### 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

## 8.4. Possible Compression Trouble Areas

Like any signal processing, compression can be misused, and improper application may cause undesirable side effects in the audio signal. Some of these problems include:

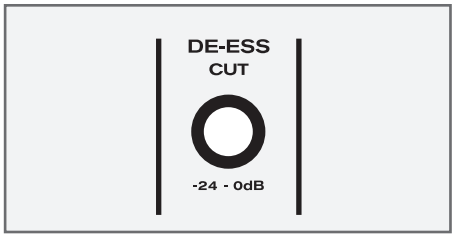
1. **Noise.** If the threshold for compression is set too low, and the output gain is raised substantially to make up for the gain loss of compression, the resulting output signal can be noisy. This is because the overall signal must be raised significantly to produce the same audible level, and the noise floor of your equipment will be amplified unnecessarily. This problem will be exaggerated if the input signal level to the compressor is very low (which will already degrade the signal-to-noise ratio).
2. **Breathing**. In situations where the compression ratio is high, the threshold is low, and the release time of the compressor is short, the noise floor will modulate up and down as the audio signal rises above and falls below the threshold.
3. **Over-compression**. Applying too much compression to a mix can sometimes result in such evened-out dynamics that the "life" of the music or speech has been removed or curtailed. Dynamic variation may be a major component of a performer's message and command of the audience; don't remove dynamics, just control them. This may be particularly true for percussive musical instruments such as drums.

## 8.5. Release & Knee Settings

Two other important compressor variables are ***release time*** and ***knee***. Release time adjusts the speed with which compression stops and output gain returns to unity with input gain, once the input signal falls below the compression threshold. Knee refers to the degree with which the full ratio of compression is imposed once the input level threshold is approached and exceeded. A "hard knee" changes from no compression to maximum compression exactly and immediately at the threshold crossing; a "soft knee" gradually imposes the full compression ratio as the input gain approaches and exceeds the threshold. In Sabine products, the "softness" of a knee can vary from 1-40, with the higher level representing the "softest" character. In such a setting, slight compression will begin well below the compression threshold, increase as the input gain crosses the threshold, and reach full compression well above the nominal threshold.

Values for release time and knee are set at the factory: default release time is 400 mSec, and the default knee setting is a "soft" setting of 20. These defaults can be temporarily changed or reprogrammed using the Sabine True Mobility™ Remote Software (see Section 13 for details).

# 9. DE-ESSER



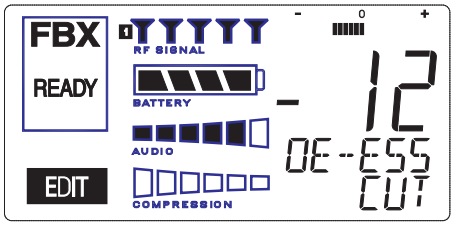




Fig. 9a: De-esser

## 9.1. De-mystifying De-essers

Certain consonant sounds produced by the human voice contain more energy than others, and have the potential to overload a microphone capsule. This can produce a disproportionately harsh result when amplified through a sound system, and/or recorded to analog or digital storage media. The most common and obvious of these sounds (in English and many languages) is the “ssss” sound, associated with pronunciation of both “s” and soft “c” consonants, also the consonants “t,” “f,” “x” and sometimes “d.” The technical term for this particular vocal sound is “sibilance,” and the devices that control such sounds are typically called “de-essers” (or sometimes sibilance controllers). The frequency range of sibilance will vary depending on the singer/speaker, the consonant involved, the orientation to the microphone, the microphone itself, and the normal variations in human vocalization. Cardioid- pattern condenser microphones are especially susceptible to sibilance problems, but the problem can also occur with other types and patterns of microphones. The range of frequencies affected by sibilance starts above 2 KHz, and generally tapers off above 10 KHz; in other words, sibilance is primarily a problem associated with higher frequencies (though not the upper octave of human hearing).

## 9.2. The Sabine De-Esser

The Sabine De-Esser is essentially a type of frequency-band compressor, active in the 2-10 KHz range, and inactive below 2KHz and above 10 KHz. Sabine’s algorithm works by dynamically comparing band-specific and associated harmonic energy levels to the total signal energy. When spikes are detected that correspond to sibilance, a shelving filter is imposed on the appropriate frequency bands, and remains in place only for the duration of the sibilance. High frequency energy levels that remain below the comparison threshold do not trigger de-essing, and lows and highs outside the sibilance range are also passed unprocessed and unaffected. This means the Sabine De-Esser is effective but transparent.

## 9.3. Using the De-esser

Using the Sabine De-Esser is simplicity itself. Turning the knob labeled “DE-ESS CUT” counter-clockwise will increase the amount of sibilance reduction, by increasing the maximum depth of the shelving filter. The maximum allowable cut is 24 dB.

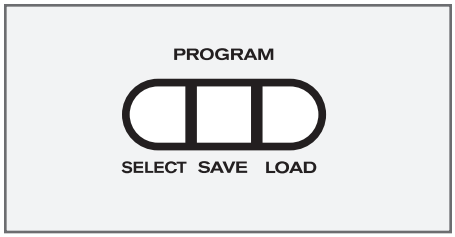



Fig. 10b

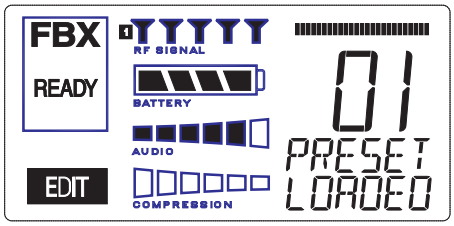



Fig. 10b

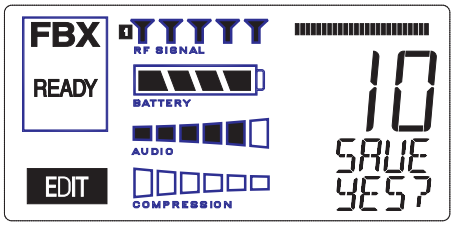



Fig. 10b: Program SAVE YES?

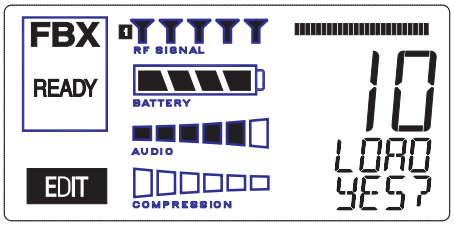



Fig. 10b: Program LOAD YES?

# 10 PROGRAM SAVE & RECALL

Most wireless microphone systems provide control of one or two settings (RF channel and maybe gain). With so little to remember, the ability to save and recall system settings has not been necessary. With the Sabine SWM7000 series, however, you get a very sophisticated processor with a variety of adjustable parameters. The ability to save and recall your carefully programmed setups can be a tremendous time-saver. Your SWM7000 allows you to store and recall up to 15 different presets.

## 10.1. Saving a Preset

To save a program, press the SELECT button. The next available location (numbered 00 - 15) will be shown in the LCD Display. If you want to replace an existing program, press SELECT until you reach that program's number. Then press the SAVE button. The function display will show "YES?". If you are ready to save, immediately press the SAVE button again, and your settings will be saved to that program number. The message SAVED will be shown for four seconds in the text display to confirm this action, as the LCD Display continues to show the number (00-09) of the preset. After four seconds, the LCD Display will revert to an indication of the RF channel.

## 10.2. Loading a Preset

Loading a program is just as easy. Press SELECT until you locate the program number you wish to load. Press LOAD. The function display will show "YES?". Immediately press the LOAD button again and your new program, including all the parameters, will be loaded for that channel. The message LOADED will appear in confirmation.

## 10.3. Naming a Preset

Presets, channels and receivers can be named using the Sabine True Mobility Remote Software. Refer to Section 14 for details.

# 11. MULTIPLE SYSTEMS OPERATION

## 11.1. Overview

In many circumstances a single wireless microphone system is all that will be in use at any one time. Larger applications (church, concert hall, theater stage, conference room, etc), however, can often require a large array of wireless microphones, all demanding flawless uninterrupted simultaneous operation.

Multiple system operation presents at least two important operational challenges: interference among transmission channels, and setup complexity. The Sabine SWM7000 provides powerful solutions to both, particularly the interference problems associated with two or more RF channels at work at the same time, at the same location.

### 11.1.1. Multiple System Interference

Sabine's SWM7000 addresses multiple system interference with two strategies. First, greater available bandwidth in the 2.4-2.4835 GHz range means more channels can occupy the band, i.e., the expanded range can be divided into a greater number of separate transmission/reception bands. Second, with Smart Spectrum transmission and reception, channels are more tolerant of interference. The net result is that the SWM7000 offers the potential for many more simultaneous transmission channels than conventional UHF or VHF systems.

While such performance benefits are one of the major advantages of the SWM7000, more systems working at the same time leads to a greater potential for complexity. Fortunately, the SWM7000 also offers tools to simplify setup and operation.

### 11.1.2. Setup Complexity

Multiple wireless systems in a large installation are of course more complicated than a single transmitter/receiver. More space is needed, and the sheer quantity of transmitters and receivers that may be in use at a single installation can prove difficult to manage. The SWM7000 series helps manage such potential complexity with four strategies and/or system accessories:

1. First, the SW72 and SW72-NDR receivers offer a 50% space-saving advantage with 2-channel receivers that occupy the same 1U space as single channel receivers. Each channel in a 2-channel system shares the true diversity operation of the two antennas connected to the single receiver chassis.
2. Second, the optional SWA6SS (six-system antenna distribution amplifier) greatly reduces the complexities of multiple receiver antenna deployment. Since each receiver has two (diversity) antennas, which can be mounted on either the rear or front panel, multiple receivers at one location can potentially create a forest of antennas protruding from the front or back of a rack. The SWA6SS Antenna Distributor reduces the number of antennas to as few as 1/6 what would otherwise be needed. An added important advantage of using the SWA6SS is its distributed signal boost provided to all the antenna outputs, delivered while maintaining diversity in all attached reception channels.

3. Third, large installations often entail long distances from transmitters to receivers, or the presence of obstacles (walls, for example) in the transmission path that can interfere with clear reception. While the SWM7000 series is designed to minimize these kinds of problems without accessories, the SWASS-EXT (set of two extension antennas, shown in figure 12b on next page) may prove helpful or even necessary in some situations. In addition to providing remote and/or desirable low profile positioning with improved reception, the SWASS-EXT also adds another 18 dB of antenna gain for even more reliable system performance. The Extension Antenna and Distribution Amplifier components are also designed to operate in tandem, with the Extension Antenna plugged directly into the amp, which can then feed (via cable) the antenna inputs of 6 receivers. A combination of 2-channel receivers (SW72-R or SW72-NDR), a set (2 pieces) of SWASS-EXT, and one SWA6SS, would reduce the antenna clutter of 12 transmission channels to a single pair of extension antennas. (See section 12 for more information about setup and use of the SWASS-EXT).
4. Fourth, software control for the ND series receivers allows up to 70 receiver channels to be controlled from a single computer. This quick and powerful control methodology means you can monitor and change transmission channels, mic modeling, compression and de-essing — in short, all front panel controls — from a remote laptop or desktop. In addition to simplifying multiple unit operation with remote front panel controls, the remote software provides additional features and functions not available from front panel control. (See Section 13 for more information about setup and use of the Remote Software).

### 11.1.2.1. SWA6SS Antenna Distribution Amplifier

Sabine's optional accessory SWA6SS Antenna Distribution Amplifier is ideal for simplifying antenna set up when multiple receivers are used, by using a single pair of antennas to replace pairs for up to 6 different receivers. Standard equipment packed with each Antenna Distributor includes an AC power cable, and 6 pairs of 1-meter long jumper cables (RG-58 AU foam core) for connecting the Antenna Distributor to receivers (2 cables provide true diversity reception to each receiver).

For best results, the Antenna Distribution Amplifier should be positioned close enough to the receivers to minimize cable runs. In most applications, you can use the standard Sabine 2.4 GHz antennas supplied with any of the receivers to connect to the terminals on the Antenna Distributor, and then connect (in matching pairs) the jumpers to all your receiver antenna connections (up to 6 receivers, 1 pair per receiver).

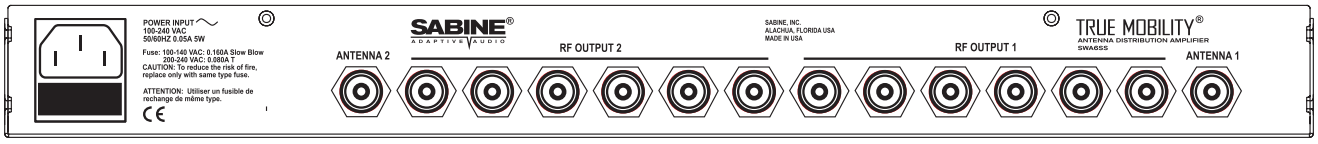



Fig. 12a SWA6SS Antanna Distributor

Care should be exercised when using longer cables, due to possible transmission signal loss (approximately 1.7 dB/meter). Using the "rule-of-thumb" that a signal loss no greater than 6 dB will prove acceptable in many circumstances, you may be able to use RG-58 cable up to 3 meters or so in length. However, a better strategy than moving the

Antenna Distributor to a better position, and risking excessive transmission loss back to the receivers or requiring an upgrade to more expensive cable, is to utilize a pair of Sabine Extension Antennas (SWASS-EXT Kit). These will connect to the antenna inputs of the Antenna Distributor, and offer increased range; better rear-source RF rejection; an expanded 180 degree forward sensitivity; flexible mounting options; and signal boost (see Section 12).

For more details regarding specifications and operation of the SWA6SS Antenna Distribution Amplifier, please refer to the operating guide included with that product.

**Mounting Receiver Antennas:** These should be mounted so they face the transmitters. For example, if the antennas are mounted on the rear of the receiver, then the back of the receiver should face the transmitters. Use the optional SWA700 Front-to-Rear antenna mounting kit to mount the antennas on the front of the receiver if necessary.

**Stacking Receivers:** Avoid stacking receivers with antennas mounted to each one. Antennas from various receivers in close proximity can increase the likelihood for interference. Mount your receivers with at least QQQ space between them, or use the SW6SS Antenna Distribution Amplifier to rout the signal from one pair of antennas to up to six receivers.

**Extension Antennas:** If the receivers must be mounted a so they cannot "see" the transmitters, then use the SWASS-EXT Extension Antennas (sold as a pair) in a position that allows a line of sight between transmitters and the antennas. The SWASS-EXT provide the following benefits:

- Wall mount or mic-stand mount
- Straight and right angle TNC connectors
- 1800 reception pattern
- +18 dB boost in RF
- Matched pairs
- Wood-tone finish
- Phantom-powered from either the receiver or the distribution amp

**Antenna Distribution:** For best results when using many receivers in one location use the SWA6SS Antenna Distribution Amplifier. The RF signal from one pair of antennas can be routed to up to 6 receivers, or 12 channels. This improves RF performance because the interaction from many receiver antennas is eliminated, and you get a much "cleaner" looking installation. Each SWA6SS comes with the cables to rout the signal from the distribution amp to the receivers. For best RF performance use the Extension Antennas with the distribution amp rather than the standard receiver antennas.


Fig. 12b SWASS-EXT Mic-stand mount and wall-mount extension antennas

## 12. EXTENSION ANTENNAS

Sabine's SWM7000 series receivers are designed for easy interface with Sabine's SWA-SSEXT Extension Antenna Kit (figure 12b). This triangular, attractive wood-grained unit is designed to mount easily and unobtrusively on a wall (allowing either a through-the-wall or out-the-bottom connection), or (by threading) atop a microphone stand for a more portable or temporary positioning. Each package contains 2 Extension Antennas, all necessary mounting hardware (screws and mic stand thread connectors), both right-angle and straight connectors for mating with RG-58 cable (for connections to a receiver or Antenna Distribution Amplifier), and an adapter to allow connection to thicker, less lossy cables such as RG-8 (which allow a greater cable run from antenna to receiver).

While an extension antenna affords the opportunity to increase the distance from transmitter to receiver, there is a loss of signal in the interconnecting cable that limits that distance. The maximum connection length is determined by the type of cable used, and the degree of signal attenuation acceptable.

**Coaxial Cable Attenuation Table**

| Cable Type | Belden # | Insulation | Center Conductor | 10 Meter Attenuation 900 MHz | 1.8 GHz | 2.4 GHz | Maximum Practical Distance Using SWASS-EXT (in meters) 900 MHz | 1.8 GHz | 2.4 GHz |
|---|---|---|---|---|---|---|---|---|---|
| RG58 | 9203 | Polyethelene | #20 Stranded | -10.00 | -14.35 | -16.29 | 22 | 15 | 14 |
| RG58/AU | 9311 | Foam Polyethelyne | #20 Stranded | -7.64 | -9.88 | -11.10 | 29 | 22 | 20 |
| RG212/U | 9861 | Polyethelene | #15.5 solid, silver plated | -3.83 | -5.34 | -6.11 | 57 | 41 | 36 |
| RG8/U | 9913 | semi-solid Polyethelyne | #10 solid | -1.40 | -2.00 | -2.50 | 157 | 110 | 88 |
| RG142 | 83242 | Teflon | #18 solid, silver plated | -4.10 | -5.72 | -6.54 | 54 | 38 | 34 |

Fig. 12c Coaxial Cable Attenuation Table

Let's presume that an acceptable degree of loss over the total cable run is 6 dB. Without external signal boosts, the different cables shown in the table would then allow maximum lengths ranging from less than 4 M (RG-58) to 24 M (RG8/U). Thus, for a passive extension antenna, your choices are to limit the cable run, or increase your budget and buy the more expensive, thicker cable.

Fortunately, Sabine's SWASS-EXT Active Extension Antenna offers a far better, more cost-effective solution, due to its built-in active 18 dB signal boost. In the case of low-cost RG-58 cable, adding an SWASS-EXT to your setup increases the acceptable maximum cable run by more than 4 times, to 14 meters. With RG-8 cable, the maximum length is extended to 88 meters!

Power for the Extension Antenna is delivered from any Sabine SWM7000 series receiver or SWA6SS Antenna Distribution Amplifier (see Section 11).

An additional advantage of using Sabine's SWASS-EXT Extension Antenna stems from its more focused, directional nature. Sabine receiver's coaxial dipole antennas (standard equipment that mount directly on the front or rear panels of the receiver or SWA6SS) are more omni-directional in nature. In contrast, the Sabine's Extension Antenna is

sensitive to RF reception in a 180-degree arc in front of its mounted position. It extends sensitivity to the front and off-axis side locations as it increases rear RF rejection.

The multiple functions (relocation of antenna, boost of signal, directional sensitivity) of Sabine's Extension Antenna mean there are many applications in which its addition to your system can greatly enhance performance. Here's a short list of such applications:

1. **Antenna repositioning.** Provides solutions when receiver placement options are limited or challenging. Sabine's Extension Antenna's multiple mounting options allow higher placement (wall mount or microphone stand mount).
2. **Barriers interrupting transmission.** Anytime a barrier interferes with transmission and reception, Sabine's SWA-SSEXT can be mounted on the transmitter side of the barrier with cable connections made on the receiver side. Perhaps the most common situation of this nature would arise when receiver and transmitter are located in separate rooms.
3. **Expanded or directional sensitivity required.** Sabine's Extension Antenna picks up in a 180-degree arc, focused towards the front. Reception in this arc is enhanced.
4. **Rear RF rejection required.** Because Sabine's Extension Antenna is less sensitive to signals received from the rear, it can be positioned to reject any such directional RF interference.
5. **Extended operational range.** Given a potential maximum cable length of almost 100 meters from Extension Antenna to receiver, Sabine's SWASS-EXT allows more options for extending the distance between transmitter and receiver. (It should be noted that the typical range of Sabine's SWM7000 series systems without the Extension Antenna is already 100 meters in typical circumstances). Consider that RF signal strength through the air is diminished by the square of the distance (twice as far away = ¼ the signal strength), while signal loss through cable is (roughly) inversely proportional (twice as far away = ½ the signal). That means you can use an extension antenna to replace transmission-through-air with transmission-through-cable, to help minimize signal loss.