EC - DECLARATION OF CONFORMITY

CE MARKING

We, the Manufacturer

SABINE, INC.
13301 NW US HIGHWAY 441
ALACHUA, FLORIDA USA

declare that the product

RECEIVER
SABINE MODEL SWM7000

Is in conformity with

Council Directive: 73/23/EEC and 89/336/EEC (EMC Directives)
Standards to which conformity is declared:

EN 60065: 2001
EN 55022: 1998 Class B
EN 50082-1: 1998

Manufacturer Signature: _____

Date: 28 April, 2003 Name: Doran Oster, President

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This operating guide written for USB enabled receivers using Sabine SWM7000 Remote Control Software version 2.0 and above.

1. INTRODUCTION

Congratulations on purchasing a Sabine 2.4 GHz Smart Spectrum True Mobility™ Wireless System. True Mobility™ Wireless Systems give you all the built-in processing you need on every microphone, and offer unique and powerful features unavailable with any other wireless microphone

1.1. Section Contents

Section 2 **Product Views** — illustrates system components (front & back panel views, transmitters, accessory lists and part numbers).

Section 3 **Quick Setup** — gives the Quick Setup procedures for Receiver & Transmitter Operation and using the FBX Feedback Exterminator®. Note that there is also a quick-start label on top of your True Mobility receiver for the Sabine FBX Feedback Exterminator®, Compressor/Limiter and De-Esser functions.

Section 4 **Transmitter Operation** — details transmitter setup and operation.

Section 5 **Receiver Operation** — details receiver installation and setup.

Section 6 **Mic SuperModeling™** — explains the use of the Sabine Mic SuperModeling™ and lists the microphones modeled.

Section 7 **FBX Feedback Exterminator®** — explains how to set up your FBX filters.

Section 8 **Compressor/Limiter** — explains the use of the Compressor.

Section 9 **De-Esser** — details operation of the adaptive De-Esser.

Section 10 **Program Save & Recall** — explains how to save and recall individual program settings.

Section 11 **Multiple Systems** — how multiple systems interface, computer control of multiple systems, suggestions for maximizing the number of collocated systems.

Section 12 **Extension Antennas** — how to get maximum performance using a Sabine Extension Antennas (Antenna Distribution Amplifier also available for multi-receiver installations).

Section 13 **Sabine Remote Control Software** — how to control up to 70 channels from one PC.

Section 14 **Tips & Troubleshooting** — gives tips on how to get the best performance from your Sabine Wireless, and describes some possible operating problems and their solutions.

Section 15 **Appendices** — wiring diagrams, frequency charts, specifications, typical system diagrams and dip switch settings for Sabine 2.4 GHz Wireless systems.

Section 16 **Cautions & Warranties** — states caution and warranty information for your True Mobility™ Wireless system.

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2. PRODUCT VIEWS

2.1. Receivers

2.1.1. Front panel views

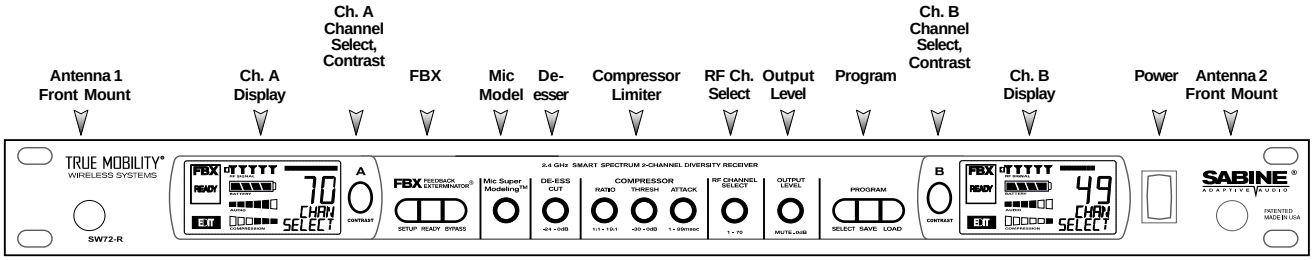


Fig. 2a - SW72-NDR & SW72-R Two-channel Receivers

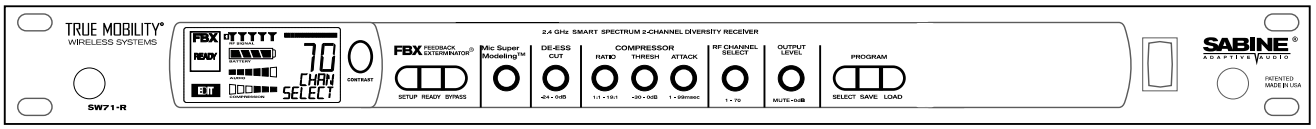


Fig. 2b - SW71-NDR & SW71-R One-channel Receivers

2.1.2. Back panel Views

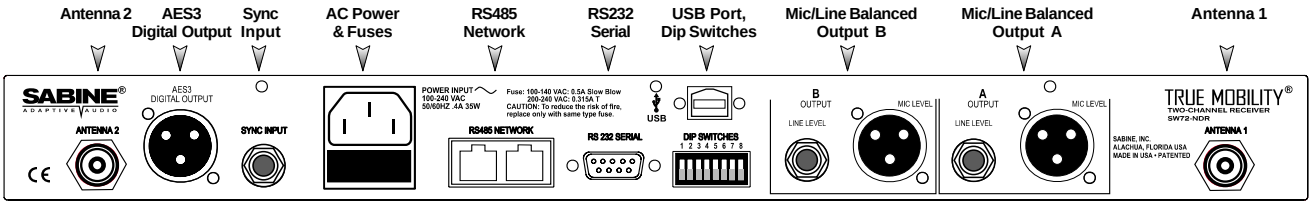


Fig. 2c - SW72-NDR Two-channel Receiver w/Network & Digital Interface

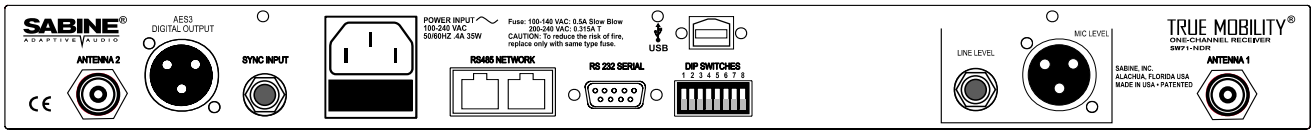


Fig. 2d - SW71-NDR One-channel Receiver w/Network & Digital Interface

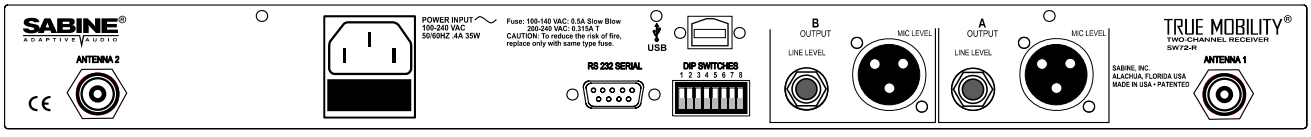


Fig. 2e - SW72-R Two-channel Receiver

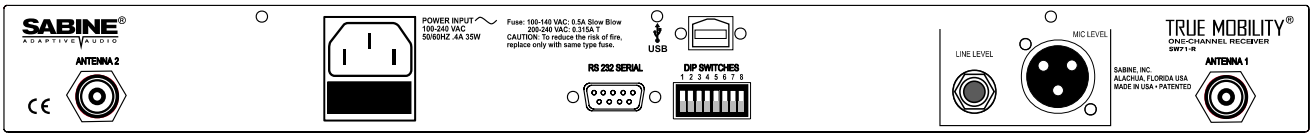
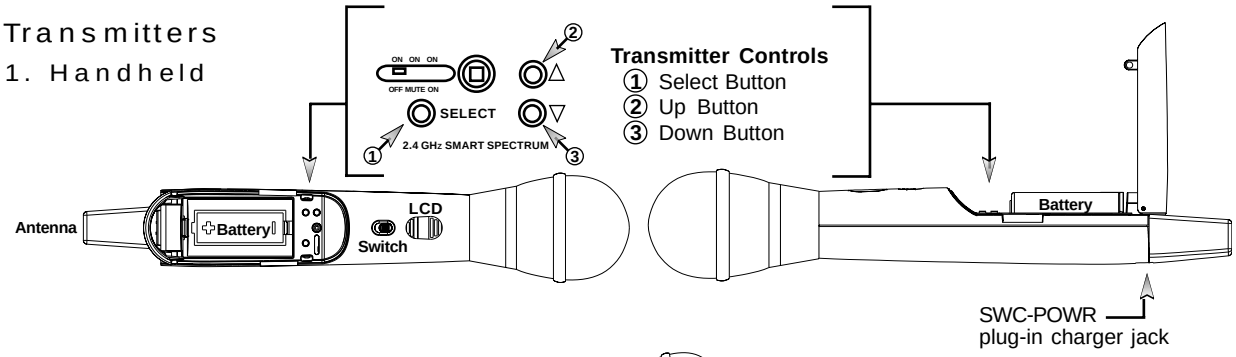


Fig. 2f - SW71-R One-channel Receiver

2.2. Transmitters

2.2.1. Handheld



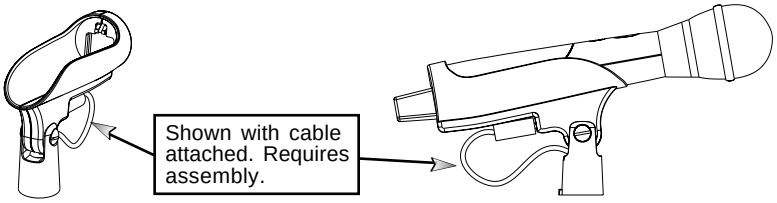


Fig. 2h - SWC70CL - SW70-HD3 & SW70-HD5 Mic Clip with Built-in Charger

2.2.2. Beltpack

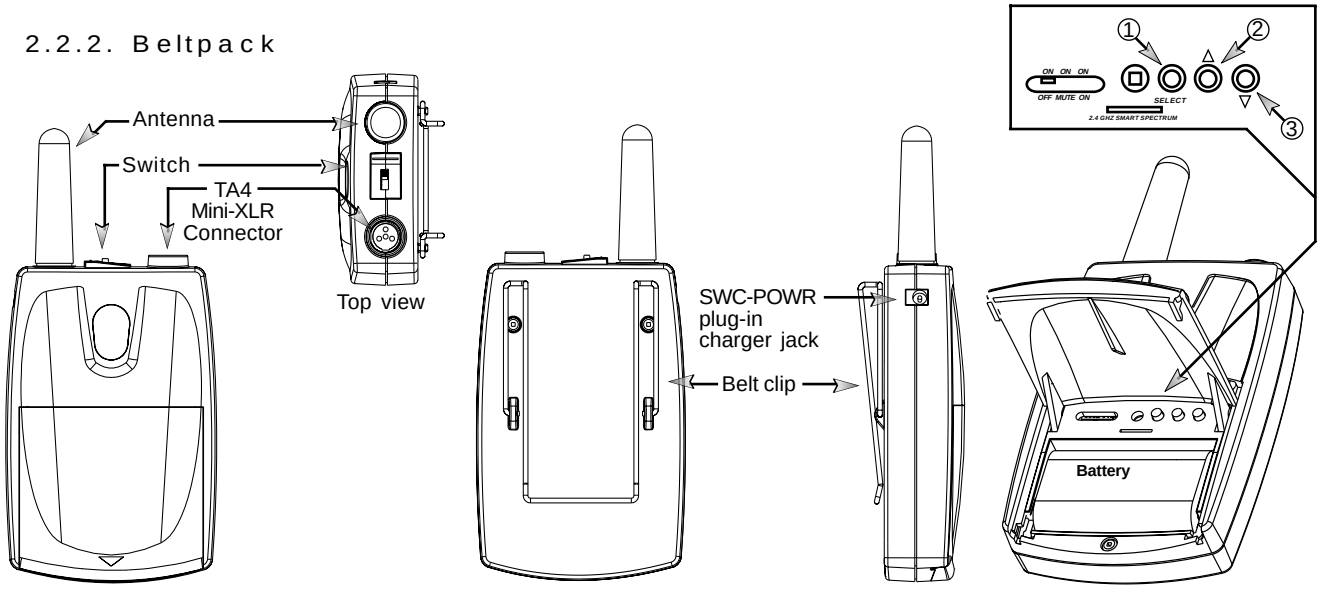


Fig. 2i - **SW70-T** Beltpack Transmitter

2.3. Components

Receivers

SW72-NDR: 2-Ch. Receiver w/Network & Digital Interface
SW71-NDR: 1-Ch. Receiver w/Network & Digital Interface
SW72-R: 2-Ch. Receiver
SW71-R: 1-Ch. Receiver

Microphones

SWT24L-TA4: Cardioid Lavalier Mic
SWT36L-TA4: Omni Lavalier Mic
SWT56W-TA4: Headworn Mic
SWT70BW-TA4: Voice Technologies Omni Headworn Mic (Black)
SWT70LW-TA4: Voice Technologies Omni Headworn Mic (Tan)
SWTVT50-TA4: Voice Technologies Miniature Omni Lavalier
SWT70G-TA4: Instrument Input w/cable

Transmitters

SW70-T: Beltpack Transmitter
SW70-HD3: Handheld Mic w/Dynamic Element (Audix OM3)
SW70-HD5: Handheld Mic w/Dynamic Element (Audix OM5)
SW70-HC: Handheld Mic w/Condenser Element

Antennas

SWA700: TNC Front to Rear Converter Kit (Set of 2)
SWA6SS: 2.4 GHz Antenna Distribution Amp for 6 systems
SWASS-EXT: 2.4 GHz Extension Antenna Kit (Set of 2)
SWAANT-2.4: 2.4 GHz Antennas (2)
SWATNC-N: RF Adaptor cable, Set of 4, TNC to NB
SWATNC-MCA: TNC Male Crimp Connector 2.4 GHz

Batteries

SWBC1: Rechargeable NiMH C for SW70-H
SWBAA2: Rechargeable NiMH AA set for SW70-T

Mic & Transmitter Accessories

SWCRJ45: RS485 Serial Connection Cable for ND Receivers
SWCCL: SW70-H Mic Holder w/Built-in Charger
SWCCL-2: Stage clip for SW70-H
SWCPOWR-EXT: Charger extension cable (3 meters)
SWCPOWR: Plug-in charger for SW70 Series Transmitters
SWC4P-TA4: Standard Mini-XLR Connector
Wind Screens available for all mics

⚠ ALKALINE BATTERY CAUTION ⚠ Alkaline batteries must be one of following types:	NEDA: 14A	ANSI: 14A	IEC: LR14
— DO NOT USE RECHARGEABLE ALKALINE BATTERIES —			

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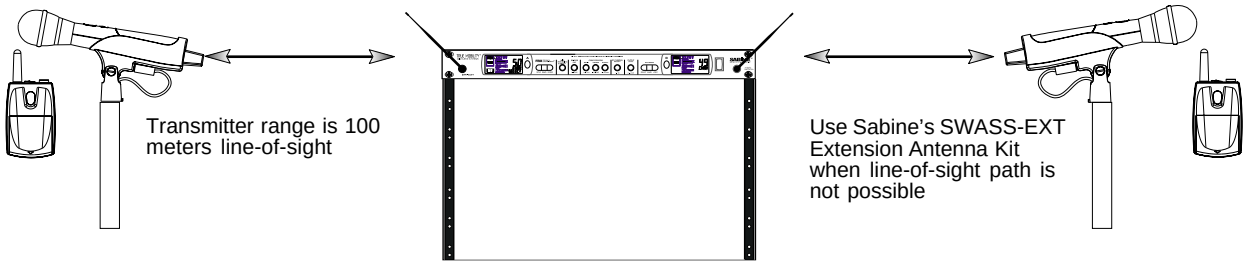
3. QUICK SETUPS

3.1. Receiver & Transmitter Quick Setup

*Please read **Section Four Transmitter Operation** and **Section Five Receiver Operation** for a complete understanding of how to set up your Sabine 2.4 GHz Smart Spectrum True Mobility™ System.*

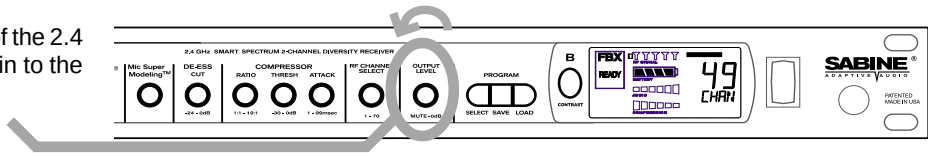
3.2. FBX Quick Setup

1

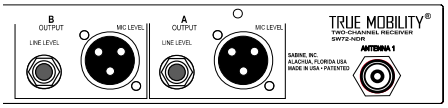


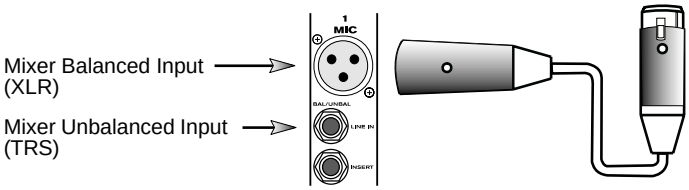
Be sure that all transmitters are off. Position receiver so that the antennas are within visual range of the intended transmitter locations. Transmitter range is about 100 meters, but structural objects in the transmission path can reduce that range. For best results, maintain a line-of-sight path between receiver antennas and transmitters (see Section 12). Use the **TNC Rear-to-Front Kit** (SWA700) included with the receiver to move antennas to front if necessary. See Appendix B for more information on multiple-system connection.

2 Turn the OUTPUT LEVEL of the 2.4 GHz receiver and mixer gain to the minimum settings.



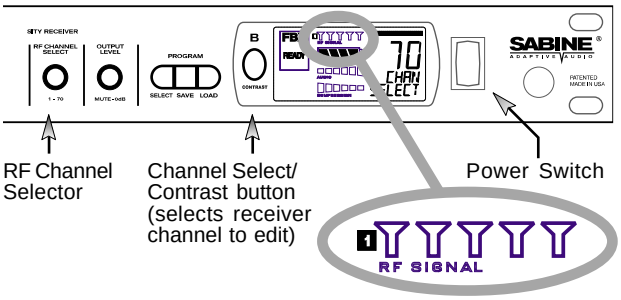
3 Connect the output (¼-inch or XLR jack) of your 2.4 GHz True Mobility™ receiver to the mic or line input of your mixer or amplifier (the receiver output gain can be adjusted to match the mixer input).





4

1. Turn on the receiver.
2. Tap the **Channel Select/Contrast button** to edit a receiver channel. (Not necessary on 1-channel SW71-R & SW71-NDR receivers).
3. Turn the **RF Channel Selector knob** to the desired channel.

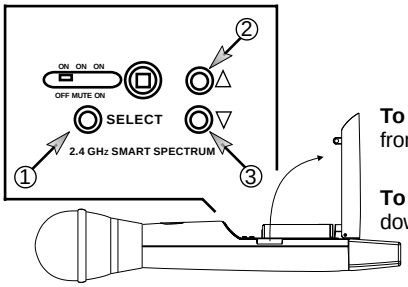


NOTE: Dual channel receivers will not allow you to select the same RF channel for both channels.

NOTE: Front panel RF Signal display will only register Sabine transmitters. It will not show RF interference. Use the RF Scan function in the software to scan for potential RF interference.

Transmitter Controls

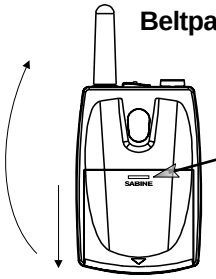
① Select Button
② Up Button
③ Down Button



To Open: Swing door up from indented area on body.

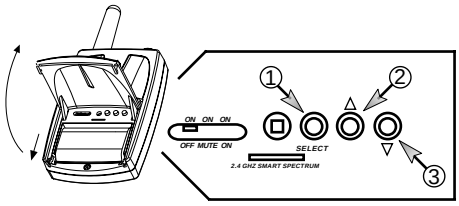
To Close: Swing door down until it latches.

Beltpack Opening/Closing Instructions



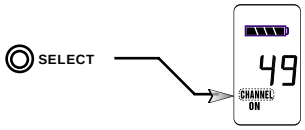
To Open: Press down **firmly** on Battery Door Handle and slide away from LCD, then swing up and back.

To Close: Swing door down, flush with transmitter body. Slide door up toward LCD. Push in and up firmly on Battery Door Handle with thumb until door lip catches.

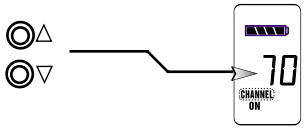


5

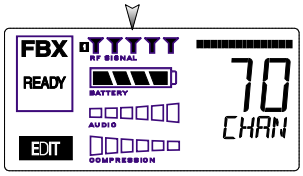
1. Turn on the transmitter.
2. Use the **SELECT** button until **CHANNEL** appears in the LED. NOTE: the transmitter is **muted during editing**.



3. Use the **UP** or **DOWN** button until the desired channel appears above **CHANNEL**.



4. Check that the receiver's **RF SIGNAL** display now indicates a strong signal (at least 3 bars).



6

Gain Adjustment Settings

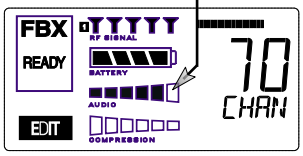
1. Transmitter (PAD Adjustment). *Adjust the Transmitter PAD setting if last segment of the Transmitter or Receiver Audio Level Meter lights up often, or remains on when mic or beltpack is used.*

1. Use the **Transmitter Select** button to scroll through functions until **PAD** flashes in the Transmitter LCD.

2. Use the **Up** or **Down** buttons to select the desired setting. Selection is stored after 3 seconds of inactivity.

3. Check to see if **Audio Level Meter** stays out of **Clipping Zone**

Adjust PAD setting so that Receiver Audio Level Meter stays out of the clipping zone (last segment)



2. Receiver. Adjust the receiver **Output Level** to supply a strong input level to the mixer, amplifier or active loudspeaker. If your receiver output is connected to a microphone level input on the mixer, keep the receiver output gain lower than when connecting to a line level mixer input. NOTE: -10 is a good place to start.

3. Mixer. Adjust the output gain of the mixer so that the mixer output meters approach clipping when all the inputs to the mixer are active, and the audio program reaches its peak level.

4. Amplifier/active loudspeaker/crossover. Finally, adjust the amplifier gain control (and/or crossover gain, if one is used) to provide the desired level of sound pressure in the auditorium or listening area.

See Section **4.2.3 Adjusting Transmitter Settings** for more information.

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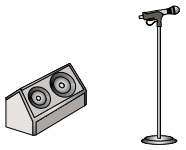
1 Place microphone and speakers in primary position.
Press and hold the **SETUP button** (Fig. 3d) on the receiver until the



2 LCD **SETUP indicator** (Fig. 3e) flashes 4 times and SETUP stays lit — then release it.

NOTE: DO NOT TALK INTO YOUR SYSTEM while in Setup Mode.

Slowly raise the gain on the mixer or amp until FBX eliminates the first few feedback tones. With each new feed-

Fig. 3d - FBX: SETUP

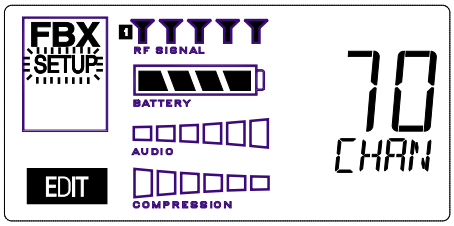
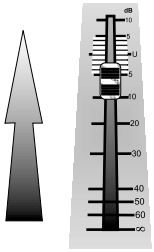


Fig. 3e - SETUP indicator flashing

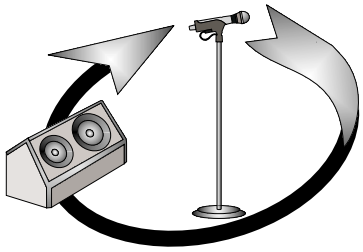
3 back frequency, you will hear a short, quiet burst of feedback that will disappear immediately as a filter is set.

Pause raising the gain, and move the microphone to another area where it will be used. Resume slowly raising the mixer gain, until FBX eliminates a few more feedback tones.

Repeat until the **SETUP** indicator automatically turns off and the **READY** indicator comes on.

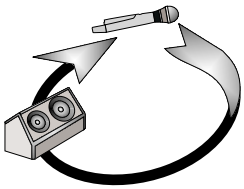


Mixer Channel

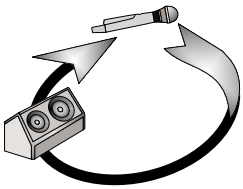


Location #1

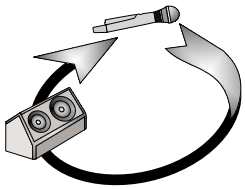
4 **NOTE:** You may quit **SETUP** mode at any time prior to its automatic exit by simply pressing the **READY** button.



Location #2



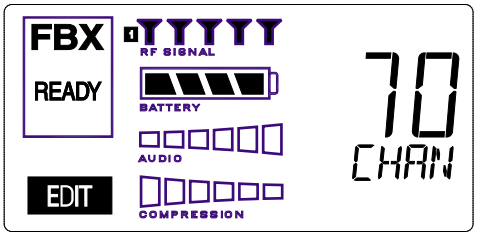
Location #3



Location #4 (if necessary)

NOTE: When choosing microphone setup locations, try to anticipate likely areas where the microphone will be positioned or moved to, or areas that may be especially prone to feedback problems (e.g., under an overhead speaker).

5 This will enable ready-to-operate status, but with fewer fixed FBX filters in place. In the default factory setting, dynamic FBX filters will still be held in reserve to catch and eliminate new feedback, regardless of how or when SETUP mode is exited. (See **Section 14.3.2** for details on the differences between fixed and dynamic FBX filters and **Section 13.4.2.1** for instructions on changing the balance of fixed versus dynamic FBX filters using the Remote Control Software or **Appendix D** for using the Dip Switches on the back of the receiver).

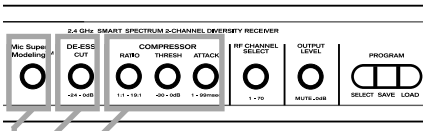


3.2.2. FBX Bypass

The **BYPASS button** (Fig. 3d) bypasses only the FBX filters, and not the additional signal processing (de-essing, compression and Mic SuperModeling™) available on the True Mobility™ Wireless Receiver. This is a useful button that allows comparison of the sound quality when FBX filters are in place, to the sound with no filters (the quality should be very similar). **Before pressing BYPASS, take care to reduce your overall system gain so that you do not release suppressed feedback!**

FBX BYPASS CAUTION

Bypassing FBX filters may allow suppressed feedback to be released!



COMPRESSOR/LIMITER

Vocal Settings

RATIO A soft voice could be set to 2:1, whereas a loud voice might require a ratio setting of 6:1.

THRESH The higher the threshold setting, the more signal is required to initiate compression. Ideally this should be set to reign in peak levels, and allow signals of lower gain to pass uncompressed. Threshold settings will depend on the nature and variety of the signal source.

ATTACK Short attack times usually work well for voice. However, too strong a compression ratio, too low a threshold, and too fast an attack may attenuate speech consonants, which provide important intelligibility cues to the audience, thus compromising clarity.

Vocals

RATIO

Soft voice — Loud voice

THRESH

Soft voice — Loud voice

ATTACK

Short attack is better for vocals. Be careful not to over attenuate speech consonants.

Guitar Settings

RATIO A high compression ratio (with gain makeup) will add sustain to held notes and chords.

THRESH Moving the threshold will change the audible thick/thinness of the guitar tone, but generally you want to compress all the notes played.

ATTACK Be wary of too quick an attack, which may reduce the percussive attack of the guitar notes.

In general, be wary of too much gain makeup, and too high a compression ratio, which may make a noisy guitar amplifier more objectionable. Ratio settings might range from 6 to 19:1, threshold variable, slower attack, soft knee, output gain boosted slightly to significantly depending on amount of compression.

Guitar

RATIO

Less Sustain — More Sustain

THRESH

Thinner sound — Thicker sound

ATTACK

Be wary of too quick an attack, which may reduce the percussive attack of the guitar notes.

Bass Guitar Settings

RATIO Set to 4:1

THRESH Set to compress peaks only.

ATTACK Quick attack, medium release, hard knee; (try various release settings, depending on the speed of notes played).

GAIN Output boosted slightly.

DE-ESSER

DE-ESSER

Less reduction — More reduction

MIC SUPERMODELING™

MIC SUPERMODELING

Scroll through available microphone settings. See website for additional downloadable microphones.

NOTE: Mic SuperModeling™ is not available using beltpack transmitters.

NOTE: ***Use these settings as a place from which to start, then adjust to your own satisfaction.***

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3.3. Tips for Good RF Performance

- Avoid potential sources of RF interference by performing a scan using Sabine's Remote Control Software., which will reveal the ambient RF level in your area on each channel of your system. Please refer to Section 13.4.2.5. for information on the RF Scan function, which will automatically determine the best RF channels to use.
- If you cannot perform a scan then proceed to use your system, beginning with Channel 1. If you hear any RF "hits" or dropouts, then try another of the 70 available channels.
- For best results, maintain line-of-sight from transmitter to receiver. Use either front or rear panel antenna mounting to maintain line-of-sight.
- Mount receiver antennas at 90 degrees to one another, leaning away at 45 degree angles, in the same plane.
- When using multiple receivers, try to maintain at least 1 foot (30 cm) distance between antennas from different units. When such antenna spacing proves difficult or impossible, we recommend using Sabine's SWA6SS Antenna Distribution Amplifier. The SWA6SS works with up to six receivers, or 12 channels.
- Maximize the distance between the receiver and light sources, such as fluorescent bulbs or neon signs, which may emit very short-range, broadband interference.
- Maximize the distance between transmitters and receivers and potential sources of RF interference.
- Maintain a minimum distance of at least 3 meters (10 feet) between transmitters and receivers or extension antennas. This can solve many anomalies.
- Turn on your system one component at a time, beginning with the first receiver.
- Be careful not to set more than one transmitter to the same channel; each paired transmitter and receiver should be set to unique corresponding channels, until all channels are receiving clearly and cleanly.

Antenna Placement Caution

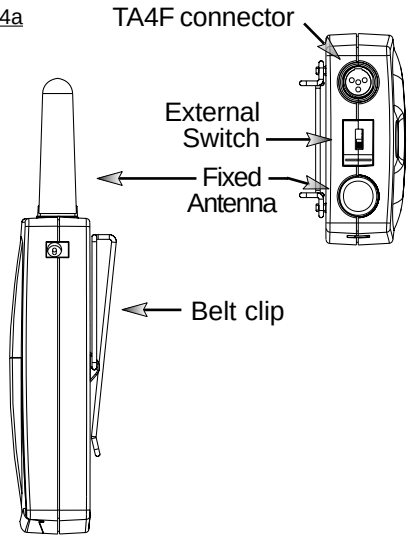
As a general precaution, keep 2.4 GHz cordless telephones, microwave ovens, WLAN antennas and 2.4 GHz wireless video camera transmitters twice the distance from your Sabine wireless microphone system antennas as that of your Sabine 2.4 GHz transmitters.

3.4. Common Sources of RF Interference

- **Microwave ovens:** In the vast majority of situations, interference from microwave ovens will not affect performance of your SWM7000 series microphone systems. 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). See caution at left.
- **Wireless Local Area Networks (WLANS):** 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 should not be affected by these WLANS because their spread spectrum technology does not present a problem for the Sabine Smart Spectrum™ system. The Sabine wireless system will not interfere with the WLAN. See caution at left.
- **2.4 GHz Cordless phones:** These home telephones broadcast at very low power and should not present interference problems for your Sabine wireless. This is especially true if the telephone uses spread spectrum technology. See caution at left.
- **Wireless Video Cameras:** Certain wireless video cameras (X10, for example) use the 2.4 GHz band. These devices are also very low power and, in general, should not present a problem when using the SWM7000 system. See Section 5 Receiver Operation for methods of optimizing clear reception and minimizing interference. See caution at left.

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

Fig. 4a



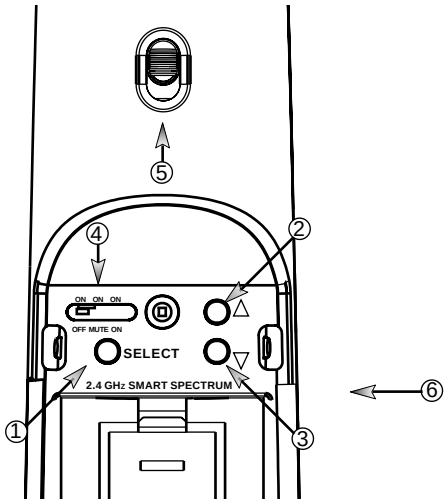


Fig. 4b SW70H Handheld Control Setting Buttons

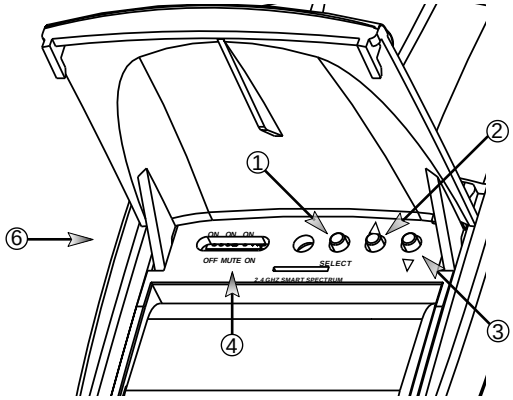


Fig. 4c SW70T Transmitter Control Setting Buttons

1. Select Button
2. Up Button
3. Down Button
4. Programmable Control of External Switch
5. External Switch
6. Recessed control and battery compartments

4. TRANSMITTER OPERATION

4.1. First step

Before you begin, let's look at a few basics regarding your transmitters. The handheld mic is ready to go — the microphone and transmitter are combined in one unit. To use the belt pack transmitter, however, you will have to connect a lavalier or headworn microphone (or instrument pickup) to its input. Sabine lavalier and headworn mics, and Sabine's guitar/instrument connector (SW70G-TA4) come equipped with the proper TA4F connector, and are ready to plug right in. Be sure to line up the pins properly — do not force the connector into the belt pack.

If you are using a different microphone with the Sabine belt pack, please refer to the **Appendix A** for the required wiring plan. Failure to use the proper wiring scheme may damage your mic or the belt pack, and void your warranty.

Use the clip on the back of the belt pack transmitter to attach it to your belt or clothing. The spring clip can be removed and reversed, to allow the transmitter and antenna to point either up or down in its clipped-on position. You can also remove the clip if you choose to keep the transmitter in your pocket. NOTE: it is essential that transmitters retain a line-of-sight relationship with the receiver antennas.

4.2. Displays and Settings

Your Sabine 2.4 GHz Smart Spectrum handheld microphone and belt pack transmitter have many powerful features, all of which are easily monitored (using the transmitter LCD display) and adjusted. The controls and displays for both handheld and belt pack transmitters are identical in function, though positioning differs (compare figures 4b & 4c). The LCD display and one control switch are located on the exterior of the transmitters. A more powerful set of recessed controls is located under the hinged access panel, to prevent accidental or inappropriate alteration of settings.

4.2.1. LCD Display

When the transmitter is first turned on, it shows an initial test screen (Fig. 4f), followed by the default screen (Fig. 4g). The LCD also reverts to this default display within a few seconds after any programming changes are made with the recessed controls. The default LCD display always shows transmission channel, audio level, and battery voltage level; additional information will appear to indicate important changes caused either by user adjustments, or automatically as transmitter status changes.

4.2.2. Accessing Transmitter Controls

Control of all your transmitter functions is made using the **Select** button and the **Up/Down** buttons. These control buttons are located inside the access compartment on the beltpack or handheld transmitters.

Opening the Beltpack Transmitter Access Compartment:

1. Press down firmly with both thumbs on door handle (above Sabine logo) and slide away from LCD.
2. Lift bottom edge of door slightly and continue pulling door down away from LCD until the door opens fully (90-degree angle from transmitter body).

Closing the Beltpack Transmitter Access Compartment:

1. Swing door down, flush with transmitter body.
2. With both thumbs pressing firmly on door handle (above Sabine logo), slide door up toward LCD until door lip catches under main body of transmitter, and bottom of door is flush with bottom of transmitter body.

Opening the Handheld Transmitter Access Compartment:

1. Grip door handles with thumb and index finger and lift up.

Opening the Handheld Transmitter Access Compartment:

1. Fold door closed until flush and locked in place.

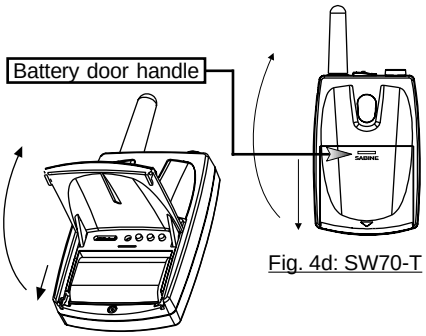


Fig. 4d: SW70-T

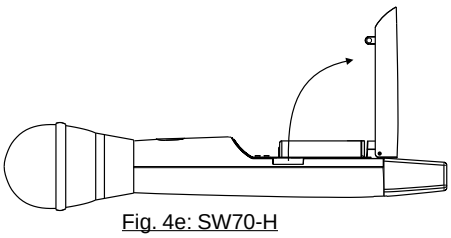


Fig. 4e: SW70-H

BEFORE CHANGING BATTERY

Turn off transmitter before changing battery(s).

Transmitter LCD Display Indicators

Fig. 4f: Start up Transmitter LCD display

CHARGE: Illuminates when the transmitter battery is being charged (i.e., when the charger is connected, either by direct plug-in or by placing the handheld mic in the Sabine charging clip).

BATTERY VOLTAGE LEVEL METER: Indicates measured battery voltage; the more segments illuminated, the higher the voltage, and the greater the remaining battery life.

AUDIO LEVEL METER: Shows the audio output level of the transmitter (affected by the pad setting).The last and largest segment indicates clipping.

PARAMETER VALUE: In default mode this indicates the RF TRANSMISSION CHANNEL chosen for the transmitter. In conjunction with the Select button (see figures 4b & 4c), this field will also display battery run-time hours, or when a low frequency roll-off filter or an attenuation (pad) is active (see Fig. 4g).

"**TIME**": Displays when battery run-time hours are being displayed.

"**MUTE**": Indicates output is currently muted.

"**PAD**": Illuminates when the microphone pad is turned on. Use this if the audio meter shows clipping.

"**ON**": Illuminates when either the audio and RF transmission, or the RF transmission only, are turned on.

"**CHANNEL**": Illuminates in default mode to display transmission channel.

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Transmitter LCD Display Cycle

Pressing the Parameter Select button cycles the LCD through the following screens. Individual screens appear for approximately 4 seconds, during which the function is editable.

NOTE: The SW70-H handheld microphone has PAD settings of 0, -6, -14 and -20 only. All transmitters are shipped at the default setting of -14.

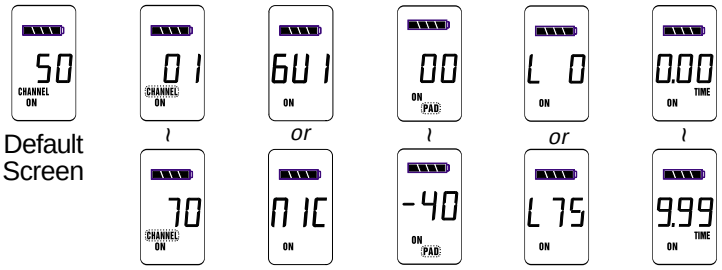

Fig. 4g

Handheld Microphone PAD Settings

Your new Sabine wireless handheld microphone is designed to accept a wide range of input levels, from spoken word all the way up to screaming vocals. In order to accommodate this broad range of inputs, the transmitter has a PAD setting. Handheld mics are set to a factory default of -14 dB, which is the preferred setting for concert vocal performance.

If you need more output out of a microphone (the receiver LCD audio meter shows the mic output level) then change the PAD settings as described below. When any level of attenuation is programmed, the default screen will illuminate PAD.

Transmitter PAD Adjustment

(See Fig. 4b, 4f & 4g)

1. Use the Transmitter Select button to scroll through functions until PAD flashes in the Transmitter LCD.
2. Use the Up or Down buttons to select the desired setting. Selection is stored after 3 seconds of inactivity.
3. Check to see if the receiver's Audio Level Meter stays out of the Clipping Zone.

Suggested PAD Settings

Venue	PAD
Speech	0 dB
Loud speech & vocal performance	-6 dB
Strong vocal performance (default)	-14 dB
Very strong vocal performance	-20 dB

Programmable External Switch

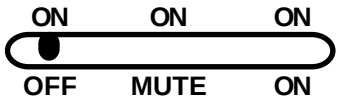

Fig. 4h - Programmable Control of External Switch

4.2.3. Adjusting Transmitter Settings

DEFAULT/CHANNEL: Press the Select button to enter Edit Mode, and repeat until the CHANNEL indicator flashes. In this mode, the Up/Down buttons will adjust Transmission Channel (1-70 available).

INPUT: (SW70-T Beltpack Transmitter only) Either "MIC" or GUI" for microphone or instrument. You are required to choose the input in order to program both the transmitter and the receiver to optimize the input settings. Choosing MIC automatically selects the 75 Hz roll-off filter. You can choose to remove that but the extended low frequency response of the SW70-T may reproduce too much low energy for your system, so beware. Choosing GUI automatically removes the 75 Hz roll off filter for that added bottom end in your instruments. NOTE: You can manually change that filter setting as needed.

PAD: Transmitter PAD setting. Press the Select button until the PAD indicator flashes. The Up/Down buttons will adjust attenuation (**SW70-H**: 0, -6, -14, -20 dB; **SW70-T**: 0, -3, -8, -11, -14, -17, -20, -30 dB). When any level of attenuation is programmed, the default screen will illuminate PAD. See margin notes on this page and p.15 for settings instructions.

TIME: Battery Run-Time Hours. Selecting this option changes the display to indicate the length of power-on time (hours and minutes) since the last battery change or recharge.

NOTE: Battery run-time hours will reset when the transmitter (with battery in place) is connected to a charger. In the case of the charger, run-time hours will not start again until the charger is disconnected. You can manually reset the run-time hours by pressing both the up and down arrows. Use this to count hours when you use alkaline batteries.

LOW FREQUENCY ROLL-OFF: Selecting this option adds a 12 dB/octave low frequency roll-off filter, starting at 75 Hz, to the audio output of the transmitter. A roll-off filter may help reduce microphone handling noise, or other unwanted low frequency content. Pressing the Up or Down button toggles between the conditions of no filter (indicated in the display as L 0) or low roll-off (indicated by L 75).

INTERNAL CONTROL OF EXTERNAL SWITCH: The recessed controls include a 3-position switch, which in turn determines how the transmitter's external two-position switch behaves (see figures 4a, 4b & 4h). From left-to-right, the 3 positions of the internal switch correspond to the following external switch operations:

1. **ON/OFF**. In internal position #1, the external switch acts as a typical on/off switch. Use this setting if you trust the microphone user to switch the microphone on and off as needed, and/or wish to conserve transmitter battery life during down times. In the ON position the transmitter LCD will display ON. Both audio and RF are on. In the OFF position the LCD ON is no longer illuminated. Both RF and audio are off, and the battery run-time hours meter is off. Note that Sabine's squelch system prevents any "popping" when switching the transmitter on and off. However, this protection causes a very short "power-on" delay in the reactivation of the audio when the external switch is turned from OFF to ON.

2. **ON/MUTE.** In internal position #2, the external switch acts as a typical mute switch. Use this setting if you trust the microphone user to switch the microphone audio output on and off as needed; it will not conserve battery life in MUTE condition, but will allow the receiver to monitor and display the RF signal strength in either switch position. In the on position the default LCD will display ON. Both audio and RF are on. In the off position the word MUTE is displayed in the LCD. The audio is muted but the transmitter is still transmitting the RF signal, and the battery run-time meter is running. There are no audible pops when switching the transmitter between MUTE and ON. Switching from MUTE to ON will instantaneously pass audio signal (there will be NO delay as with internal position #1).
3. **ON/ON.** In internal position #3, the external switch is disabled. The transmitter (both RF and audio) is always on, and the word ON is always displayed in the transmitter LCD screen. Use this setting if you do not want to allow the speaker or performer to turn off the transmitter, or are worried that a transmitter may be accidentally turned off. Caution: When your program is over we suggest you move this switch to another setting so you can turn off the transmitter and save your battery. You may also elect to remove the battery (though replacing the same one will restart the run-time meter and affect its accuracy accordingly).

Once you have completed the transmitter setup, you are ready to work with your receiver (see Section 5). First, however, let's talk about the issues and solutions concerning the source of transmitter power: the battery.

4.2.4. Transmitter Battery Management

4.2.4.1. Battery problems and Sabine solutions

Rechargeable Battery memory. Batteries that are repeatedly recharged prior to a complete discharge may fail more quickly in subsequent uses. This problem is usually referred to as "battery memory." Fortunately, Sabine's innovative Tireless Wireless™ Charger takes steps to avoid this problem, by automatically reconditioning the battery whenever its intelligent diagnostics determine this is appropriate. **For this process to work best, we recommend that each charger be paired with a specific transmitter for a "monogamous" charging relationship.** If you have multiple pairing options — i.e., multiple channel systems, we recommend color- or number-coded charger/transmitter pairs. With these precautions, use of Sabine's Tireless Wireless™ Charger will insure maximum life per battery charge, and also prolong the useful multiple-charge life span of rechargeable batteries.

Battery life. Both handheld and beltpack transmitters can work with disposable alkaline, disposable heavy-duty (manganese dioxide-carbon zinc), or rechargeable Nickel Metal Hydride (NiMH) batteries. We specifically caution against using NiCad rechargeables due to well-known battery memory problems, and specifically recommend using the Sabine-supplied SWBC1 (C-cell for the handheld microphone) or SWBAA2 (double-A for the belt pack) batteries. With the Sabine-supplied rechargeable SWBC1, the typical recharge life of the handheld transmitter battery is 8 hours (typically, an alkaline C-cell will give about 12 hours). The beltpack's rechargeable SWBAA2 batteries will last about 8 hours per recharge (typically, alkaline AA batteries will last about 10 hours). NOTE: Heavy-duty batteries will fall somewhere in the middle, between rechargeables and alkalines.

Beltpack Transmitter PAD Settings

The SW70-T beltpack transmitter has a broad range of PAD settings, which allow you to use it with almost any microphone or instrument. As in all audio equipment, the setting of the input level is crucial to achieving the best sound quality. Setting minimal PAD levels (-3, -6, or -10 dB) may produce a distorted sound if you are using a high output microphone or instrument. Conversely, setting a more extreme PAD level (-40, -37, or -34 dB) may require you to raise your system gain unnecessarily, resulting in a noisier output. Watch the input meter on either the transmitter or the receiver (see illustrations) and set your level so there are at least three indicators illuminated for normal program level, with an occasional move to the fourth indicator. The fifth and biggest indicator denotes clipping – watch out! If you see clipping, choose a lower pad setting (for example, from -10 to -14 dB).

Transmitter PAD Adjustment

(See Fig. 4c, 4f & 4g)

1. Use the Transmitter Select button to scroll through functions until PAD flashes in the Transmitter LCD.
2. Use the Up or Down buttons to select the desired setting. Selection is stored after 3 seconds of inactivity.
3. Check to see if the receiver's Audio Level Meter stays out of the Clipping Zone.

Suggested PAD Settings

Venue	PAD
Low output microphones	-10 dB
Standard mics & acoustic instruments with low-gain pickups	-14 dB
Electric guitars with low-gain pickups & mics with higher gain	-20 dB
Most standard electric guitars	-26 or -30 dB
Instruments with high-gain pre-amps	-34 dB

Tech Tip

Transmitter/Charger Pairing

For best results, pair each charger with a specific transmitter for a "monogamous" charging relationship.

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IMPORTANT BATTERY INFORMATION

Acceptable Batteries for use with Handheld & Beltpack Transmitters

SW70-H Handheld Microphones

1 "C" size (26x50mm, 単2電池1本使用**)**

- **NiMH Rechargeable (Sabine part #: SWBC1)**
- **Alkaline: NEDA 14A - ANSI 14A - IEC LR14**
- **Heavy Duty batteries (NOT recommended)**

SW70-T Beltpack Transmitters

2 "AA" size (14.5x50.5mm, 単3電池2本使用**)**

- **NiMH Rechargeable (Sabine part #: SWBAA2)**
- **Alkaline: NEDA 14A - ANSI 14A - IEC LR14**
- **Heavy Duty batteries (NOT recommended)**

Alkaline batteries must be one of following types:

NEDA: 14A ANSI: 14A IEC: LR14

WARNING! DO NOT USE Alkaline Rechargeable Batteries

Alkaline "C" Rechargeable Batteries

Alkaline "AA" Rechargeable Batteries

FIRST-TIME BATTERY CHARGING

Your Sabine True Mobility® transmitter comes with one or more rechargeable NiMH batteries. **For best results, charge the battery for at least 8 hours before using it for the first time.** Please note that the full charging potential of the battery will be achieved after the first 5 charging cycles have been completed.

NiMH rechargeable batteries are highly resistant to "memory effect," which affects some other rechargeable batteries. The included NiMH batteries will provide more lifetime charges and longer battery life for each charge than many other rechargeable batteries.

BEFORE CHANGING BATTERY

Turn off transmitter before changing battery(s).

Sabine rechargeable battery advantages. Here are several more good reasons why you can feel more confident about using rechargeable batteries:

1. All transmitters report two types of battery status information. The first report is the all-important voltage the battery is supplying. Second, you'll know how long the battery has been in use (battery run time hours). Each receiver channel also receives telemetry information from its associated transmitter, regarding the battery voltage, and displays the information in the receiver LCD (see figure 5b). When the voltage reaches a level indicating an estimated 30 remaining minutes of useful battery life, both transmitter and receiver automatically flash warnings in their LCD displays. As an alternative means of anticipating battery depletion, you can check the number of hours of use, by checking the transmitter LCD display (see Section 4.2.2 and figure 4g), or the Remote Control Software.
2. The handheld microphone clip that we provide with each handheld transmitter not only holds the microphone — it also can double as an unobtrusive charger housing. Anytime the mic is parked in the clip (and the clip is connected to the charger power supply), the mic is being charged. As an additional safety margin against battery failure, the mic placed in the powered clip gets its power from the charger, not the battery, so it will work perfectly even if the battery is completely dead.
3. Sabine's intelligent charger circuitry detects the type of battery in place within the battery compartment, and automatically turns off the charger if the battery is not compatible with the charger.
4. The Tireless Wireless™ Charger detects when a battery is fully charged, and turns off the charging cycle.
5. The Tireless Wireless™ Charger prevents futile attempts to resuscitate dead batteries — if the battery is unresponsive, the charging cycle is stopped.
6. Belt pack and handheld batteries can be recharged without removing them from the transmitters. Just connect charger plug to the transmitter jack (see Fig. 4l).

NOTE: In the "most discharged" battery condition, a full recharge may take up to 10 hours for a handheld C-cell, or 3 hours for the AA batteries used with the belt pack transmitter. When in doubt, charge the batteries overnight. Sabine's battery-protection circuit will shut the charger down when charging is completed.

4.2.4.2. Charging Your Batteries

Equipment Connections. Each SW70T or SW70H transmitter comes equipped with an SWC-POWR Tireless Wireless™ plug-in charger (see Fig. 4l). In addition, each SW70H comes with its own battery-charging mic clip (SWC70-CL). The SWC-POWR charger can be plugged directly into either the transmitter or into the clip. A Sabine rechargeable battery (SWBC1) will charge whenever the mic clip is connected to the Sabine SWC-POWR charger and the handheld is properly placed within the mic clip.

Charging Indicators. Much like your cell phone, the transmitters will let you know the charging status of the battery. When the battery is charging, the battery meter will flash to indicate the relative level of the charge — one, two, three or four elements will flash (see Fig. 4i).

Once the battery is fully charged, all four elements in the battery meter will flash. This indicates that the charging circuit is no longer on (see Fig. 4j).

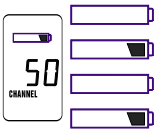
NOTE: The right-side indicator segment will flash for several minutes when charging is first attempted (see Fig. 4h). The lower the battery level, the longer this initial "testing/not charging" flashing sequence will continue. During this time, the Tireless Wireless battery circuit is evaluating the suitability and charge status of the battery in place. When it has completed its evaluation, it will either commence the progressive flashing depicted in figure 4i (CHARGING), or continue to flash (TESTING/NOT CHARGING). All segments flashing in unison signifies that the battery is fully charged (see Fig. 4j).

These same indications will also be displayed on the receiver LCD, and on the Remote Control Software screen.

NOTE: The Tireless Wireless battery charger will only charge NiMH rechargeable batteries. If you place any other kind of battery in the transmitter, and then attempt to charge it by connecting the charger, the Tireless Wireless circuit will detect the type of battery and will not begin charging. Again, the battery indicator on the transmitter will flash the right-side element indicating testing/no charging (see Fig. 4h).

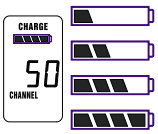
Battery Warnings. When the transmitter battery voltage drops below a critical threshold, the battery icon (which normally displays the voltage level) will begin to flash. This will occur on the transmitter and receiver and is an indication that you need to replace the battery, or charge it by placing the handheld mic in the charger clip. NOTE: Microphone will still transmit audio when placed in clip. Alternatively, you can connect the charger directly to the transmitter using the built-in charger jack located on the side of the beltpack transmitter and near the antenna on the handheld transmitter (see Fig. 4l). If the battery is not changed or recharged, the transmitter will eventually turn off (see Fig. 4k).

Fig. 4h: ***TESTING/NOT CHARGING***



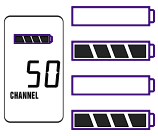
Right-side battery indicator segment will flash to indicate that the battery is being tested. This occurs prior to charging a NiMH battery and whenever a non-rechargeable battery is placed on charge. Charging is not occuring when indicator lights in this fashion.

Fig. 4i: ***CHARGING***



Battery indicator segments will flash progressively starting from the relative charge state of the battery. This example depicts a fully discharged battery being charged. As the charge progresses, left-side segments will remain visible as right side segments continue to flash, until all segments are visible. At that point, all segments will flash on and off in unison (see Fig. 4j).

Fig. 4j: ***FULL CHARGE***



Battery indicator segments will flash in unison to indicate that the battery is fully charged.
NOTE: Battery can be left connected to the charger and will receive periodic maintenance charging.

Fig. 4k: ***Battery CHARGE LEVEL displays***

Fully Charged
Partially Used
Very Used
Very Low (Flashing)

NOTE: When the battery has reached a specific discharge level, the transmitter will automatically turn off, and the transmitter LCD will display the message at right.

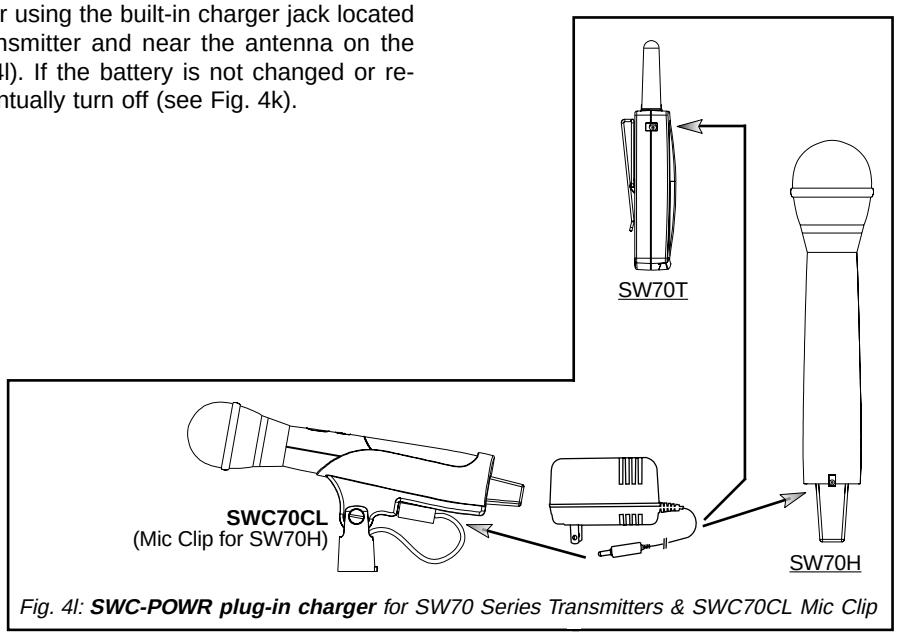


Fig. 4l: ***SWC-POWR plug-in charger*** *for SW70 Series Transmitters & SWC70CL Mic Clip*

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5. RECEIVER OPERATION

5.1. LCD Display.

The receiver LCD display is shown below (Fig. 5b). Two-channel receivers feature two LCDs, one for each channel. The display provides a snapshot report of the condition of your wireless channel, including battery status information sent from the transmitter by telemetry.

The right two-thirds of the display primarily shows status information regarding the condition of your receiver channel, as follows:

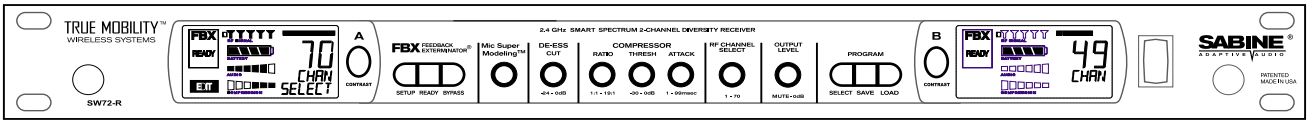


Fig. 5a: SW72R front panel

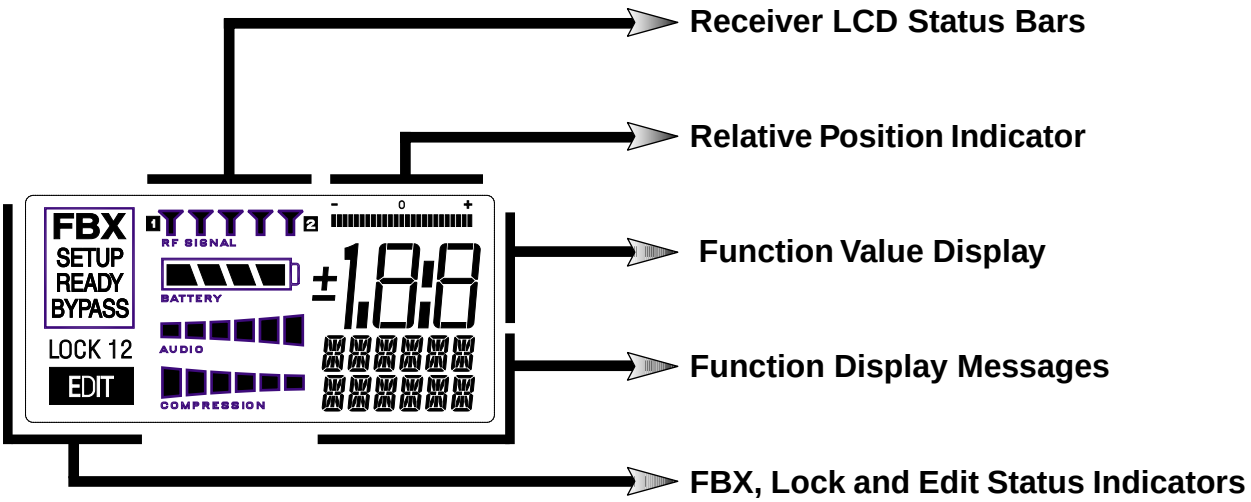
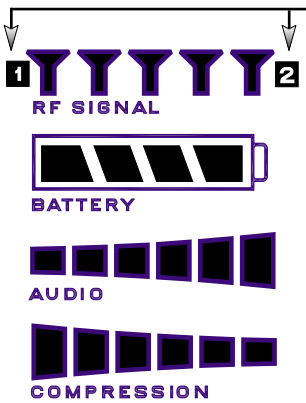


Fig. 5b: Receiver LCD Compete Display

Receiver LCD Status Bars



Diversity Status: Either 1 or 2 is lit, showing the active antenna.

RF Signal Strength Indicator: Indicates presence of RF (from transmitter, or external sources) on the chosen reception channel. The greater the number of illuminated icons, the stronger the RF signal detected.

Battery Voltage Level Meter: Indicates the battery voltage of the corresponding transmitter; the more segments are illuminated, the higher the voltage, and the greater the remaining battery life.

Audio Level Meter: Shows the audio input level (received audio signal).

Compression Meter: Shows the active gain reduction applied to the receiver channel's audio output.

Function Display Messages

Firmware Version: Displays for 2 seconds on power up; shows the receiver firmware version.

Transmitter Battery Low: You have 15 minutes or less to change transmitter batteries.

Mute: Transmitter muted; the transmitter on/off switch is set to mute.

Front Panel Locked: Front Panel is locked and the selected function cannot be edited. See Appendix D for an explanation of front panel locking.

De-Esser: The De-Esser is actively reducing sibilance.

FBX, Lock and Edit Status Indicators

FBX Status: SETUP is illuminated while the receiver is in SETUP MODE. READY is the normal operational mode, indicating SETUP has been performed and FBX filters are active. BYPASS indicates the audio signal is NOT going through FBX filters (but all other DSP processing is active).

Front Panel Lock Status: LOCK 1 indicates all front panel controls are locked to prevent intentional tampering, or accidental programming. LOCK 2 indicates a subset of controls are locked, allowing selected others to be adjusted with software only. Default LOCK 2 setting locks out all functions except FBX and Program Load.

Edit Status: In a 2-channel receiver, this field illuminates when the corresponding Channel Button is pushed, indicating Controls are assigned to this channel.

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5.2. Parameter Control & LCD Display

5.2.1. One set of Controls for 1 or 2 Channels

Whether you have a one- or two-channel SWM7000 series receiver is apparent by the number of LCD displays on the front panel. However, only one set of control knobs is provided for either one- or two-channel receivers. Note that in a 2-channel receiver, this set of controls is shared, and assigned to a channel by pushing either the A or B **Channel Select button** (see Section 5.2.2). Your SWM7000 Series receiver uses Sabine's Tweek-n-Peek™ digital control system. Whenever you turn a control knob one click, the associated function is shown on two lines of text display in the LCD. The large numeric display will indicate the current parameter value. Additional turns/clicks change the parameter setting and display the value as the change is made. After a few seconds of inactivity, the LCD will revert to its default display (RF channel).

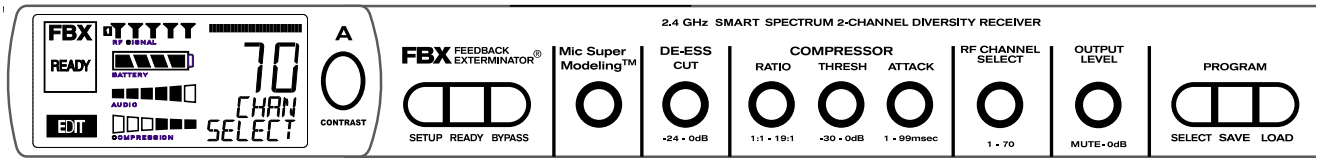

Fig. 5c Sabine Tweek-n-Peek

Sabine's Tweek-n-Peek™

Whenever you turn a control knob one click, the name of the corresponding function is shown and the current edit setting is displayed on the LCD. This applies for all the front panel knobs.

For example, if you turn the Compressor ratio knob one click, you will see the current compression ratio in the Settings Display. The Text display will show COMP on the first line and RATIO on the second. Subsequent turns will edit that setting up or down, depending on the direction you turn the knob.

Since the control knobs are continuous rotary encoders with no end points, the Relative Position Indicator (RPI) is a handy way of seeing where you are in relation to the full range of the knob in question. In our compressor Ratio example, if you are at a ratio of 9:1, about the middle of the range, the RPI will display about one half of the bar. NOTE: The setting range of each control is printed on the front panel below each knob.

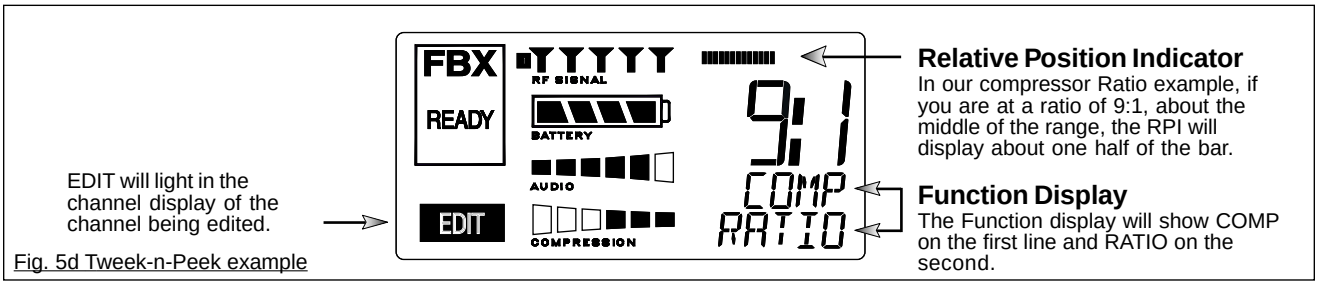

Fig. 5d Tweek-n-Peek example

5.2.2. Channel Select / Contrast Button.

The elliptical button immediately adjacent to the LCD has multiple functions. First, it adjusts the LCD contrast and viewing angle. Change the degree of angle by pressing and holding the button down. The adjustment range will cycle in a continuously reversing loop — when it gets to the maximum value it reverses and begins to decrease in value. You can stop holding the button down and initiate single button pushes to advance (or decrease) the contrast setting incrementally.

In addition, the Contrast/Channel Select button has another function, in 2-channel receivers only (SWM72-R or SWM72-NDR). Such units feature two LCDs and two Contrast/Channel Select buttons. A single (without continuing pressure) push assigns all Parameter Control knobs to the selected channel. The button will light, the associated LCD will brighten, and the word EDIT will appear in the lower left of the LCD, all indicating the active edit channel. For the active channel, turning any Parameter Control knob will first display (one click) and then adjust (subsequent turns) the settings of the function selected, indicating the changes in the Settings Display. For the inactive channel, turning any Parameter Control knob will display the current setting in that channel's Settings Display. **The channel must be activated in order to change settings.**

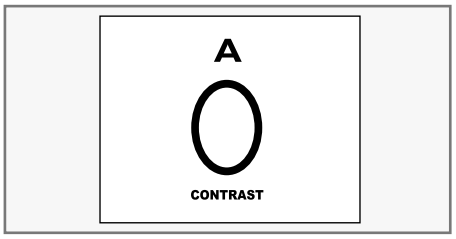

Fig. 5e: Contrast button:

Tap to select which channel to control

Hold to adjust contrast and viewing angle. Range of value is 1 - 30, 15 is default.

5.2.3. Special LCD Display Messages.

In addition to the Status and programmable information discussed above, the text lines of the LCD Settings Display may also (under certain circumstances) automatically override other displays. The conditions when this will occur and the messages displayed are shown on page 19.

5.3. RF Channel Select

Range = 1 to 70 Choose the RF channel for this system. The transmitter must have the same channel selected. Turn the **RF CHANNEL SELECT** knob until the desired channel is displayed on the LCD. See chart (Appendix E) for exact frequency of each channel.

NOTE: Dual channel receivers will not allow you to select the same RF channel for both channels.

NOTE: Front panel RF Signal display will only register Sabine transmitters. It will not show RF interference. Use the RF Scan function in the software to scan for potential RF interference (see Section 13.4.2.5).

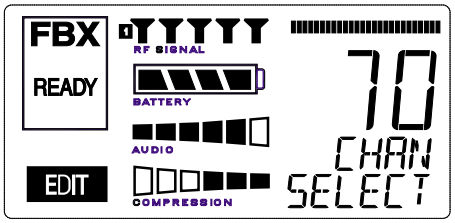

Fig. 5f

5.4. Output Level

Range = MUTE to 0 dB Adjust the output level to match the input characteristics of the downstream component. Each tick of the output level knob adjusts the level by ½ dB. The LCD displays this in 1 dB resolution, so it takes two ticks of the knob to change the output level value on the LCD.

The output level varies from microphone level to line level, so if you are patching the receiver to the mic level input of a mixer, turn down the level to avoid overdriving the mixer input. Minus 15 dB is a good place to start. If you are patching into a line level device, turn up the receiver output. For best results, follow the golden rule of gain structure: maximize gain at early stages in the signal path, to minimize noise that will be accumulated and amplified by adding late-stage gain.

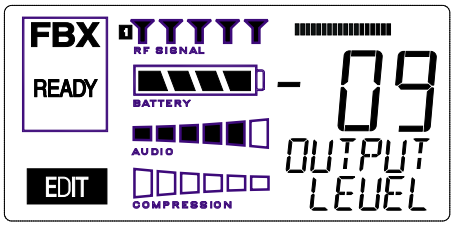

Fig. 5g

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5.5. Receiver Antenna Placement

One of the biggest potential problems in any wireless system is RF interference. Understanding wave interference patterns will help you to place and orient your receivers and antennas properly, and thereby reduce the likelihood of RF interference.

Your SWM7000 series receiver ships with two standard coaxial bipole antennas. Each antenna picks up in a donut-shaped (toroidal) pattern, more or less equally in all directions, with null points directly above and below.

5.5.1. Multi-path Interference

Like sound waves, radio waves are subject to wave interference patterns produced by reflected or delayed waves combining with direct, unreflected waves, converging upon a receiving antenna simultaneously. In the RF world this phenomenon is called **multi-path interference**. As with audio comb filtering, radio waves can combine additively or subtractively. Thus, mounting an antenna close to a reflective surface can result in poor reception. For example, if weaker than expected reception occurs, and the receptive part of the antenna (the top 3 cm) is close to a reflective surface (wall, large metal objects, etc.), you might improve reception simply by repositioning, or re-aiming, the antennas.

In some situations — for example, those with difficult lines-of-sight, or when transmitters and receivers are separated by a wall, or when receiver placement options are limited — an extension antenna may be necessary to guarantee reliable reception. Please refer to Section 12 for information about the advantages and use of Sabine's SWASS-EXT Extension Antenna Kit.

5.5.2. Receiver & Antenna Placement Tips

1. **When possible, maintain line of sight from transmitter to receiver.** Consider the potential range of transmitter "roaming," and locate your receiver accordingly. If direct line of sight proves impossible or difficult, consider using Sabine's low-profile, active Extension Antenna Kit (SWASS-EXT), which boosts the signal strength, extends the maximum distance from transmitter to receiver, expands and focuses antenna sensitivity, and allows antenna and receiver to be positioned further apart or in separate rooms.
2. **Decide on front or rear panel antenna mounting (to maintain line-of-sight path).** Antennas typically mount on the rear panel of your receiver, but the included accessory SWA700 front mounting kit can be screwed onto the front and connected via jumper to the back panel terminals. When mounting receivers in a rack that is deeper than the receiver, move the antennas to the front for improved reception. For any rack mounted receiver, try to keep the top 1.25 " (3 cm) of both antennas extended outside the sides of the rack (see Fig. 5h). Non-rack mounted receivers should be oriented so that the antennas face the transmitters.
3. **Maximize the distance between the receiver and light sources,** such as fluorescent bulbs or neon signs, which may emit very short-range, broadband interference. These light sources should not be a problem in normal circumstances, but, as a cautionary preventative, we recommend a minimum distance of 3 meters (10 feet) between them and any receivers or extension antennas.
4. **Note the placement of any microwave ovens in the immediate vicinity**. Place any receivers or extension antennas as far away as is practical from microwave ovens.
5. **Mount receiver antennas at 90 degrees to one another,** leaning away at 45 degree angles, in the same plane. This will decrease the likelihood that one antenna will be susceptible to the same orientation-specific directional or multi-path problems that may affect the other one.

6. **When using multiple receivers, try to maintain at least 1 foot (30 cm) distance between antennas from different units.** If you are rack-mounting multiple receivers, you may want to avoid spacing them in adjacent rack spaces, to maintain distance between antennas. When such antenna spacing proves difficult or impossible, we recommend using Sabine's Antenna Distribution Amplifier (Sabine SWA6SS), which can help manage antenna configurations and, more importantly, improve system-wide interference rejection. The SWA6SS works with up to six receivers.
7. In very rare instances, **poorly shielded or malfunctioning computers or digital effects units may cause RF interference.** You can test whether such units are the sources of such interference by switching them off one at a time, and determining if interference rejection improves.
8. **Turn on your system one component at a time, beginning with the first receiver.** If you don't have a computer handy, keep all other receivers and transmitters switched off for the time being.
9. **Use the RF Scan function included in the Remote Control Software.** This will give you a picture of the potential interference in your area, both real-time and over time. Please refer to Section 13.4.2.5. for information on Sabine Remote Control Software's Automatic RF Scan function, which will automatically determine the best RF channels to use.
10. **Maintain a minimum distance of at least 3 meters (10 feet) between transmitters and receivers or extension antennas.** This can solve many anomalies.
11. **Be careful not to set more than one transmitter to the same channel**; each paired transmitter and receiver should be set to unique corresponding channels, until all channels are receiving clearly and cleanly.
12. **Once the physical placement of your receiver(s) and antenna(s) is decided**, proceed with the remainder of the setup process.

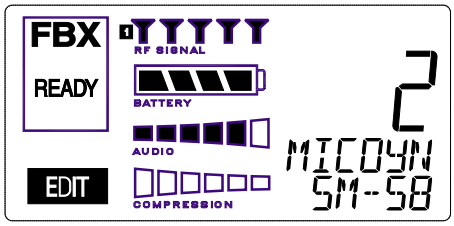

Fig. 6a

6. MIC SUPERMODELING™

6.1. Introduction

Microphones come in a dazzling variety of shapes, sizes, polar patterns, frequency response curves, phase response curves, etc. Few things arouse as much passion amongst audio engineers as discussions about what microphone to use in a given application. Sound rental companies and recording studios proudly tout their impressive microphone collections, and singers frequently favor a certain brand and model number as "perfect for my voice."

The only viable "please everyone" strategy is to stock a wide assortment of microphones. This is far easier for wired microphones than for wireless. Changing a wired microphone is as simple as disconnecting one mic and connecting an alternative — the same cable and same microphone stand allows easy interchangeability. At worst you might have to exchange microphone clips along with the microphones themselves.

For wireless microphones, however, the situation is not so simple. With different transmission frequencies, different proprietary designs, different types of connectors (microphone to belt pack transmitter), and the matched-set nature of transmitters and receivers, changing a microphone/transmitter is far more complex.

Sabine has a better idea — Sabine's proprietary Microphone SuperModeling™. With digital technology, it's possible to start with the sonic signature of a high quality microphone (such as Sabine's standard condenser and dynamic capsules used in our SWM7000 handheld series systems), and emulate the characteristics of other popular microphones—all at the twist of a knob. You won't have to change microphones, cables, connections, or receivers, interrupt a performance, or even get up from your mixing chair! Best of all, you will have an instant answer to a variety of demands from singers and speakers for their favorite microphone — even if they pass the microphone around.

6.2. Emulation Choices

Each Sabine SWM7000 receiver (SW72-NDR, SW71-NDR,SW72-R, SW71-R) comes equipped with 7 different SuperModel microphones available per channel. Four of these (Shure SM-58, Shure Beta 58, Audio Technica ATM 41A, and AKG D-3800)* are designed for use with either of Sabine's dynamic handheld microphone/transmitters (SW70-HD3 or SW70-HD5). The remaining three (Shure Beta 87A, AKG C535EB, and Audio Technica ATM 89R)* are designed for use with Sabine's condenser handheld microphone/transmitter (SW70-HC). In addition to these SuperModeling choices, you may prefer to use Sabine's high quality microphones "just the way they are;" i.e., without emulation.

Telemetry information sent by the handheld transmitter to the corresponding receiver (or receiver channel for a 2-channel unit) identifies the type of transmitter, and loads the appropriate emulation library. Note that beltpack transmitters also send telemetry that turns off the Super Model option, as this feature is designed to work only with handheld microphone/transmitters.

6.3. Mic Modeling Front Panel Control

Simply turn the parameter control labeled "Mic SuperModeling™" to scroll through and select the microphone you wish to emulate. The first click of the knob will show the current setting, without changing it; additional turns will change the emulation that is active. The top text line of the Settings Display will read either MICDYN (dynamic) or MICCON (condenser) depending on the telemetry information sent by the handheld; the bottom line will display the microphone being emulated. Note that one choice is to bypass modeling, and simply utilize the excellent quality of the Sabine microphone capsules. In this case the bottom text line will simply read OFF. Finally, whenever telemetry information indicates that a belt pack transmitter is the RF source, or if a handheld transmitter is replaced by a belt pack with the same receiver (or some such other unpredictable event transpires), the Settings Display will read MICMOD/OFF whenever the Mic Modeling knob is turned.

Sabine Mic SuperModeling™

SuperModeling™ Dynamic Models*:

- Shure SM-58
- Shure Beta-58A
- AKG D-3800
- Audio-Technica ATM 41a

SuperModeling™ Condenser Models*:

- Shure Beta 87A
- AKG C535 EB
- Audio-Technica ATM 89R

*****_Company names, product names, and trademarks listed as modeled 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._

There are no modeling settings for lavalier or headset microphones — mic placement makes these an unrealistic choice for modeling. NOTE: other lavalier microphones can be used with the Sabine Beltpack Transmitter.

NOTE

A very short crossfade of the audio signal occurs when switching between mic models. This ensures no digital artifacts will occur when you change the sound of the mic.

6.4. Future Microphone Modeling Choices

When Sabine adds to the library of "virtual microphones" that are modeled by the receiver DSP, these will be made available as a firmware upgrade from the Sabine web site, www.Sabine.com.

6.4.1. Mic Model Upgrade Instructions

New Mic SuperModeling™ "virtual microphones" can be downloaded easily using the remote control software on your PC. NOTE: The Mic SuperModeling Update Wizard **can be accessed only from the initial software startup menu** (prior to connecting to a receiver or entering Demo/Edit Mode). If you have already connected and attempt to access the Upgrade Wizard, the message box at right will appear (Fig. 6b):

Fig. 6b

To download new mic models:

1. With your PC connected to the Internet, pull down the Sabine Online menu in the software menu bar and select "Add New Mic Models."
2. Click the "Download Mic Models from Sabine" and follow the dialog box instructions.
3. The last dialog box will allow you to either connect to a receiver and update the mic models on that receiver, or cancel and complete the upgrade process at a later date. Note that this dialog box will show the actual file path of the new mic model file.

Fig 6c

Upgrading from a disk or previously downloaded files:

Mic SuperModeling™ files already downloaded can be flashed into your receiver using the second option "Load Mic Models from disk." Clicking this button opens a dialog box (default directory is your "Sabine" directory).

NOTE: File name will always be "micmodels.smm" **and will include all mic models available up to the date the file was downloaded.**

NOTE

Mic SuperModeling™ is not available using beltpack transmitters.

CHANGING AUDIX CAPSULES

Sabine's Mic SuperModeling™ function requires a baseline characteristic for the capsule in use. Therefore, after changing capsules, you will need to "tell" the transmitter which capsule is now attached.

NOTE: this is only necessary when the capsule is changed.

See **Appendix G** for instructions on how to reset your transmitter after changing Audix capsules

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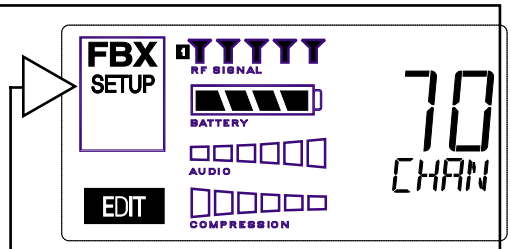


Fig. 7a

SETUP Indicator

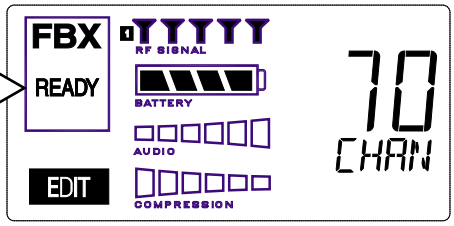


Fig. 7b: READY Indicator

NOTE: make sure READY is displayed before using your system for a performance.

FBX SETUP NOTE

LCD "READY" Flashing

As you get close to the end of the setup procedure, READY will begin to flash on the LCD. **Stop raising the gain!** The FBX will now go into Ready Mode.

7. FBX FEEDBACK EXTERMINATOR®

7.1. FBX Introduction

There are two types of FBX filters, 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.

7.1.1. FBX Fixed Filters

Fixed filters are set automatically during the FBX SETUP and will not change frequency until manually reset.

7.1.2. FBX Dynamic Filters

Dynamic FBX filters also set automatically, but can change frequency, on a rotating basis, as the need arises.

7.1.3. 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. The default setting of 7 Fixed and 3 Dynamic can be changed to 8 Fixed and 2 Dynamic using the DIP switches 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, 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.

7.1.4. 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 D 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.

7.2. FBX Set Up

Follow these easy steps to obtain the maximum gain and protection from feedback. Sabine FBX employs a very fast and quiet setup mode to make it easy to use.

1. Place the speakers in the positions where they will be used during the program.
2. If there is any equipment with a noise gate in the signal path, you MUST DISENGAGE the noise gate(s) prior to the setup procedure. You may reengage these noise gates upon conclusion of your FBX setup.
3. Patch your Sabine receiver into the mixer or amp channel. Set the amp master output gain to a normal operating position.

   NOTE: The level of your power amplifier should be set to a level that allows a healthy gain structure prior to the amplifier. If your amplifier is turned up

fully, and your mixer meters show little movement when signal passes through, then your amplifier will have to work harder to process the weak signal. You will improve the performance of your sound system and lower system noise by reducing the gain on your power amp and increasing your mixer gain. FBX response time will also be better with proper gain structure.

4. First, turn on your receiver and select a clear channel (no RF Signal bars showing). Then turn on your wireless transmitter or handheld microphone and select the same channel, Now turn on the mixer (gain low), then any other accessories, and finally the power amp. If you are using a graphic EQ, adjust only for the desired tonal qualities, but **do not notch for feedback!**
5. With the microphone turned on, raise the Output Level of the receiver slowly until a strong input signal at the mixer is apparent. The microphone should now be audible.
6. Now you are ready to set FBX filters. Press and hold SETUP (far left button) on the wireless receiver, until the word SETUP in the channel LCD flashes 4 times, then stops flashing. This will clear any FBX filters already in place. NOTE: You should do this each time you move your sound system, change a sound system component, or relocate your microphone. Your Sabine True Mobility Wireless System will remember its settings from the last time you turned the unit off.
7. During Setup mode, do not talk into the microphone or pass audio program through a transmitter. This may cause the Sabine True Mobility™ system to set inappropriate filters. The only appropriate use of the setup mode is to create and filter feedback. SETUP must be exited prior to normal microphone usage. This happens automatically after setting FBX filters, or you may exit manually by pressing READY at any time.
8. Identify the primary usage positions, and likely feedback-prone locations, in the potential movement range of the wireless microphone. Take the microphone to the first of these locations.

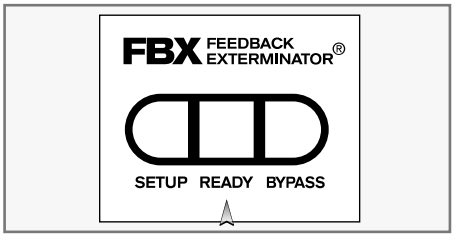


Fig. 7c: READY Button

Tech Tip

READY & Locked Fixed

READY = Lock Fixed on other Sabine FBX products

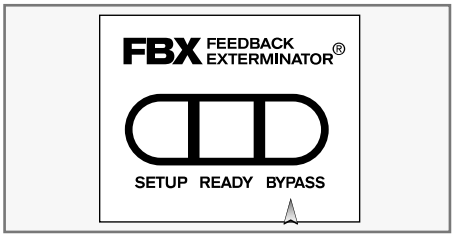


Fig. 7d:BYPASS Button

9. Slowly raise the mixer channel gain to the point of feedback — and then slowly beyond, until you hear the chirping tones of feedback quickly being eliminated by FBX filters setting. Stop raising gain after 2 or 3 feedback tones have chirped and corresponding FBX filters have set. Rest assured that any feedback that occurs will be at a quiet volume, and very short in duration.
10. Move the microphone to another area of use and slowly raise gain until FBX eliminates a few more feedback tones (2 or 3). Repeat this step until the word Setup automatically disappears and the word READY appears. This indicates your unit is ready for operation. The total number of filters available for feedback filtering is 10; in the factory default setting, your unit will automatically enter READY mode when the eighth filter is set. Alternatively, you may enter READY status with fewer fixed FBX filters in place, simply by pressing the READY button at any time. NOTE: Be sure that the word READY appears in the FBX section of your receiver LCD during performance or any normal operation.

    Any feedback that occurs after setup will be eliminated by dynamic filters, which remain in reserve to catch surprise feedback if it occurs during performance/operation.

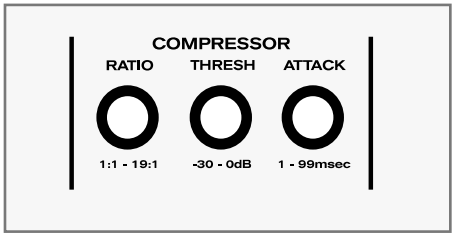
    In most instances you will experience an additional gain of 6-9 dB before feedback when using the Sabine True MobilityTM System. Precise results will depend on system and acoustical considerations.

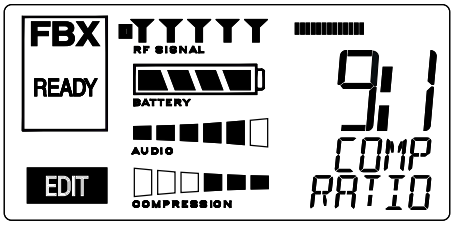
    All fixed filters in place will remain set until the Setup button is pushed and held as described in step 6. All dynamic filters will remain in place until new feedback occurs (when they will move to the new frequency), or until the Setup button is pushed and held. Your True Mobility receiver will remember its FBX (and all other) settings even if the power is turned off. See Section 14 for a complete discussion of Sabine FBX Feedback Exterminators®.

7.2. FBX Bypass Button

The Bypass button bypasses only the FBX Section, and not the additional signal processing (Parametric Filters, Hi/Lo Cut, De-essing and Compression) available in the Targeted Input Processing section of the Sabine True Mobility™ Wireless Receiver.

NOTE: You can easily bypass Compression signal processing by turning the Compressor Ratio knob counterclockwise until you get to 1:1 ratio, and the De-esser signal processing by turning the De-esser knob clockwise until you get to 0 cut.





8. COMPRESSOR/LIMITER OPERATION

8.1. Basics of Compression

The dynamic range (how loud we can hear to how quiet a sound we can detect) of the human ear is far greater than the capability of sound systems to reproduce. Although some of this equipment limitation is at the upper extreme of the dynamic range (where too loud a signal will produce distortion), much of the restriction occurs at the low level end, where the signal disappears below the “noise floor” of the circuitry.

A compressor (or in its most powerful form, a limiter) is the most widely used tool for controlling dynamic range. In the simplest terms, a compressor is designed to squeeze the dynamic range of an audio program; i.e., to make quiet signals louder, and loud signals quieter. A compressor becomes a limiter when the compression ratio (the ratio of the input gain change to the output gain change) is so high that the output level effectively won’t rise above a “brick wall” ceiling, regardless of how much the input gain increases (typically a ratio of 10:1 and greater).

A compressor acts like an “automatic mix engineer” with a hand on the fader and an inhumanly fast reaction time. When the input level increases, the “engineer” drops the fader; when the level decreases, the fader is raised. When the amount of fader compensation equals the variation in signal level, the output level of the audio program will sound consistent.

The practical benefits of compression and limiting include:

1. **Speaker protection.** A compressor will control sudden level peaks and prevent your speakers from damage. Most often in this type of application, the compression ratio is high enough to qualify as a limiter.
2. **Perceived increase in loudness.** Because compressed peak levels are kept from rising as high as uncompressed signals, you gain headroom for your audio program and can raise its overall average gain. Compression is often added to the entire audio mix, both in live sound and recording, to increase its perceived loudness.
3. **Achieving more consistent levels**. For expressive instruments or vocals, which may have a large dynamic range, compression can help maintain more consistent mix levels. So a speaker who varies from a whisper to a shout will not disappear or stand out in the mix, relative to other less dynamic instruments or vocals. Vocal level variations are also common when multiple users share a single microphone, due to differences in voice volumes and mic-to-mouth positions from one user to another. Compression will help even out such variations as well.

8.2. Using the Compressor

Compressor knobs are located immediately to the right of the FBX and De-Esser controls. The controls consist of standard Ratio, Thresh (threshold) and Attack knobs, and a horizontal gain ladder in the LED display shows compressor gain reduction.

Ratio: Compression ratio is the ratio of the input gain change to the output gain change. The compression ratio on your Sabine Wireless ranges from 1:1 to 19:1, in increments of 1 dB. Set Ratio to 1:1 to bypass Compressor.

Thresh: Compression threshold sets the input level at which the compressor/limiter begins to act on the signal. The input level threshold at which compression is engaged can be adjusted from -30 dBv to 0 dBv, in increments of 1 dBv.

Attack: Compressor attack time sets the speed with which signal compression begins once an input signal exceeds the threshold level. The range may be adjusted from 1 to 99 mS, in 1 mS increments.

Gain: (Output Level) Since the output gain is attenuated whenever the input gain exceeds the compression threshold, the overall output level of a compressed signal will be reduced. Commonly, this reduced output gain is compensated for by raising the level of the output signal (the term is “gain make-up”). Output Level range may be adjusted from mute (minus infinity) up to +20 dB, in increments of 1 dB (depending on input).

8.3. Suggested Compression Settings

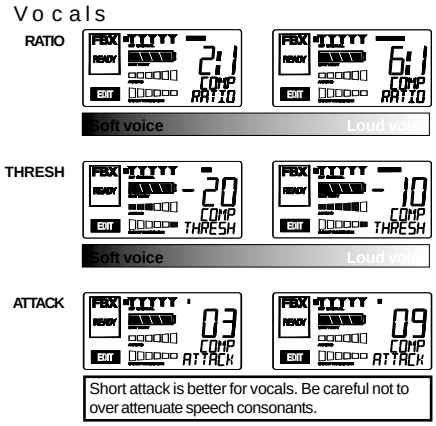
8.3.1. Vocal Settings

The renowned expressiveness of the human voice is due in large part to its dynamics. A vocal that varies from a whisper to a scream has a strong emotional impact, but those same dynamics present a challenge to the sound engineer. Ideal vocal compression maintains some dynamic range while keeping the vocal the focal point of the mix.

Ratio: A soft voice might require a ratio of 2:1, whereas a loud voice might require a ratio setting of 6:1.

Thresh: The higher the threshold setting, the more signal is required to initiate compression. Ideally this should be set to reign in peak levels, and allow signals of lower gain to pass uncompressed. Threshold settings will depend on the nature and variety of the signal source. Strong vocalists will require a different threshold than quiet speakers or singers.

Attack: Short attack times usually work well for voice. However, too strong a compression ratio, too low a threshold, and too fast an attack may attenuate speech consonants, which provide important intelligibility cues to the audience, thus compromising clarity.



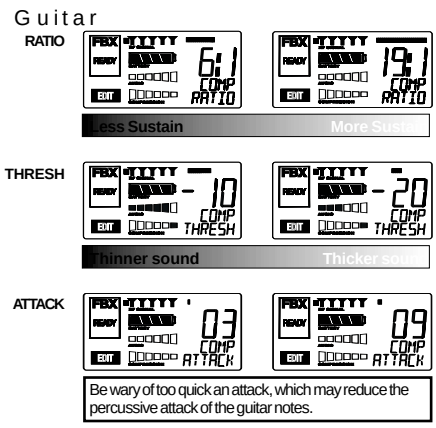
8.3.2. Guitar Settings

Ratio: A high compression ratio (with gain makeup) will add sustain to held notes and chords.

Thresh: Moving the threshold will change the audible thick/thinness of the guitar tone, but generally you want to compress all the notes played.

Attack: Be wary of too quick an attack, which may reduce the percussive attack of the guitar notes.

In general, be wary of too much gain makeup, and too high a compression ratio, which may make a noisy guitar amplifier more objectionable. Ratio settings might range from 6 to 20:1, threshold variable, slower attack, soft knee, output gain boosted slightly to significantly depending on amount of compression.



8.3.3. Bass Guitar Settings

Bass players use a variety of techniques, often in the same song, that can benefit from compression. Compressing bass evens out peaks and keeps the bass level in the mix.

Ratio: Set to 4:1

Thresh: Set to compress peaks only

Attack: Quick attack, medium release, hard knee (try various release settings, depending on the speed of notes played)

Gain: Output boosted slightly

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