fixed & Dynamic Filters**

FBX filters come in two flavors, fixed and dynamic. Both operate automatically. There is no audible difference between fixed and dynamic filters in terms of sonic purity; the difference arises in their application.

#### **14.3.2.1. Fixed FBX Filters**

Once they set automatically (see Section 7 for information on setting filters), fixed FBX filters will NOT change frequency. You can think of fixed filters as cures for problem frequencies (the “first-to-feedback” frequencies encountered during normal system operation), common to most locations in the room.

#### **14.3.2.2. Dynamic FBX Filters**

Dynamic FBX filters also set automatically, but can change frequency, on a rotating basis, as the need arises. To help distinguish dynamic from fixed filters, consider the example of a speaker using a wireless lavalier microphone, who walks under a ceiling speaker for the first time. In so doing, he enters a location-specific feedback zone, where it's possible that a problem frequency may have escaped detection and notching by a fixed filter. If all fixed filters have been deployed, a dynamic filter will be set automatically as soon as feedback appears, solving the problem. Great! But what happens when the speaker then moves away from the ceiling speaker, and close to a floor monitor? Feedback from the ceiling speaker is no longer a problem, but a new frequency starts to squeal. If all fixed and dynamic FBX filters are already set, a dynamic filter will change, to adjust to the new location. An FBX dynamic filter thus stands guard if new problem feedback arises after all available filters have been set, providing a deeper and more flexible level of protection against the dreaded surprise of feedback.

Other than the ability to change frequency, a dynamic filter is equivalent to a fixed filter.

#### **14.3.2.3. Balancing Fixed & Dynamic Filters**

Each channel of your SWM7000 wireless receiver offers a total of 10 FBX filters (combined fixed and dynamic), which can be used as needed to exterminate feedback. After years of experience and experimentation, Sabine has settled upon a default balance of 7 fixed and 3 dynamic filters, set at the factory. This default condition can be changed to 8 fixed and 2 dynamic, by changing a DIP switch on the back of your receiver (see Appendix D FBX Configuration DIP Switch), or to any configuration using the Remote Control software (see Section 13).

If you follow setup instructions for setting FBX filters (see Section 7), your receiver will automatically exit SETUP mode (enter READY status) after all fixed filters, and the first dynamic filter, have set. In the default condition, this means you will have set eight filters (seven fixed and one dynamic), with two dynamic filters still unset and remaining on standby alert. If you wish to set fewer filters, press the READY button before SETUP automatically exits, after you have set enough filters to safely achieve your desired gain level. In that case, in the factory default condition, you will reserve three unset dynamic filters for standby.

#### **14.4.3. FBX Filter Width**

Sabine's experience and testing with filters and sound quality along led us to decide upon a default FBX filter width of .10 (one-tenth) octave as the optimal notch width, able to eliminate feedback without affecting music programs. If, with all filters properly set, feedback is still a problem, FBX filters may be set to .20 (one-fifth) octave width. This wider filter setting will help to better eliminate feedback trouble areas, but may also affect music programs slightly. Therefore, the wider setting is generally considered to be appropriate where speech (less demanding than music) is the primary application of the Sabine Wireless system. You can globally change FBX filter width by repositioning a rear panel DIP switch, to change from .10 to .20 octave (see Appendix QQQ FBX Configuration DIP Switch), or by adjusting filter width using the True Mobility™ Remote Software (which allows a range of widths from .01 to 1.0 octave). You may also mix filter widths, either by adjusting individual filter widths using the Remote Software, or by changing the DIP switch position during setup. The width of any set filter will always be determined by the position of the switch at the time the filter is created.

#### **14.4.4. Who Benefits from FBX?**

Virtually every sound system will be improved with the Sabine True Mobility™ Wireless System. Singers and speakers who do not have sound technicians can now increase their monitor or house system volume so they can hear themselves clearly and with full fidelity, without worrying if their microphones will suddenly squeal if they move to the wrong place.

Auditoriums and churches of all sizes will enjoy reliable feedback control. Hotels and conference centers around the world can offer meeting rooms with microphones that won't howl during programs. The Sabine True Mobility™ Wireless System can be installed in theaters, schools, sports arenas, courtrooms, teleconferencing, intercoms or interactive remote classrooms — anywhere one or multiple microphones are used.

## 15. TIPS & TROUBLESHOOTING

### 15.1. Tips for Maximum Performance

- Keep a clear and unobstructed path between transmitter and receiver.
- Position receiver antennas at least one meter off the performance floor level.
- Avoid placing receiver antennas near large metallic or other dense materials.
- Keep receiver antennas away from RF signal generating equipment (computers, high-voltage equipment, etc.).
- Position antennas perpendicular to each other. (QQQ same as UHF/VHF?)
- Use a Sabine Antenna Distribution System (SWA6SS) for multiple system installation.
- Return transmitters to a charger when not in use.
- Use a Sabine SWASS-EXT Extension Antenna to extend range and/or improve reception.

### 15.2. Troubleshooting

**Problem:** True Mobility receiver and transmitter power are on, receiver RF Signal meters and Input Level meters are lighting up, but there is no sound from system.

**Solution:** Check connection between receiver and mixer/amp. Adjust receiver Output Level control.

**Problem:** True Mobility receiver and transmitter power are on, but receiver RF Signal meters and Input Level meters are not lighting up.

**Solution:** Check transmitter On/Battery Indicator. Recharge transmitter if necessary. Check transmitter and receiver frequency Channel settings (make sure they match). Check receiver squelch setting. Check receiver antenna connections. Check distance between transmitter and receiver antennas and possible obstructions in path.

**Problem:** Transmitter is on, but sound is noisy.

**Solution:** Check transmitter On/Battery Indicator. Replace weak battery with fresh battery from charger unit if necessary. Check for other sources of RF interference (high voltage equipment, lighting equipment, etc.). Check distance between transmitters and receiver antennas.

**Problem:** Transmitter is off, but noise still coming from receiver.

**Solution:** Adjust receiver squelch control. Check for other sources of RF interference (high voltage equipment, lighting equipment, trolley cars, etc.). Select another frequency. Check connection and position of the receiver antennas. Utilize a Sabine Extension Antenna.

### 15.3. Common Sources of RF Interference

Since Marconi and others pioneered the first radio broadcasts, the radio spectrum has become increasingly crowded with a huge diversity and variety of RF sources. The strength, frequency, location, and timing cycles of these RF sources create a shifting pattern of interfering and overlapping frequencies and coverage patterns, which can render the use of radio microphones a difficult and unpredictable business.

The typical sources of interference for conventional wireless mics can be high-powered broadcasters such as radio stations and TV transmitters, or other short-range wireless devices, including multiple radio microphones operating at the same location (either by design, or by coincidence), that operate in proximate (or harmonically related) bandwidths. Less commonly, interference may arise from spurious outputs emitted by electronic equipment (notably computers, printers, or similar devices with digital clocks), faulty electrical equipment, neon signs, dimmers and lighting controllers, and so forth.

UHF and VHF mics are especially vulnerable because they share the RF spectrum with the very high-powered transmitters for television. The coming conversion to digital and high-definition broadcast will increase the problems for UHF and VHF.

The 2.4 to 2.4835 GHz frequency band is not only well above the fundamental (nominal) transmission frequencies of such strong analog and digital broadcasts, but also high enough to escape interference problems occurring at the strong first harmonic of even the highest digital television broadcast. The band is approved worldwide for a variety of uses, including such diverse transmitters as baby monitors, garage door openers, wireless LANs, amateur satellite, cordless telephones, etc. Compared to RF broadcast sources like television and radio stations, these low power devices produce very localized, short range interference; furthermore, many of the devices working in the 2.4 GHz range use spread spectrum transmission and reception. Both of these facts mean such uses of the RF spectrum are less likely to cause interference with, or suffer from interference from the use of, Sabine's systems.

#### 15.3.1 RF sources and bandwidths

Your first step in checking for interference should be utilizing the Scan function in the SWM7000 Remote Control Software. See section QQQ for a complete discussion of the benefits of scanning, which will reveal any potential RF sources in your location and allow you to make an informed choice of channels to use. The scanner can scan for long periods of time and will give you a report of RF activity over time for each of the 70 channels available on your Smart Spectrum system.

**1. Microwave ovens:** 2.450 - 24.60 GHz, SWM7000 channels 26 through 37

In the vast majority of situations, interference from microwave ovens will not affect performance of your SWM7000 series microphone systems, for several reasons. First, since barriers such as walls work to block interference, a microwave oven will likely present a problem only when located in fairly close proximity within the same room as the wireless receiver (or reception antenna). Second, microwave ovens emit RF only when in use — and even then, consumer microwave ovens are actively emitting RF for only about 8 msec during each AC power cycle, allowing the balance of the

cycle (50% - 60%) for signal recovery. Consumer-quality microwave ovens emit RF restricted to a narrow band (2450 - 2460 MHz). This targeted band affects less than 12% of the bandwidth available for operation with Sabine systems, and can be avoided by changing RF channels for transmitters and receivers, with at worst a 12% reduction in the number of clear, available channels.

Commercial quality microwave ovens present a bigger potential problem. They sweep over a wider band of frequencies than the limited band affected by consumer units, and use two magnetron tubes which alternate to avoid inactivity during a power cycle. Fortunately, Sabine systems are only affected by such ovens in close proximity to receiver antennas. That protection, plus the availability of 70 different RF channels to choose from, makes serious interference problems arising from microwaves unlikely and avoidable.

## **2. WLANS (wireless local area networks):** QQQ – QQQ GHz, SWM7000 channels QQQ through QQQ

These computer network devices allow computers to connect via wireless devices that act as both receivers and transmitters. These low-powered transceivers often have selectable channels and can utilize the entire 2.4 GHz band. In general Sabine microphones will not be affected by these WLANS because their spread spectrum technology does not present a problem for the Smart Spectrum system.

You can, however, experience interference if the Sabine receiver is closer than 2 meters to the WLAN device, and the Sabine transmitter is greater than 20 meters away from the receiver. Additionally, the Sabine wireless system will not interfere with the WLAN unless the converse situation arises. Placing the Sabine transmitter closer than 2 meters to the WLAN device and placing the Sabine receiver greater than 20 meters away could cause interference in your WLAN from the Sabine wireless. Both these situations are easy to avoid, and we recommend you observe these limitations.

For a true picture of the RF imprint of your WLAN, perform a Scan with the SWM7000 Remote Software.

## **3. Cordless phones:** QQQ – QQQ GHz, SWM7000 channels QQQ through QQQ

These home telephones broadcast at very low power in general will not present any interference problems with your Sabine wireless. This is especially true if the telephone uses spread spectrum technology. Again, the only potential for interference comes when the cordless phone transmitter is extremely close to the Sabine receiver and the Sabine transmitter is very far away. For best results avoid these conditions.

## **4. Wireless Video Cameras:** QQQ - QQQ GHz, SWM7000 channels QQQ through QQQ

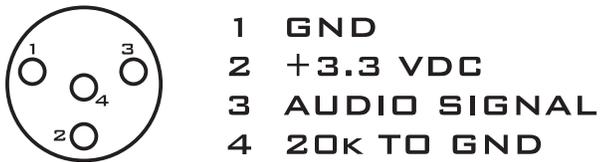
Certain wireless video cameras (X10, for example) use the 2.4 GHz band. These devices are also very low power and will not present a problem when using the SWM7000 system.

In the event problems still arise, see **Section 5 Receiver Operation** for methods of optimizing clear reception and minimizing interference.

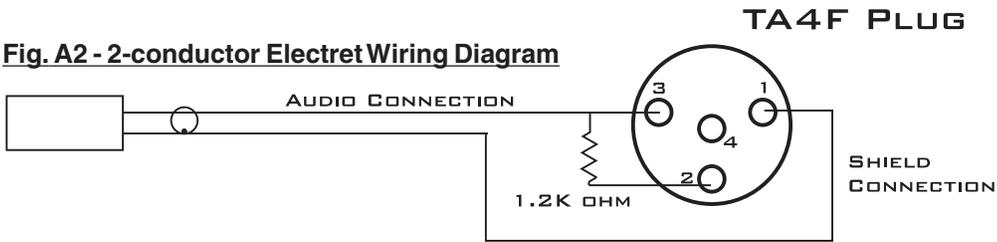
## 16. APPENDICES

### Appendix A: Beltpack Connector Wiring Diagrams

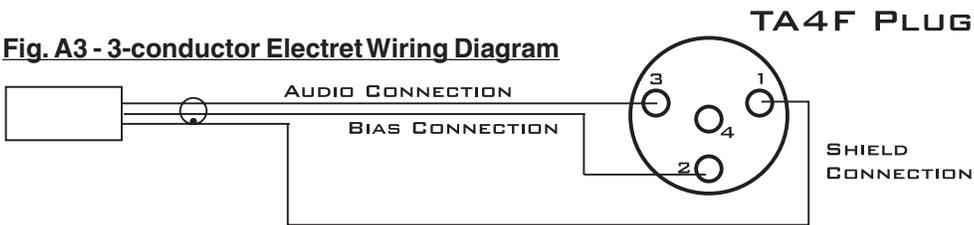
**Fig. A1 - Transmitter Input Connector Wiring Diagram**



**Fig. A2 - 2-conductor Electret Wiring Diagram**



**Fig. A3 - 3-conductor Electret Wiring Diagram**



## Appendix B: Specifications

### SW70 Series Receivers, 1- or 2-channel

Carrier Frequency Range: ISM Band 2400 - 2483.5 MHz  
 Frequencies: 70 pre-programmed  
 Oscillation Mode: PLL synthesized  
 Receiving Mode: True diversity  
 Sensitivity: 6 dBV at S/N over 70 dB  
 Image Rejection: >63 dB  
 Spurious Rejection: >76 dB  
 Stability: 50 ppm  
 Maximum Deviation: +/- 150 KHz  
 Dynamic Range: > 100 dB  
 S/N Ratio: 95 dB (Typical)  
 THD: <0.1%  
 Frequency Response: 20 Hz - 20 KHz +/- 1 dB  
 Antennas: 2, 1/4 wavelength  
 Power Supply: 100-240 VAC 50-60 Hz  
 Rack-Mount case  
 Working Range: >100 meters  
 Outputs: Balanced XLR and TRS, mic or line level  
 RS232 & RS485\*\* Serial Interface  
 Digital Audio Output with Sync Input\*\*

### SW70 Series Handheld Microphones

Dynamic Mic Capsule: Audix OM3 (Optional OM5)  
 Condenser Mic Capsule: Sabine  
 Antenna: Internal Fixed  
 Maximum FM Deviation: +/- 100 KHz  
 RF Frequency Stability: 10 ppm  
 RF Output: 1.0 mW  
 Spurious output: < -50 dB of rated output  
 Telemetry: Battery Voltage, Mute Status, Capsule Type  
 Programmable LCD  
 Programmable On/Off switch  
 Battery: Sabine Rechargeable or one 1.5V Alkaline C cell  
 Rechargeable Battery Life: 8 hours per charge,  
 500 charge cycles (typical)  
 Alkaline Battery Life: 14 hours (typical)

### SW70 Series BeltPack Transmitter

Maximum FM Deviation: +/- 150 KHz  
 RF Frequency Stability: 10 ppm  
 Spurious output: < -50 dB of rated output  
 RF Output: 1.0 mW  
 Telemetry: Battery Voltage, Mute Status  
 Programmable LCD  
 Programmable On/Off switch  
 Mic input impedance: 47 K Ohms  
 Mic bias: 3.3V  
 Mic connector: TA4  
 Antenna type: Internal Fixed  
 Battery: Sabine Rechargeable or two 1.5V Alkaline AA cells  
 Rechargeable Battery Life: 10 hours per charge,  
 500 charge cycles (typical)  
 Alkaline Battery Life: 14 hours (typical)

### SWA6SS Antenna Distribution Amplifier (SWA6SS)

Two antenna inputs  
 Six outputs per antenna to receivers  
 Filter Bandwidth: 2350 - 2500 MHz +/- 3 dB  
 1 dB Compression Input Level: -20 dBm  
 Noise Figure: < 3.7 dB (Center Band)  
 Input/Output Gain: (+)1.6dB (Center Band)  
 Output Port Isolation: 30 dB minimum  
 Connector: TNC type  
 Power Supply: 100-130 VAC or 200-240 VAC 50/60 Hz

### Digital Signal Processing

#### FBX Filters

Ten independent digital filters per channel, controlled automatically from 20 Hz to 20 KHz  
 Filter depth: 3 dB steps from 0 dB to -40 dB  
 Filter width: .1 or .2 octave\*  
 Resolution: 1 Hz from 20 Hz to 20 KHz  
 Time required to find and eliminate feedback: typically 0.3 seconds @ 1 KHz

#### Digital Compressor/Limiter

Threshold: -30 dB to 0 dB  
 Ratio: 1:1 through infinity  
 Knee: soft  
 Attack: 1-99 msec  
 Release: 400 msec  
 Automatic De-Esser  
 Cut range: 0 to -30 dB  
**Microphone SuperModeling**  
 Dynamic Capsules\*\*\*  
 Shure SM-58  
 Shure Beta 58A  
 Audio Technica ATM 41a  
 Condenser Capsules\*\*\*  
 Shure Beta 87A  
 AKG C535 EB  
 Audio Technica ATM 89R

### Presets

15 User Presets – Saves all configurations

### Mechanical

Dimensions: 1-U rack-mount, 19 x 1.75 x 9 in.  
 (48.3 x 4.5 x 21.6 cm)  
 Weight: 5.3 lb. (2.4 kg)

\*Below approximately 200 Hz the feedback filters become slightly wider to increase the feedback and rumble capture speed at these low frequencies.

\*\*ND Series Receivers Only

\*\*\*Company names, product names, and trademarks listed here are the property of their respective owners and are used only to identify evaluated microphones used to develop digital processing; they in no way imply association, endorsement, or approval by any named manufacturer.

(SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE)

## Appendix C: Typical System Diagram

## Appendix D: Dip Switch Settings

## 17. CAUTIONS & WARRANTY

**Warning!** This equipment must be earthed.

**Caution!** Risk of electric shock. Do not open.

**Caution!** Shock hazard. Do not remove covers. No user serviceable parts inside. Refer servicing to qualified service personnel.

**Warning!** To reduce the risk of fire or electric shock, do not expose this product to rain or moisture.

**Attention!** Cet appareil doit être relié à la terre.

**Attention!** Risque de choc électrique; ne pas ouvrir.

**Attention!** Risque de choc; ne pas ôter les capots. Aucune pièce accessible à l'intérieur. S'adresser à un technicien qualifié.

**Attention!** Pour réduire le risque d'incendie ou de choc électrique, ne pas laisser l'appareil sous la pluie ou à l'humidité.

**Achtung!** Dieses Gerät muss Schutzgeerdet sein.

**Achtung!** Gefahr eines elektrischen Stromschlags. Gehäuse nicht öffnen.

**Achtung!** Gefahr eines elektrischen Stromschlags. Gehäuse nicht öffnen. Keine von Benutzer zu bedienenden Teile im Geräteinneren.

Überlassen Sie das Gerät zu Servicezwecken nur geschultem Fachpersonal.

Um Brandgefahr oder das Risiko eines elektrischen Schlags auszuschließen, das Gerät vor Nässe und Feuchtigkeit schützen.

**Advertencia!** Este equipo debe estar conectado a tierra.

**Precaución!** Riesgo de descarga eléctrica. No abrir.

**Precaución!** Riesgo de descarga eléctrica. No desmontar las tapas. Piezas interiores no reparables por el usuario. Reparable sólo por personal cualificado.

**Advertencia!** Para reducir el riesgo de incendio o de descarga eléctrica no exponga este producto a la lluvia o humedad.

FCC Statement:

This device complies with Part 15, Class B, of the FCC Rules. Operation is subject to the following conditions: (1) This device may not cause harmful interference; and (2) This device must accept any interference received, including interference that may cause undesired operation. Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio TV technician for help.

### Canadian Compliance Statement

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la class B prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

### Japanese EMI Compliance Statement

この装置は、第二種情報装置

(住宅地域又はその隣接した地域において使用されるべき情報装置)

で住宅地域での電波障害防止を目的とした情報処理装置等電波障害自主規制協議会 (VCCI) 基準に適合しております。

しかし、本装置をラジオ、テレビジョン受信機に近接してご使用になると、受信障害の原因となることがあります。

取扱説明書に従って正しい取り扱いをして下さい。



**WARNING!**



The True Mobility is designed to operate from standard AC power. Please be sure the power in your area is compatible with the power requirements marked on the rear of the unit. Using the wrong input voltage may cause permanent damage to the unit and will void the warranty.

The True Mobility Wireless Microphone system is supplied with one of the following AC power cords:

Japan	100 VAC
U.S./North America	120 VAC
Continental Europe	230 VAC
United Kingdom	240 VAC
Australia	240 VAC



**Battery Caution**



DO NOT BURN OR PUNCTURE BATTERY. DOING SO COULD RELEASE TOXIC MATERIALS WHICH COULD CAUSE INJURY.

DO NOT SHORT CIRCUIT. MUST BE RECYCLED OR DISPOSED OF PROPERLY.

1. Read all safety and operating instructions before using this product.
2. All safety and operating instructions should be retained for future reference.
3. Obey all cautions in the operating instructions and on the unit.
4. All operating instructions should be followed.
5. Use only shielded audio and data cables.
6. This product should not be used in the presence of moisture or rain, or near any water, i.e., a bathtub, sink, swimming pool, wet basement, etc.
7. This product should be located so that its position does not interfere with proper ventilation. Do not use in direct sunlight. Do not place flat against a wall or in a built-in enclosure that will impede the flow of cooling air.
8. This product should not be placed near a source of heat such as a stove or radiator.
9. Connect only to a power supply of the type marked on the unit adjacent to the power entry module.
10. Never break off the ground pin on the power supply cord.
11. Power supply cords should always be handled carefully. Never walk or place equipment on power supply cords. Periodically check cords for cuts or signs of stress, especially at the plug and the point where the cord exits the unit.
12. The power supply cord should be unplugged when the unit is to be unused for long periods of time.
13. Care should be taken so that objects do not fall and liquids are not spilled into the unit through the ventilation holes or any other openings.
14. This unit should be checked by a qualified service technician if:
  - A. The power supply cord or plug has been damaged.
  - B. Anything has fallen or been spilled into the unit.
  - C. The unit does not operate correctly.
  - D. The unit has been dropped or the enclosure damaged.
15. The user should not attempt to service this equipment. All service work should be done by a qualified service technician.

### CAUTION - Implanted cardiac pacemakers or AICD devices:

Any source of RF (radio frequency) energy may interfere with normal functioning of the implanted device. All wireless microphones have low-power transmitters (less than 0.05 watts output) that are unlikely to cause difficulty, especially if they are at least a few inches away. However, since a belt-pack transmitter typically is placed against the body, Sabine suggests attaching it at the belt, rather than in a shirt pocket where it may be immediately adjacent to an implanted medical device. Note also that any medical-device disruption will cease when the RF transmitting source is turned off. Please contact your physician or medical-device provider if you have any questions, or experience any problems with the use of this or any other RF equipment.

**CAUTION!**

EXPOSURE TO EXTREMELY HIGH NOISE LEVELS MAY CAUSE A PERMANENT HEARING LOSS. INDIVIDUALS VARY CONSIDERABLY IN SUSCEPTIBILITY TO NOISE INDUCED HEARING LOSS, BUT NEARLY EVERYONE WILL LOSE SOME HEARING IF EXPOSED TO SUFFICIENTLY INTENSE NOISE FOR A SUFFICIENT TIME. THE U.S. GOVERNMENT'S OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) HAS SPECIFIED THE FOLLOWING PERMISSIBLE NOISE LEVEL EXPOSURES:

DURATION/DAY IN HOURS SLOW RESPONSE	SOUND LEVEL IN dBA	DURATION/DAY IN HOURS SLOW RESPONSE	SOUND LEVEL IN dBA
8	90	1-1½	102
6	92	1	105
4	95	½	110
3	97	¼ or less	115
2	100		

ACCORDING TO OSHA, ANY EXPOSURE IN EXCESS OF THE ABOVE PERMISSIBLE LIMITS COULD RESULT IN HEARING LOSS. EAR PLUGS OR PROTECTORS IN THE EAR CANALS OR OVER THE EARS MUST BE WORN WHEN OPERATING THIS DEVICE IN ORDER TO PREVENT A PERMANENT HEARING LOSS, IF EXPOSURE IS IN EXCESS OF THE LIMITS AS SET FORTH ABOVE. TO ENSURE AGAINST POTENTIALLY DANGEROUS EXPOSURE TO HIGH SOUND PRESSURE LEVELS, IT IS RECOMMENDED THAT ALL PERSONS EXPOSED TO EQUIPMENT CAPABLE OF PRODUCING HIGH SOUND PRESSURE LEVELS SUCH AS THIS DEVICE BE PROTECTED BY HEARING PROTECTORS WHILE THIS UNIT IS IN OPERATION.

FBX and FBX Feedback Exterminator are registered trademarks of Sabine, Inc., and are the brand names of its line of automatic feedback controllers. Covered by U.S. Patent No. 5,245,665, Australian Patent No. 653,736, Canadian Patent No. 2,066,624-2, German Patent No. 69118486.0, and U.K. Patent No. 0486679. Other patents pending.

True Mobility, Graphi-Q, Power-Q, Real-Q, and Real-Q2 are trademarks of Sabine, Inc.

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THIS LIMITED WARRANTY VALID ONLY WHEN PURCHASED AND REGISTERED IN THE UNITED STATES OR CANADA. ALL EXPORTED PRODUCTS ARE SUBJECT TO WARRANTY AND SERVICES TO BE SPECIFIED AND PROVIDED BY THE AUTHORIZED DISTRIBUTOR FOR EACH COUNTRY.

Ces clauses de garantie ne sont valables qu'aux Etats-Unis et au Canada. Dans tous les autres pays, les clauses de garantie et de maintenance sont fixées par le distributeur national et assurée par lui selon la législation en vigueur.

Diese Garantie ist nur in den USA and Kanada gültig. Alle Export-Produkte sind der Garantie und dem Service des Importeurs des jeweiligen Landes unterworfen.

Esta garantía es válida solamente cuando el producto es comprado en E.U. continentales o en Canada. Todos los productos que sean comprados en el extranjero, están sujetos a las garantías y servicio que cada distribuidor autorizado determine y otrezca en los diferentes países.

**ONE-YEAR LIMITED WARRANTY/REMEDY**

SABINE, INC. ("SABINE") warrants this product to be free from defects in material and workmanship for a period of one (1) year from date of purchase PROVIDED, however, that this limited warranty is extended only to the original retail purchaser and is subject to the conditions, exclusions and limitations hereinafter set forth:

**CONDITIONS, EXCLUSIONS AND LIMITATIONS OF LIMITED WARRANTIES**

These limited warranties shall be void and of no effect if:

- The first purchase of the product is for the purpose of resale; or
- The original retail purchase is not made from an AUTHORIZED SABINE DEALER; or
- The product has been damaged by accident or unreasonable use, neglect, improper service or maintenance, or other causes not arising out of defects in material or workmanship; or
- The serial number affixed to the product is altered, defaced or removed; or
- The power supply grounding pin is removed or otherwise defeated. In the event of a defect in material and/or workmanship covered by this limited warranty, Sabine will repair the defect in material or workmanship or replace the product, at Sabine's option; and provided, however, that, in any case, all costs of shipping, if necessary, are paid by you, the purchaser.

THE WARRANTY REGISTRATION CARD SHOULD BE ACCURATELY COMPLETED, MAILED TO AND RECEIVED BY SABINE WITHIN FOURTEEN (14) DAYS FROM THE DATE OF YOUR PURCHASE.

In order to obtain service under these warranties, you must:

- Bring the defective item to any Authorized SABINE DEALER and present therewith the ORIGINAL PROOF OF PURCHASE supplied

to you by the AUTHORIZED SABINE DEALER in connection with your purchase from him of this product. If the DEALER is unable to provide the necessary warranty service, you will be directed to the nearest other SABINE AUTHORIZED DEALER which can provide such service. OR:

- Ship the defective item, prepaid, to:  
SABINE, INC.  
13301 NW US HIGHWAY 441  
ALACHUA, FL 32615-8544

Include therewith a complete, detailed description of the problem, together with a legible copy of the original PROOF OF PURCHASE and a complete return address. Upon Sabine's receipt of these items:

If the defect is remedial under the limited warranties and the other terms and conditions expressed have been complied with, Sabine will provide the necessary warranty service to repair or replace the product and will return it, FREIGHT COLLECT, to you, the purchaser.

Sabine's liability to the purchaser for damages from any cause whatsoever and regardless of the form of action, including negligence, is limited to the actual damages up to the greater of \$500.00 or an amount equal to the purchase price of the product that caused the damage or that is the subject of or is directly related to the cause of action. Such purchase price will be that in effect for the specific product when the cause of action arose. This limitation of liability will not apply to claims for personal injury or damage to real property or tangible personal property allegedly caused by Sabine's negligence. Sabine does not assume liability for personal injury or property damage arising out of or caused by a non-Sabine alteration or attachment, nor does Sabine assume any responsibility for damage to interconnected non-Sabine equipment that may result from the normal functioning and maintenance of the Sabine equipment.

UNDER NO CIRCUMSTANCES WILL SABINE BE LIABLE FOR ANY LOST PROFITS, LOST SAVINGS, ANY INCIDENTAL DAMAGES OR ANY CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE PRODUCT, EVEN IF SABINE HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

THESE LIMITED WARRANTIES ARE IN LIEU OF ANY AND ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR USE; PROVIDED, HOWEVER, THAT IF THE OTHER TERMS AND CONDITIONS NECESSARY TO THE EXISTENCE OF THE EXPRESS LIMITED WARRANTIES, AS HEREIN ABOVE STATED, HAVE BEEN COMPLIED WITH, IMPLIED WARRANTIES ARE NOT DISCLAIMED DURING THE APPLICABLE ONE-YEAR PERIOD FROM DATE OF PURCHASE OF THIS PRODUCT.

SOME STATES DO NOT ALLOW LIMITATION ON HOW LONG AN IMPLIED WARRANTY LASTS, OR THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATIONS OR EXCLUSIONS MAY NOT APPLY TO YOU. THESE LIMITED WARRANTIES GIVE YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH MAY VARY FROM STATE TO STATE.

THESE LIMITED WARRANTIES ARE THE ONLY EXPRESS WARRANTIES ON THIS PRODUCT, AND NO OTHER STATEMENT, REPRESENTATION, WARRANTY OR AGREEMENT BY ANY PERSON SHALL BE VALID OR BINDING UPON SABINE.

In the event of any modification or disclaimer of express or implied warranties, or any limitation of remedies, contained herein conflicts with applicable law, then such modification, disclaimer or limitation, as the case may be, shall be deemed to be modified to the extent necessary to comply with such law.

Your remedies for breach of these warranties are limited to those remedies provided herein, and Sabine gives this limited warranty only with respect to equipment purchased in the United States of America.

**INSTRUCTIONS-WARRANTY REGISTRATION CARD**

1. Mail the completed WARRANTY REGISTRATION CARD to:

SABINE, INC.  
13301 NW US HIGHWAY 441  
ALACHUA, FL 32615-8544

- a. Keep the PROOF OF PURCHASE. In the event warranty service is required during the warranty period, you will need this document. There will be no identification card issued by Sabine, Inc.

**2. IMPORTANCE OF WARRANTY REGISTRATION CARDS AND NOTIFICATION OF CHANGES OF ADDRESS:**

- a. Completion and mailing of WARRANTY REGISTRATION CARDS - Should notification become necessary for any condition that may require correction, the REGISTRATION CARD will help ensure that you are contacted and properly notified.
- b. Notice of address changes - If you move from the address shown on the WARRANTY REGISTRATION CARD, you should notify Sabine of the change of address so as to facilitate your receipt of any bulletins or other forms of notification which may become necessary in connection with any condition that may require dissemination of information or correction.

3. You may contact Sabine directly by telephoning (386) 418-2000.

4. Please have the Sabine product name and serial number available when communicating with Sabine Customer Service.

Manufactured by: Sabine, Inc.  
13301 NW US Highway 441

Alachua, Florida 32615-8544 USA

Phone: (386) 418-2000 • Fax: (386) 418-2001 www.Sabine.com

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Sabine, Inc.  
13301 NW US Highway 441  
Alachua, Florida 32615-8544 USA  
Phone: (386) 418-2000  
Fax: (386) 418-2001  
[www.Sabine.com](http://www.Sabine.com)

SWM7000 Series 2.4 GHz Smart Spectrum Wireless Systems Operating Guide